APPLICATION FOR CERTIFICATION FOR THE INLAND EMPIRE ENERGY CENTER RIVERSIDE COUNTY, CALIFORNIA

VOLUME 2 – APPENDICES

Submitted to:

California Energy Commission
Sacramento, California

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August 2001

APPLICATION FOR CERTIFICATION FOR INLAND EMPIRE ENERGY CENTER

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APPENDIX A

FOUNDATION AND CIVIL ENGINEERING DESIGN CRITERIA

APPENDIX A CIVIL ENGINEERING DESIGN CRITERIA
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1.0 INTRODUCTION

This appendix summarizes the codes, standards, criteria and practices that will be generally used in the design and construction of civil engineering systems for the IEEC. More specific project information will be developed during execution of the IEEC to support detailed design, engineering, material procurement specification and construction specifications as required by the California Energy Commission (CEC).

2.0 CODES AND STANDARDS

The design of civil engineering systems for the IEEC will be in accordance with the laws and regulations of the federal government, the State of California, the county, the city and industry standards. The current issue or edition of the documents at the time of filing of this Application for Certification (AFC) will apply, unless otherwise noted. In cases where conflicts between the cited documents exist, requirements of the more conservative document will be used.

2.1 Civil Engineering Codes and Standards

The following codes and standards have been identified as applicable, in whole or in part, to civil engineering design and construction of power plants.

- American Association of State Highway and Transportation Officials (AASHTO) Standards and Specifications
- American Concrete Institute (ACI) - Standards and Recommended Practices
- American Institute of Steel Construction (AISC) - Standards and Specifications
- American National Standards Institute (ANSI) - Standards
- American Society of Testing and Materials (ASTM) - Standards, Specifications and Recommended Practices
- American Water Works association (AWWA) - Standards and Specifications
- American Welding Society (AWS) - Codes and Standards
- Asphalt Institute (AI) - Asphalt Handbook
- California Building Code (CBC), 1998
- California Department of Transportation, Standards and Specifications
- California Energy Commission - Recommended Seismic Design Criteria for Non-Nuclear Generating Facilities in California, 1989
- Concrete Reinforcing Steel Institute (CRSI) - Standards
- Factory Mutual (FM) - Standards
- National Fire Protection Association (NFPA) - Standards
- Steel Structures Painting Council (SSPC) - Standards and Specifications

2.2 Engineering Geology Codes, Standards and Certifications

Engineering geology activities will conform to the applicable federal, state and local laws, regulations, ordinances and industry codes and standards.

2.2.1 Federal

None are applicable.

2.2.2 State

The Warren-Alquist Act, PRC, Section 25000 et seq. and the CEC Code of Regulations (CCR), Siting Regulations, Title 20 CCR, Chapter 2, require that AFC address the geologic and seismic aspects of the project.

The California Environmental Quality Act (CEQA), PRC 21000 et seq. and the CEQA Guidelines require that potentially significant effects, including geologic hazards, be identified and a determination made as to whether they can be substantially reduced.

2.2.3 County

California State Planning Law, Government Code Section 65302, requires each county to adopt a general plan, consisting of nine mandatory elements, to guide its physical development. Section 65302(f) requires that a seismic safety element be included in the general plan.

The IEEC development activities will require certification by a Professional Geotechnical Engineer and a Professional Engineering Geologist during and following construction, in accordance with the 1998 California Building Code (CBC), Appendix 33. The Professional Geotechnical Engineer and the Professional Engineering Geologist will certify the placement of earthen fills and the adequacy of the site for structural improvements, as follows:

- Both the Professional Geotechnical Engineer and the Professional Engineer will address CBC Appendix 33, Sections 3309 (Grading Permit Requirements), 3312 (Cuts), 3315 (Drainage and Terracing, 3316 (Erosion Control), and 3318 (Completion of Work).
- The Professional Geotechnical Engineer will also address CBC Appendix 33, Sections 3314 (Setbacks).

Additionally, the Professional Engineering Geologist will present findings and conclusions pursuant to PRC, Section 25523 (a) and (c); and 20 CCR, Section 1752 (b) and (c).

APPENDIX B

STRUCTURAL ENGINEERING DESIGN CRITERIA

APPENDIX B STRUCTURAL ENGINEERING DESIGN CRITERIA
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1.0 INTRODUCTION

This appendix summarizes the codes, standards, criteria and practices that will be generally used in the design and construction of structural engineering systems for the IEEC. More specific project information will be developed during execution of the IEEC to support detailed design, engineering, material procurement specification and construction specifications.

2.0 CODES AND STANDARDS

The design of structural engineering systems for the IEEC will be in accordance with the laws and regulations of the federal government, the State of California, Riverside County ordinances, and the industry standards. The current issue or edition of the documents at the time of filing of this Application for Certification (AFC) will apply, unless otherwise noted. In cases where conflicts between the cited documents exist, requirements of the more conservative document will be used.

The following codes and standards have been identified as applicable, in whole or in part, to structural engineering design and construction of power plants:

- California Building Code (CBC), 1998 Edition.
- American Institute of Steel Construction (AISC):
  a. Manual of Steel Construction - 9th Edition
  b. Specification for the Design, Fabrication and Erection of Structural Steel for Buildings - ASD
  c. Specification for Structural Joints Using ASTM A325 or A490 Bolts
  d. Code of Standard Practice for Steel Buildings and Bridges
- American Concrete Institute (ACI):
  a. ACI 318 - 99, Building Code Requirements for Structural Concrete
  b. ACI 301 - 99, Specifications for Structural Concrete for Buildings
  c. ACI 350R – 89, Environmental Engineering Concrete Structures
  c. ACI 543R - 00, Design, Manufacture, and Installation of Concrete Piles
- American Society of Civil Engineers (ASCE):
  a. ASCE 7-98 - Minimum Design Loads for Buildings and Other Structures
- American Welding Society (AWS):
  a. D1.1 - Structural Welding Code - Steel
  b. D1.3 - Structural Welding Code - Sheet Steel

- Code of Federal Regulations, Title 29 - Labor, Chapter XVII, Occupational Safety and Health Administration (OSHA).
  a. Part 1910 - Occupational Safety and Health Standards
  b. Part 1926 - Construction Safety and Health Regulations
- National Association of Architectural Metal Manufacturer (NAAMM) - Metal Bar Grating Manual.
- Hoist Manufacturers Institute (HMI), Standard Specifications for Electric Wire Rope Hoists (HMI 100).
- National Electric Safety Code (NESC), C2-1993.
- National Fire Protection Association (NFPA Standards).
  a. NFPA 850 Fire Protection for Electric Generating Plants.
- OSHA Williams-Steiger Occupational Safety and Health Act of 1970.
- Steel Deck Institute (SDI) - Design Manual for Floor Decks and Roof Decks.
- Design of Large Steam Turbine-Generator Foundations, ASCE 1987.

2.1 CEC Special Requirements

Prior to the start of any increment of construction, the proposed lateral force procedures for IEEC structures and the applicable designs, plans and drawings for IEEC structures will be submitted for approval.

Proposed lateral-force procedures, designs, plans, and drawings shall be those for:

- Major IEEC structures
- Major foundations, equipment supports, and anchorage
- Large, field-fabricated tanks
- Turbine/generator pedestal; and
- Switchyard structures

3.0 STRUCTURAL DESIGN CRITERIA

3.1 Datum

Site topographic elevations will be based on an elevation survey conducted using known elevation benchmarks.

3.2 Frost Penetration

The site is located in an area free of frost penetration. Bottom elevation of all foundations for structures and equipment, however, will be maintained at a minimum of 12 inches below the finished grade.

3.3 Temperatures

The design basis temperatures for Civil and structural engineering systems will be as follows:

- Maximum 110° F
- Minimum 20° F

3.4 Design Loads

3.4.1 General

Design loads for structures and foundations will comply with all applicable building code requirements.

3.4.2 Dead Loads

Dead loads will consist of the weights of the structure and all equipment of a permanent or semi-permanent nature including tanks, bins, wall panels, partitions, roofing, drains, piping, cable trays, bus ducts, and the contents of tanks and bins measured at full operating capacity. The contents of the tanks and bins, however, will not be considered as effective in resisting structure uplift due to wind forces; but will be considered as effective for seismic forces.

3.4.3 Live Loads

Live loads will consist of uniform floor live loads and equipment live loads. Uniform live loads are assumed equivalent unit loads that are considered sufficient to provide for movable and transitory loads, such as the weights of people, portable equipment and tools, small equipment or parts, which may be moved over or placed on the floors during maintenance operations, and planking. The uniform live loads will not be applied to floor areas that will be permanently occupied by equipment.

Lateral earth pressures, hydrostatic pressures, and wheel loads from trucks will be considered as live loads.

Uniform live loads will be in accordance with ASCE Standard 7, but will not be less than the following:

a. Roofs 20 psf
b. Floors and Platforms (Steel grating and checkered plates) 100 psf

In addition, a uniform load of 50 psf will be used to account for piping and cable trays, except that where the piping and cable loads exceed 50 psf, the actual loads will be used.

Furthermore, a concentrated load of 5 kips will be applied concurrently to the supporting beams of the floors to maximize stresses in the members, but the reactions from the concentrated loads will not be carried to the columns.

c. Floors (Elevated Concrete floors) 100 psf

In addition, elevated concrete slabs will be designed to support an alternate concentrated load of 2 kips in lieu of the uniform loads, whichever governs. The concentrated load will be treated as uniformly distributed load acting over an area of 2.5 square feet, and will be located in a manner to produce the maximum stress conditions in the slabs.

d. Control Room Floor 150 psf

e. Stairs, Landings and, Walkways 100 psf

In addition, a concentrated load of 2 kips will be applied concurrently to the supporting beams for the walkways to maximize the stresses in the members, but the reactions from the concentrated loads will not be carried to the columns.

f. Pipe Racks 100 psf

Where the piping and cable tray loads exceed the design uniform load, the actual loads will be used. In addition, a concentrated load of 15 kips will be applied concurrently to the supporting beams for the walkways to maximize the stresses in the members, but the reactions from the concentrated loads will not be carried to the columns.

g. Hand Railings

Hand railings will be designed for either an uniform horizontal force of 50 plf applied simultaneously with a 100 plf uniform vertical live load, or a 200-pound concentrated load applied at any point and in any direction, whichever governs.

h. Slabs on Grade 250 psf

i. Truck Loading Surcharge Adjacent to Structures 500 psf during normal operation and 1,000 psf during construction

j. Truck Support Structures AASHTO-HS-20-44

k. Special Loading Conditions Actual loadings

Laydown loads from equipment components during maintenance and floor areas where trucks, forklifts, or other transports will have access will be considered in the design live loads.

Live loads may be reduced in accordance with the provisions of CBC Section 1607.

Posting of the floor load capacity signs for all roofs, elevated floors, platforms and walkways will be in compliance with the OSHA Occupational Safety and Health Standard, Walking and Working Surfaces, Subpart D. Floor load capacity for slabs on grade will not be posted.

3.4.4 Earth Pressures

Earth pressures will be in accordance with the recommendations contained in the IEEC geotechnical report.

3.4.5 Groundwater Pressures

Hydrostatic pressures due to groundwater or temporary water loads will be considered.

3.4.6 Wind Loads

The wind forces will be calculated in accordance with CBC 1998, Chapter 16A, Division III, with a basic wind speed of 80 mph and a "C" exposure category.

3.4.7 Seismic Loads

Structures will be designed and constructed to resist the effects of earthquake loads as determined in CBC 1998, Chapter 16A, Division IV. The site is located on seismic zone 4. The occupancy category of the structure is 3 (Special Occupancy Structure) and corresponding importance factor (I) is 1.00. Other seismic parameters will be obtained from the geotechnical report.

3.4.8 Snow Loads

Snow loads will not be considered.

3.4.9 Turbine-Generator Loads

The combustion turbine-generators and the steam-turbine generators loads for pedestal and foundation design will be furnished by the equipment manufacturers, and will be applied in accordance with the equipment manufacturers' specifications, criteria and recommendations.

3.4.10 Special Considerations for Steel Stacks

Steel stacks will be designed to withstand the normal and abnormal operating conditions in combination with wind loads and seismic loads, and will include the along-wind and across-wind effects on the stacks. The design will meet the requirements of ASME/ANSI STS-1-1986, "Steel Stacks," using allowable stress design method, except that increased allowable stress for wind loads, as permitted by AISC, will not be used.

3.4.11 Special Considerations for Structures and Loads During Construction

For temporary structures, or permanent structures left temporarily incomplete to facilitate equipment installations, or temporary loads imposed on permanent structures during construction, the allowable stresses may be increased by 33 percent.

Structural backfill may be placed against walls, retaining walls, and similar structures when the concrete strength attains 80 percent of the design compressive strength (f'c), as determined by sample cylinder tests. Restrictions on structural backfill, if any, will be shown on the engineering design drawings.

Design restrictions imposed on construction shoring removal that are different from normal practices recommended by the ACI Codes will be shown on engineering design drawings.

Metal decking used as forms for elevated concrete slabs will be evaluated to adequately support the weight of concrete plus a uniform construction load of 50 psf, without increase in allowable stresses.

4.0 DESIGN BASES

4.1 General

Reinforced concrete structures will be designed by the strength design method, in accordance with ACI 318, "Building Code Requirements for Structural Concrete."

Steel structures will be designed by the working stress method, in accordance with AISC Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.

Allowable soil bearing pressures for foundation design will be in accordance with the "Final Subsurface Investigation and Foundation Report" for the IEEC.

Reinforced concrete for sumps, cooling tower basins, and other structures designed to contain water will meet the requirements of ACI 350.

4.2 Factors of Safety

The factor of safety for all structures, tanks, and equipment supports will be as follows:

- Against Overturning 1.50
- Against Sliding 1.50 for Wind Loads
  1.10 for Seismic Loads
- Against Uplift Due to Wind 1.50
- Against Buoyancy 1.25

4.3 Allowable Stresses

Calculated stresses from the governing loading combinations for structures and equipment supports will not exceed the allowable limits permitted by the applicable codes, standards and specifications.

4.4 Load Factors and Load Combinations

For reinforced concrete structures and equipment supports, using the strength method, the strength design equations will be determined based on CBC 1998, Sections 1612.2, 1612.4, 1909.2 and using ACI-318-99 Eqs (9-2), (9-3). The Allowable Stress Design load combinations of CBC 1998 section 1612.3 will be used to assess soil bearing pressure and stability of structures per CBC 1998 Sections 1805 and 1629.1, respectively.

Steel framed structures will be designed in accordance with CBC 1998, Chapter 22, Divisions I, III and IV and the AISC Specification for the Structural Steel Buildings, Allowable Stress Design and Plastic Design, June 1, 1989. Connections will conform to Research Council on Structural Connections of the Engineering Foundation Specification for Structural Joints. Connections for moment frame structures will conform to the recommendations of FEMA Report 350 for seismic connections.

5.0 CONSTRUCTION MATERIALS

5.1 Concrete and Grout

The design compressive strength (f'c) of concrete and grout, as measured at 28 days, will be as follows:

- Electrical ductbank encasement and lean concrete backfill (Class L-1) 2000 psi
- Structural concrete (Class S-1) 3000 psi
- Structural concrete (Class S-2) 4000 psi
- Grout (Class G-1) 5000 psi

The classes of concrete and grout to be used will be shown on engineering design drawings or indicated in design specifications.

5.2 Reinforcing Steel

Reinforcing steel bars for concrete will be deformed bars of billet steel, conforming to ASTM A 615, Grade 60.

Welded wire fabric for concrete will conform to ASTM A 185.

5.3 Structural and Miscellaneous Steel

Structural and miscellaneous steel will generally conform to ASTM A 36, ASTM A 572 or ASTM A992 except in special situations where higher strength steel is required.

High strength structural bolts, including nuts and washers, will conform to ASTM A 325 or ASTM A 490.

Bolts other than high strength structural bolts will conform to ASTM 307, Grade A.

5.4 Concrete Masonry

Concrete masonry units will be hollow, normal weight, non-load bearing Type I conforming to ASTM C 129.

Mortar will conform to ASTM C 270, Type M.

Grout will conform to ASTM C 476.

5.5 Other Materials

Other materials for construction, such as anchor bolts, shear connectors, concrete expansion anchors, embedded metal, etc., will conform to industry standards and will be identified on engineering design drawings or specifications.

APPENDIX C

MECHANICAL ENGINEERING DESIGN CRITERIA

APPENDIX C MECHANICAL ENGINEERING DESIGN CRITERIA
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1.0 INTRODUCTION

This appendix summarizes the codes, standards, criteria and practices that will be generally used in the design and construction of mechanical engineering systems for IEEC. More specific project information will be developed prior to construction of the IEEC to support detailed design, engineering, material procurement specification and construction specifications as required by the California Energy Commission.

2.0 CODES AND STANDARDS

The design of the mechanical systems and components will be in accordance with the laws and regulations of the federal government, State of California, and industry standards. The current issue or revision of the documents, at the time of the filing of this AFC will apply, unless otherwise noted. If there are conflicts between the cited documents, the more conservative requirements shall apply.

The following codes and standards are applicable to the mechanical aspects of the IEEC.

- California Building Code
- Uniform Mechanical Code
- Uniform Plumbing Code
- ASME Boiler and Pressure Vessel Code
- ASME/ANSI 1331.1 Power Piping Code
- ASME Performance Test Codes
- ASME Standard TDP-1
- ANSI B16.5, B16.34, and B133.8
- American Boiler Manufacturers Association (ABMA)
- American Gear Manufacturers Association (AFMA)
- Air Moving and Conditioning Association (AMCA)
- American Petroleum Institute (API) - except for electrical requirements
- American Society for Testing and Materials (ASTM)
- American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE)
- American Welding Society (AWS)
- Cooling Tower Institute (CTI)
- Heat Exchange Institute (HEI)
- Manufacturing Standardization Society (MSS) of the Valve and Fitting Industry
- National Fire Protection Association (NFPA)

3.0 MECHANICAL ENGINEERING GENERAL DESIGN CRITERIA

3.1 General

The systems, equipment, materials, and their installation that will be designed in accordance with the applicable codes; industry standards; and local, state, and federal regulations, as well as the design criteria; manufacturing processes and procedures; and material selection, testing, welding, and finishing procedures specified in this section.

Detailed equipment design will be performed by the equipment vendors in accordance with the performance and general design requirements specified by Calpine. Equipment vendors will be responsible for using construction materials suited for the intended use.

Asbestos will not be used in the materials and equipment supplied. Flanges manufactured in the People's Republic of China will be prohibited from use on any mechanical equipment. Where feasible, materials will be selected to withstand the design operating conditions, including expected ambient conditions, for the design life of the plant. It is anticipated that some materials will require replacement during the life of the plant due to corrosion, erosion, etc.

3.2 Pumps

Pumps will be sized in accordance with industry standards. Where feasible, pumps will be sized for maximum efficiency at the normal operating point. Pumps will be designed to be free from excessive vibration throughout the operating range.

3.3 Tanks

Large outdoor storage tanks will not be insulated.

Overflow connections and lines will be provided. Maintenance drain connections will be provided for complete tank drainage.

Manholes, where provided, will be at least 18 in. in diameter and hinged to facilitate removal. Storage tanks will have ladders and cleanout doors as required to facilitate access/maintenance. Provisions will be included for proper tank ventilation during internal maintenance.

3.4 Heat Exchangers

The surface condenser will be designed in accordance with Heat Exchanger Institute (HEI) standards. Other heat exchangers will be provided as components of mechanical equipment packages and may be shell-and-tube or plate type. Heat exchangers will be designed in accordance with Tubular Exchanger Manufacturers Association (TEMA) or manufacturer's standards. Fouling factors will be specified in accordance with TEMA.

3.5 Pressure Vessels

Pressure vessels will include the following features/ appurtenances:

- Process, vent, and drain connections for startup, operation, and maintenance
- Materials compatible with the fluid being handled
- A minimum of one manhole and one air ventilation opening (e.g., handhole) where required for maintenance or cleaning access
- For vessels requiring insulation, shop-installed insulation clips spaced not greater than 18 in. on center
- Relief valves in accordance with the applicable codes

3.6 Piping and Piping Supports

Stainless steel pipe may be Schedule 5S or 10S where design pressure permits. Underground piping may be high-density polyethylene (HDPE) or polyvinyl chloride (PVC) where permitted by code, operating conditions, and fluid properties. In general, water system piping will be HDPE or PVC where embedded or underground and carbon steel where above ground.

Piping systems containing steam will be of welded construction. Threaded joints will not be used in piping used for steam, lubricating oil, and CTG natural gas service. Natural gas piping components will not use synthetic lubricants. Victaulic, or equal, couplings will be used for low energy aboveground piping, where feasible.

Piping systems will have high point vents and low point drams. Drains with restricting orifices or steam traps with startup and blowdown drains and strainers/crud traps will be installed in low points of steam lines where condensate can collect during normal operation.

Steam piping systems and steam drain lines in the plant will be sloped in the direction of steam flow. Condensate collection in piping systems will be avoided by installing automatic drain devices and manual devices as appropriate.

Steam lines fitted with restricting devices, such as orifices in the process runs, will include adequate drainage upstream of the device to prevent water from collecting in lines.

Hose and process tubing connections to portable components and systems will be compatible with the respective equipment suppliers' standard connections for each service. Stainless steel piping will be used for the lubricating oil systems.

3.7 Valves

3.7.1 General Requirements

Valves will be arranged for convenient operation from floor level where possible and, if required, will have extension spindles, chain operators, or gearing. Hand-actuated valves will be operable by one person.

Valves will be arranged to close when the handwheel is rotated in a clockwise direction when looking at the handwheel from the operating position. The direction of rotation to close the valve will be dearly marked on the face of each handwheel.

The stops that limit the travel of each valve in the open or closed position will be arranged on the exterior of the valve body. Valves will be fitted with an indicator to show whether they are open or closed; however, only critical valves will be remotely monitored for position.

Valve materials will be suitable for operation at the maximum working pressure and temperature of the piping to which they are connected. Steel valves will have cast or forged steel spindles. Seats and faces will be of low friction, wear-resistant materials. Valves in throttling service will be selected with design characteristics and of materials that will resist erosion of the valve seats when the valves are operated partly closed.

Valves operating at less than atmospheric pressure will include means to prevent air in-leakage. No provision will be made to repack valve glands under pressure.

3.7.2 Drain and Vent Valves and Traps

Drains and vents in 900 pound class or higher piping and 500°F or higher service will be double valved.

Drain traps will include air cock and easing mechanism. Internal parts will be constructed from corrosion-resistant materials and will be renewable.

Trap bodies and covers will be cast or forged steel and will be suitable for operating at the maximum working pressure and temperature of the piping to which they are connected. Traps will be piped to drain collection tank or sumps and returned to the cycle if convenient.

3.7.3 Low Pressure Water Valves

LP water valves will be the butterfly type of cast iron construction. Cast iron valves will have cast iron bodies, covers, gates (discs), and bridges; the spindles, seats, and faces will be bronze. Fire protection valves will be UL-approved butterfly valves meeting NFPA requirements.

3.7.4 Instrument Air Valves

Instrument air valves will be the ball type of bronze construction, with valve face and seat of approved wear-resistant alloy.

3.7.5 Nonreturn Valves

Nonreturn valves for steam service will be in accordance with ANSI standards and properly drained. Nonreturn valves in vertical positions will have bypass and drain valves. Bodies will have removable access covers to enable the internal parts to be examined or renewed without removing the valve from the pipeline.

3.7.6 Motor-Actuated Valves

Motor-actuated valves will be fitted with both hand and motor operating gear. The hand and motor actuation mechanisms will be interlocked so that the hand mechanism is disconnected before the motor is started.

Motor actuators will include torque switches to stop the motor automatically when the valve gate has reached the "full open" or "full closed" position.

The motor actuator will be placed in a position relative to the valve that prevents leakage of liquid, steam, or corrosive gas from valve joints onto the motor or control equipment.

3.7.7 Safety and Relief Valves

Safety valves and/or relief valves will be provided as required by code for pressure vessels, heaters, and boilers. Safety and relief valves will be installed vertically. Piping systems that can be over-pressurized by a higher-pressure source will also be protected by pressure relief valves. Equipment or parts of equipment that can be over-pressurized by thermal expansion of the contained liquid will have thermal relief valves. HRSG safety valves will be flanged.

3.7.8 Instrument Root Valves

Instrument root valves will be specified for operation at the working pressure and temperature of the piping to which they are connected. Test points and sample lines in systems that are 600 pound class or higher service will be double valved.

3.8 Heating, Ventilating, and Air Conditioning

HVAC system design will be based on site ambient conditions.

Except for the HVAC systems serving the control room and administration areas, the systems will not be designed to provide comfort levels for extended human occupancy.

Air conditioning will include both heating and cooling of the inlet filtered air. Air velocities in ducts and from louvers and grills will be low enough not to cause unacceptable noise levels in areas where personnel are normally located.

Fans and motors will be mounted on anti-vibration bases to isolate the units from the building structure. Exposed fan outlets and inlets will be fitted with guards. Wire guards will be specified for belt-driven fans and arranged to enclose the pulleys and belts.

Air filters will be housed in a manner that facilitates removal. The filter frames will be specified to pass the air being handled through the filter without leakage.

Ductwork, filter frames, and fan casings will be constructed of mild steel sheets stiffened with mild steel flanges and galvanized. Ductwork will be the sectional bolted type and will be adequately supported. Duct joints will be leaktight.

Grills and louvers will be of adjustable metal construction.

3.9 Thermal Insulation and Cladding

Parts of IEEC requiring insulation to reduce heat loss or afford personnel safety will be thermally insulated. Minimum insulation thickness for hot surfaces near personnel will be designed to limit the outside lagging surface temperature to a maximum of 140°F, based on 80°F ambient temperature and 1 mph/hr air velocity. Other insulation minimums will be designed to limit the heat loss to approximately 80 Btu/hr-ft^2 based on an 80°F ambient condition and an air velocity of 20 mph/hr.

The thermal insulation will have as its main constituent calcium silicate, foam glass, fiberglass, or mineral wool, and will consist of pre-formed slabs or blankets, where feasible.

Asbestos materials will be prohibited. An aluminum jacket or suitable coating will be provided on the outside surface of the insulation. Where a hard-setting compound is used as an outer coating, it will be nonabsorbent and noncracking. Thermal insulation will be chemically inert even when saturated with water. Insulation system materials, including jacketing, will have a flame spread rating of 25 or less when tested in accordance with ASTM E 84.

Insulation at valves, pipe joints, steam traps, or other points to which access may be required for maintenance will be specified to be removable with a minimum of disturbance to the pipe insulation. At each flanged joint, the molded material will terminate on the pipe at a distance from the flange equal to the overall length of the flange bolts to permit their removal without damaging the molded insulation. Steam trap stations will be "boxed" for ease of trap maintenance and freeze protection.

Above ground insulated piping will be clad with pebbled or corrugated aluminum of not less than 30 mil thickness and frame reinforced. At the joints, the sheets will be sufficiently overlapped and corrugated to prevent moisture from penetrating the insulation.

Design temperature limits for thermal insulation will be based on system operating temperature during normal operation.

Outdoor and underground insulation, if required, will be moisture resistant.

3.10 Testing

Hydrostatic testing, including pressure testing at 1.5 times the design pressure, will be specified and performed for pressure boundary components where an in-service test is not feasible or permitted by code.

3.11 Welding

Welders and welding procedures will be certified in accordance with the requirements of the applicable codes and standards before performing any welding. Calpine will maintain indexed records of welder qualifications and weld procedures.

3.12 Painting

Except as otherwise specified, equipment will receive the respective manufacturer's standard shop finish. Finish colors will be selected from among the paint manufacturer's standard colors.

Finish painting of uninsulated piping will be limited to that required by OSHA for safety or for protection from the elements.

Piping to be insulated will not be painted.

3.13 Lubrication

The types of lubrication specified for IEEC equipment will be suited to the operating conditions and will comply with the recommendation of the equipment manufacturers.

The initial startup charge of flushing oil win be provided by the equipment manufacturer and will be the manufacturer's standard lubricant for the intended service. Subsequently, such flushing oil will be sampled and analyzed to determine whether it can also be used for normal operation or must be replaced in accordance with the equipment supplier's recommendations.

Rotating equipment will be splash lubricated, force lubricated, or self-lubricated. Oil cups will be provided as necessary. Where automatic lubricators are fitted to equipment, provision for emergency hand lubrication will also be specified. Where applicable, equipment will be designed to be manually lubricated while in operation without the removal of protective guards. Lubrication filling and drain points will be readily accessible.

APPENDIX D

CONTROL SYSTEMS ENGINEERING DESIGN CRITERIA

APPENDIX D CONTROL SYSTEMS ENGINEERING DESIGN CRITERIA
CONTENTS

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1.0 INTRODUCTION

This appendix summarizes the codes, standards, criteria and practices that will be generally used in the design and installation for instrumentation and controls for the IEEC. More specific project information will be developed prior to construction of IEEC to support detailed design, engineering, material procurement specification and construction specifications as required by the California Energy Commission.

2.0 CODES AND STANDARDS

The design specification of all work will be in accordance with the laws and regulations of the federal government, State of California, and industry standards. A summary of general codes and industry standards applicable to design and construction follows.

- American National Standards Institute (ANSI)
- American Society of Mechanical Engineers (ASME)
- The Institute of Electrical and Electronics Engineers (IEEE)
- Instrument Society of America (ISA)
- National Electrical Manufacturers Association (NEMA)
- National Electrical Safety Code (NESC)
- National Fire Protection Association (NFPA)
- American Society for Testing and Materials (ASRM)

3.0 CONTROL SYSTEMS DESIGN CRITERIA

3.1 General Requirements

Pneumatic signal levels, where used, will be 3-15 psig for pneumatic transmitter outputs, controller outputs, electric-to-pneumatic converter outputs, and valve positioner inputs.

The primary sensor full-scale signal level, other than thermocouples, will be between 10 mV and 125 V.

3.2 Pressure Instruments

In general, pressure instruments will have linear scales with units of measurement in pounds per square inch gauge.

Pressure gauges will have either a blowout disk or a blowout back and an acrylic or shatterproof glass face.

Pressure gauges on process piping will be resistant to plant atmospheres.

Siphons will be installed on pressure gauges in steam service as required by the system design. Steam pressure sensing transmitters or gauges mounted above the steam line will be protected by a loop seal.

Pressure test points will have isolation valves and caps or plugs. Pressure devices on pulsating services will have pulsation dampers.

3.3 Temperature Instruments

In general, temperature instruments will have scales with temperature units in degrees Fahrenheit. Exceptions to this are electrical machinery RTDs and transformer winding temperatures, which are in degrees Celsius.

Dial thermometers will have 4½- or 5-inch-in-diameter (minimum), dials and white faces with black scale markings and will be every-angle type and bimetal actuated. Dial thermometers will be resistant to plant atmospheres.

Temperature elements and dial thermometers will be protected by thermowells except when measuring gas or air temperatures at atmospheric pressure. Temperature test points will have thermowells and caps or plugs.

RTDs will be 100 ohm platinum or 10 ohm copper, ungrounded, three-wire circuits (R_{100}/R_0-1.385). The element will be spring-loaded, mounted in a thermowell, and connected to a cast iron head assembly.

Thermocouples will be single-element, grounded, spring-loaded, Chromel-Constantan (ANSI Type E) for general service. Thermocouple heads will be the cast type with an internal grounding screw.

3.4 Level Instruments

Reflex-glass or magnetic level gauges will be used. Level gauges for high-pressure service will have suitable personnel protection.

Gauge glasses used in conjunction with level instruments will cover a range that is covered by the instrument. Level gauges will be selected so that the normal vessel level is approximately at gauge center.

A single remote water level indicating system will be provided for each HRSG drum.

3.5 Flow Instruments

Flow transmitters will be the differential pressure type with the range matching the primary element. In general, linear scales and charts will be used for flow indication and recording.

The flow element for feedwater flow to each HRSG will be laboratory calibrated venturi flow nozzles.

In general, feedwater flow meters will be temperature compensated when the water temperature is greater than approximately 250°F, critical steam flow meters will be temperature and/or pressure compensated, and airflow measurements will be temperature compensated.

3.6 Control Valves

Control valves in throttling service will generally be the globe-body cage type with body materials, pressure rating, and valve trims suitable for the service involved. Other style valve bodies (e.g., butterfly, eccentric disk) may also be used when suitable for the intended service.

Valves will be designed to fail in a safe position.

Control valve body size will not be more than two sizes smaller than line size, unless the smaller size is specifically reviewed for stresses in the piping.

Control valves in 600 class service and below will be flanged where economical. Where flanged valves are used, minimum flange rating will be ANSI 300 Class.

Critical service valves will be defined as ANSI 900 Class and higher valves in sizes larger than 2 inches.

Severe service valves will be defined as valves requiring anticavitation trim, low noise trim, or flashing service, with differential pressures greater than 100 psid.

In general, control valves will be specified for a noise level no greater than 90 dBA when measured 3 feet downstream and 3 feet away from the pipe surface.

Valve actuators will use positioners and the highest pressure, smallest size actuator, and will be the pneumatic-spring diaphragm or piston type. Actuators will be sized to shut off against at least 110 percent of the maximum shutoff pressure and designed to function with instrument air pressure ranging from 60 to 125 psig.

Handwheels will be furnished only on those valves that can be manually set and controlled during system operation (to maintain plant operation) and do not have manual bypasses.

Control valve accessories, excluding controllers, will be mounted on the valve actuator unless severe vibration is expected.

Solenoid valves supplied with the control valves will have Class H coils. The coil enclosure will normally be a minimum of NEMA 4 but will be suitable for the area of installation. Terminations will typically be by pigtail wires.

Valve position switches (with input to the DCS for display) will be provided for MOVs and open/dose pneumatic valves. Automatic combined recirculation flow control and check valves

(provided by the pump manufacturer) will be used for pump minimum-flow recirculation control. These valves will be the modulating type.

3.7 Instrument Tubing and Installation

Tubing used to connect instruments to the process line will be ⅜- or ½-inch-outsidediameter copper or stainless steel as necessary for the process conditions.

Instrument tubing fittings will be the compression type. One manufacturer will be selected for use and will be standardized as much as practical throughout the plant.

Differential pressure (flow) instruments will be fitted with three-valve manifolds; two-valve manifolds will be specified for other instruments as appropriate.

Instrument installation will be designed to correctly sense the process variable. Taps on process lines will be located so that sensing lines do not trap air in liquid service or liquid in gas service. Taps on process lines will be fitted with a shutoff (root or gauge valve) close to the process line. Root and gauge valves will be main-line class valves.

Instrument tubing will be supported in both horizontal and vertical runs as necessary. Expansion loops will be provided in tubing runs subject to high temperatures. The instrument tubing support design will allow for movement of the main process line.

3.8 Pressure and Temperature Switches

Field-mounted pressure and temperature switches will have either NEMA Type 4 housings or housings suitable for the environment.

In general, switches will be applied such that the actuation point is within the center one-third of the instrument range.

3.9 Field-Mounted Instruments

Field-mounted instruments will be of a design suitable for the area in which they are located. They will be mounted in areas accessible for maintenance and relatively free of vibration and will not block walkways or prevent maintenance of other equipment. Freeze protection will be provided.

Field-mounted instruments will be grouped on racks. Supports for individual instruments will be prefabricated, off-the-shelf, 2-inch pipestand. Instrument racks and individual supports will be mounted to concrete floors, to platforms, or on support steel in locations not subject to excessive vibration.

Individual field instrument sensing lines will be sloped or pitched in such a manner and be of such length, routing, and configuration that signal response is not adversely affected.

Local control loops will generally use a locally mounted indicating controller (pressure, temperature, flow, etc.).

Liquid level controllers will generally be the nonindicating, displacement type with external cages.

3.10 Instrument Air

Branch headers will have a shutoff valve at the takeoff from the main header. The branch headers will be sized for the air usage of the instruments served, but will be no smaller than ⅜-inch. Each instrument air user will have a shutoff valve and filter at the instrument.

APPENDIX E

ELECTRICAL ENGINEERING DESIGN CRITERIA

APPENDIX E ELECTRICAL ENGINEERING DESIGN CRITERIA
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1.0 INTRODUCTION

This appendix summarizes the codes, standards, criteria, and practices that will be generally used in the design and construction of electrical engineering systems for the IEEC. More specific project information will be developed prior to construction of IEEC to support detailed design, engineering, material procurement, and construction specifications as required by the California Energy Commission.

2.0 CODES AND STANDARDS

The design of the electrical systems and components will be in accordance with the laws and regulations of the federal government, State of California, and industry standards. The current issue or revision of the documents at the time of the filing of this AFC will apply, unless otherwise noted. If there are conflicts between the cited documents, the more conservative requirement shall apply.

The following codes and standards are applicable to the electrical aspects of the IEEC.

- American National Standards Institute (ANSI)
- American Society for Testing and Materials (ASTM)
- Anti-Friction Bearing Manufacturers Association (AFBMA)
- Insulated Cable Engineers Association (ICEA)
- Institute of Electrical and Electronics Engineers (IEEE)
- Illuminating Engineering Society (IES)
- National Electrical Code (NEC)
- National Electrical Manufacturers Association (NEMA)
- National Electrical Safety Code (NESC)
- National Fire Protection Association (NFPA)
- Underwriters Laboratories, Inc. (UL)

3.0 SWITCHYARD AND TRANSFORMERS

3.1 Switchyard

The switchyard will be air-insulated. The switchyard will consist of circuit breakers for the transformers and lines to the grid, with disconnect switches on each side of the breakers. Each line will be equipped with the appropriate instrument transformers for protection and metering. Instrument transformers will also be used for generator synchronizing. Surge arresters will be provided for the outgoing lines in the area of the takeoff towers.

The circuit breakers may be of either the dead or live tank design with two bushing current transformers on each bushing. Disconnect switches shall be vertical. Switches will be located

on each side of the breakers to isolate the breaker, and one switch will be located at each line termination or transformer connection for isolation of the lines or transformer for maintenance. Instrument transformers (current and capacitive voltage transformers) will be included for protection. Separate instrument transformers will be used for metering.

Aluminum alloy tubular bus will be used. Cable connections between the tube bus and equipment will be ACSR cable. Tube and cables will meet all electrical and mechanical design requirements.

The switchyard design will meet the requirements of the National Electrical Safety Code - ANSI C2.

A grounding grid will be provided to control step and touch potentials in accordance with IEEE Standard 80, Safety in Substation Grounding. All equipment, structures and fencing will be connected to the grounding grid of buried conductors and ground rods, as required. The substation ground grid will be tied to the plant ground grid.

Lightning protection will be provided by shield wires and/or lightning masts. The lightning protection system will be designed in accordance with IEEE 998 guidelines.

AR faults shall be detected, isolated, and cleared in a safe and coordinated manner as soon as practical to insure the safety of Equipment, Personnel and the Public. Protective relaying will meet IEEE requirements and will be coordinated with the utilities requirements.

Each bus will be provided with a redundant high impedance differential relay system. Each outgoing line will be provided with redundant high-speed relay systems with transfer trip capability. Transmission lines will have primary and backup microprocessor based distance relays with communication capability to the remote substation. Relay equipment for the remote ends is not included.

Each circuit breaker will be provided with independent breaker failure relay protection schemes. Breaker failure protection will be accomplished by fault detector relays and fin-Ling relays for each breaker. Each high voltage breaker will have 2 redundant trip coils.

Interface with the utility supervisory control and data acquisition (SCADA) system will be provided. Interface will be at the interface terminal box and RTU. Communication between the IEEC switchyard and SCE's Valley substation, at the other end of the overhead transmission lines, will be included. Remote Terminal Units (RTUS) will allow interface and remote control of the switchyard.

Revenue metering will be provided on the 500 kV outgoing lines recording net power to or from the switchyard (bidirectional). Meters and the metering panel will be provided.

3.2 Transformers

Each generator will be connected to the 500 kV switchyard through a separate main 18 kV to 500 kV step-up transformer. The step-up transformers will be designed in accordance with ANSI standards C57.12.00, C57.12.90, and C57.116. The main transformers will be two-winding, delta-wye, OA/FA/FA. The neutral point of the HV winding will be solidly rounded. Each main step-up transformer will have metal oxide surge arrestors adjacent to the HV terminals and will have manual de-energized ("no-load") tap changers located in the HV wings.

IEEC facility power will be supplied through unit auxiliary transformers connected upstream of the combustion turbine circuit breakers. Two-winding, delta-wye 18 kV to 4.16 kV transformers will be provided.

APPENDIX F

MAJOR MECHANICAL EQUIPMENT

Major Mechanical Equipment List

Equipment	Qty	Size/Capacity	Service/Remarks
Combustion turbine generators (CTG's), each with a dedicated heat recovery steam generator (HRSG)	2	234 MVA	HRSG's include duct firing, SCR and oxidation catalysts.
Steam turbine generator (STG)	1	398 MVA	Steam turbine bypass system allows both CTG/HRSG trains to operate at base load with the steam turbine out-of-service.
HRSG boiler feedwater pumps	2	100 percent per HRSG	
Condensate pumps	3	50 percent capacity	
Condenser	1	100 percent capacity	Condenser must be in operation for combined cycle operation or operation of CTG in steam turbine bypass mode. The condenser will be provided with split water boxes to allow on-line tube cleaning and repair.
Circulating water pumps	2	50 percent capacity	
Cooling tower	1	100 percent capacity	Cooling tower is multi-cell mechanical draft design. Basin will be divided to allow a portion to be isolated for cleaning.
Auxiliary cooling water pump	1	100 percent capacity	Primary source of circulating water for auxiliary cooling will be from main circulating water pumps.
Closed loop cooling water pumps	2	100 percent capacity	
Closed cycle cooling water heat exchangers	2	100 percent capacity	
Demineralized water system, including microfiltration, reverse osmosis, and ion exchange demineralizers	3	50 percent capacity trains	Redundant installed pumps will be provided.

APPENDIX G

GEOTECHNICAL ENGINEERING INVESTIGATION

REPORT

PRELIMINARY GEOTECHNICAL INVESTIGATION CALPINE MORENO POWER PLANT RIVERSIDE COUNTY, CALIFORNIA

Prepared for

Calpine Corporation
6700 Koll Center Parkway, Suite 200
Pleasanton, CA 94566

URS Project No. 58-00011071.01-SI001

December 15, 2000

URS

1615 Murray Canyon Road, Suite 1000
San Diego, CA 92108-4314
619-294-9400 Fax: 619-293-7920

URS

December 15, 2000

Mr. Ralph Hallenbacher
Calpine Corporation
6700 Koll Center Parkway, Suite 200
Pleasanton, CA 94566

Subject: Preliminary Geotechnical Investigation
Moreno Power Plant
Riverside County, California
URS Project No. 58-00011071.01-SI001

Dear Mr. Hallenbacher:

URS Corporation (URS) is pleased to provide the accompanying report which presents the results of our preliminary geotechnical investigation for the subject project. This study was performed in accordance with our proposal dated October 10, 2000.

This report presents our conclusions and recommendations pertaining to the geotechnical aspects of the project, as well as the results of our field explorations and laboratory testing. We recommend that URS perform a review of the proposed plans and specifications for the project when they become available. URS can provide additional or revised recommendations at that time, if necessary.

If you have any questions, or if we can be of further service, please give us a call.

Very truly yours,

URS CORPORATION

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Senior Project Engineer

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Appendix A	Borings and Test Pits
Appendix B	Cone Penetrometer Test Soundings
Appendix B	Shear Wave Velocity Profile
Appendix C	Laboratory Testing

This report presents the results of URS Corporation's (URS) preliminary geotechnical investigation for the proposed Moreno Power Plant. This report has been prepared for Calpine Corporation and their consultants to assist in project planning and preliminary design.

1.1 PROJECT DESCRIPTION

The proposed project consists of construction of a gas burning power plant on a 45-acre parcel of farmland located in west-central Riverside County, approximately ¼ mile south of the unincorporated community of Romoland, California (Figure 1). The site is situated about 1.2 miles east Interstate 215, south of Pinacate Road (Highway 74), east of Antelope Road, west of San Jacinto Road, and north of McLaughlin Road (Figure 2).

Planned construction will likely consist of reinforced concrete and steel framed structures and cooling water ponds. Structural loads are expected to be from light to heavy.

1.2 PURPOSE AND SCOPE OF INVESTIGATION

The purpose of this investigation was to provide preliminary geotechnical recommendations for the planning and design of the proposed facility. The scope of our investigation included a review of available site information including published geologic information, field explorations, laboratory testing, engineering analyses and evaluations, and preparation of this report. This report presents discussions, conclusions, and preliminary recommendations regarding:

- Geologic setting of the site
- Potential geologic hazards
- Subsurface conditions
- 1997 UBC Seismic design criteria
- Presence and effect of collapsible and expansive soil
- Groundwater conditions
- Earthwork and grading
- Foundation types
- Allowable soil bearing pressures and friction values
- Estimated settlements
- Temporary construction slopes
- Lateral earth pressures for retaining walls
- Concrete slabs-on-grade
- Site surface and wall backfill drainage
- Corrosivity, resistivity, and water soluble sulfate/chloride content of on-site soils
- Rigid and flexible pavements

A subsurface investigation consisting of geophysical surveys, cone penetrometer tests (CPTs), soil borings and backhoe test pits was performed between October 18 and October 25, 2000.

2.1 BORINGS AND TEST PITS

The data collected has been used to characterize the subsurface conditions at the site. The investigation was performed under the technical supervision of an engineering geologist from our office. The borings and test pits were logged and the soil encountered was classified in general accordance with the Unified Soil Classification System.

Nine borings were advanced to depths ranging from about 20 feet to 100 feet below the existing ground surface. Nine test pits were excavated to depths ranging from 5 feet to 10 feet below the existing ground surface. The locations of the borings and test pits are shown on the Site Plan (Figure 2).

The borings were advanced using a Mobile B-61 drill rig equipped with a mud rotary system. Soil encountered within the borings were sampled at approximate intervals of 5 feet and subsequently returned to our laboratory for testing. Relatively undisturbed samples were obtained with a modified California sampler. Near-surface, disturbed bulk samples were also obtained from the test pits and collected in buckets or bags for further testing. Nuclear density and moisture tests were performed at various depths in the test pits in accordance with ASTM 2922.

The field explorations are discussed further in Appendix A. A Key to Boring Logs and Test Pits is presented in Appendix A as Figure A-1. Logs of the borings and test pits are presented as Figures A-2 through A-19. Field density tests are shown at the corresponding depth on the test pit logs. The descriptions on the logs are based on field observations, sample inspection, and laboratory test results.

2.2 CPT SOUNDINGS

Several CPT soundings were attempted on October 18, 2000. The CPT soundings consisted of a hydraulic ram pushing an electronic piezocone using hollow steel rods. The piezocone was instrumented to record data including tip resistance, sleeve friction, and pore pressure. The CPT provides a continuous record of these parameters, which are correlated to soil strength and other in-situ physical parameters.

Due to dense and hard soil conditions, the CPT was not able to advance beyond a depth of approximately 3 to 5 feet. The CPT data, including tip resistance, sleeve friction, and stratigraphic interpretations are presented in Appendix C.

2.3 SHEAR WAVE VELOCITY PROFILE

A shear wave velocity (V_s) profile to a depth of approximately 130 feet below the project site was performed by GEOVision Geophysical Services, Inc. on September 12, 2000. The geophysical survey technique used was the Seismic Analysis of Surface Waves (SASW) method. The SASW method consists of measuring surface wave phase data in the field, generating a

dispersion curve, and using iterative modeling to back-calculate the variation of shear wave velocities (V_s) with depth. A shear wave velocity profile for the site is presented as Figure 3. SASW results are typically considered accurate within ±10 percent (Brown, Diehl, and Nibor, 2000). SASW procedures and results are discussed further in Appendix C.

2.4 CPT SOUNDINGS

Several CPT soundings were attempted on October 18, 2000. The CPT soundings consisted of a hydraulic ram pushing an electronic piezocone using hollow steel rods. The piezocone was instrumented to record data including tip resistance, sleeve friction, and pore pressure. The CPT provides a continuous record of these parameters, which are correlated to soil strength and other in-situ physical parameters.

Due to dense and hard soil conditions, the CPT was not able to advance beyond a depth of approximately 3 to 5 feet. The CPT data, including tip resistance, sleeve friction, and stratigraphic interpretations are presented in Appendix C.

2.5 LABORATORY TESTING

Soil samples from the borings and test pits were returned to our geotechnical laboratory for further examination and testing. Laboratory testing was undertaken of the soil samples to confirm the field classifications and to evaluate their physical and mechanical characteristics. Representative samples were selected for moisture content, dry density, grain-size analyses, laboratory compaction, direct shear, R-value, expansion index, pH, corrosivity, resistivity, soluble chloride and soluble sulfate tests. Testing was performed in general accordance with ASTM standards. Results of the laboratory tests are shown at the corresponding sample locations on the boring and test pit logs (Appendix A) and in Appendix D.

Our knowledge of the site conditions has been developed from a review of the area geology and seismicity, field reconnaissance, and the field and laboratory programs undertaken for this investigation.

3.1 GEOLOGIC SETTING

The project lies within the Perris Valley located in the central part of the Perris block of the northern Peninsular Ranges of southern California. The Perris block is a stable structural block bounded on the west by the Elsinore fault zone and on the east by the San Jacinto fault zone (Figure 4). Perris Valley is a broad alluvial plain interrupted locally by topographic highs underlain by crystalline bedrock. The Lakeview Mountains lie to the northwest of the site and a bedrock knob called Double Butte lies to the east. South of the site, and east of Sun City, lies an unnamed knob of granitic rock. These outcrops are composed of granitic rock varying in composition from granodiorite to tonalite, with lesser gabbro, and gabbroic to dioritic dikes.

The site is located on an alluvial surface built up by sediments shed off the adjacent highlands. The site is located approximately 3 miles southwest of the Lakeview Mountains and 2.5 miles west of the Double Butte. A geologic map of the Romoland 7.5-minute quadrangle is provided to show a more detailed view of the surrounding geology (Figure 5).

3.2 SEISMIC SETTING

The site lies in the Perris Valley between the San Jacinto and the Elsinore fault zones as shown on Figure 4 and the regional fault and epicenter map, Figure 6. The San Jacinto and Elsinore faults are the closest active faults to the site located at distances of 10 and 11 miles from the site, respectively. Both faults have been zoned as active Earthquake Fault Hazard Zones under the State of California's Alquist-Priolo Act. The San Jacinto and Elsinore faults are described in more detail below.

San Jacinto Fault

The San Jacinto fault has been an important source of moderate to large earthquakes in southern California and has been more active than the San Andreas relative to historical seismicity. The San Jacinto fault is divided into 7 segments ranging in length from 22 to 90 kilometers (km). The San Jacinto Valley segment lies to the northeast of the site. It is approximately 42 km in length with a recurrence interval of 83 years and capable of a magnitude M_w 6.9 event (CDMG, 1998). The Working Group on California Earthquake Probabilities (WGCEP, 1995) has assessed the rupture probability for the San Jacinto Valley segment at 43 percent before the year 2024. The last event on this segment was a magnitude 6.8 earthquake occurring on April 12, 1918.

Elsinore Fault

The Elsinore fault is a major northwest-trending strike-slip fault and accomodates 10 to 15 percent of the plate-boundary slip in southern California and could produce earthquakes of magnitude 7 or larger (WGCEP, 1995). The Elsinore fault is divided into five segments. The Temecula segment lies to the southwest of the site. It is approximately 35 km in length and capable of a magnitude M_w 6.8 event. The recurrence interval has been estimated at 240 years for

this segment, and the Working Group on California Earthquake Probabilities (1995) has assessed the rupture probability for the Temecula segment at 16 percent before the year 2024. The last large earthquake on the segment is thought to have occurred in 1918.

3.3 SURFACE CONDITIONS

The project site is approximately a square 45-acre parcel of farmland currently planted with wheat. The site slopes gently to the southwest with elevations ranging from about +1437 feet MSL to +1448 feet MSL (Figure 2). The highest elevation lies along the northeastern boundary at approximately +1448 feet Mean Sea Level (MSL).

A dirt road (Antelope Road) exists on the western boundary of the property. Farmland and a heavy equipment storage yard are present west of Antelope Road. Additional farmland surrounds the property on its eastern and southern boundaries. Other nearby structures include a 500-kV transmission line and a small transmission line on wooden poles to the south, a Wyroc asphalt site to the north, an Orco cement block manufacturing plant and Sannipoli Corporation concrete box plant to the northeast, and a gravel storage yard to the east. The Atchison, Topeka, and Santa Fe railroad tracks cut across the northeast corner of the site. The site can be accessed at the northwestern property corner (Figure 2).

3.4 SUBSURFACE CONDITIONS

The subsurface conditions beneath the site include residual soil, alluvium, and crystalline bedrock at depth. A geologic cross-section of the site is shown in Figure 7.

3.4.1 Residual Soil

Residual soil is present across the site ranging in depth from 1 foot to 3.5 feet. It consists of porous, dense to very dense, light brown, silty, fine to coarse sand. It has been plowed repeatedly in the past during agricultural use.

3.4.2 Alluvium

Our borings and test pits encountered alluvial deposits to the maximum depths of our explorations (100 feet). The alluvium consists primarily of very dense, clayey sand to silty to well-graded, fine to coarse sand with and without gravel, to hard clay or silt as noted in the test pit and the boring logs (Appendices A and D). The alluvial soil within the upper five feet of the ground surface are typically porous.

The sampler blow counts in the alluvium were consistently high due to the overall high density of the material (Figure 7). Nuclear gauge tests at depths of 1 and 5 feet in the test pits indicated dry density ranging from 102.3 to 122.6 pounds per cubic foot (pcf) and moisture contents ranging from 1.8 to 12.6 percent (of dry weight). Laboratory test results from our borings for these materials indicated dry density ranging from 109 to 131 pounds per cubic foot (pcf) and moisture contents from 1 to 16 percent (of dry weight).

3.5 SHEAR WAVE PROFILE

Based on the SASW profiling and our correction for overburden pressure, the corrected average shear wave velocity of the alluvial materials at the site may be assumed to be on the order 360 m/s (Figure 3). In our opinion, this shear wave velocity may be considered representative of dense granular or stiff, fine-grained materials.

3.6 GROUNDWATER

Groundwater was encountered in Boring B-4 at a depth of 78.5 feet. This corresponds to an elevation of +1364 feet above mean sea level (MSL). Based on well data provided by the Eastern Municipal Water District, the direction of regional groundwater flow in the general vicinity of the project area is from east to west.

The discussions, conclusions, and recommendations presented in this report are based on information provided to us, review of available information, results of our field explorations, and laboratory testing, empirical correlations, engineering evaluations and analyses and professional judgment.

4.1 SEISMIC HAZARDS

Fault rupture, strong ground shaking, liquefaction, and seismically induced settlements are seismic hazards potentially impacting the site. The following sections discuss these hazards.

4.1.1 Fault Rupture

The nearest active faults to the site are the San Jacinto and Elsinore faults located at distances of approximately 10 and 11 miles from the center of the site, respectively. Based on the published mapping of active faults, there is no evidence of active faulting in the vicinity of the project site. The zone of faulting along the San Jacinto and Elsinore faults is well defined. In our opinion, the likelihood of fault rupture at the site is low.

4.1.2 Seismic Shaking

We recommend that all structures on the site be built in accordance with the seismic design provisions presented in the Uniform Building Code (UBC, 1997). A shear velocity profile to a depth of 131 feet (40 m) below the site's ground surface was determined by performing a geophysical survey (see Section 2.3). The average corrected shear wave velocity was approximately 360 m/s, which corresponds with a seismic soil profile type of S_C in accordance with UBC. Therefore, we recommend that a soil profile of S_C be used for design. Based on the site location and site conditions described above, we recommend that the values listed below be used for seismic design of the power plant.

Parameter	Value	1997 UBC Reference
Soil Profile	S_C	Table 16-J
Seismic Zone	4	Figure 16-2
Zone Factor, Z	0.4	Table 16-I
Seismic Source Name	San Jacinto Fault	Figure 0-33*
Seismic Source Type	B	Table 16-U
Distance to Seismic Source	15 km	Figure 0-34*
Near Source Factor N_a	1.0	Table 16-S
Near Source Factor N_v	1.0	Table 16-T
Seismic Coefficient C_a	0.40	Table 16-Q
Seismic Coefficient C_v	0.56	Table 16-R

*From "Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada", prepared by California Department of Conservation, Division of Mines and Geology, February, 1998.

4.1.3 Liquefaction

Seismically induced soil liquefaction is a phenomenon in which loose to medium dense, saturated, granular materials undergo matrix rearrangement, develop high pore water pressure, and lose shear strengths due to cyclic ground vibrations induced by earthquakes. This rearrangement and strength loss is followed by a reduction in bulk volume. Manifestations of soil liquefaction can include loss of bearing and lateral capacities for foundations, and surface settlements and tilting in level ground. Soil liquefaction can also result in instabilities and lateral deformation in areas of sloping ground.

Because the site is predominately underlain by relatively dense to very dense alluvial soil and the groundwater is relatively deep, the probability of soil liquefaction affecting the site is considered to be very low.

4.2 SITE EARTHWORK

We anticipate that grading at the site will consist of overexcavation and recompaction of surface materials, general regrading of the site, and excavation for foundations. We recommend that our firm review the grading plans and project specifications prior to finalizing, and provide additional recommendations if necessary. We recommend that a pre-grading conference be held at the site with the owner, contractor, civil engineer, and geotechnical engineer in attendance.

4.2.1 Soil Characteristics

The very near-surface materials at the site consist primarily of primarily dry, slightly porous, silty to clayey, fine to coarse sand. It is our opinion that the soil within the anticipated excavation depths can be excavated with moderate to heavy effort using conventional excavating equipment. In our opinion, the site soil will generally be classified as select fill. Select fill may be defined as having as least 40 percent material less than ¼ inch in size, having an Expansion Index (EI) of less than 30 (ASTM D4829), and which does not have perishable, spongy, deleterious, or otherwise unsuitable materials. Surface materials at the site may be considered to be non-expansive. The upper 5 feet of existing soil is porous and may be considered collapsible.

The existing on-site materials should generally be suitable for reuse during construction. In the event that import fill soil is required, the material should be granular with an EI no greater than 30.

4.2.2 Site Preparation

We recommend that prior to the start of earthwork operations, all refuse and debris be removed from the project area. Any abandoned underground utilities should be removed and the trenches properly backfilled.

Existing near surface materials at the site may be considered to be medium dense to dense and collapsible. We recommend a minimum of 5 feet of soil below the proposed finish and existing grades, whichever is greater, be overexcavated and recompacted in all site development areas having structures, and 10 feet beyond. We recommend a minimum of 3 feet of soil below the

proposed finish and existing grades, whichever is greater, be overexcavated and recompacted in all other site development areas, including pavement and pond areas.

Loose or soft soils exposed within the proposed grading areas that are not removed by the grading operation should be scarified as required, brought to proper moisture content, and then recompacted to 90 percent of the maximum dry density as determined by ASTM D1557 prior to placement of additional fill.

4.2.3 Fills and Backfills

We recommend that earthwork be performed in accordance with Section 300 of the most recent approved edition of the "Standard Specifications for Public Works Construction" (Green Book). In general, all fills and backfills should be compacted to a minimum relative compaction of 90 percent when tested in accordance with ASTM D1557; moisture contents during placement should be in excess of the optimum moisture content. Fill soils should be placed in loose lifts no thicker than 12 inches. We recommend that URS observe the grading operations and test the compacted fills.

4.2.4 Fill and Cut Slopes

It is anticipated that permanent fill slopes for landscaping and detention basins may be on the order of 20 feet or less in height. It is recommended that these slopes have inclinations of 2:1 (horizontal:vertical) or flatter. Properly compacted fill slopes are considered to have a safety factor against deep-seated failure in excess of 1.5 for static conditions. In our opinion, the probability of the slopes with a static safety factor greater than 1.5 becoming unstable is low. We recommend that fill slopes be planted, drained, and maintained with a minimum amount of surface irrigation.

4.3 SURFACE DRAINAGE AND EROSION CONTROL

The potential for soil erosion is largely impacted by local soil characteristics, vegetative cover, topographic relief, and the frequency and intensity of rainfall and wind. Removal of vegetation and/or disturbance to surficial soil by construction activities may result in local increases of erosion rates in unprotected areas. As a result, sedimentation may increase in local drainages at site perimeters and slope intersections. Uncontrolled diversion of storm water runoff from the site to unlined drainage channels could result in erosion of the drainage channels due to concentrated flow. This is particularly true during and immediately following site grading. Site development normally increases the amount of impervious area, thus increasing the volume of storm water runoff.

To reduce soil erosion and sediment transport, protective material such as gravel, crushed stone, pavement, and other effective erosion control materials should be used to stabilize exposed soil. Slopes should be provided with temporary drainage and erosion control measures during construction until permanent measures can be installed. Storm water runoff from construction areas should be conveyed to temporary diked detention areas for sediment deposition, then

discharged to the existing natural drainage courses with velocities slow enough to prevent further erosion in the drainage courses.

Control of erosion and sedimentation on recently graded construction sites requires both vegetative and structural measures. Vegetative species used to control erosion should be selected to accommodate the soil characteristics and climate at the site. Storm runoff control should be provided during and after completion of site grading by using diversion dikes and permanent drainage facilities. Sediment retention structures such as sediment basins, sediment traps, or silt fences should be used to keep eroded material on the site. Straw bales, used along, or in combination with geotextiles, can be effective sediment retention structures when properly installed and maintained.

We recommend the following practices be part of this project:

- Accommodate the surface runoff from all disturbed lands. Prepare drainage ways that handle concentrated runoff from disturbed areas by using rip-rap or other lining materials to control erosion in the drainage ways.
- Trap sediment-laden runoff in basins to allow soil particles to settle out before flows are released to receiving waters.
- Reduce erosion by limiting the area and time of exposure, and by the provision of diversion channels.
- Use temporary plant cover, mulching, and/or structures to control runoff and protect areas subject to erosion during construction.
- Minimize soil exposure during the rainy season by proper timing of grading and construction and be prepared to shut down all earthwork if heavy precipitation occurs.
- Have erosion control equipment and materials onsite if needed in an emergency to quickly construct temporary collectors, diversion channels, intercept drains, berms, dikes, or filters.

We recommend that positive measures be taken to properly finish grade the site so that drainage waters from the site are directed off the site and away from foundations. Even when these measures have been taken, experience has shown that a shallow groundwater or surface water condition can and may develop in areas where no such water condition existed prior to construction.

To further reduce the possibility of moisture related problems, we recommend that any landscaping and irrigation be kept as far from the proposed pads as possible. Irrigation water should be kept to a minimum required level. We recommend that the ground surface in all areas be graded to slope away from foundations and equipment pads, and that all runoff water be directed to proper drainage areas and not be allowed to pond. A minimum ground slope of 2 percent is suggested for unpaved areas and 1 percent for paved areas.

4.4 FOUNDATIONS

4.4.1 Shallow Foundations

The results of our investigation indicate that alluvial soils underlie the proposed structures and equipment pads. It is our opinion that these structures and equipment pads may be supported on conventional spread or continuous footings founded in these materials provided site preparation has been completed in accordance with recommendations presented in Section 4.2.

Shallow foundations should be at least 24 inches wide and 24 inches deep. We recommend using a maximum allowable soil bearing pressure of 4,000 pounds per square foot (psf) having these minimum dimensions. This pressure may be increased by 500 pounds for every additional foot of embedment to a maximum of 6,000 psf. In addition, this pressure may be increased by one-third for loads that include wind or seismic forces. We recommend that all foundation elements, including any grade beams, be heavily reinforced top and bottom. The reinforcement should be designed by the structural engineer. We recommend that foundation excavations be cleaned of loose material and that the excavations be observed by a qualified engineer or geologist prior to placing steel or concrete.

Resistance to lateral loads by shallow foundations can be provided by passive resistance along the edge of the footings and frictional resistance along the bottom of the footings. For passive resistance, we recommend that an equivalent fluid weight of 300 pcf be used for footings or grade beams poured against the excavated foundation soil. If friction is to be used to resist lateral loads, we recommend using a coefficient of 0.4 between the soil and foundation concrete. If it is desired to combine frictional and passive resistance in design, we recommend using a frictional coefficient of 0.3.

We estimate that shallow foundation for the proposed foundations, designed as recommended above, may undergo total settlements on the order of ½ inch. Differential settlements are estimated to be approximately one half of the total settlement over a distance of approximately 20 feet or adjacent columns.

4.4.2 Mat Foundations

Mat foundations generally consist of a relatively thick section of heavily reinforced concrete extending under the entire footprint of the structure. The relatively high stiffness of such foundations allows the supported structure to accommodate potentially large settlements by redistributing the structure's loads.

We recommend that mat foundations be heavily reinforced top and bottom (each way) to resist flexural and shear forces. Actual mat thickness, reinforcement, and details should be determined by the structural engineer.

Deflections and differential settlements of mat foundation may be estimated by the structural engineer using subgrade reaction methods of analyses. We recommend using a modulus of vertical subgrade reaction of 200 tons per cubic foot (tcf) for mat foundations. This value should be adjusted to account for large mat foundation dimensions in accordance with the selected

subgrade reaction method of analyses. A one-third increase in the allowable bearing pressure value may be used for loads that include wind and seismic forces.

4.5 RETAINING WALLS

Retaining walls should be designed to resist the pressure exerted by retained soil plus any additional lateral forces due to loads placed adjacent to or near the wall. Retaining walls with maximum heights of 15 feet can be designed as cantilever walls with an equivalent fluid weight of 30 pcf for the active earth pressure. This pressure is based on horizontal backfill surface conditions, the use of on-site select soil for backfilling the walls, and adequate drainage to prevent buildup of hydrostatic pressure in the backfill.

Maximum allowable bearing pressures presented in Section 4.4.1 should be used for design of retaining wall foundations. Resistance to lateral loads on the retaining walls may be provided by passive resistance with an equivalent fluid weight of 300 pcf along the outside face of footings. This value assumes a horizontal surface for the soil mass extending at least 10 feet or three times the height generating the passive pressure, whichever is greater. The upper 12 inches of material in areas not protected by floor slabs or pavement should not be included in design for passive resistance to lateral loads.

If other loading conditions are to be considered in the vicinity of the walls, such as adjacent footings, we should be advised so that additional recommendations can be provided.

4.6 CONCRETE SLABS-ON-GRADE

We recommend that concrete slabs-on-grade be at least 5 inches thick and reinforced mid-depth with steel. Our experience indicates that concrete slabs reinforced with steel rebar generally perform better than those using wire mesh as reinforcement. The slab thickness and reinforcement should be designed by a structural engineer for the actual loading conditions. Some means of reducing the effects of shrinkage cracks should be provided, such as expansion joints at regular intervals both ways. The spacing of such joints should be determined by the structural engineer, but is typically on the order of 15 feet. We recommend that concrete slabs-on-grade be underlain by a minimum 4 inch underlay of relatively clean, coarse sand. The majority of native on site soils may be considered suitable in this regard.

4.7 PAVEMENTS

We recommend that the top 12 inches of pavement subgrade areas consist of properly compacted select fill material. This subgrade soil should be scarified and compacted to at least 95 percent of the maximum dry density, as determined in accordance with ASTM D1557.

Subgrade suitability of the onsite soil was evaluated by performing R-value tests. The results of these tests are shown below, and in Appendix D:

Sample No.	R-Value
Composite 1 (TP 1-1, TP 2-2, TP 3-2)	44
Composite 2 (TP 4-2, TP 5-2)	28
Composite 3 (TP 7-2, TP 8-2, TP 9-2)	62

We have assumed a subgrade R-value of 30 in our pavement design for subgrade materials composed of existing materials. We have used the Caltrans method of pavement design assuming a Traffic Index (TI) of 4.5 in parking areas and 6.0 for areas of truck traffic and in driveways. We recommend a minimum pavement section consisting of 3 inches of asphaltic concrete (AC) over 4 inches of aggregate base for a TI of 4.5. We recommend a minimum pavement section of 3 inches of AC over 8 inches of aggregate base for a TI of 6.0. This design assumes a pavement life of 20 years with normal maintenance. However, we recommend that additional R-value testing be performed just prior to site paving in order to refine this pavement design, if deemed necessary.

We recommend using Portland Cement Concrete (PCC) pavements in areas where dumpsters will be stored and picked up or in areas of anticipated heavy truck traffic. Our experience indicates that heavy truck traffic areas can shorten the useful life of asphalt concrete sections. We recommend that in these areas, 6 inches of PCC be used over the prepared select subgrade. We recommend that concrete pavements be provided with expansion joints at regular intervals (approximately 15 feet each way). Construction joints (if any) should be provided with load transfer devices, such as keys or dowels.

Aggregate base should conform to the current Standard Specifications for Public Works Construction (SSPWC) Section 200-2.2.2. The aggregate base materials should be placed at a minimum relative compaction of 95 percent. Asphalt concrete should conform to the SSPWC, Section 203-6.2.1 for the asphalt and Section 203.6.2.2 for the aggregate. PCC should conform to Section 20 of the SSPWC. The paving operations should be inspected by a qualified testing laboratory. We recommend that a qualified engineer observe and test the compaction of subgrade and base materials.

4.8 CORROSION POTENTIAL

The results of the pH, resistivity, and chemical analyses, as performed by M.J. Schiff & Associates, Inc., are presented in Appendix C. The tests were performed on samples of materials obtained from the following locations and depths. The tests indicated the following results:

Sample	Electrical Conductivity (mS/cm)	Water Soluble Sulfates (mg/kg)	Water Soluble Chloride (mg/kg)	pH	Minimum Resistivity (ohm-cm)
Composite 1 (TP 1-1, TP 2-2, TP 3-2)	0.07	65	14	7.6	2,000
Composite 2 (TP 4-2, TP 5-2)	0.09	74	21	7.6	1,500

Sample	Electrical Conductivity (mS/cm)	Water Soluble Sulfates (mg/kg)	Water Soluble Chloride (mg/kg)	pH	Minimum Resistivity (ohm-cm)
Composite 3 (TP 7-2, TP 8-2, TP 9-2)	0.10	96	14	7.7	1,500
Boring 4-3	0.11	122	50	7.4	870
Boring 4-5	0.05	45	25	7.5	2,400
Boring 4-7	0.07	103	21	7.7	1,900
Boring 4-9	0.04	31	25	7.7	2,400
Boring 4-11	0.07	91	46	7.8	2,200

It has been our experience that the resistivity results between 500 and 1,000 ohm-cm may be considered corrosive, between 1,000 and 2,000 ohm-cm may be considered to fairly corrosive, and between 2,000 and 4,000 may be considered moderately corrosive conditions with respect to metallic utility piping and conduits. The results of these tests also indicate that sulfate and chloride attack to concrete may be considered negligible. A corrosion engineer should be consulted for additional design information.

We have observed only a very small portion of the pertinent subsurface conditions. The recommendations made herein are based on the assumption that soil and geologic conditions do not deviate appreciably from those found during our investigation.

The site is located in an area of high seismic risk. It is generally considered economically unfeasible to build a totally earthquake-resistant project; it is therefore possible that a large or nearby earthquake could cause damage at the site.

Geotechnical engineering and the geologic sciences are characterized by uncertainty. Professional judgements presumed herein are based partly on our understanding of the project, and partly on our general experience. Our engineering work and judgment rendered meet current professional standards; we do not guarantee the performance of the project in any respect.

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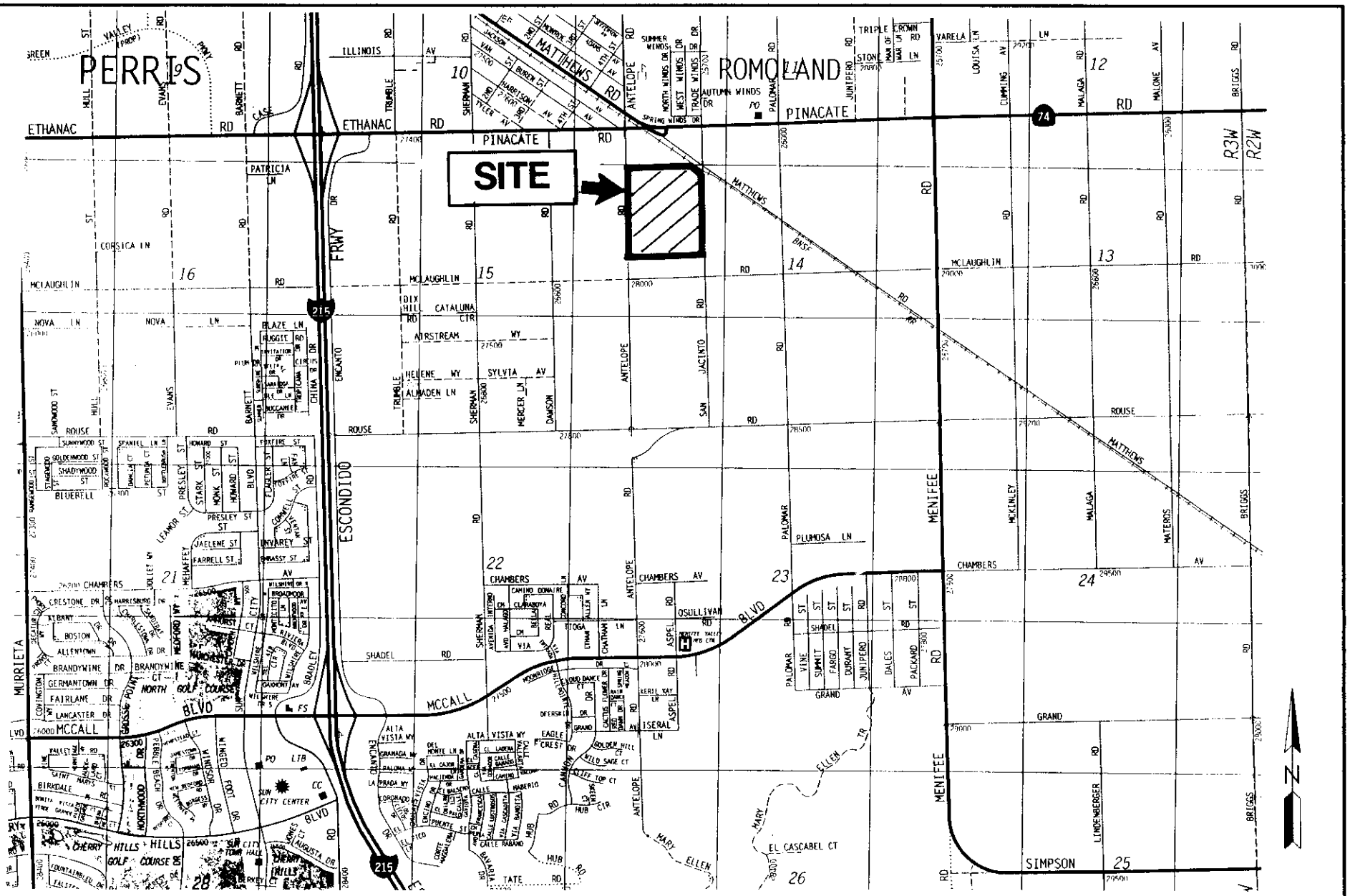

VICINITY MAP
CALPINE MORENO POWER PLANT

URS	CHECKED BY: MA	DATE: 12-7-00	FIG. NO: 1
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CALPINE CORPORATION

MORENO VALLEY INTERCONNECTION STUDY

SYSTEM IMPACT STUDY

JANUARY 15, 2001

SOUTHERN CALIFORNIA
EDISON
An EDISON INTERNATIONAL℠ Company

Prepared by
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for

EXECUTIVE SUMMARY

Southern California Edison Company ("SCE") performed a System Impact Study as requested by Calpine Corporation ("Calpine") for the operation of a new 679-MW plant to be connected to SCE at Valley 500-kV substation. The proposed operating date for the Calpine project is June 1, 2004.

Calpine's proposed generation project would be served by a new customer 500 kV switchrack connected to the SCE 500-kV system at the Valley 500-kV substation as shown in Figures 1 and 2. Calpine's generation project includes two new 175-MW combustion turbine generators, each with an auxiliary load of 5 MW, and a new 329-MW single steam generator for a net total 669 MW.

The purpose of the study is to determine the adequacy of the California Independent Operator ("ISO") Controlled Grid and SCE's electrical system to accommodate Calpine generation. This includes identifying any problems with interconnecting the project and maintaining reliability of the transmission network, and identify the extent of the need for congestion management if congestion is created at the ISO Controlled Grid, which falls under CAISO responsibilities. ***The study accuracy and the results for the assessment of the system adequacy are contingent on the accuracy of the technical data provided by the customer as shown in Figure 1 and Appendix C.*** **Any changes to the attached data could void the study results.**

System studies were performed for two system conditions: (a) 2004 heavy summer load forecast (coincident one-in-ten-years heat wave load forecast assumption) with high East-of-River/West-of-River flow and maximum generation in the SCE's eastern area, and (b) 2004 light spring load forecast (65% of 2004 heavy summer) with high East-of-River/West-of-River flow and maximum generation in the SCE's eastern area. The study includes assessments for power flow (steady state and post transient), transient stability, and short circuit duty analysis, respectively with and without the new 679-MW generation.

CONCLUSIONS

1. The load flow analysis identified no loading or voltage drop criteria violation or generation congestion.
2. The stability studies indicated that the Calpine project has no adverse impact on system stability.
3. Post transient analysis identified no post-transient voltage deviations criteria violation.
4. The three-phase short circuit duty analysis indicated that the Calpine 679-MW generation project increases the three-phase short-circuit duties at twenty nine bulk power substations and eighteen 115-kV substations by 0.1kA or more. A single-phase-to-

ground short circuit study for Calpine 679-MW project will be conducted as a part of the facilities study.

FACILITY STUDY

A Facility Study will be required to determine the system upgrades or modifications required to mitigate the impacts identified to interconnect the Calpine's 679-MW generation project. The Facility Study should include the following scope:

1. Develop the cost of SCE system and direct assignment facilities as required to interconnect the Project to SCE's electrical system. These facilities, not including the generating station step up transformers, include:
   - construction of a switchrack for a new 500kV line position at Valley 500-kV;
   - 500-kV circuit breakers; and
   - relay protection and metering equipment.

2. About 0.5-mile 500-kV transmission line will be constructed by either Calpine or SCE under a generaton-tie line agreement, but the generation-tie facilities and costs will not be included in the Facility study.

3. Evaluate the need for circuit breaker replacement at twenty nine bulk power substations and eighteen 115-kV substations, listed respectively in tables 5 and 6, where the Calpine 679-MW generation projects increases the three-phase short circuit duties by 0.1 kA or more.

4a. Perform single-phase-to-ground short circuit duty to determine the impact of the Calpine project on short circuit duties at buses in the SCE bulk transmission and the Valley 115kV systems.

4b. Evaluate the need for circuit breaker replacement at buses for which the facility study indicates that the Calpine 679-MW generation project increases the single-phase phase-to-ground short circuit duties by 0.1 kA or more.

5. Develop costs for the required circuit breaker replacement or upgrades.

6. Perform stability study to verify if the system is stable for single-phase-to-ground fault with delayed clearing.

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INTRODUCTION

Southern California Edison Company (SCE) performed a system impact study as requested by Calpine Corporation for the operation of a new 679-MW plant at Calpine's Moreno Valley substation connected to the Valley 500 kV substation. The proposed operation date for the Calpine project is June 1, 2004.

Calpine's proposed generation project would be served by a new customer 500 kV switchrack connected to the SCE 500 kV system at the Valley 500 kV substation as shown in Figures 1 and 2. Calpine's generation project includes two new 175 MW combustion turbine generators, each with an auxiliary load of 5 MW, and a new 329-MW single steam generator, for a net total 669 MW.

The purpose of the study is to determine the adequacy of the California Independent Operator ("ISO") Controlled Grid and SCE's electrical system to accommodate Calpine's generation. This determination identifies any problems with interconnecting the project and maintaining reliability of the transmission system, and assesses the extent of the need for congestion management if congestion is created at the ISO Controlled Grid, which falls under CAISO responsibilities.

The study was performed for two system conditions: (a) 2004 heavy summer load forecast (coincident once-in-ten-years heat wave load forecast assumptions) with very high internal eastern area generation and high West-of-River flow, and (b) 2004 light spring load forecast (65% of 2004 heavy summer) with very high internal eastern area generation and high West-of-River flow.

This report describes the study conditions and assumptions, and presents the results of Power Flow (steady state and post transient), Transient Stability, and Short-Circuit Duty assessments.

STUDY CONDITIONS AND ASSUMPTIONS

A. Planning Criteria

The study was conducted by applying the SCE Transmission Planning Criteria and Guidelines, as well as the California Independent System Operator (CAISO) Reliability Criteria. More specifically, the main criteria applicable to this study are as follows:

Load Flow Assessment

The following contingencies are considered for transmission or subtransmission lines and 500/230 kV transformer banks ("AA-Banks"):

Assuming the largest unit (San Onofre Unit 2 or 3) initially off and then:

- Single Contingencies (N-1 Line or N-1 AA-Bank)

Assuming both San Onofre Units 2 and 3 in service and then:

- Single Contingencies (N-1 Line or N-1 AA-Bank)
- Double Contingencies (N-2 Two Lines, N-1 Line and N-1 AA-Bank) (Outages of two AA-Banks are beyond the Planning Criteria)

The following loading criteria are used:

Transmission Lines (230 and 500 kV)		Base Case	100%
		N-1	115%*
		N-2	135%*
Subtransmission Lines (66 and 115 kV)		Base Case	100%
		N-1	135%*
		N-2	135%*
500-230kV Transformer Banks (AA-Banks) Purchased after 1970	Base Case	100% of Normal Loading Limit	
	Long-Term**	110% of NPL (24-hours)	
	Short-Term**	150% of NPL (1-hour)	

*Except when specific lower limitations have been identified

**If no factory heat run studies (FHR) or load capability studies (LCS) are available. Higher limits can be used if FHR or LCS are available, as long as they do not exceed 120% and 160% of NPL for long-term and short-term respectively.

For AA-Banks purchased before 1970, the above limits are the same, except for the long-term limit which is only 100% NPL.

Stability Assessment

The Transmission System is to remain stable under a three-phase fault at the most critical locations, normally cleared, with the loss of one or two transmission lines.

The stability study for single-phase-to-ground faults with delayed clearing will be completed in the facility study.

Post Transient Assessment

The maximum voltage deviations allowed under contingency conditions in the post transient time frame are:

- 5 percent under N-1 assuming both San Onofre generating units on
- 7 percent under N-1 assuming one San Onofre generating unit off
- 10 percent under N-2 assuming both San Onofre generating units on

Congestion Assessment

The following principles, outlined below, were used for accommodating generation into the SCE transmission system that fall under CAISO jurisdiction:

- Sufficient transmission capacity shall be maintained to accommodate all existing Must Run and Regulatory Must-Take generation resources with all facilities in service
- Sufficient transmission capacity shall be maintained to accommodate the total output of any single market generation resource which is not classified as Must-Run
- The CAISO protocol on congestion management shall apply when two or more market generation resources which are not classified as Must-Run exceeds the available capacity of the system

The following Guide for interconnection studies was used in developing power flow runs to be studied in analyzing congestion issues associated with this generation project:

a) For Base Case conditions (all transmission facilities in service), run the system

b) For Base Case conditions, add the total output of the proposed Calpine generation. Run the system as a)

c) If the normal loading limits of some facilities are exceeded with the addition of the project, reduce project generation until the overload is mitigated.

The results of these studies should be able to identify:

a). If there is capacity available on the SCE transmission system to accommodate the proposed Calpine generation addition without the need for system upgrades

b). If line or substation overloads exist in the area, along with an estimate of the magnitude of the overloads, and

c). If there are any impacts to the power import capabilities of any of the transmission paths serving Southern California.

B. Calpine Generation Station

Figure 1 shows the one-line diagram of the Valley 500 kV substation including the proposed Calpine project. A summary of the net total power output for the new units is as follows:

Proposed Calpine Generation

Total Net Output	679 MW
2 Units (CT1-CT2)	175 MW each
1 Unit (ST1)	3twenty nine MW
Total Auxiliary Load	10 MW

The interconnection point of the proposed generating facilities to the SCE system is the Valley 500 kV Substation bus.

The dynamic data for the new generating gas turbine and steam units (generators, exciters, governors, and power system stabilizers) using the GE PSLF models, as provided by Mr. Greg Lamberg of Calpine Corporation, is shown in Appendix C.

C. System Conditions

To simulate the SCE transmission system for analysis, the study used the same databases that were used to conduct the 2001-2005 CAISO Controlled Transmission Expansion Plan. The data base was modified to include all the projects ahead of the Calpine project in the system impact studies queue (generation and lines), in particular the SDGE proposed Rainbow-Valley 500 kV line project. This assumption was made in effort to capture the worst system condition for load flow, post-transient voltage, transient stability, and short circuit duty.

The study considered two system load conditions: heavy summer and light spring. The summer peak load forecast were based on the SCE's 1999 Transmission Substation Transformer Capacity Assessment, and reflects a coincident one-in-ten-years heat wave load forecast assumption. The 2004 loads for heavy summer and light spring system conditions is shown in Table 1.

D. Load Flow Study

Load flow studies were conducted for the SCE bulk transmission system under heavy summer and light spring conditions. Further description of the case assumptions follows:

a). 2004 Heavy Summer

2004 heavy summer load with high internal generation in SCE eastern area electrical system and high West-of-River import (6,065 MW). Generation included: Year 2000 reliability must-run, regulatory must-take, all existing generation in eastern area including wind generation, and all other proposed generation projects in queue up to Calpine project. Generation pattern was

maximized in the eastern area to identify extent of potential congestion after the Calpine project.

b). 2004 Light Spring

2004 light spring load with high generation in SCE's eastern area electrical system and high West-of-River import (6,215 MW). Generation included: Year 2000 reliability must-run, regulatory must-take, all existing generation in eastern area including wind generation, and all other proposed generation projects in queue up to Calpine project. Generation pattern was maximized in the eastern area to identify extent of potential congestion after the Calpine project.

SCE AREA TOTAL GENERATION, IMPORT, LOAD AND LOSSES (MW)				
	Summer 2004		Spring 2004	
	No Calpine	Case 1	No Calpine	Case 2
Generation	15,624	15,555	8,153	8,165
Import	6,662	6,662	6,410	6,410
Load	21,705	21,715	14,198	14,208
Total System Losses	581	502	377	366

Contingencies

For each of the four cases, load flow simulations of the bulk power system were conducted for the base case, and a total of 93 single contingencies and 93 credible N-2 contingencies for lines and 500-230 kV transformer banks. Due to the size of the contingency list, the list is not included in this report but is available upon request.

To assess the single-element contingencies, power flow cases with one San Onofre unit off and both SONGS unit on were utilized. For double-element contingencies, both San Onofre units were assumed on-line. For the contingencies that caused thermal line overloads, additional studies were conducted to determine if the overload were triggered by the Calpine project.

E. Transient Stability Study

Stability studies were conducted for the contingencies listed in Table 3. Stability studies were conducted with 5-cycle 3-phase faults on 230-kV buses and 4-cycle 3-phase faults on 500kV buses in the vicinity of the Valley 500-kV bus.

The same two Calpine project cases used for power flow studies were also used for the stability study. For each of the two cases, a total of 14 critical contingencies were evaluated for stability.

The stability study for single-phase-to-ground faults with delayed clearing will be conducted in the facility study.

F. Post Transient Study

The post transient voltage studies were conducted for the contingencies resulting in the largest voltage drops identified by load flow studies in order to determine the impact of the Calpine project on the post transient voltage deviations of the 230-kV and 500-kV bulk power system.

G. Short Circuit Duty Study

To determine the impact of the Calpine project on short circuit duties at buses in the SCE bulk transmission system, the study calculated the maximum symmetrical three-phase short circuit duty at all bulk power system buses and Normally Expected three-phase short circuit duty at the Valley system 115-kV buses. It should be noted that the Valley 115-kV system is not ISO controlled because it is served radially from the Valley 500-kV bus.

The study used a 2004 heavy summer scenario with all generators in service. The study also considered the following major transmission upgrades based on the current plans for the projects identified in the CAISO Controlled Transmission 2001-2005 Assessment and the market generation projects which interconnection studies have already been performed:

- Rainbow-Valley 500kV project
- Mira Loma #4 AA-Bank in 2003.

Single-phase-to-ground short circuit duty study will be conducted in the facility study.

STUDY RESULTS

A. Load Flow Study

For both 2004 heavy summer and light spring conditions, the new project results in reduced line loadings under the base case, N-1, and N-2 line contingencies, as shown by Tables 2-1 and 2-2 respectively, for the lines on which the project has the largest impact.

Base Cases

Addition of the Calpine 679-MW generation project does not result in any line loading or voltage drop criteria violations, or generation congestion. Power Flow Plots in Appendix A

illustrate the base case power flows of the Heavy Summer (plots:1a-1f) and Light Spring (plots:2a-2f) for with and without the new Calpine 679-MW generation.

Single Contingencies (N-1)

As shown by Table 2-2, under 2004 light Spring conditions addition of the Calpine 679-MW project reduces the loading of the Devers-San Bernardino No. 1 230-kV line from 105% to 103% under the N-1 outage of the Devers-Valley 500-kV line. Although these loadings do not exceed the standard loading criteria of 110%, they exceed the limitation of 100% on this line. This loading problem will be eliminated by a Remedial Action Scheme for the proposed merchant project ahead of the Calpine project in the queue.

Double Contingencies (N-2)

The study identified no N-2 contingency problems with common mode failure (same corridor or same tower) for both the Heavy Summer and Light Spring cases, as shown in Tables 2-1 and 2-2. The highest impact was on the Devers-Valley 500kV line in both Heavy Summer and Light Spring cases: for Heavy Summer this line loading reduces to 54% from 63% and for Light Spring to 56% from 63% (with the addition of Calpine project) under the outage of Devers-San Bernardino No. 1 and 2 230kV lines.

B. Transient Stability Study

As shown in Table 3, all three-phase transient stability cases were found to be stable. Therefore the addition of the new Calpine project does not adversely affect system stability.

The transient stability study for single-phase-to-ground faults with delayed clearing will be conducted in the facility study.

C. Post Transient Voltage Study

The steady state load flow study was used as an initial screening method for voltage deviation violations. Any bus voltage deviations greater than 5% under N-1 or N-2 contingencies were considered for post transient analysis. The list of these critical contingencies is summarized in Table 4.

The new Calpine project did not cause post transient voltage deviations violations (in excess of 5% under N-1 and 10% under N-2). Under N-1 contingencies the highest voltage deviations occurs at Valley and Devers 500kV and Moraga and Valley 115kV buses under the outage of Palo Verde-N. Gila 500kV line. Under N-2 contingencies, the highest voltage deviation was identified at Santiago 230kV under the outage of Santiago-San Onofre Nos. 1 and 2 230kV lines.

D. Short Circuit Duty Study

The study results indicate that the Calpine's project increases three-phase short-circuit duties at twenty nine bulk power substations and eighteen Valley 115-kV substations by 0.1 kA or more, as shown in Tables 5 and 6, respectively.

Single-phase-to-ground short circuit duty study will be conducted in the facility study.

CONCLUSIONS

1. The load flow analysis identified no loading or voltage drop violation or generation congestion.
2. The stability studies indicated that the Calpine project has no adverse impact on system stability.
3. Post transient analysis identified no post-transient voltage deviations criteria violation.
4. The three-phase short circuit duty analysis indicated that the Calpine 679-MW generation project increases the three-phase short-circuit duties at twenty nine bulk power substations and eighteen Valley 115-kV substations by 0.1kA or more. A single-phase-to-ground short circuit study for Calpine 679-MW project will be conducted as a part of the facilities study.

FACILITY STUDY

A Facility Study will be required to determine the system upgrades or modifications required to mitigate the impacts identified to interconnect the Calpine's 679-MW generation project. The Facility Study should include the following scope:

1. Develop the cost of SCE system and direct assignment facilities as required to interconnect the Project to SCE's electrical system. These facilities, not including the generating station step up transformers, include:
   - construction of a switchrack for a new 500kV line position at Valley 500-kV;
   - 500-kV circuit breakers; and
   - relay protection and metering equipment.
2. About 0.5-mile 500-kV transmission line will be constructed by either Calpine or SCE under a generaton-tie line agreement, but the generation-tie facilities and costs will not be included in the Facility study.

3. Evaluate the need for circuit breaker replacement at twenty nine bulk power substations and eighteen 115-kV substations, listed respectively in tables 5 and 6, where the Calpine 679-MW generation projects increases the three-phase short circuit duties by 0.1 kA or more.

4a. Perform single-phase-to-ground short circuit duty to determine the impact of the Calpine project on short circuit duties at buses in the SCE bulk transmission and the Valley 115kV systems.

4b. Evaluate the need for circuit breaker replacement at buses for which the facility study indicates that the Calpine 679-MW generation project increases the single-phase phase-to-ground short circuit duties by 0.1 kA or more.

5. Develop costs for the required circuit breaker replacement or upgrades.

6. Perform stability study to verify if the system is stable for single-phase-to-ground fault with delayed clearing.

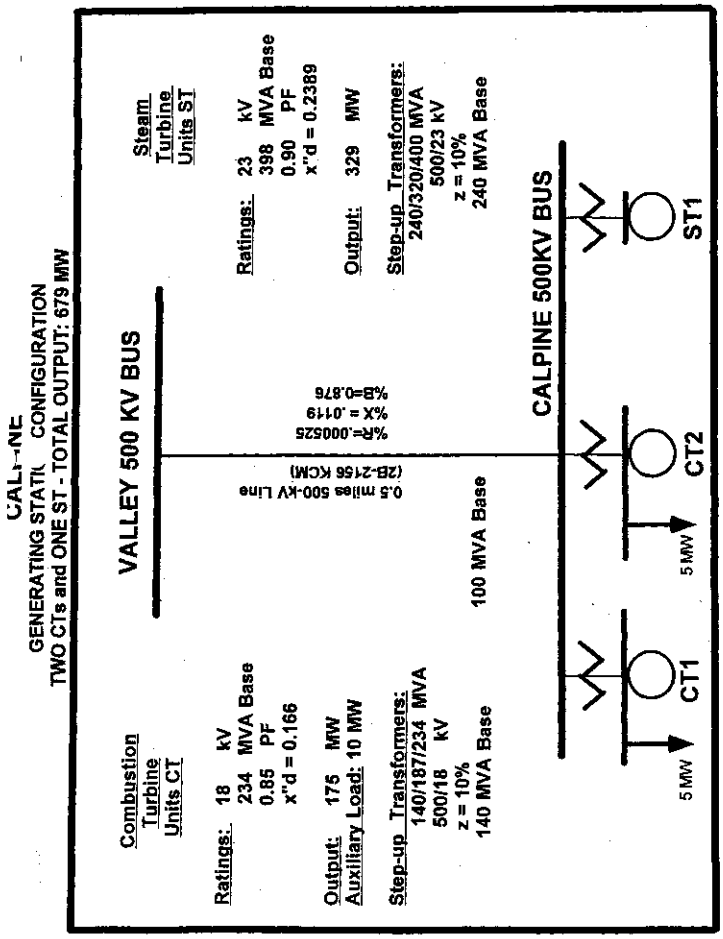
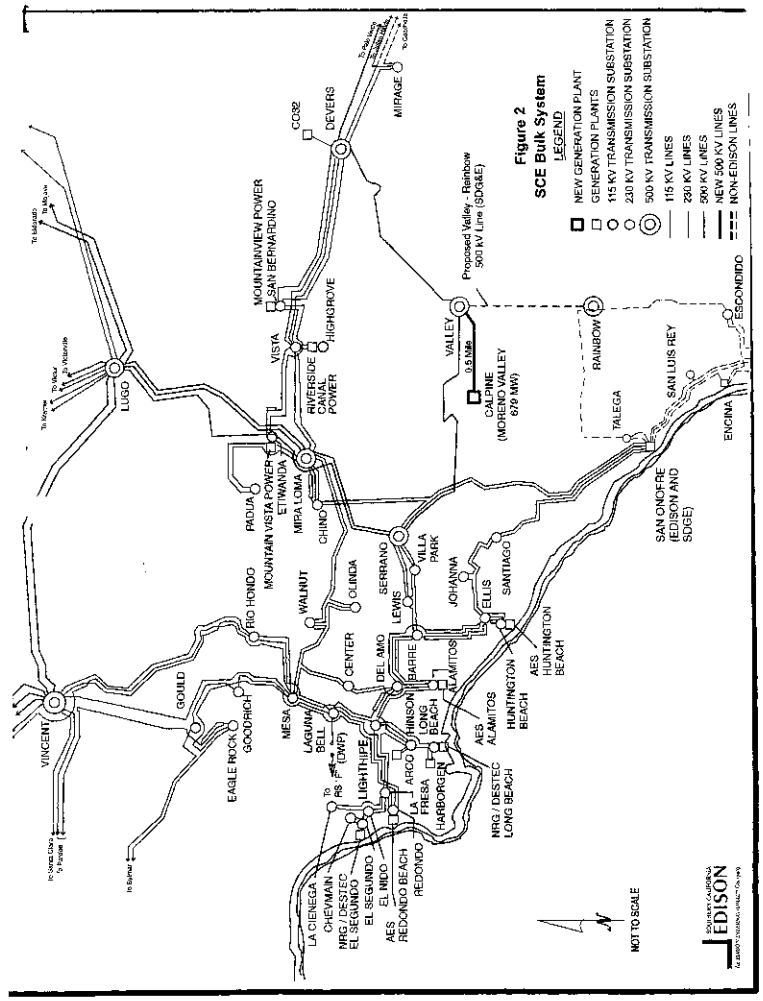


FIGURE 1

FIGURES



TABLES

TABLE 1

A-Station Loads for 2004 Heavy Summer and Light Spring

(ONE-IN-TEN YEAR ADJUSTED NONCOINCIDENT PEAK LOAD)

A-STATION	HEAVY SUMMER 2004	LIGHT SPRING 2004
ALAMITOS	176	114
ANTELOPE	510	332
BAILEY	62	40
BARRE	732	476
BLYTHE	51	33
CAMINO	1	1
CENTER	470	305
CHEVMAIN	100	65
CHINO	651	423
CIMA	1	1
DEL AMO	519	337
DEVERS / MIRAGE	844	549
EAGLE MT.	2	1
EAGLE ROCK	220	143
ELLIS	651	423
EL NIDO	317	206
ETIWANDA	446	250
GOLETA	284	185
GOULD	118	77
HINSON	355	231
JOHANNA	439	285
KRAMER	254	165
LA CIENEGA	480	312
LA FRESA	568	368
LAGUNA BELL	569	370
LEWIS	657	427
LIGHTHIPE	486	316
MESA	627	408
MIRA LOMA	512	333
MOORPARK	798	519
OLINDA	378	246
PADUA	718	467
RECTOR	609	396
RIO HONDO	710	462
SAN BERDO	498	324
SANTA CLARA	493	320
SANTIAGO	982	638
SAUGUS	642	417
SPRINGVILLE	172	112
VALLEY	1055	686
VESTAL	147	96
VICTOR	473	307
VILLA PARK	759	493
VISTA 69KV	758	493
VISTA 115KV	419	272
WALNUT	701	456
TOTALS	21413	13918

TABLE 2-1

CALPINE - MORENO VALLEY
SYSTEM IMPACT STUDY
LOAD FLOW STUDY RESULTS

2004 Heavy Summer Load

CASE	PLOT	CONTINGENCY	Impacted Lines	Without Calpine % loading of impacted elements		With Calpine % loading of impacted Elements	
N-0 — BASE CASE WITH BOTH SONGS ON							
0	1a-1f	--none--	Devers-Valley 500kV Line	60%		50%	
N-1 — TWO CASES:				Both SONGS ON	One SONGS ON	Both SONGS ON	One SONGS ON
1		Devers-Valley 500kV Line	Devers-San Bernardino No. 1 230kV Line	99%	99%	91%	89%
			Valley-Serrano 500kV	83%	86%	54%	55%
		Valley-Serrano 500kV Line	Devers-Valley 500kV Line	68%	88%	41%	56%
			Devers-San Bernardino No. 1 230kV Line	30%	18%	36%	33%
N-2 — SAME CORRIDOR WITH BOTH SONGS ON							
2		Devers-San Bernardino No. 1 & 2 230kV Line	Devers-Valley 500kV Line	63%		54%	
			Devers-Vista No. 1 230kV Line	58%		59%	

* Note: Load Flow Simulation Plots for N-1 and N-2 contingencies will be provided upon request.

TABLE 2-2

CALPINE - MORENO VALLEY
SYSTEM IMPACT STUDY
LOAD FLOW STUDY RESULTS

2004 Light Spring Load

CASE	PLOT	CONTINGENCY	Impacted Lines	Without Moreno Valley % loading of impacted elements		With Moreno Valley % loading of impacted elements		Limiting Factor
N-0 — BASE CASE WITH BOTH SONGS ON								
0	2a-2f	--none--	Valley-Serrano 500kV Line	8%		19%		None
N-1 — TWO CASES:				Both SONGS ON	One SONGS ON	Both SONGS ON	One SONGS ON	
1		Devers-Valley 500kV Line	Devers-San Bernardino No. 1 230kV Line	105%	103%	103%	99%	100% Line Clearance
			Valley-Serrano 500kV	64%	69%	39%	42%	None
		Valley-Serrano 500kV Line	Devers-Valley 500kV Line	67%	89%	41%	46%	
			Devers-San Bernardino No. 1 230kV Line	38%	28%	59%	47%	
N-2 — SAME CORRIDOR WITH BOTH SONGS ON								
2		Devers-San Bernardino No. 1 & 2 230kV Line	Devers-Valley 500kV Line	63%		58%		None
			Devers-Vista No. 1 230kV Line	61%		88%		None

* Note: Load Flow Simulation Plots for N-1 and N-2 contingencies will be provided upon request.

TABLE 3

TRANSIENT STABILITY STUDY RESULTS
CALPINE - MORENO VALLEY INTERCONNECTION STUDY

CASE	FAULT LOCATION	CONTINGENCY	HEAVY SUMMER STABILITY RESULTS	LIGHT SPRING STABILITY RESULTS
N-1 Contingencies with One SONGS Unit Off-Line				
1	Devers 230kV Bus	Devers-San Bernardino #1 230kV Line	STABLE	STABLE
2	Devers 230kV Bus	Devers-Mirage 230kV Line	STABLE	STABLE
3	Devers 230kV Bus	Devers-Coachella 230kV Line	STABLE	STABLE
4	Devers 230kV Bus	Devers-Vista #1 230kV Line	STABLE	STABLE
5	Devers 500kV Bus	Devers-Valley 500kV Line	STABLE	STABLE
6	Palo Verde 500kV Bus	Devers-Palo-Verde 500kV Line	STABLE	STABLE
7	Palo Verde 500kV Bus	Palo-Verde-North Gila 500kV Line	STABLE	STABLE
8	Valley 500 kV Bus	Valley-Serrano 500 kV Line		
N-2 Contingencies with Both SONGS Units On-Line				
9	Devers 230kV Bus	Devers-San Bernardino #1 230kV Line Devers-Vista #2 230kV Line	STABLE	STABLE
10	Devers 230kV Bus	Devers-San Bernardino #2 230kV Line Devers-Vista #2 230kV Line	STABLE	STABLE
11	Devers 230kV Bus	Devers-Vista #1 230kV Line Devers-Vista #2 230kV Line	STABLE	STABLE
12	Devers 230kV Bus	Devers-Mirage 230kV Line Devers-Coachella 230kV Line	STABLE	STABLE
13	Lugo 500kV Bus	Lugo-Mira Loma # 2 500kV Line Lugo-Mira Loma # 3 500kV Line	STABLE	STABLE
14	San Onofre 230kV Bus	Trip SONGS Units #2 & #3	STABLE	STABLE

Note: Single-Phase-to-Ground Faults with 12-Cycle Delay Cleaning Time will be studied as part of the Facilities Study

TABLE 4

POST-TRANSIENT VOLTAGE DEVIATIONS RESULTS
CALPINE - MORENO VALLEY INTERCONNECTION STUDY
2004 Heavy Summer
MAXIMUM VOLTAGE DEVIATIONS IN EXCESS OF 3 PERCENT

CASE	CONTINGENCY*	BUSES	% VOLTAGE DEVIATION	
			BEFORE	AFTER
	N-1 Contingencies			
1	Devers-San Bernardino #1 230kV Line	None	–	–
2	Devers-Mirage 230kV Line	None	–	–
3	Devers-Coachella 230kV Line	None	–	–
4	Devers-Vista #1 230kV Line	None	–	–
5	Devers-Valley 500kV Line	None	–	–
6	Devers-Palo-Verde 500kV Line	Eagle Mountain 16	3.3	–
		Lugo 500kV	3.2	–
		J. Hinds	3.3	–
7	Palo-Verde-North Gila 500kV Line	Valley 500kV	6.1	3.3
		Devers 500kV	5.9	3.8
		Valley 115kV	6.3	-4.4
		Lugo 500kV	3.3	–
		Moraga 115kV	6.8	-4.7
	N-2 Contingencies			
8	Devers-San Bernardino #1 230kV Line Devers-Vista #2 230kV Line	None	–	–
9	Devers-Mirage 230kV Line Devers-Coachella 230kV Line	Mirage 230kV	1	3.2
10	Lugo-Mira Loma # 2 500kV Line Lugo-Mira Loma # 3 500kV Line	None	–	–
11	San Onofre-Santiago # 1 230kV Line San Onofre-Santiago # 2 230kV Line	Santiago230kV	5.3	5.1
		Johanna 230kV	4.5	4.4
		Ellis	3.6	3.5
		H. Beach 230kV	3.3	3.2
12	Devers-San Bernardino No. 1 230kV Devers-San Bernardino No. 2 230kV	None	–	–

TABLE 5

MAXIMUM THREE PHASE SHORT CIRCUIT DUTIES
INCREASED BY 0.1KA OR MORE
BY ADDITION OF CALPINE PROJECT

		BEFORE CALPINE		AFTER CALPINE		CHANGE
NAME	KV	X / R	KA	X / R	KA	KA
PROJECT						
MORENOVL	500			23.3	17.5	17.5
VIOLATIONS						
MRLOMA E	230	23.9	64.2	24.0	64.8	0.6
MRLOMA W	230	23.9	64.2	24.0	64.8	0.6
VILLA PK	230	20.5	45.7	20.8	46.3	0.6
REVIEW						
LUGO	500	21.5	43.0	21.6	43.4	0.4
MIRALOMA	500	24.7	32.3	24.8	32.8	0.5
SERRANO	500	23.5	28.1	23.8	29.1	1.0
VINCENT	500	17.2	34.5	17.2	34.6	0.1
ALMITOSW	230	27.3	41.2	27.3	41.3	0.1
BARRE	230	17.7	49.9	17.7	50.2	0.3
CENTER S	230	15.7	41.0	15.7	41.1	0.1
CHINO	230	16.5	48.0	16.5	48.3	0.3
DEVERS	230	17.2	31.3	17.5	31.7	0.4
ELLIS	230	17.5	41.9	17.5	42.0	0.1
ETIWANDA	230	22.0	45.2	22.0	45.4	0.2
HUNTGBCH	230	16.9	36.7	16.9	36.8	0.1
JOHANNA	230	18.3	26.3	18.3	26.4	0.1
LBEACH	230	13.8	28.7	13.8	28.8	0.1
LEWIS	230	19.4	43.8	19.6	44.3	0.5
LUGO	230	27.5	40.0	27.5	40.1	0.1
MESA CAL	230	16.1	53.6	16.1	53.7	0.1
OLINDA	230	13.9	27.4	13.9	27.5	0.1
PADUA	230	14.8	19.1	14.8	19.2	0.1
S.ONOFRE	230	26.1	48.7	26.1	49.0	0.3
SANBRDNO	230	16.7	34.7	16.7	34.9	0.2
SANTIAGO	230	19.0	28.3	19.0	28.4	0.1
SERRANO	230	22.7	52.1	23.0	52.9	0.8
VINCENT	230	18.3	59.3	18.3	59.4	0.1
VISTA	230	18.4	43.1	18.4	43.4	0.3
WALNUT	230	13.8	29.2	13.8	29.3	0.1

TABLE 6

MAXIMUM THREE PHASE SHORT CIRCUIT DUTIES
INCREASED BY 0.1KA OR MORE
BY ADDITION OF CALPINE PROJECT

115 kV BUS	KA Before Calpine Project	KA After Calpine Project	CHANGE
ALESANDRO	6.047	6.145	0.1
AULD	9.580	9.831	0.3
BUNKER	11.114	11.452	0.3
CAJALCO	5.618	5.704	0.1
ELSINORE	6.345	6.455	0.1
IVYGLEN	3.044	3.069	0.0
MAYBERRY	7.401	7.551	0.2
MORAGA	6.832	6.960	0.1
MORENO	5.916	6.011	0.1
MWD	7.385	7.536	0.2
NELSON	9.095	9.323	0.2
NEWCOMB	7.797	7.962	0.2
PAUBA	5.242	5.317	0.1
PECHANGA	5.707	5.796	0.1
SKYLARK	7.214	7.356	0.1
STADLER	5.933	6.029	0.1
STETSON	8.638	8.844	0.2
VALLEY	20.807	22.024	1.2
VALLEY SO.	20.383	21.550	1.2

APPENDIX A

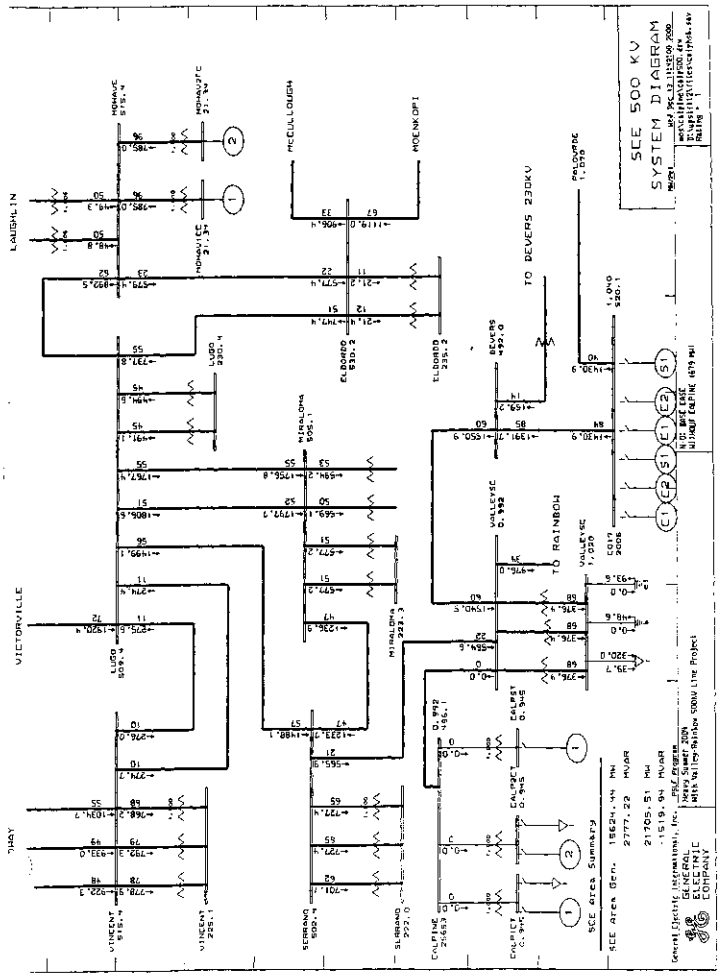
LOAD FLOW PLOTS

(500kV, Main 230kV, and Valley 115kV Systems)

for

Base Case

With and Without Calpine Project



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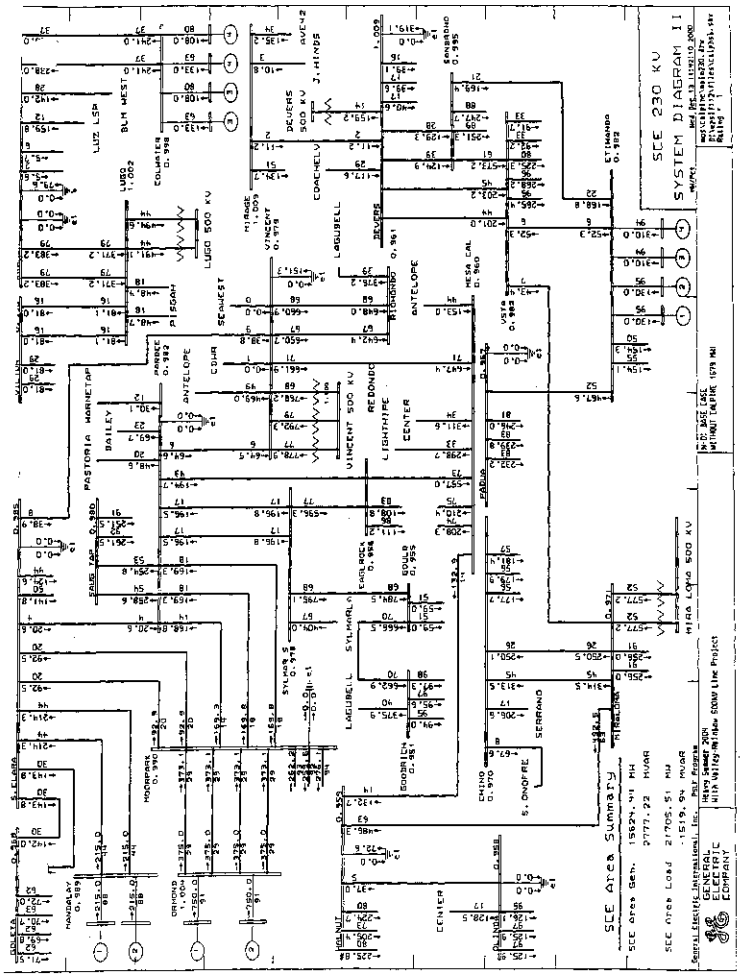

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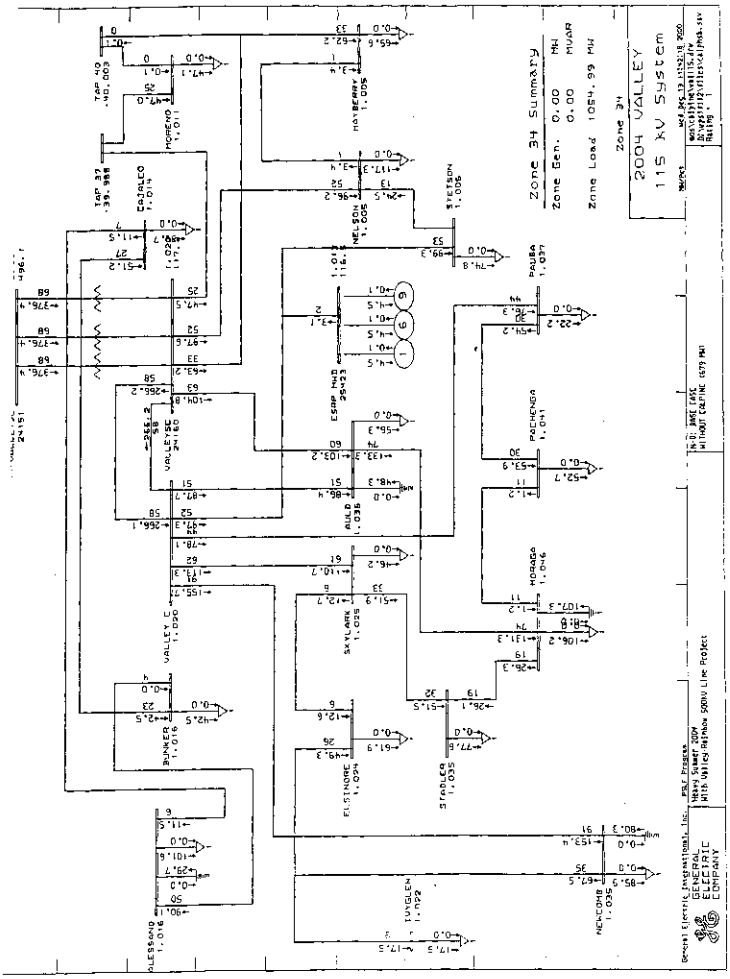

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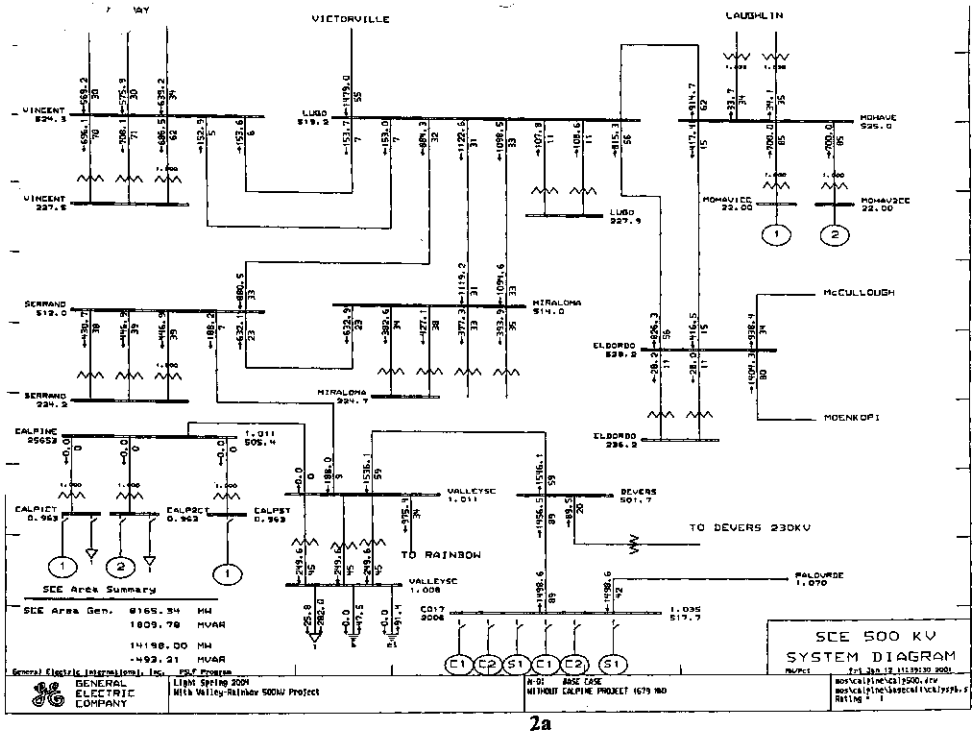
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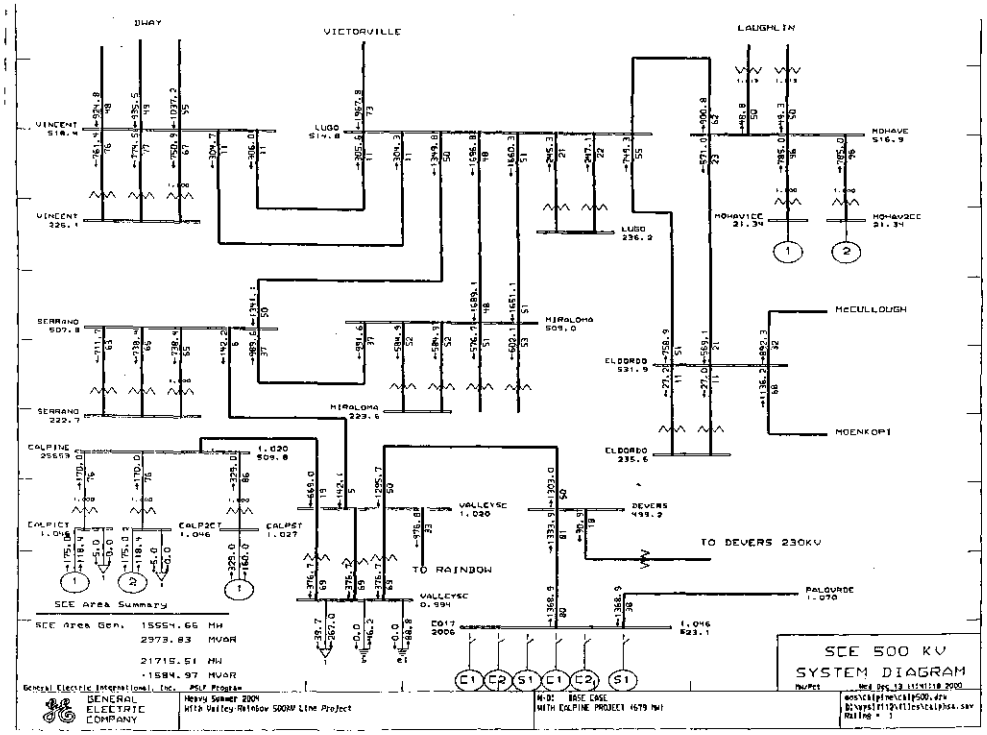
VINCENT
LUGO
MOHAVE
MOHAVICE
SERRANO
MIRALOMA
McCULLOUGH
ELDORDO
MOENKOPI
CALPINE
CALPICT
CALPST
VALLEYSC
DEVERS
TO DEVERS 230KV
TO RAINBOW
PALOURDE
SCE Area Summary
SCE Area Gen. 8165.34 MW
1809.78 MVAR
14198.00 MW
-492.21 MVAR
SCE 500 KV
SYSTEM DIAGRAM
GENERAL ELECTRIC COMPANY
Light Spring 2004
With Valley-Rainbow 500kV Project
N-01 BASE CASE
WITHOUT CALPINE PROJECT (679 MW)

2a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VINCENT
LUGO
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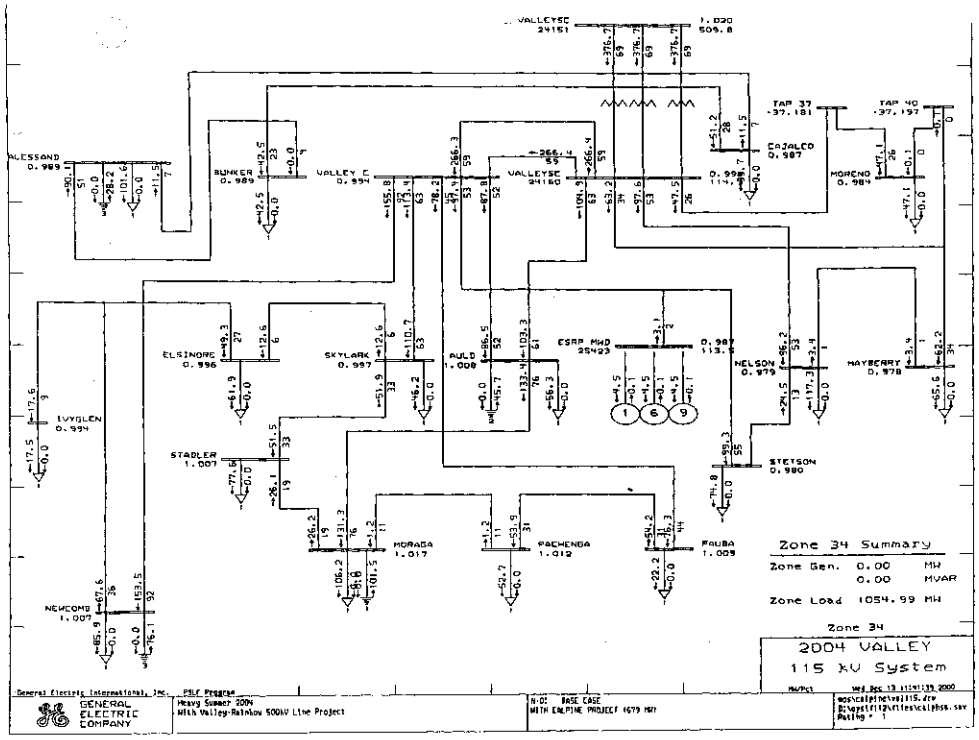
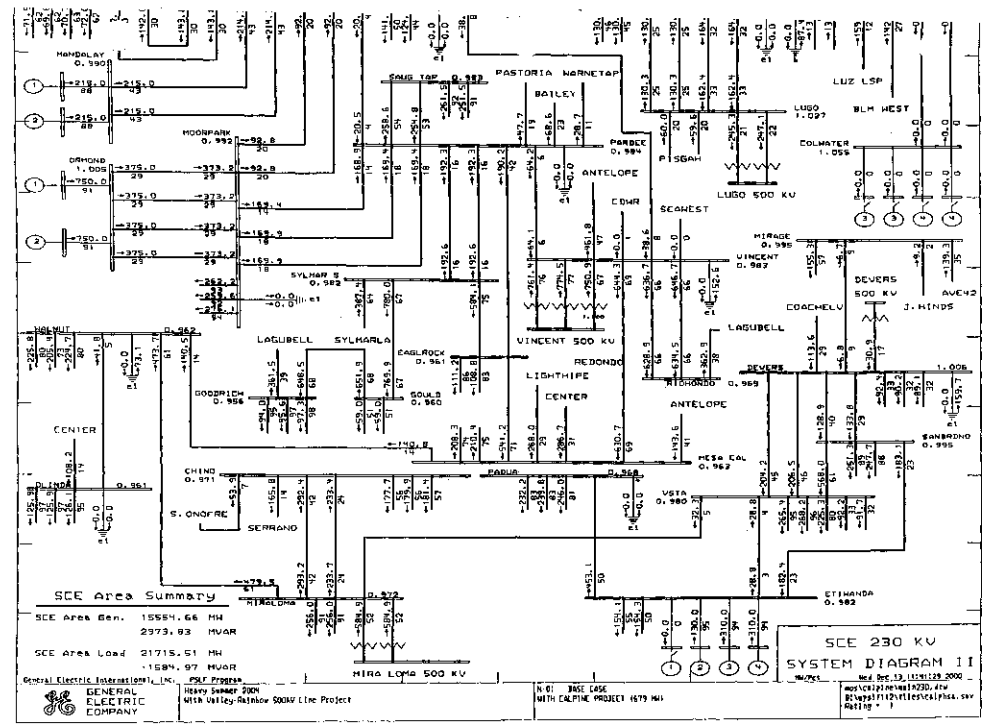
SERRANO
MIRALOMA
McCULLOUGH
ELDORDO
MOENKOPI
CALPINE
CALPICT
CALPST
VALLEYSC
DEVERS
TO DEVERS 230KV
TO RAINBOW
PALOURDE
SCE Area Summary
SCE Area Gen. 15554.66 MW
2973.83 MVAR
21715.51 MW
-1584.97 MVAR
SCE 500 KV
SYSTEM DIAGRAM
GENERAL ELECTRIC COMPANY
Heavy Summer 2004
With Valley-Rainbow 500kV Line Project
N-01 BASE CASE
WITH CALPINE PROJECT (679 MW)

1d


VALLEYSC
ALESSAND
BUNKER
VALLEY C
VALLEYSC
CAJALCO
MORENO
TAP 37
TAP 40
ELSINORE
SKYLARK
AULD
ESRP MWD
NELSON
MAYBERRY
IVYGLEN
STADLER
STETSON
MORAGA
PACHENGA
FAUBA
NEWCOMB
Zone 34 Summary
Zone Gen. 0.00 MW
0.00 MVAR
Zone Load 1054.99 MW
Zone 34
2004 VALLEY
115 kV System
GENERAL ELECTRIC COMPANY
Heavy Summer 2004
With Valley-Rainbow 500kV Line Project
N-01 BASE CASE
WITH CALPINE PROJECT (679 MW)

1f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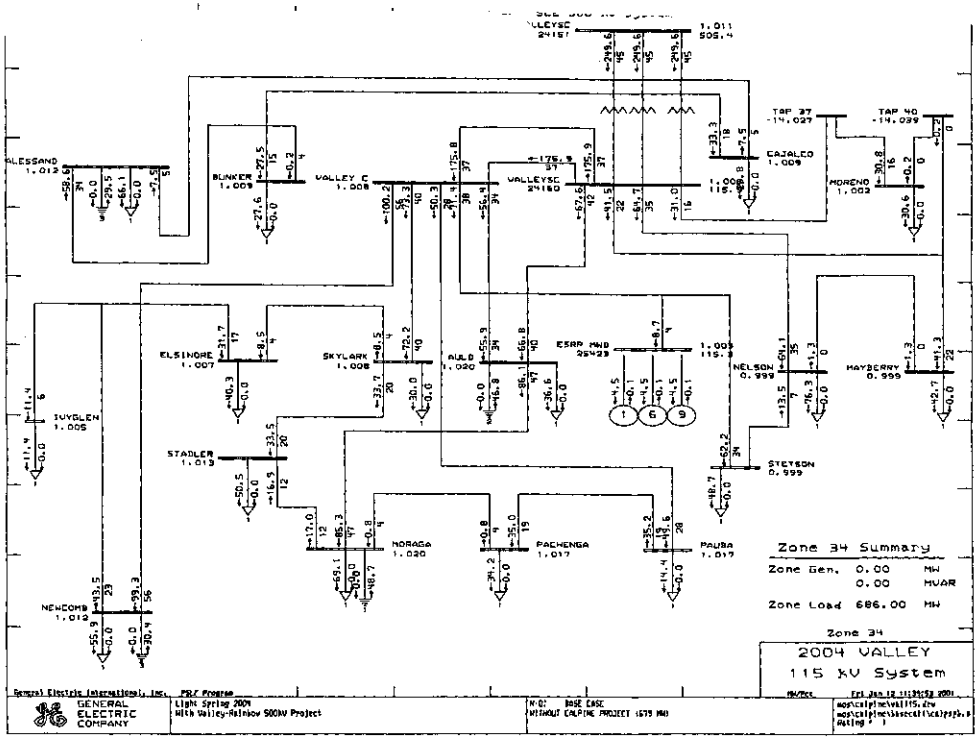
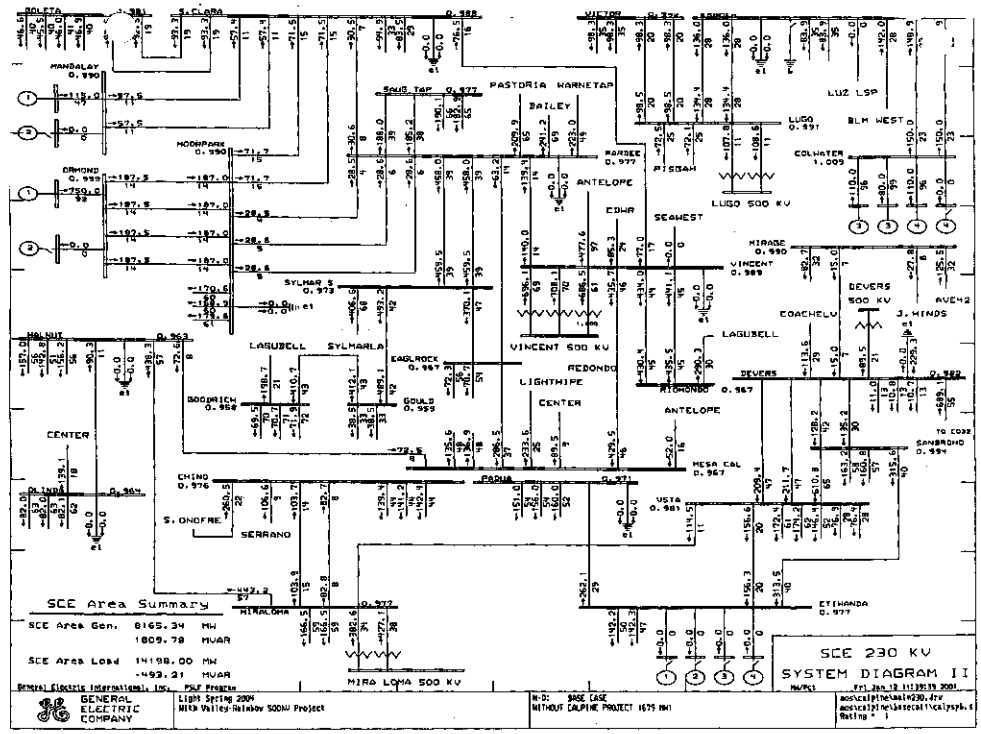
PASTORIA WARNETAP
BAILEY
LUZ LSP
BLM WEST
MOORPARK
ORMOND
PARDEE
PISGAH
ANTELOPE
LUGO 500 KV
COLWATER
CDWR
SEAWEST
MIRAGE
VINCENT
DEVERS 500 KV
AVE42
J. HINDS
COACHELV
SYLMAR S
LAGUBELL
SYLMARLA
VINCENT 500 KV
REDONDO
LIGHTHIPE
CENTER
GOODRICH
GOULD
RICHMOND
SANBRDNO
MESA CAL
CHINO
PADUA
VSTA
S. ONOFRE
SERRANO
MIRALOMA
ETIWANDA
MIRA LOMA 500 KV
SCE Area Summary
SCE Area Gen. 15554.66 MW
2973.83 MVAR
SCE Area Load 21715.51 MW
-1584.97 MVAR
SCE 230 KV
SYSTEM DIAGRAM II
GENERAL ELECTRIC COMPANY
Heavy Summer 2004
With Valley-Rainbow 500kV Line Project
N-01 BASE CASE
WITH CALPINE PROJECT (679 MW)

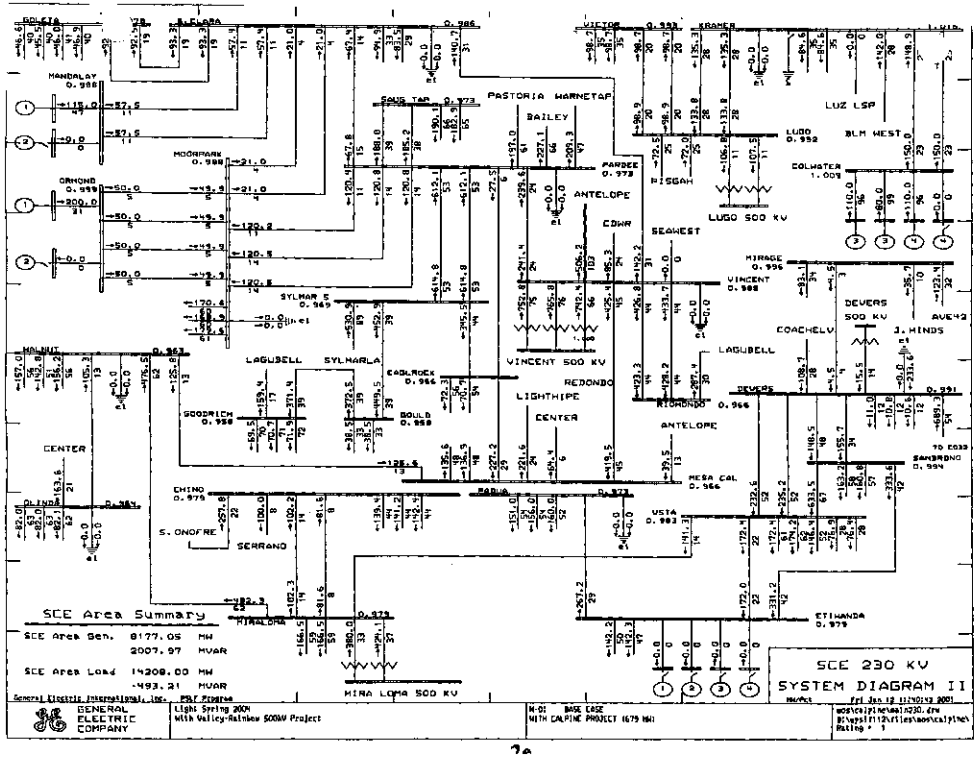
1e


Zone 34 Summary
Zone Gen. 0.00 MW
0.00 MVAR
Zone Load 686.00 MW
Zone 34
2004 VALLEY
115 kV System
GENERAL ELECTRIC COMPANY
Light Spring 2004
With Valley-Rainbow 500kV Project
N-0: BASE CASE
WITHOUT CALPINE PROJECT (675 MW)

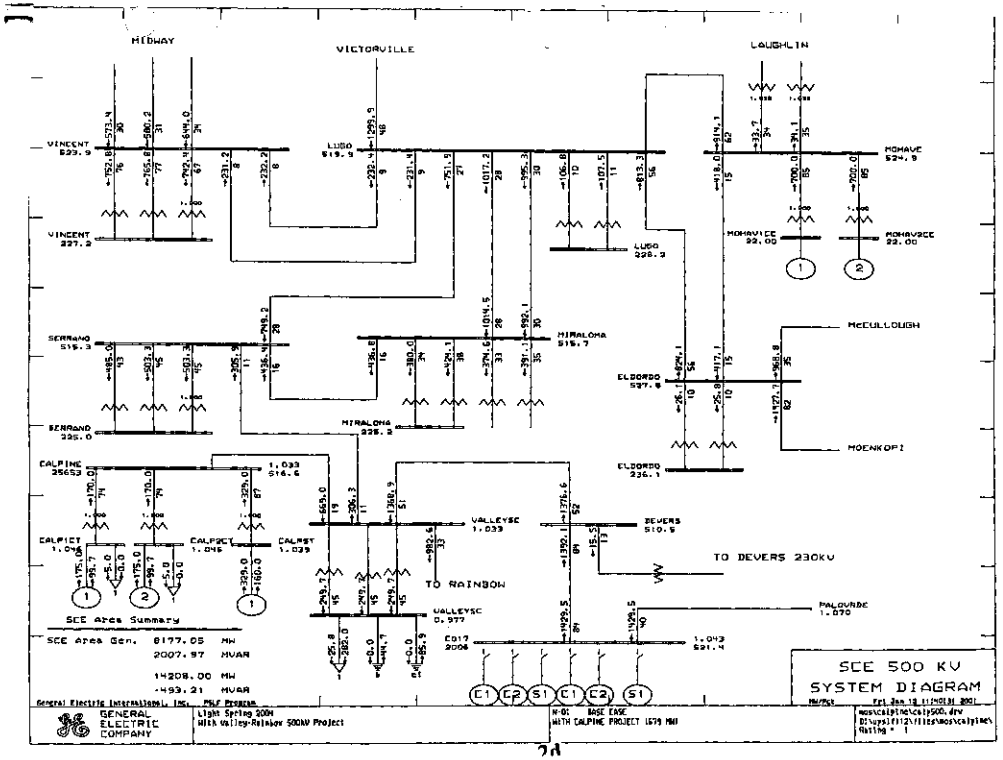
2c


SCE Area Summary
SCE Area Gen. 8165.34 MW
1809.78 MVAR
SCE Area Load 14198.00 MW
-493.21 MVAR
SCE 230 KV
SYSTEM DIAGRAM II
GENERAL ELECTRIC COMPANY
Light Spring 2004
With Valley-Rainbow 500kV Project
N-0: BASE CASE
WITHOUT CALPINE PROJECT (675 MW)

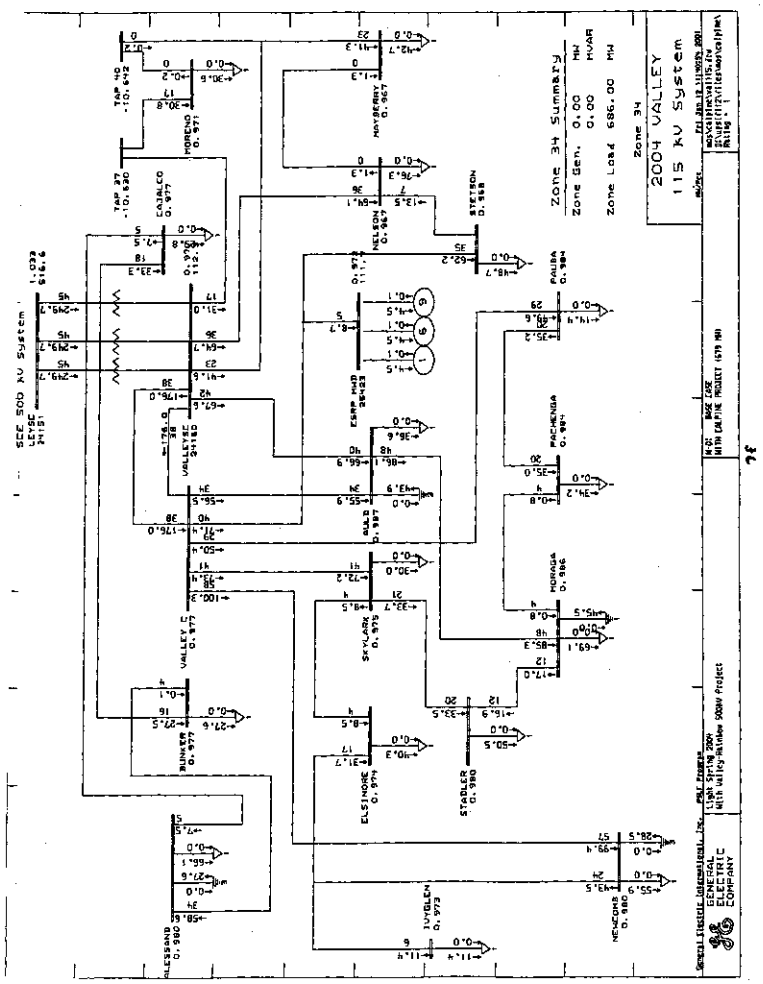
2b


SCE Area Summary
SCE Area Gen. 8177.05 MW
2007.97 MVAR
SCE Area Load 14208.00 MW
-493.21 MVAR
SCE 230 KV
SYSTEM DIAGRAM II
GENERAL ELECTRIC COMPANY
Light Spring 2004
With Valley-Rainbow 500kV Project
N-0: BASE CASE
WITH CALPINE PROJECT (675 MW)

2a


SCE Area Summary
SCE Area Gen. 8177.05 MW
2007.97 MVAR
14208.00 MW
-493.21 MVAR
SCE 500 KV
SYSTEM DIAGRAM
GENERAL ELECTRIC COMPANY
Light Spring 2004
With Valley-Rainbow 500kV Project
N-0: BASE CASE
WITH CALPINE PROJECT (675 MW)

2d



APPENDIX B

STABILITY PLOTS

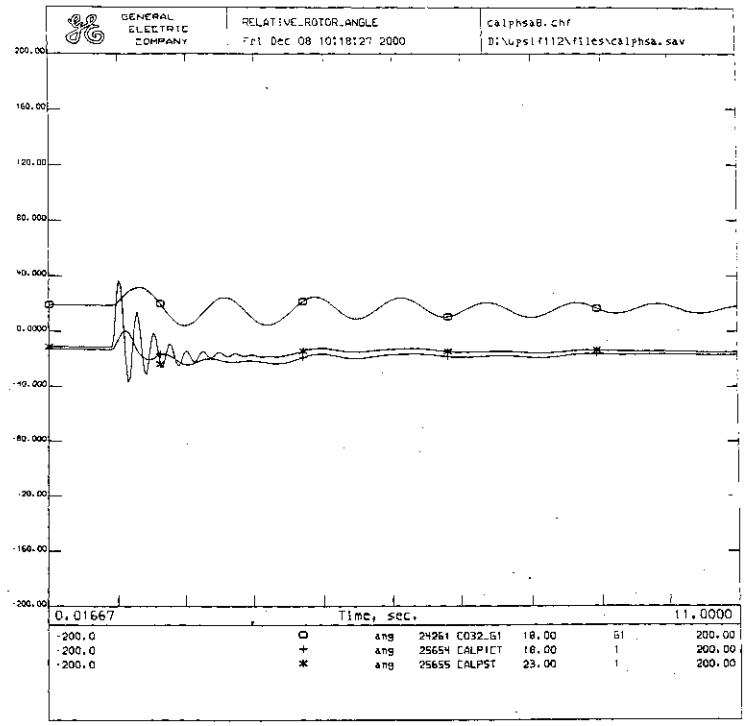
With Calpine

for

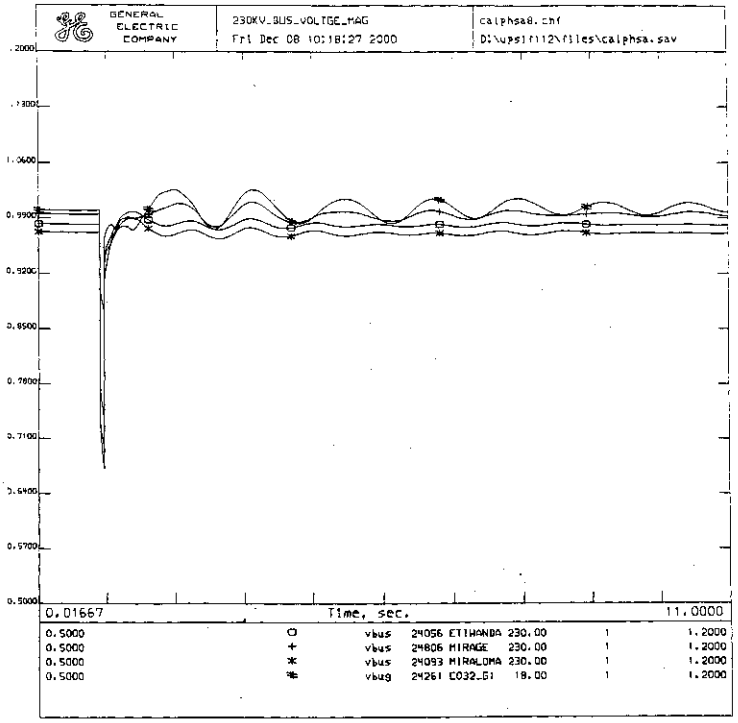
B-1: Heavy Summer
B-2: Light Spring

Transient Stability

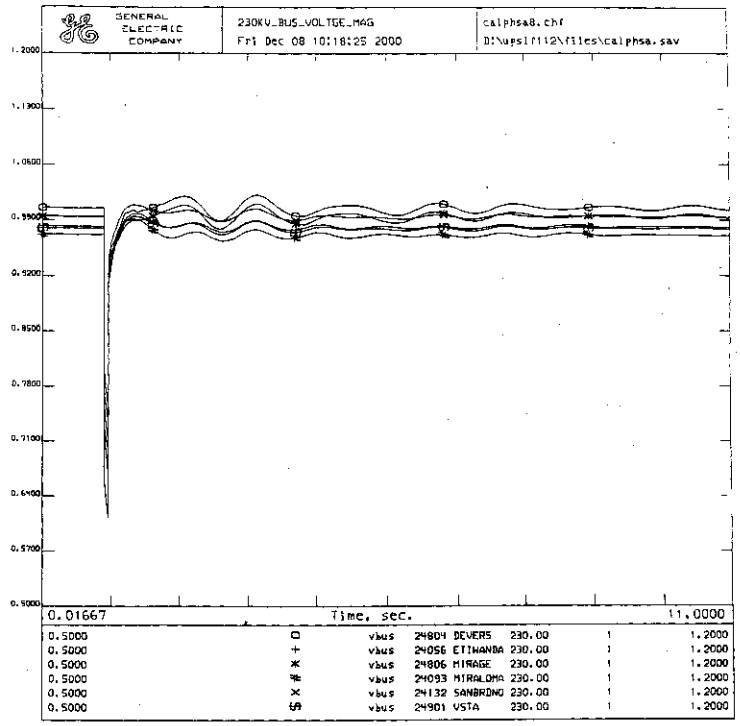
B-1: Heavy Summer – With Calpine



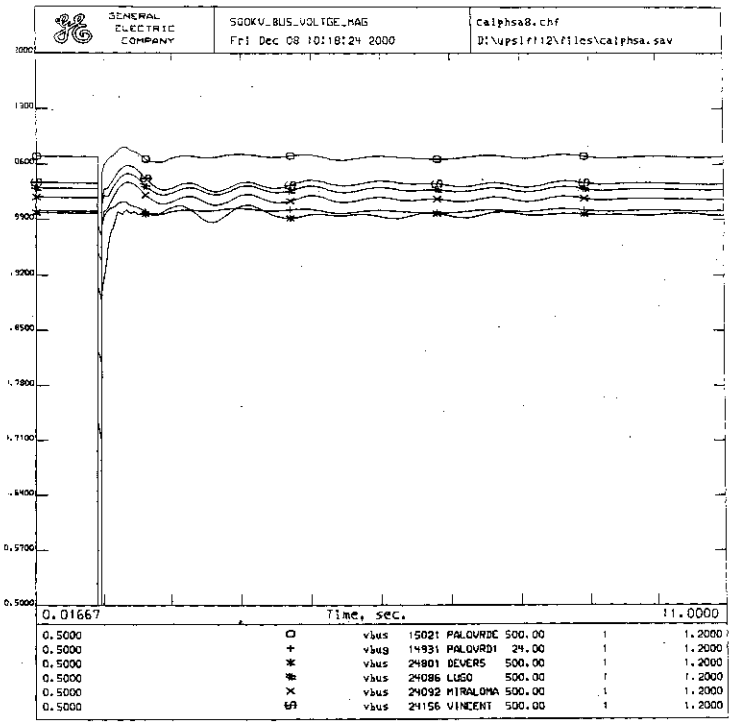
2004 Heavy Summer
4-CYCLE 3-Phase Fault on Valley 500-kV Bus
Contingency - Serrano-Valley 500KV Line
SYSTEM STABILITY STUDY CASES - Case 8:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa8.swt



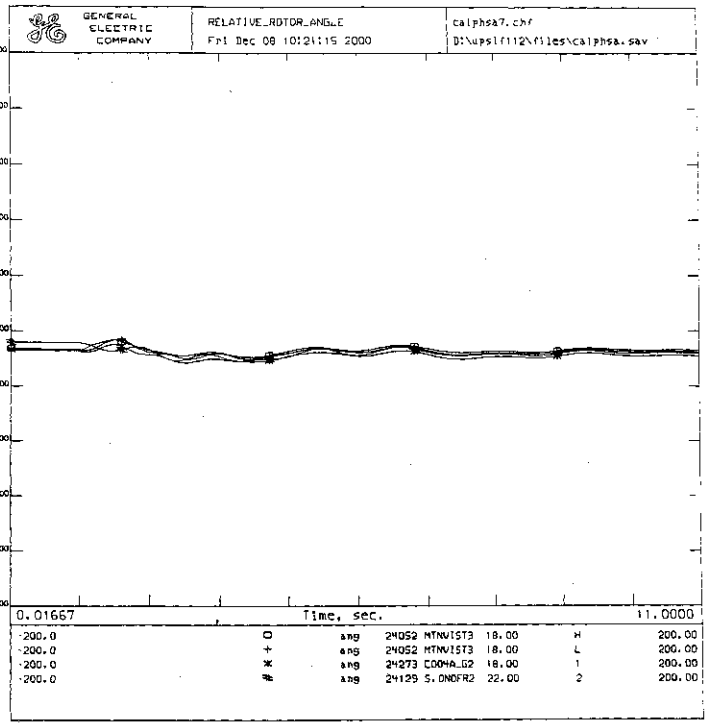
2004 Heavy Summer
4-CYCLE 3-Phase Fault on Valley 500-KV Bus
Contingency - Serrano-Valley 500KV Line
SYSTEM STABILITY STUDY CASES - Case 8:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa8.swt



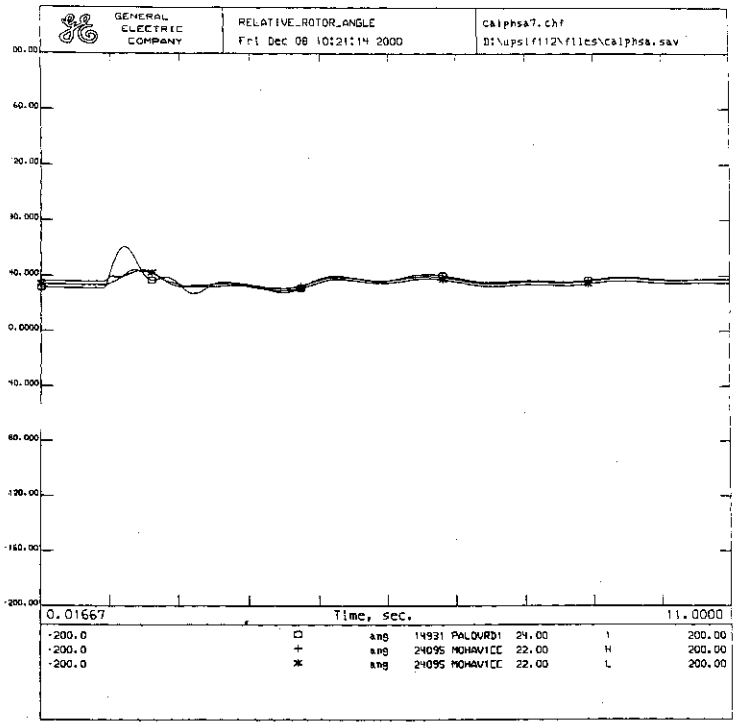
2004 Heavy Summer
4-CYCLE 3-Phase Fault on Valley 500-KV Bus
Contingency - Serrano-Valley 500KV Line
SYSTEM STABILITY STUDY CASES - Case 8:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa8.swt



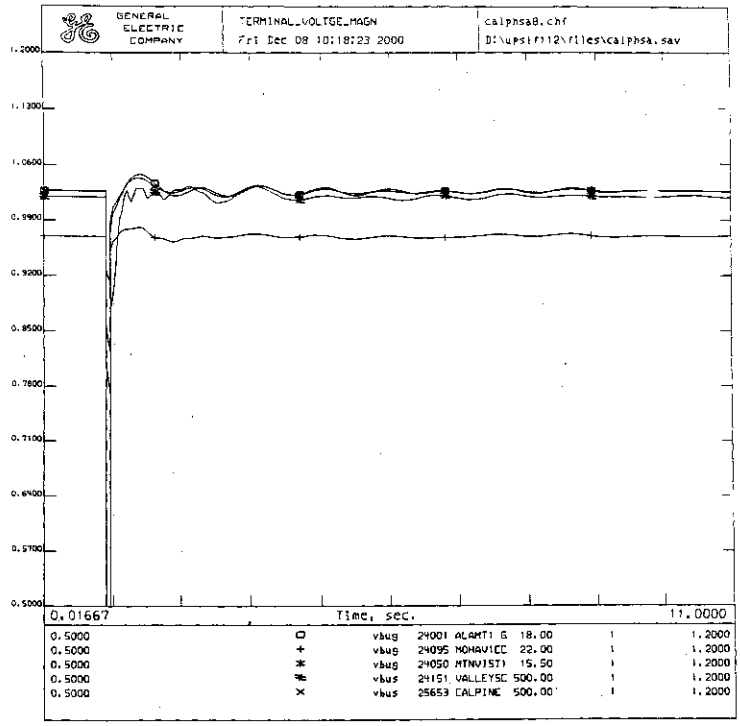
2004 Heavy Summer
4-CYCLE 3-Phase Fault on Valley 500-KV Bus
Contingency - Serrano-Valley 500KV Line
SYSTEM STABILITY STUDY CASES - Case 8:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa8.swt



2004 HEAVY SUMMER
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-N.GILA 500 KV LINE
SYSTEM STABILITY STUDY CASES - Case 07:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa7.swt



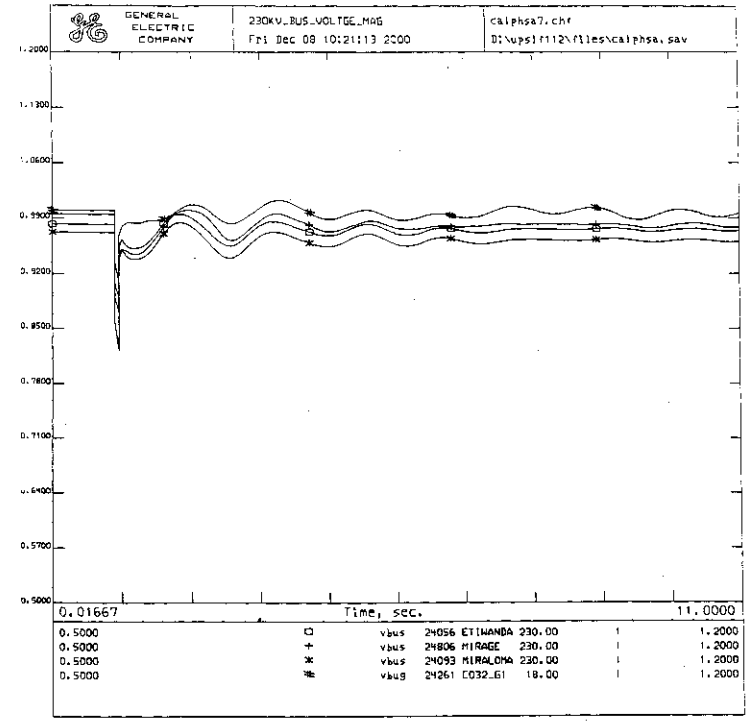
2004 HEAVY SUMMER
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-N.GILA 500 KV LINE
SYSTEM STABILITY STUDY CASES - Case 07:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa7.swt



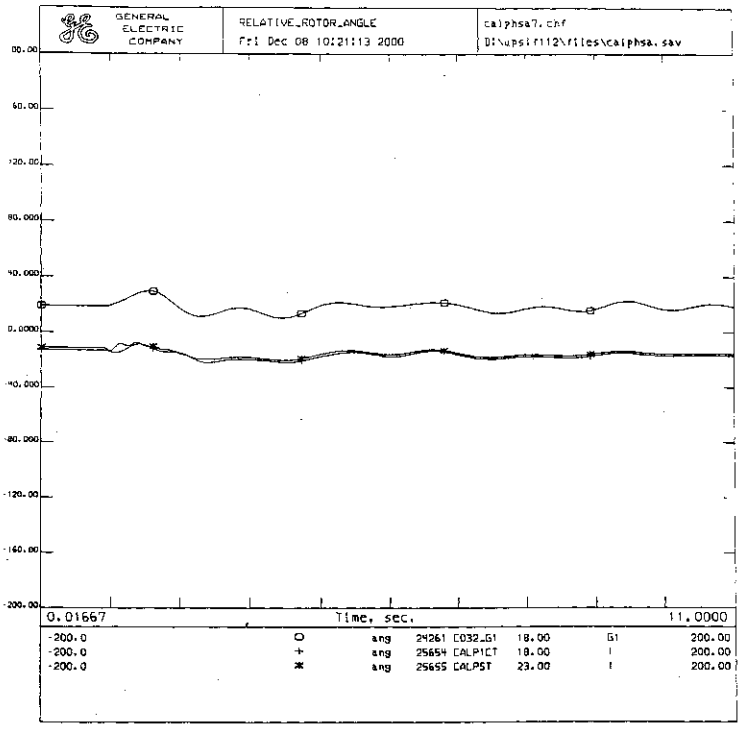
2004 Heavy Summer
4-CYCLE 3-Phase Fault on Valley 500-KV Bus
Contingency - Serrano-Valley 500KV Line
SYSTEM STABILITY STUDY CASES - Case 8:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa8.swt

CASE 8

```
calphsa.sav
calphsa.dyd
TITLE
2004 Heavy Summer
4-CYCLE 3-Phase Fault on Valley 500-KV Bus
Contingency - Serrano-Valley 500KV Line
SYSTEM STABILITY STUDY CASES-Case 8:With Calpine(679 MW)
calphsa.sav - calphsa.dyd + calphsa8.swt
RUN 10
CC
CC  ***** CALPINE: MORENO VALLEY SYSTEM IMPACT STUDY ******
CC
CC  APPLY A 4 CYCLE 3-PHASE FAULT ON THE VALLEYSC 500 BUS
CC
FB  0.0 "VALLEYSC" 500
CC  CLEAR FAULT
CFB 4.0 "VALLEYSC" 500
CC   REMOVE SERRANO - VALLEY 500 KV LINE
DL   4.0 "SERRANO " 500. "VALLEYSC" 500. "1 "
```



2004 HEAVY SUMMER
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-N.GILA 500 KV LINE
SYSTEM STABILITY STUDY CASES - Case 07:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa7.swt



2004 HEAVY SUMMER
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-N.GILA 500 KV LINE
SYSTEM STABILITY STUDY CASES - Case 07:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa7.swt

CASE 7

```
calphsa.sav
calphsa.dyd
TITLE
2004 HEAVY SUMMER
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-N.GILA 500 KV LINE
SYSTEM STABILITY STUDY CASES-Case 7:With Calpine(679 MW)
calphsa.sav + calphsa.dyd + calphsa7.swt
RUN 10.0
CC
CC  ***** CALPINE: MORENO VALLEY SYSTEM IMPACT STUDY ******
CC  APPLY A 4 CYCLE 3-PHASE FAULT ON THE PALOVERDE 500 KV BUS
CC
FB  0.0 "PALOVRDE" 500
CC  FLASH SERIES CAPACITORS IN: MOENKOPI-YAVAPAI-WESTWING LINE
FC  0.0 "MOENKOPI" 500. "YAVAPAI " 500. "1 " 1
FC  0.0 "YAVAPAI " 500. "WESTWING" 500. "1 " 2
CC  FLASH SERIES CAPACITORS IN: NAVAJO-WESTWING LINE
FC  0.0 "NAVAJO  " 500. "WESTWING" 500. "1 " 1
FC  0.0 "NAVAJO  " 500. "WESTWING" 500. "1 " 3
CC  FLASH SERIES CAPACITORS IN: PALO VERDE-DEVERS LINE
FC  0.0 "PALOVRDE" 500. "DEVERS  " 500. "1 " 1
FC  0.0 "PALOVRDE" 500. "DEVERS  " 500. "1 " 3
CC  FLASH SERIES CAPACITORS   IN: PALO VERDE-N.GILA-IMPERIAL
CC  VALLEY-MIGUEL 500 KV LINES
FC  0.0 "PALOVRDE" 500. "N.GILA  " 500. "1 " 3
FC  0.0 "N.GILA  " 500. "IMPRLVLY" 500. "1 " 2
FC  0.0 "IMPRLVLY" 500. "MIGUEL  " 500. "1 " 1
CC  APPLY A 98MW(7.2%) MACHINE FAULT DAMPING TO PALO VERDE UNITS
GFD 0.0 "PALOVRD1" 24.00 "1 " 0.072485
GFD 0.0 "PALOVRD2" 24.00 "1 " 0.072485
GFD 0.0 "PALOVRD3" 24.00 "1 " 0.072485
CC  CLEAR FAULT
CFB 4.0 "PALOVRDE" 500
CC    REMOVE PALO VERDE-NORTH GILA LINE
DL    4.0 "PALOVRDE" 500. "N.GILA  " 500. "1 "
CC  REINSERT SERIES CAPACITORS IN: PALO VERDE-N.GILA-IMPERIAL
CC  VALLEY-MIGUEL 500 KV LINES
RC  4.0 "PALOVRDE" 500. "N.GILA  " 500. "1 " 3
RC  4.0 "N.GILA  " 500. "IMPRLVLY" 500. "1 " 2
RC  4.0 "IMPRLVLY" 500. "MIGUEL  " 500. "1 " 1
CC  REMOVE FAULT DAMPING TO PALO VERDE UNITS
GFD 4.0 "PALOVRD1" 24.00 "1 " 0.0
GFD 4.0 "PALOVRD2" 24.00 "1 " 0.0
GFD 4.0 "PALOVRD3" 24.00 "1 " 0.0
CC  REINSERT SERIES CAPACITORS IN: MOENKOPI-YAVAPAI-WESTWING LINE
RC  8.0 "MOENKOPI" 500. "YAVAPAI " 500. "1 " 1
RC  8.0 "YAVAPAI " 500. "WESTWING" 500. "1 " 2
CC  REINSERT SERIES CAPACITORS IN: NAVAJO-WESTWING LINE
RC  8.0 "NAVAJO  " 500. "WESTWING" 500. "1 " 1
RC  8.0 "NAVAJO  " 500. "WESTWING" 500. "1 " 3
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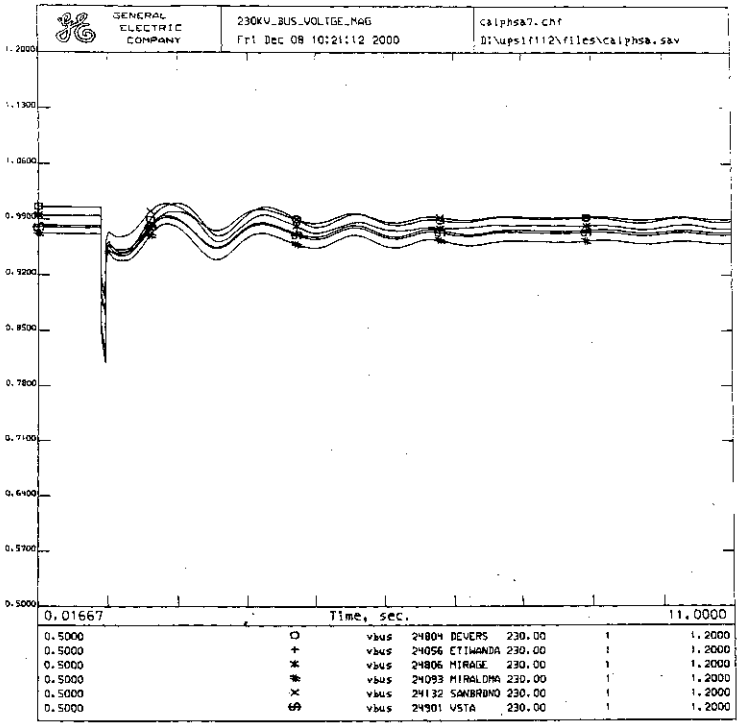
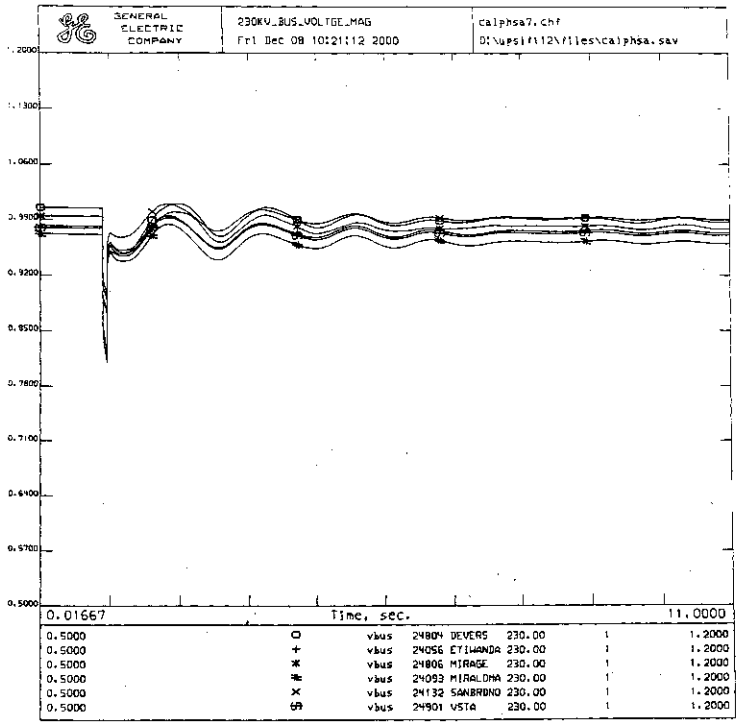
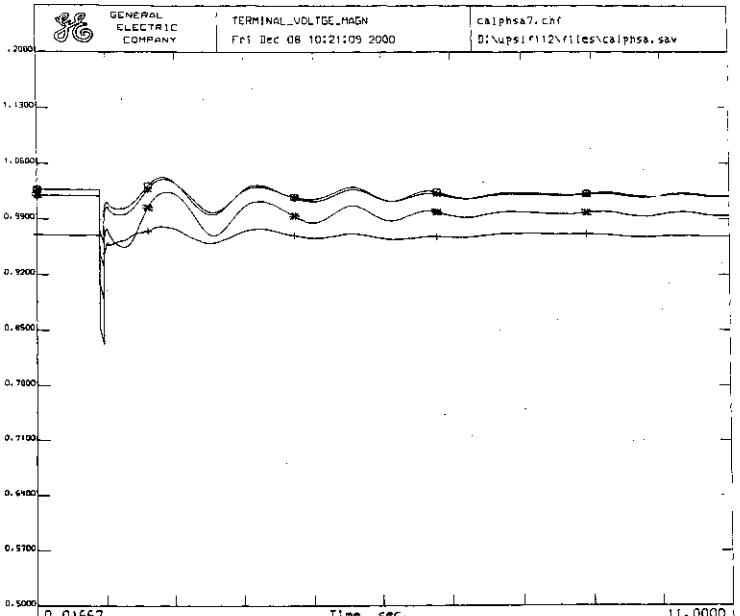


2004 HEAVY SUMMER
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-N.GILA 500 KV LINE
SYSTEM STABILITY STUDY CASES - Case 07:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa7.swt

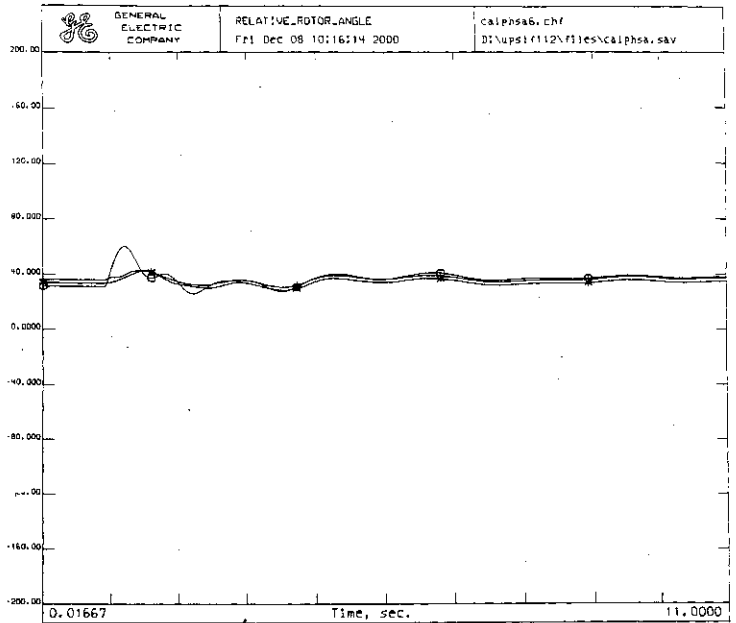


2004 HEAVY SUMMER
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-N.GILA 500 KV LINE
SYSTEM STABILITY STUDY CASES - Case 07:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa7.swt



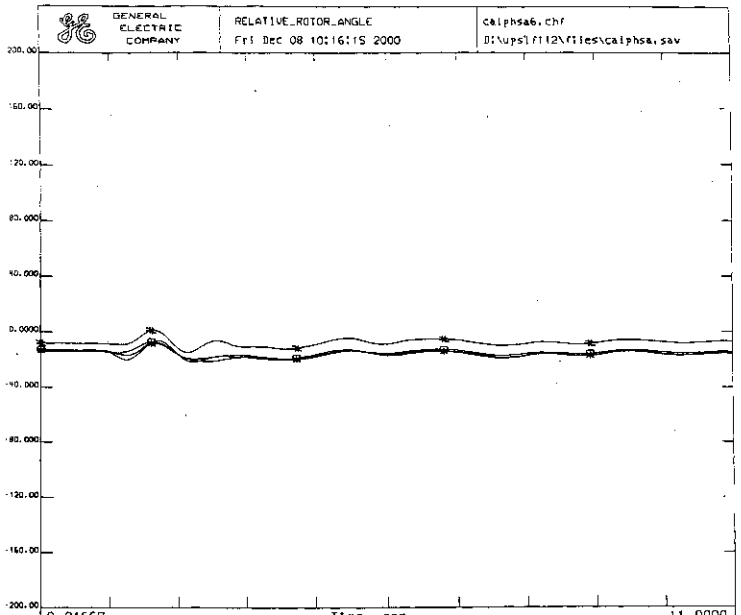
0.5000	○	vbus	24001 ALAMT1 G	18.00	1	1.2000
0.5000	+	vbus	24095 MOHAVICC	22.00	1	1.2000
0.5000	✱	vbus	24050 MTNVIST1	15.50	1	1.2000
0.5000	✱	vbus	24151 VALLEYSC	500.00	1	1.2000
0.5000	×	vbus	25653 CALPINE	500.00	1	1.2000

2004 HEAVY SUMMER
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-N.GILA 500 KV LINE
SYSTEM STABILITY STUDY CASES - Case 07:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa7.swt



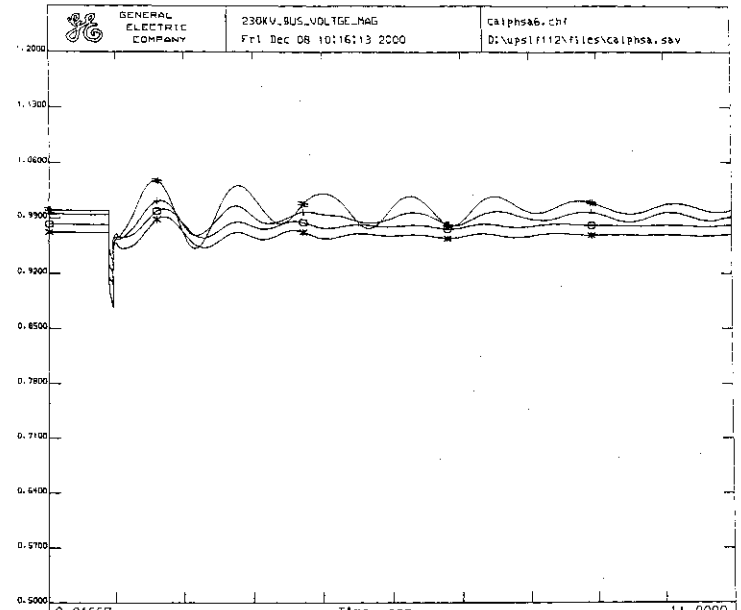
-200.0	○	ang	14931 PALOVRD1	24.00	1	200.00
-200.0	+	ang	24095 MOHAVICC	22.00	H	200.00
-200.0	✱	ang	24095 MOHAVICC	22.00	L	200.00

2004 HEAVY SUMMER
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-DEVERS 500 KV LINE
SYSTEM STABILITY STUDY CASES -CASE 6:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa6.swt



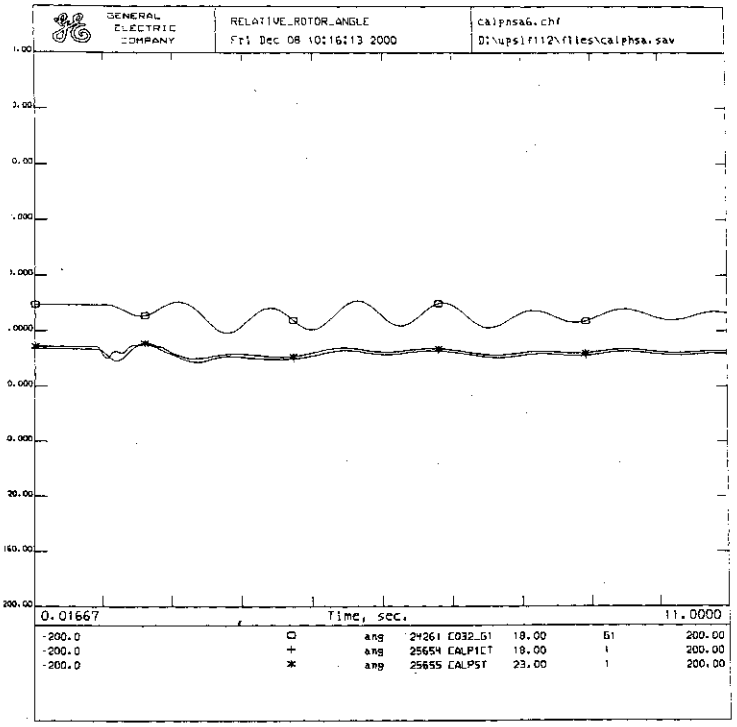
-200.0	○	ang	24052 MTNVIST3	18.00	H	200.00
-200.0	+	ang	24052 MTNVIST3	18.00	L	200.00
-200.0	✱	ang	24273 COOMA_G2	18.00	1	200.00
-200.0	✱	ang	24129 S.ONOFR2	22.00	2	200.00

2004 HEAVY SUMMER
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-DEVERS 500 KV LINE
SYSTEM STABILITY STUDY CASES -CASE 6:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa6.swt

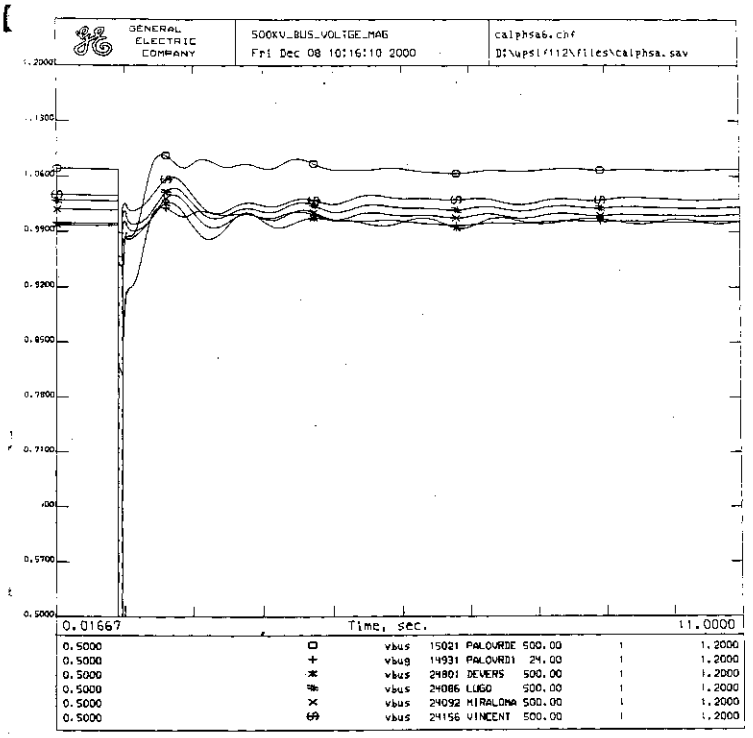


0.5000	○	vbus	24056 ETIWANDA	230.00	1	1.2000
0.5000	+	vbus	24806 MIRAGE	230.00	1	1.2000
0.5000	✱	vbus	24093 MIRALOMA	230.00	1	1.2000
0.5000	✱	vbus	24261 CO32_G1	18.00	1	1.2000

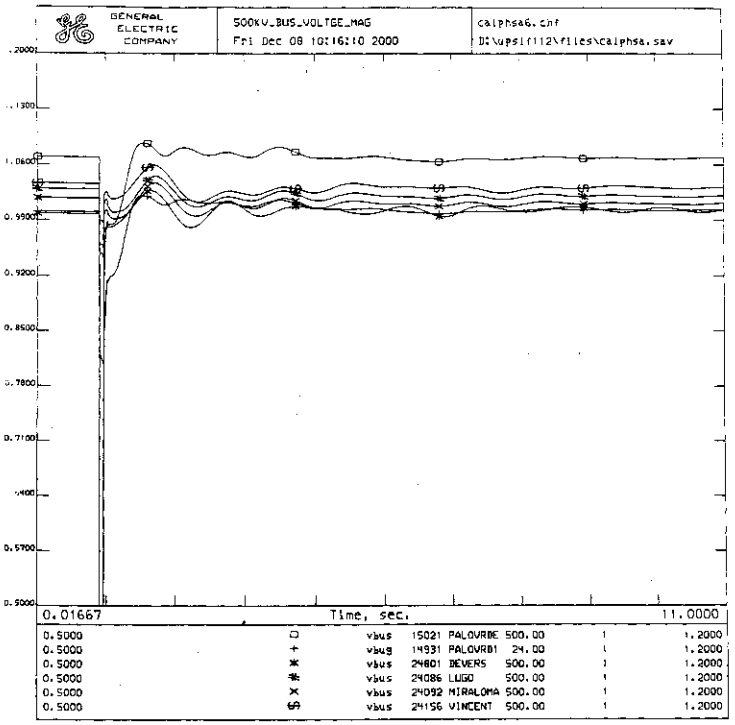
2004 HEAVY SUMMER
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-DEVERS 500 KV LINE
SYSTEM STABILITY STUDY CASES -CASE 6:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa6.swt



2004 HEAVY SUMMER
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-DEVERS 500 KV LINE
SYSTEM STABILITY STUDY CASES -CASE 6:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa6.swt



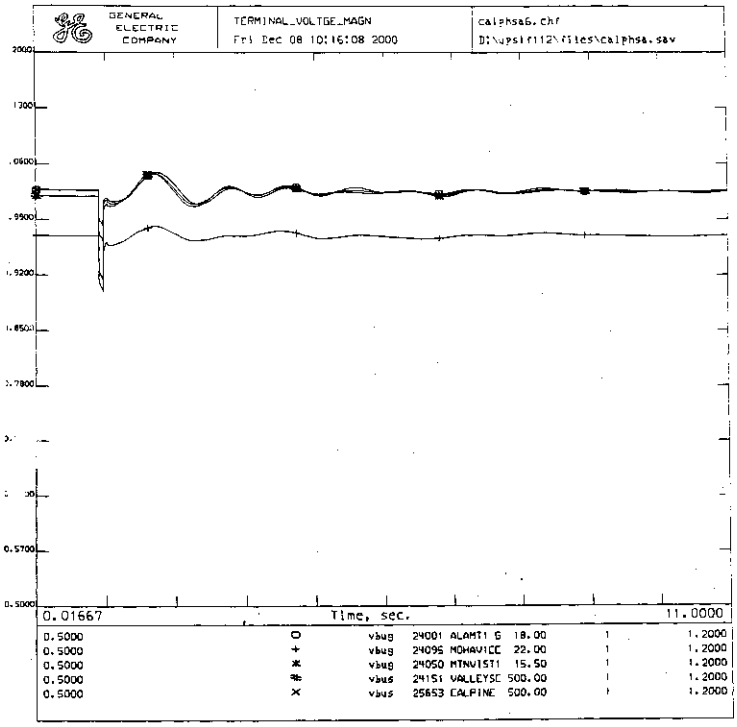
2004 HEAVY SUMMER
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-DEVERS 500 KV LINE
SYSTEM STABILITY STUDY CASES -CASE 6:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa6.swt



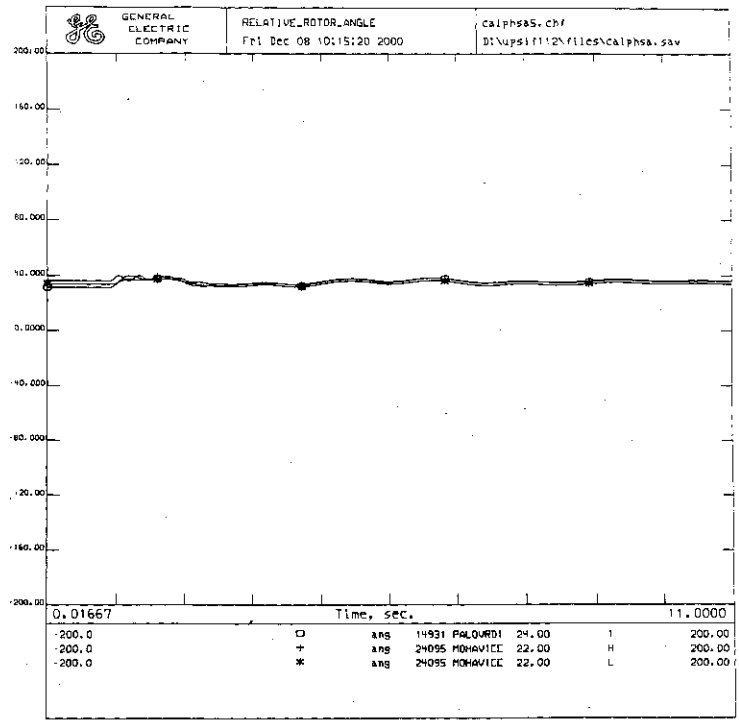
2004 HEAVY SUMMER
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-DEVERS 500 KV LINE
SYSTEM STABILITY STUDY CASES -CASE 6:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa6.swt

CASE 6

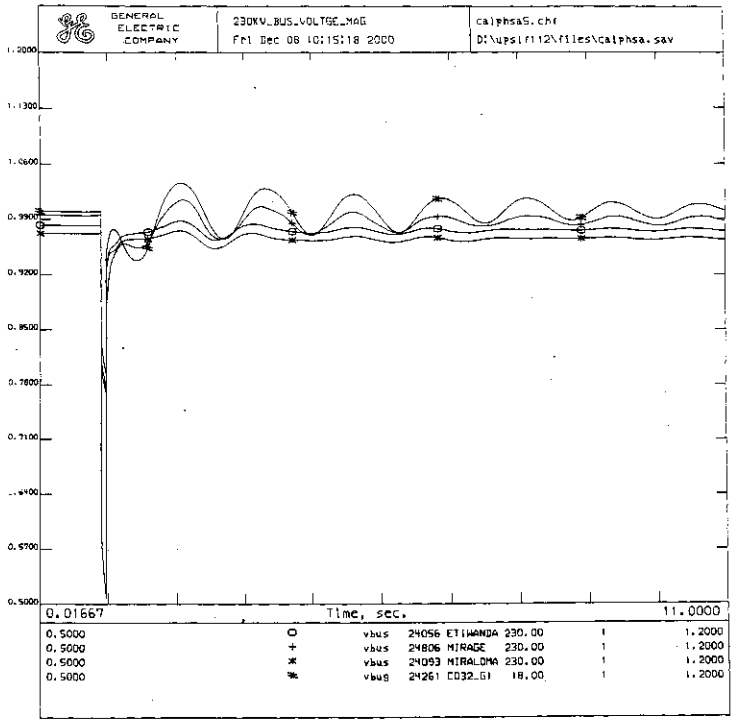
```
calphsa.sav
calphsa.dyd
TITLE
2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-DEVERS 500 KV LINE
SYSTEM STABILITY STUDY CASES-CASE 6:With Calpine(669 MW)
calphsa.sav + calphsa.dyd + calphsa6.swt
RUN 10.0
CC  MSV 0.0 "KEEL-SVC" 19.60 "1 "  350. -300.
CC  MSV 0.0 "MV-SVC  " 19.60 "1 "  350. -300.
*   Fault bus at Palo Verde
FB   0.0 "PALOVRDE" 500.
*  Apply fault damping to each Palo Verde Unit
GFD   0.0 "PALOVRD1" 24. "1 "  0.072485
GFD   0.0 "PALOVRD2" 24. "1 "  0.072485
GFD   0.0 "PALOVRD3" 24. "1 "  0.072485
*   Flash series capacitors in following 500 kV Lines
FC   0.0 "C017    " 500. "DEVERS  " 500. "1 "  1
FC   0.0 "C017    " 500. "DEVERS  " 500. "1 "  3
FC   0.0 "PALOVRDE" 500. "N.GILA  " 500. "1 "  1
FC   0.0 "PALOVRDE" 500. "N.GILA  " 500. "1 "  3
FC   0.0 "N.GILA  " 500. "IMPRLVLY" 500. "1 "  2
FC   0.0 "IMPRLVLY" 500. "MIGUEL  " 500. "1 "  1
FC   0.0 "MOENKOPI" 500. "YAVAPAI " 500. "1 "  1
FC   0.0 "YAVAPAI " 500. "WESTWING" 500. "1 "  2
FC   0.0 "NAVAJO  " 500. "WESTWING" 500. "1 "  1
FC   0.0 "NAVAJO  " 500. "WESTWING" 500. "1 "  3
FC   0.0 "MEAD    " 500. "PERKINS " 500. "1 "  1
FC   0.0 "MEAD    " 500. "PERKINS " 500. "1 "  3
*   Clear fault at Palo Verde
CFB  4.0 "PALOVRDE" 500.
*   Trip Palo Verde - Devers 500 kV Line
DL   4.0 "C017    " 500. "DEVERS " 500. "1 "
DL   4.0 "PALOVRDE" 500. "C017   " 500. "1 "
DB   4.0 "C017    " 500.
DB   4.0 "C0171C1G" 15.
DB   4.0 "C0171C2G" 15.
DB   4.0 "C0171S1G" 15.
DB   4.0 "C0172C1G" 15.
DB   4.0 "C0172C2G" 15.
DB   4.0 "C0172S1G" 15.
*  Remove fault damping to each Palo Verde Unit
GFD   4.0 "PALOVRD1" 24. "1 "  0.0
GFD   4.0 "PALOVRD2" 24. "1 "  0.0
GFD   4.0 "PALOVRD3" 24. "1 "  0.0
*   Reinsert series capacitors in following 500 kV Lines
RC   4.0 "PALOVRDE" 500. "N.GILA  " 500. "1 "  1
RC   4.0 "PALOVRDE" 500. "N.GILA  " 500. "1 "  3
RC   4.0 "N.GILA  " 500. "IMPRLVLY" 500. "1 "  2
RC   4.0 "IMPRLVLY" 500. "MIGUEL  " 500. "1 "  1
RC   4.0 "MEAD    " 500. "PERKINS " 500. "1 "  1
RC   4.0 "MEAD    " 500. "PERKINS " 500. "1 "  3
RC   8.0 "MOENKOPI" 500. "YAVAPAI " 500. "1 "  1
RC   8.0 "YAVAPAI " 500. "WESTWING" 500. "1 "  2
RC   8.0 "NAVAJO  " 500. "WESTWING" 500. "1 "  1
RC   8.0 "NAVAJO  " 500. "WESTWING" 500. "1 "  3
```



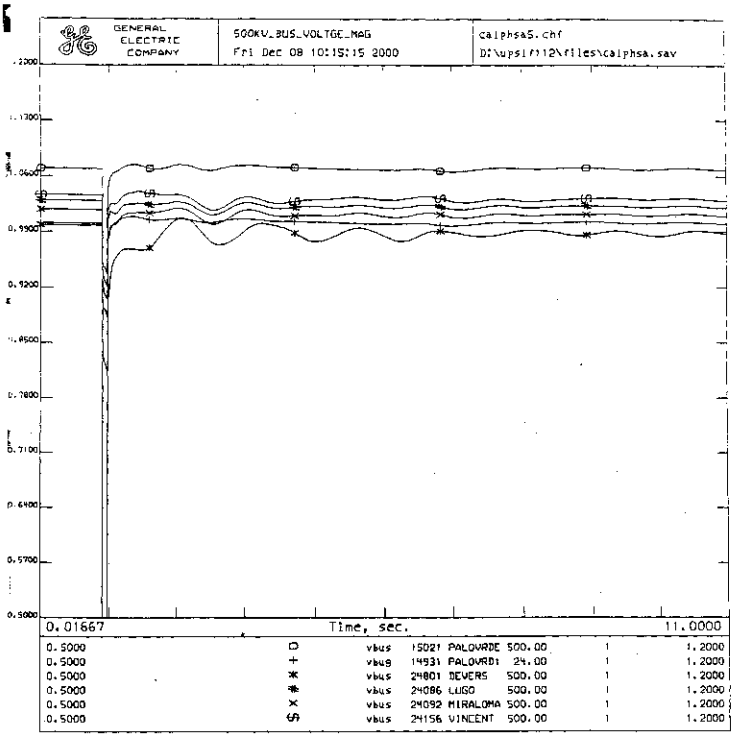
2004 HEAVY SUMMER
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-DEVERS 500 KV LINE
SYSTEM STABILITY STUDY CASES -CASE 6:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa6.swt



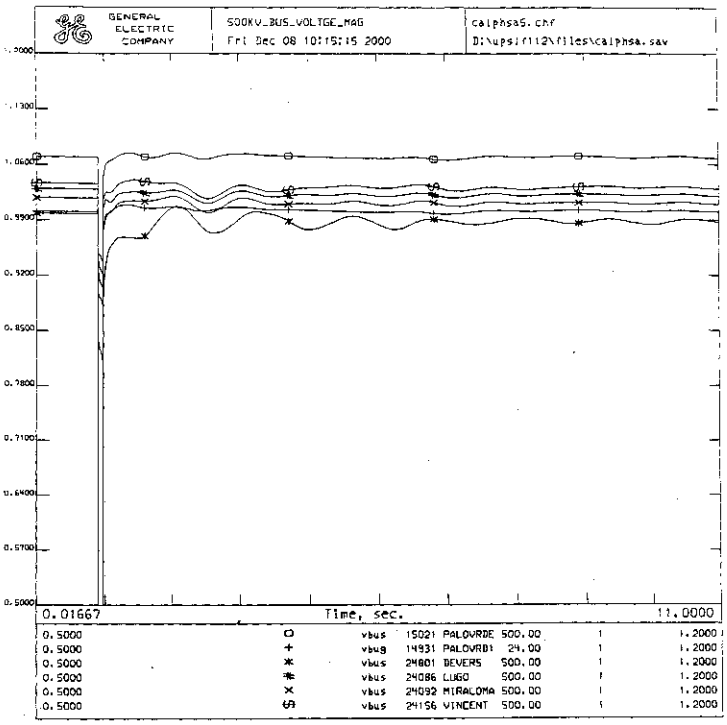
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 500-KV Bus
Contingency - Devers-Valley 500-KV Line
SYSTEM STABILITY STUDY CASE - Case 5:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa5.swt



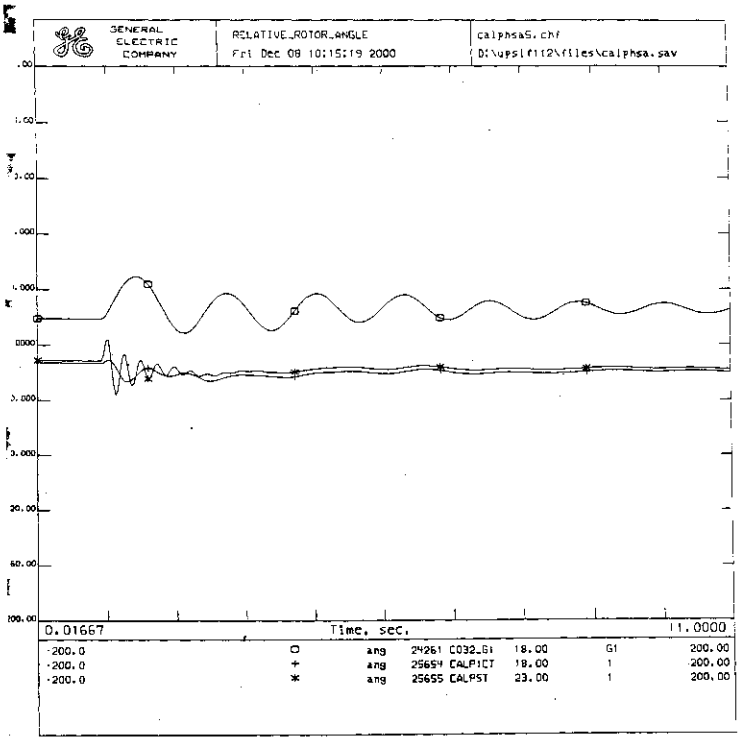
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 500-KV Bus
Contingency - Devers-Valley 500-KV Line
SYSTEM STABILITY STUDY CASE - Case 5:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa5.swt



2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 500-KV Bus
Contingency - Devers-Valley 500-KV Line
SYSTEM STABILITY STUDY CASE - Case 5:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa5.swt



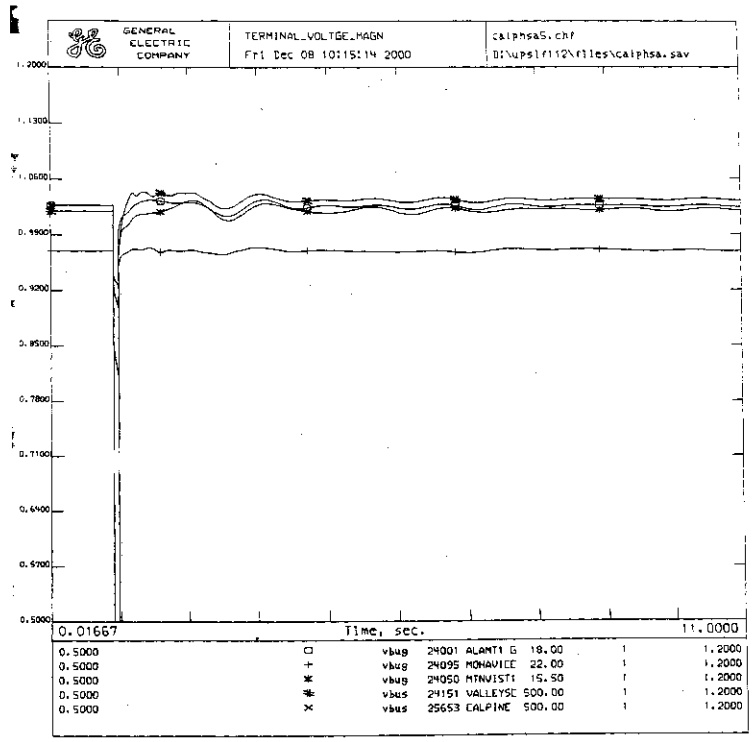
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 500-KV Bus
Contingency - Devers-Valley 500-KV Line
SYSTEM STABILITY STUDY CASE - Case 5:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa5.swt



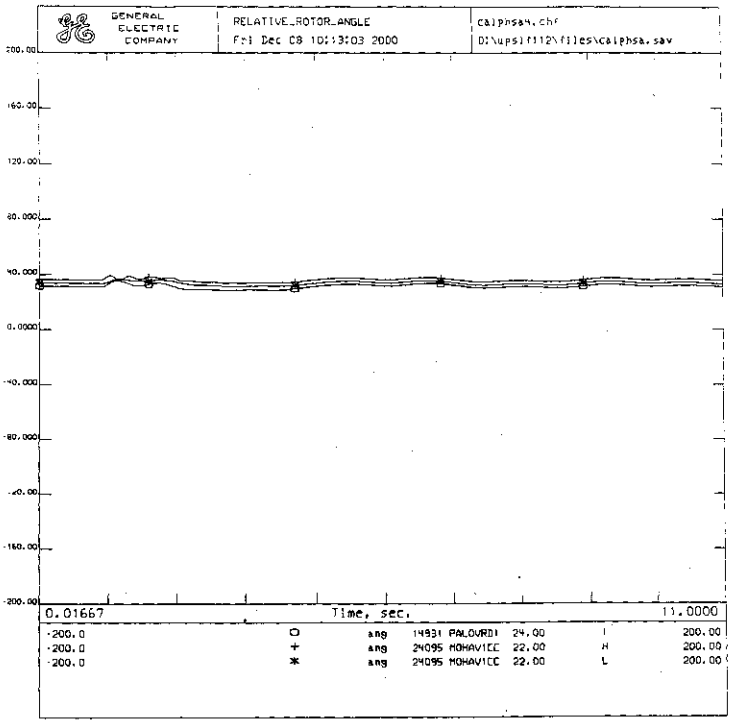
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 500-KV Bus
Contingency - Devers-Valley 500-KV Line
SYSTEM STABILITY STUDY CASE - Case 5:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa5.swt

CASE 5

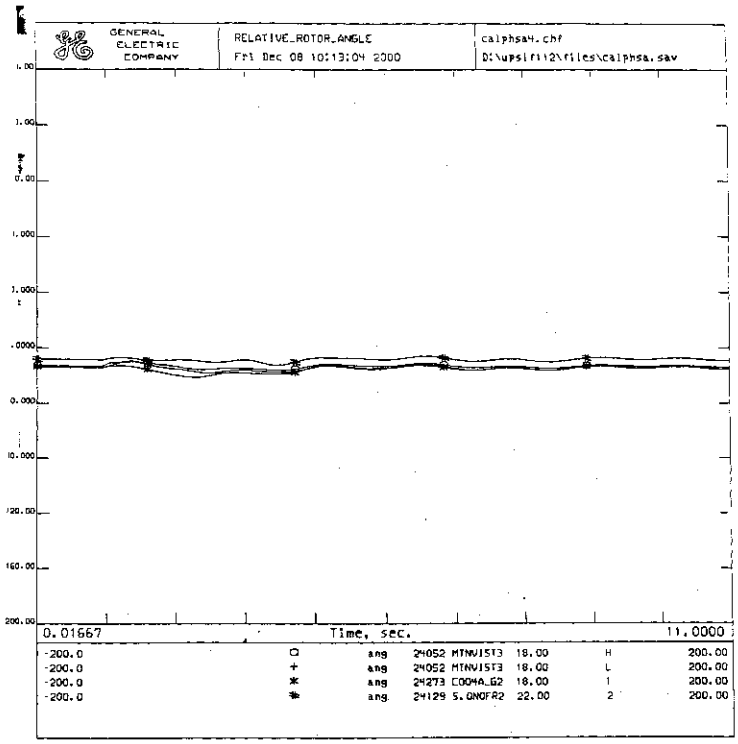
```
calphsa.sav
calphsa.dyd
TITLE
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 500-KV Bus
Contingency - Devers-Valley 500-KV Line
SYSTEM STABILITY STUDY CASE-Case 5:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa5.swt
RUN 10.0
CC
CC  ***** CALPINE: MORENO VALLEY SYSTEM IMPACT STUDY ******
CC  APPLY A 5 CYCLE 3-PHASE FAULT ON THE DEVERS 500 BUS
CC
FB  0.0 "DEVERS  " 500
CC  CLEAR FAULT
CFB 5.0 "DEVERS  " 500
CC   REMOVE DEVERS-VALLEY 500KV LINE
DL   5.0 "DEVERS  " 500. "VALLEYSC" 500. "1 "
```



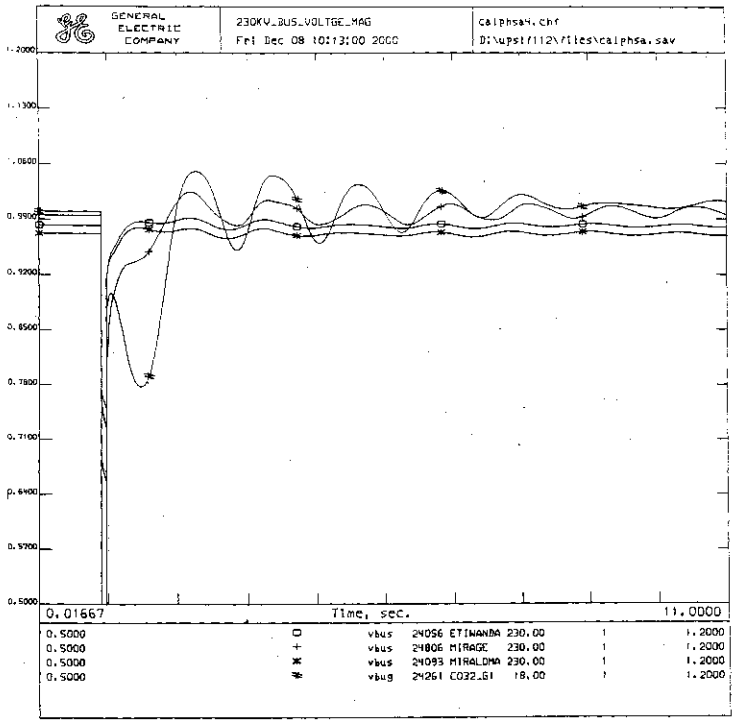
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 500-KV Bus
Contingency - Devers-Valley 500-KV Line
SYSTEM STABILITY STUDY CASE - Case 5:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa5.swt



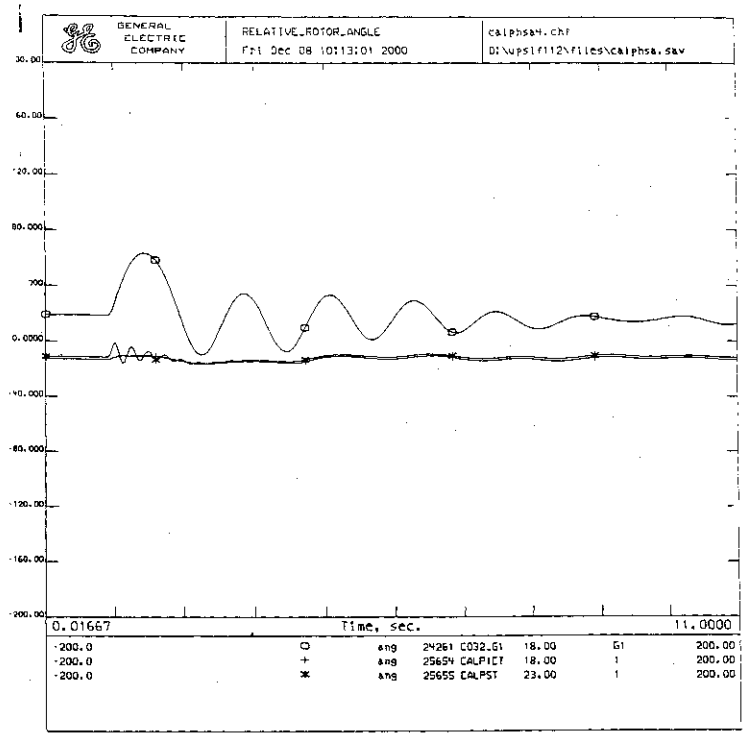
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 4:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa4.swt



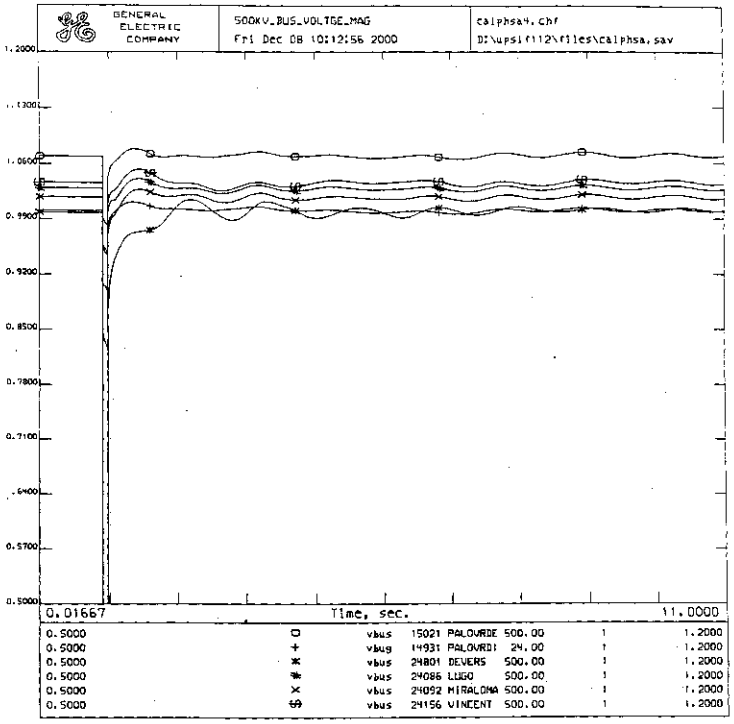
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 4:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa4.swt



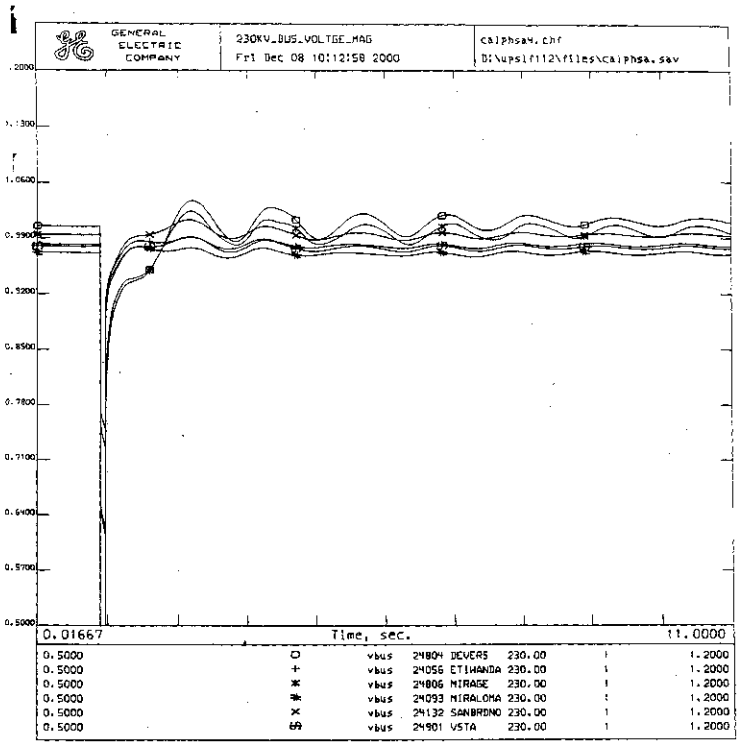
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 4:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa4.swt



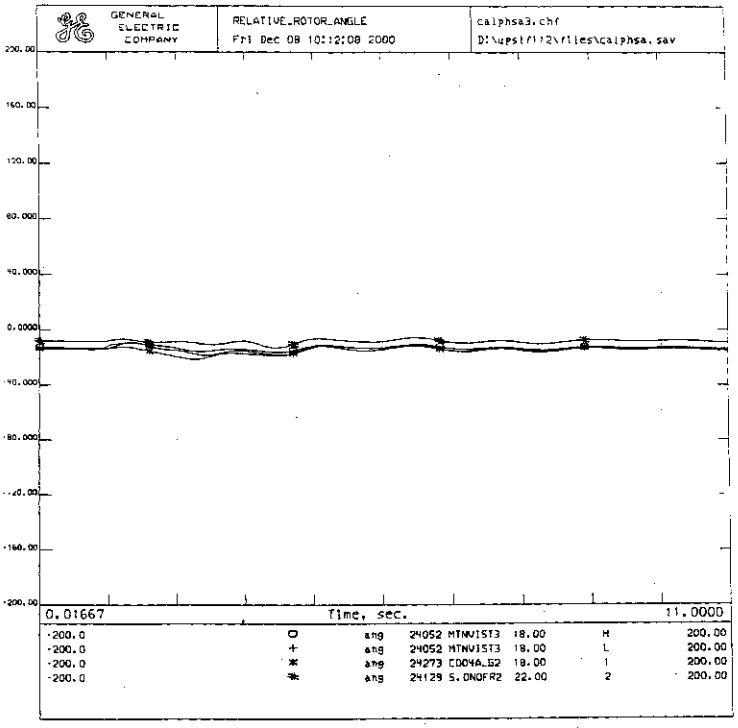
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 4:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa4.swt



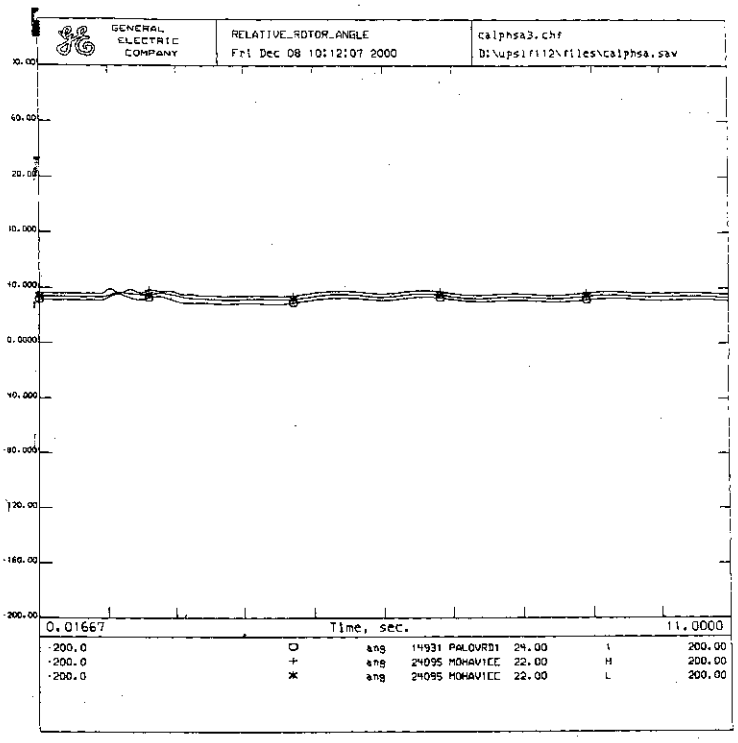
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 4:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa4.swt



2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 4:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa4.swt



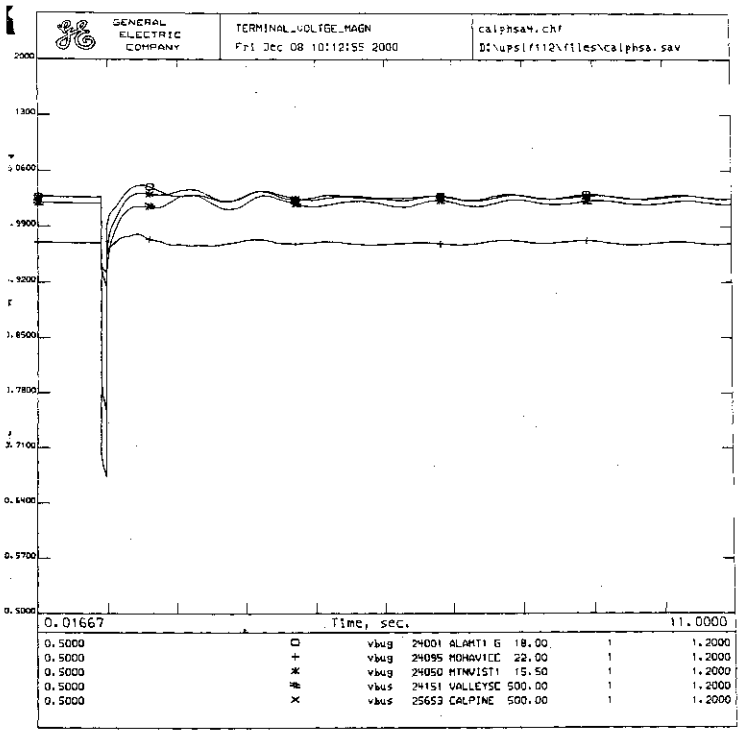
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Coachella 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 3:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa3.swt

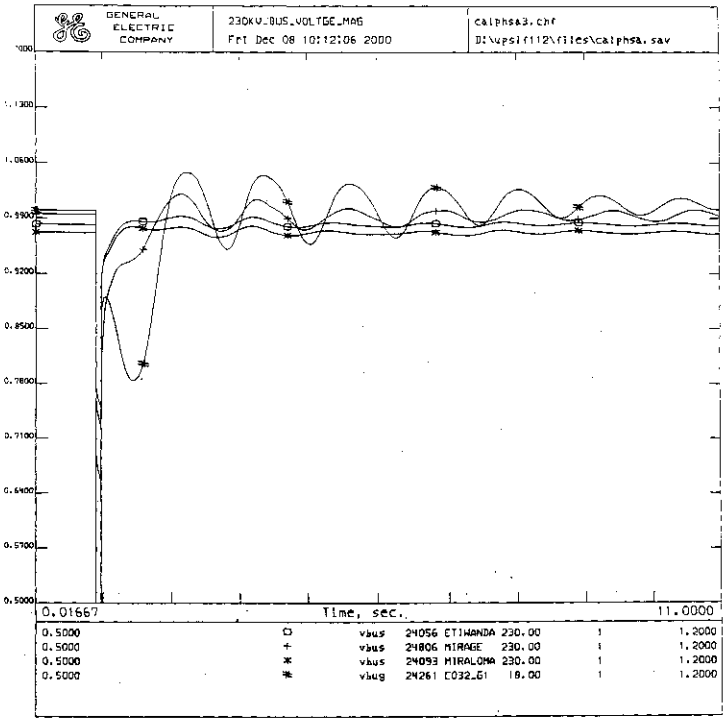


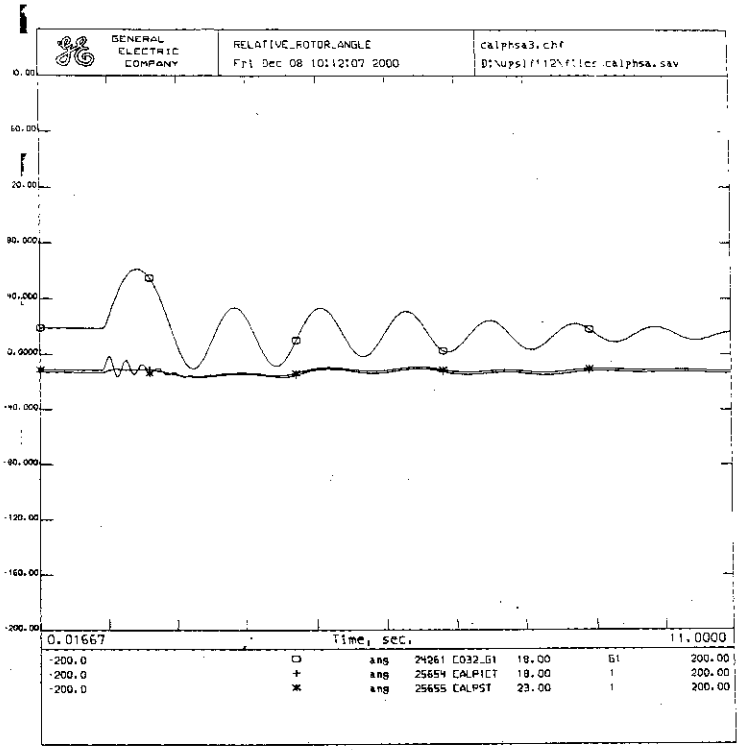
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Coachella 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 3:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa3.swt

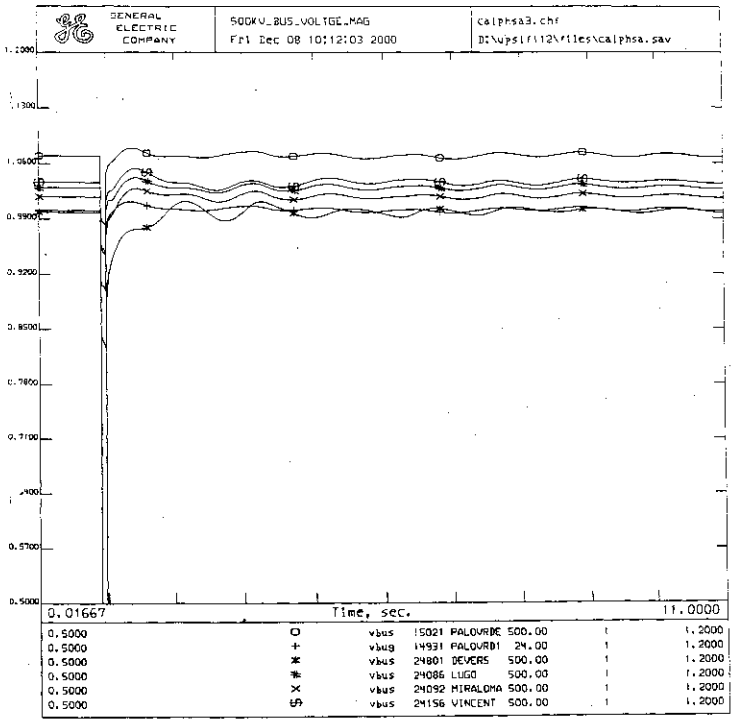
CASE 4

```
calphsa.sav
calphsa.dyd
TITLE
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista 230-KV Line
SYSTEM STABILITY STUDY CASE-Case 4:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa4.swt
RUN 10.0
CC
CC  ***** CALPINE: MORENO VALLEY SYSTEM IMPACT STUDY ******
CC  APPLY A 5 CYCLE 3-PHASE FAULT ON THE DEVERS 230 BUS
CC
FB  0.0 "DEVERS  " 230
CC  CLEAR FAULT
CFB 5.0 "DEVERS  " 230
CC   REMOVE DEVERS-VISTA 230KV LINE
DL   5.0 "VSTA    " 230. "DEVERS  " 230. "1 "
```

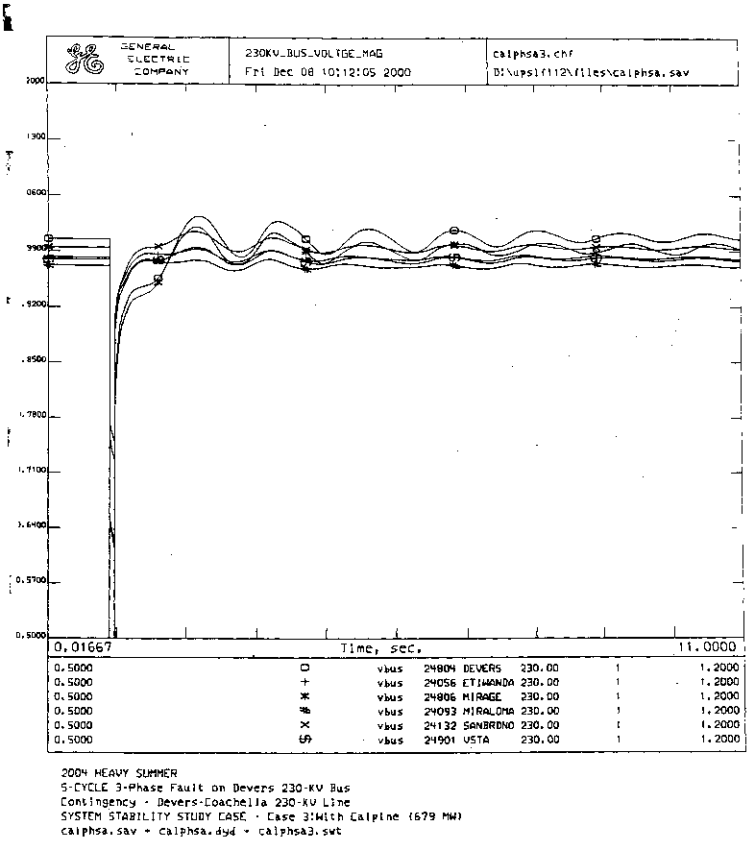








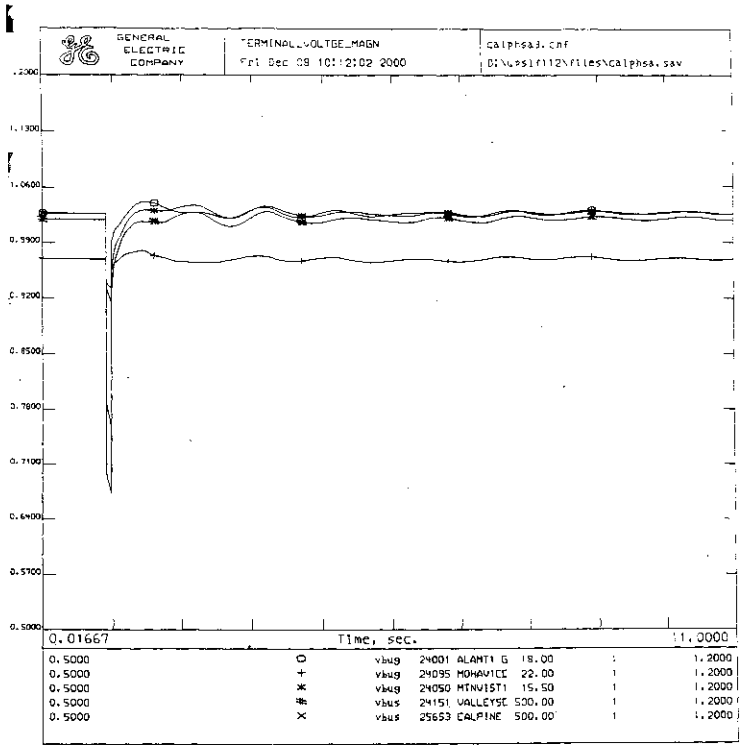
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Coachella 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 3:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa3.swt



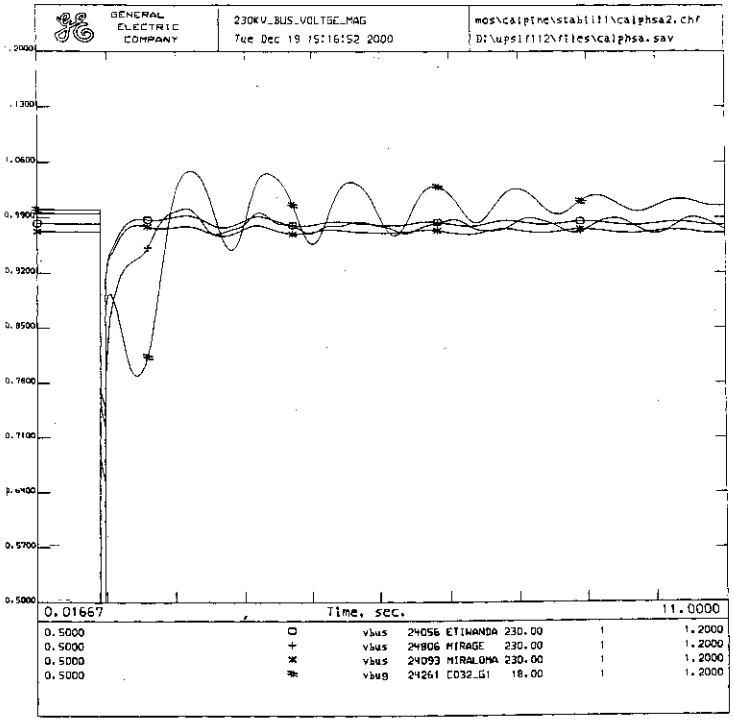
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Coachella 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 3:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa3.swt

CASE 3

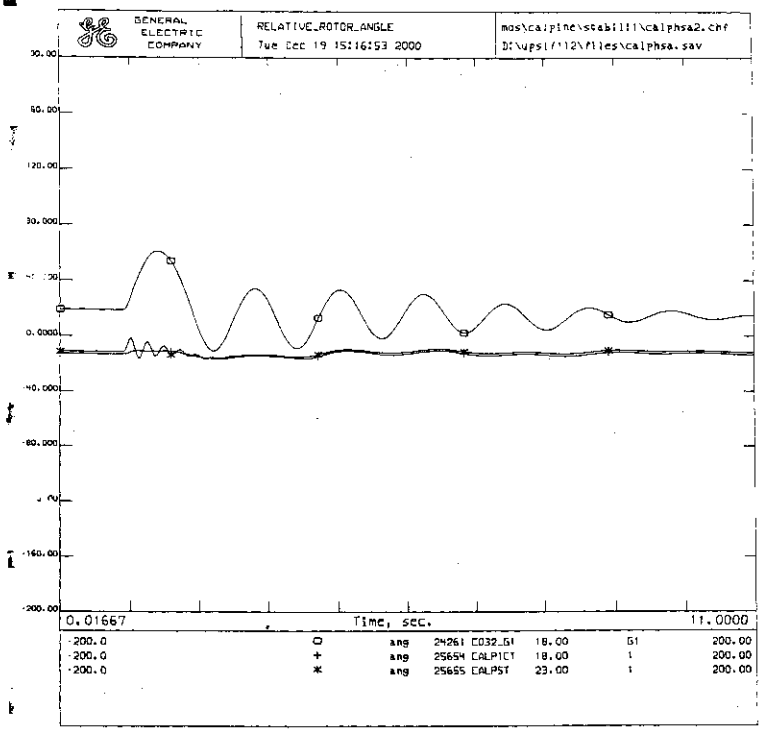
```
calphsa.sav
calphsa.dyd
TITLE
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Coachella 230-KV Line
SYSTEM STABILITY STUDY CASE-Case 3:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa3.swt
RUN 10.0
CC
CC  ***** CALPINE: MORENO VALLEY SYSTEM IMPACT STUDY ******
CC  APPLY A 5 CYCLE 3-PHASE FAULT ON THE DEVERS 230 BUS
CC
FB  0.0 "DEVERS  " 230
CC  CLEAR FAULT
CFB 5.0 "DEVERS  " 230
CC   REMOVE DEVERS-COACHELLA 230KV LINE
DL   5.0 "COACHELV" 230. "DEVERS  " 230. "1 "
```



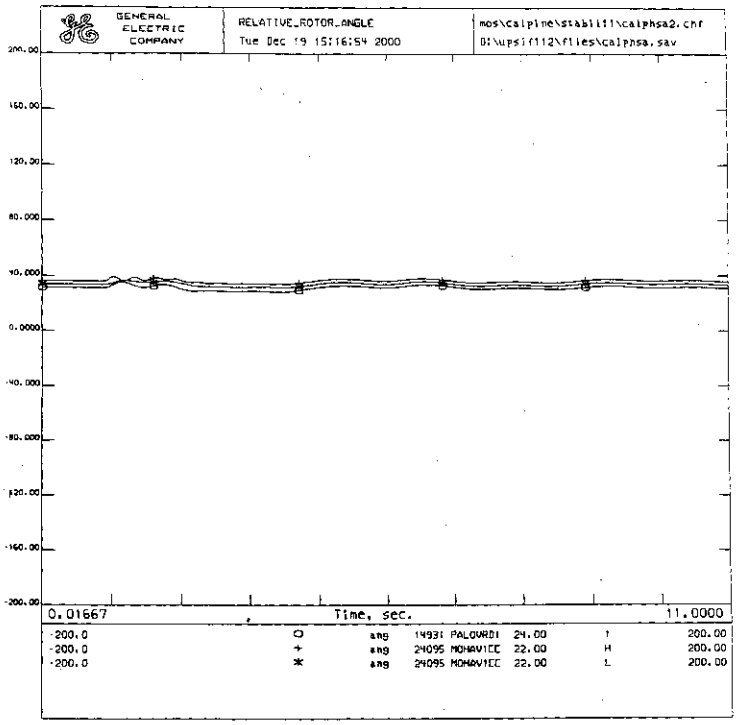
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Coachella 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 3:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa3.swt



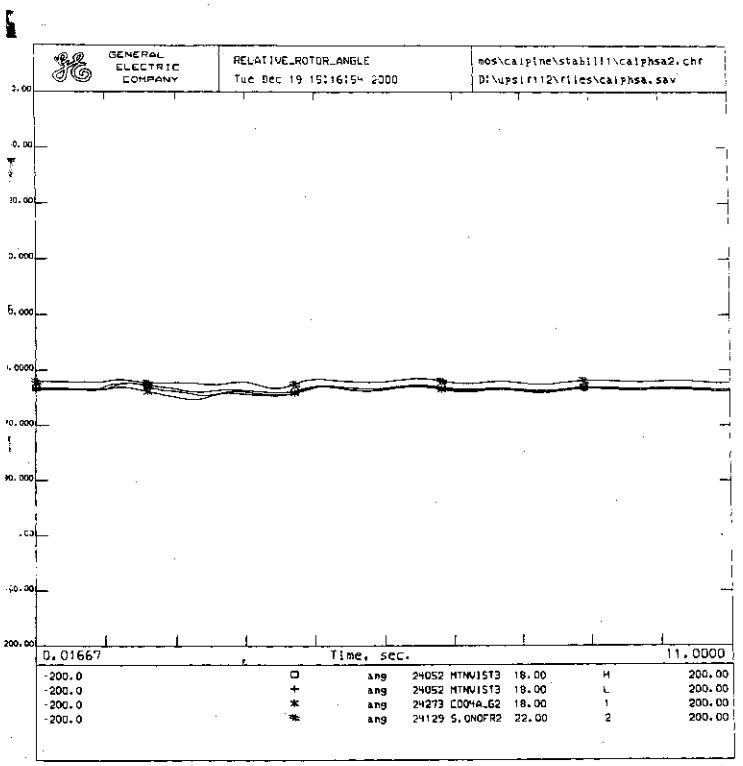
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 2:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa2.swt



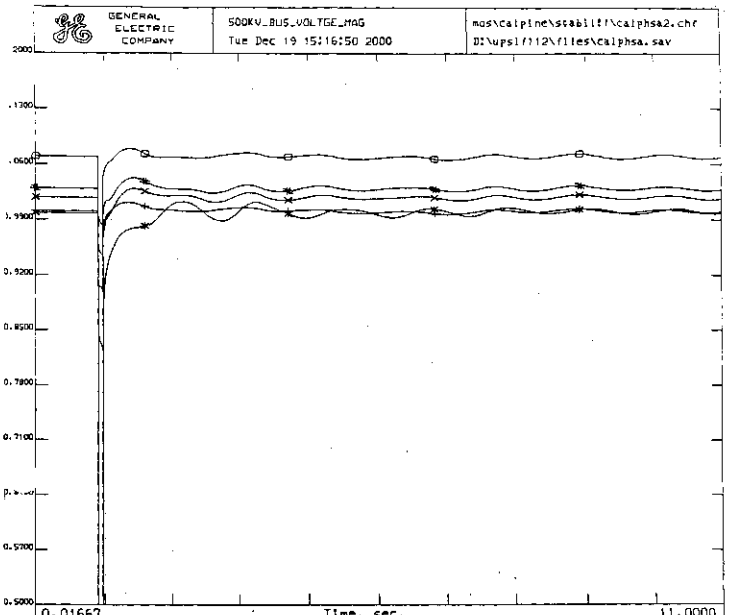
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 2:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa2.swt



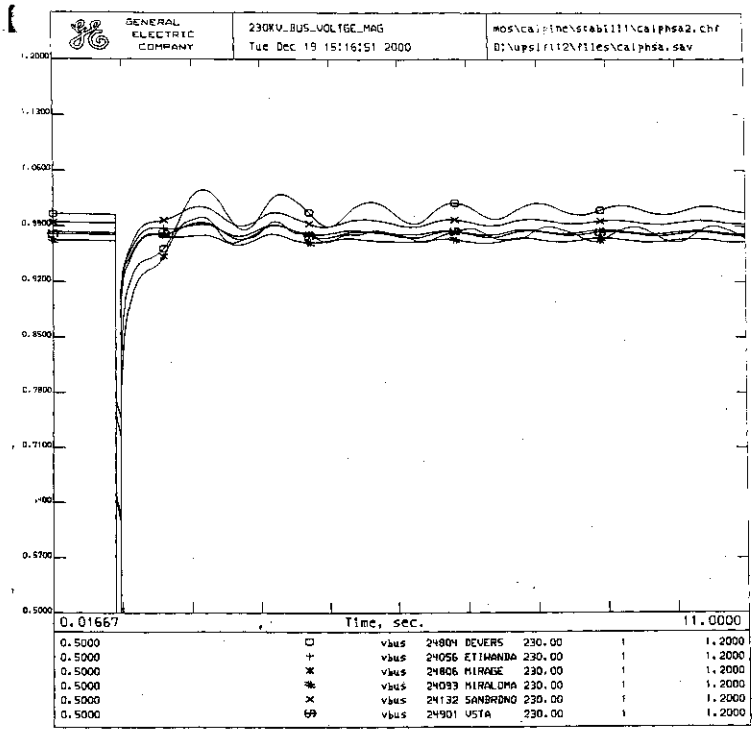
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 2:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa2.swt



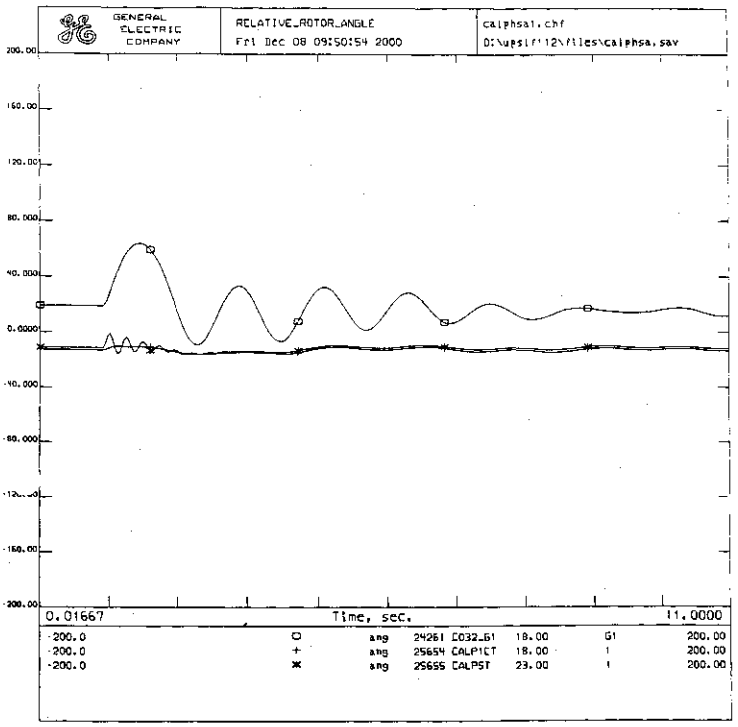
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 2:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa2.swt



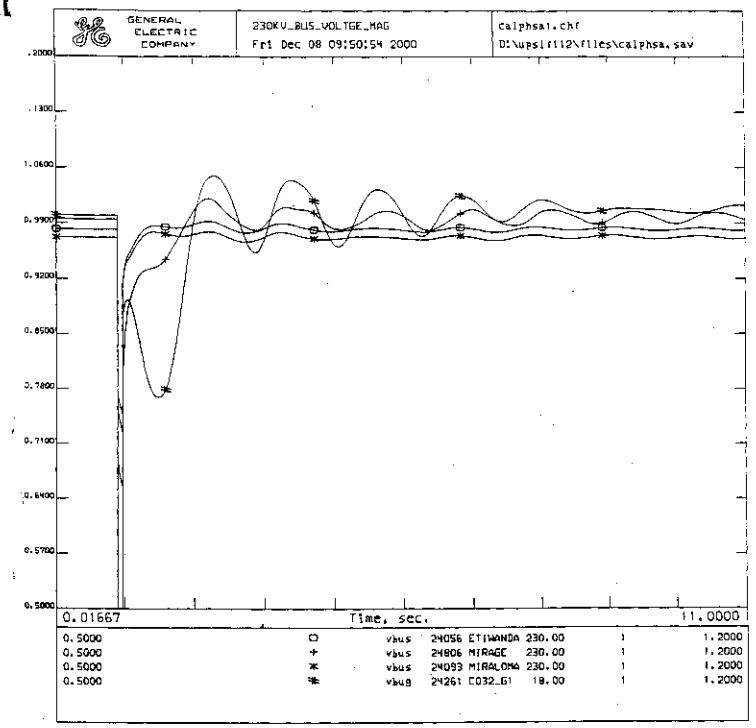
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 2:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa2.swt



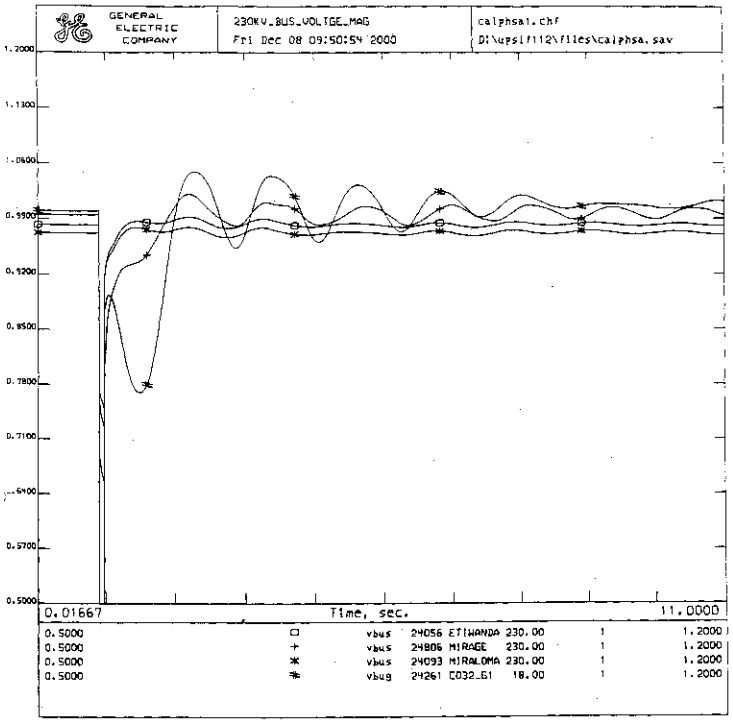
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 2:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa2.swt



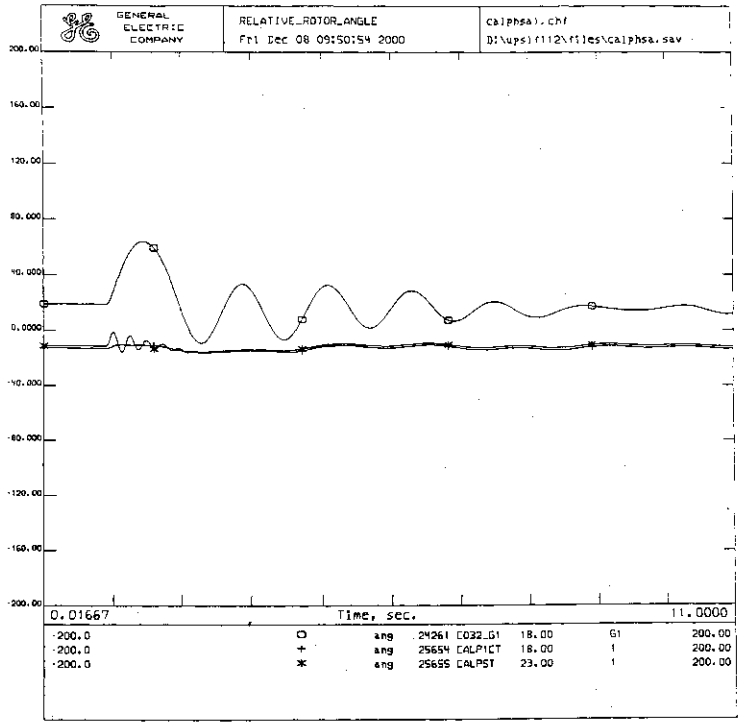
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 1:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa1.swt



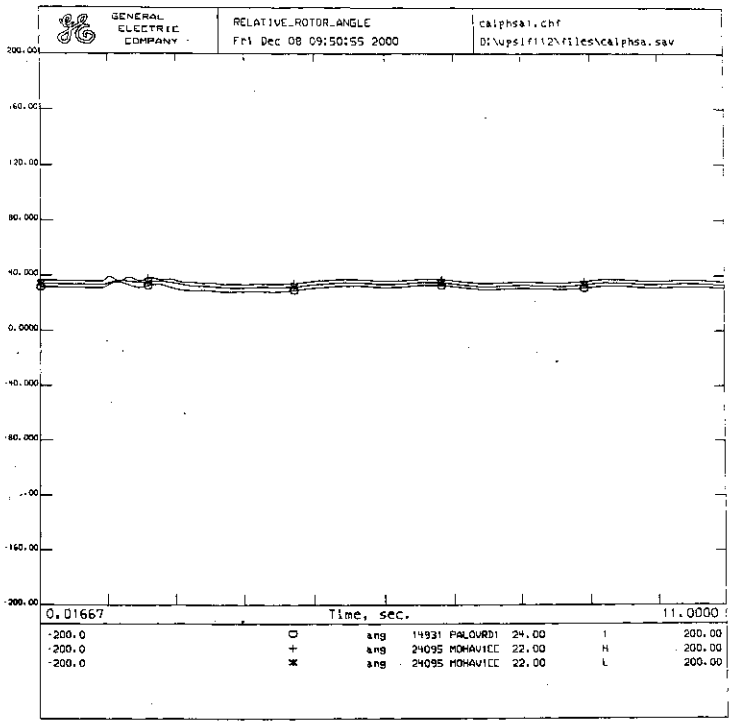
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 1:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa1.swt



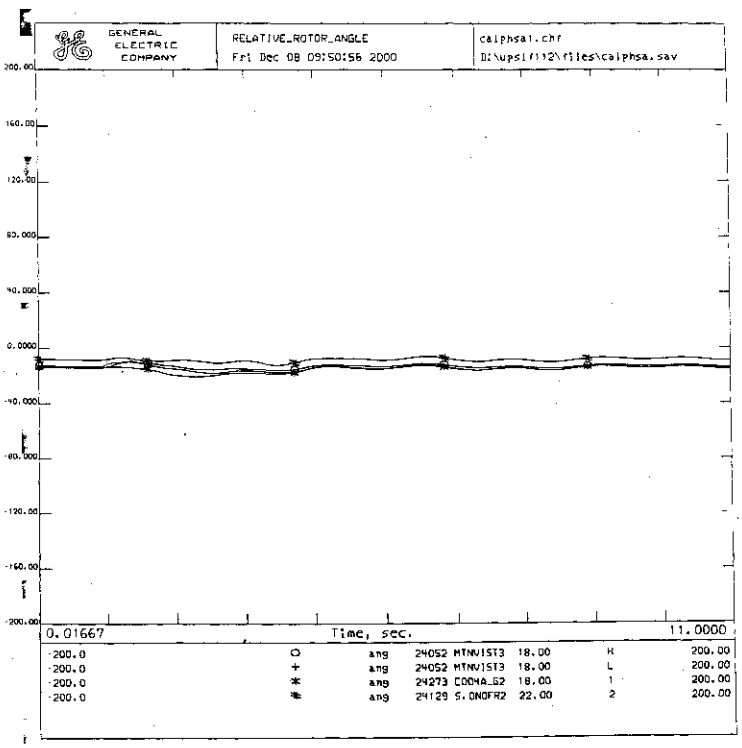
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 1:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa1.swt



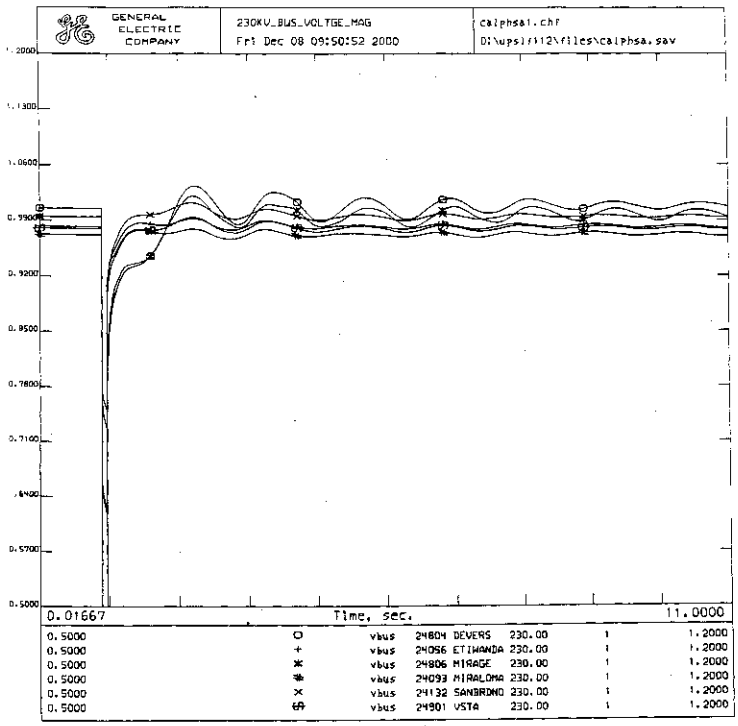
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 1:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa1.swt



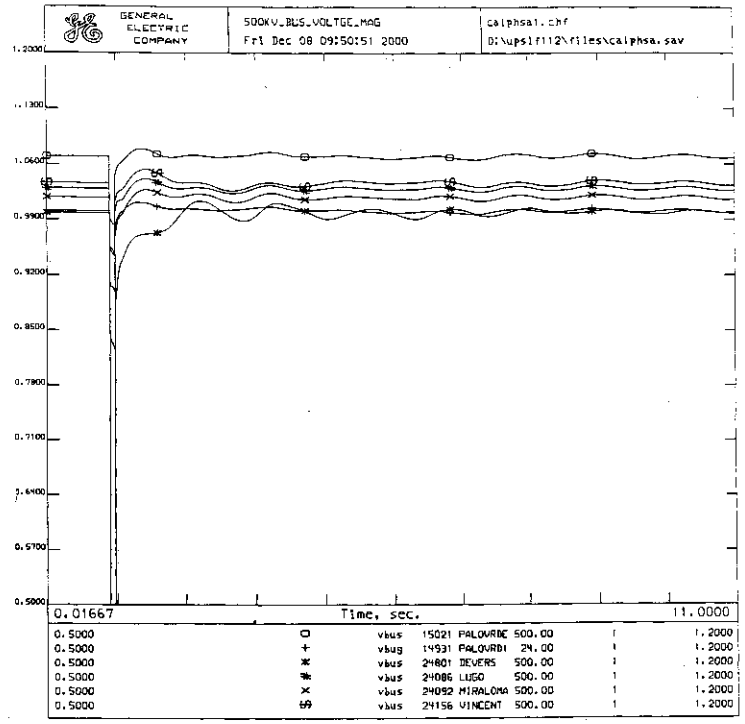
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 1:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa1.swt



2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 1:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa1.swt



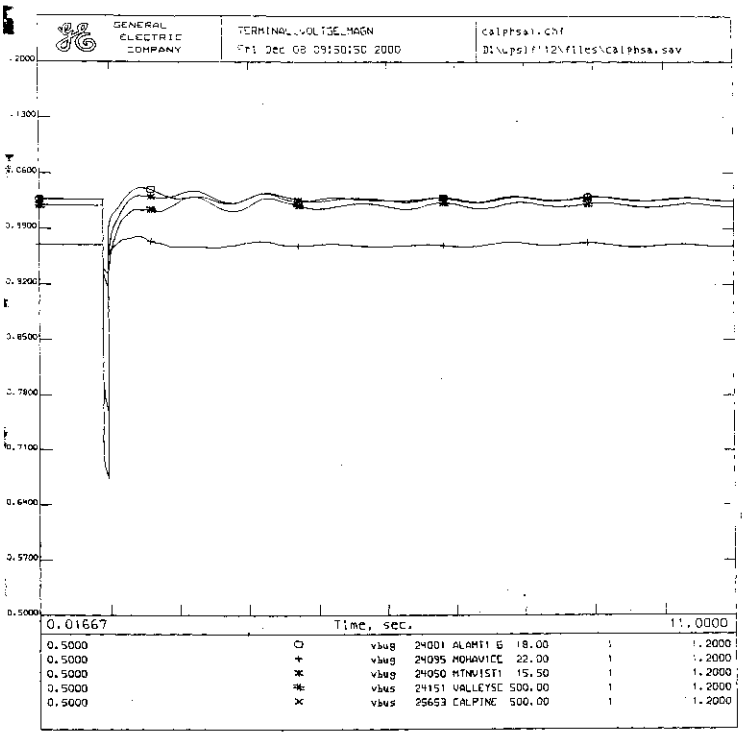
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 1:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa1.swt



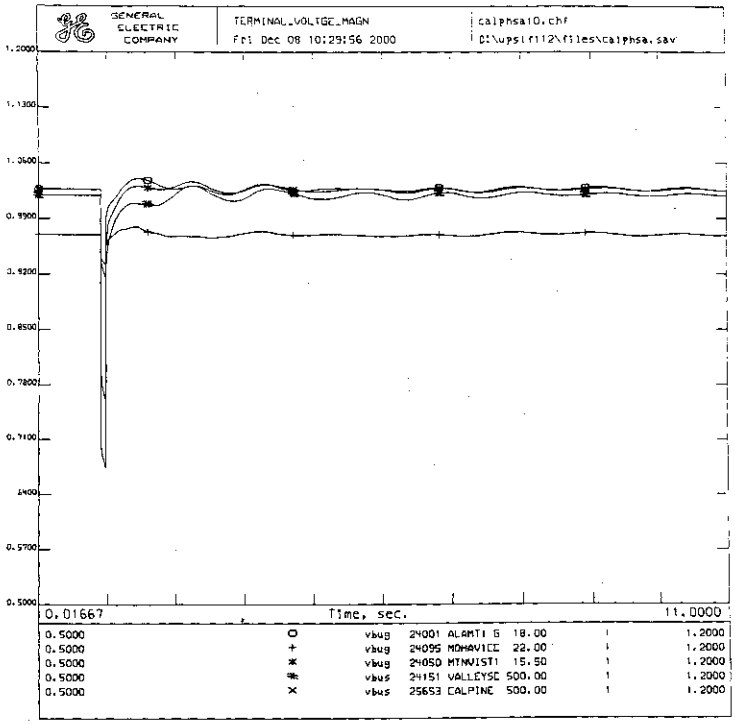
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 1:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa1.swt

CASE 1

```
calphsa.sav
calphsa.dyd
TITLE
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 230-KV Line
SYSTEM STABILITY STUDY CASE-Case 1:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa1.swt
RUN 10.0
CC
CC  ***** CALPINE: MORENO VALLEY SYSTEM IMPACT STUDY ******
CC  APPLY A 5 CYCLE 3-PHASE FAULT ON THE DEVERS 230 BUS
CC
FB  0.0 "DEVERS  " 230
CC  CLEAR FAULT
CFB 5.0 "DEVERS  " 230
CC   REMOVE DEVERS-SAN BERNARDINO NO. 1 230KV LINE
DL   5.0 "SANBRDNO" 230. "DEVERS  " 230. "1 "
```



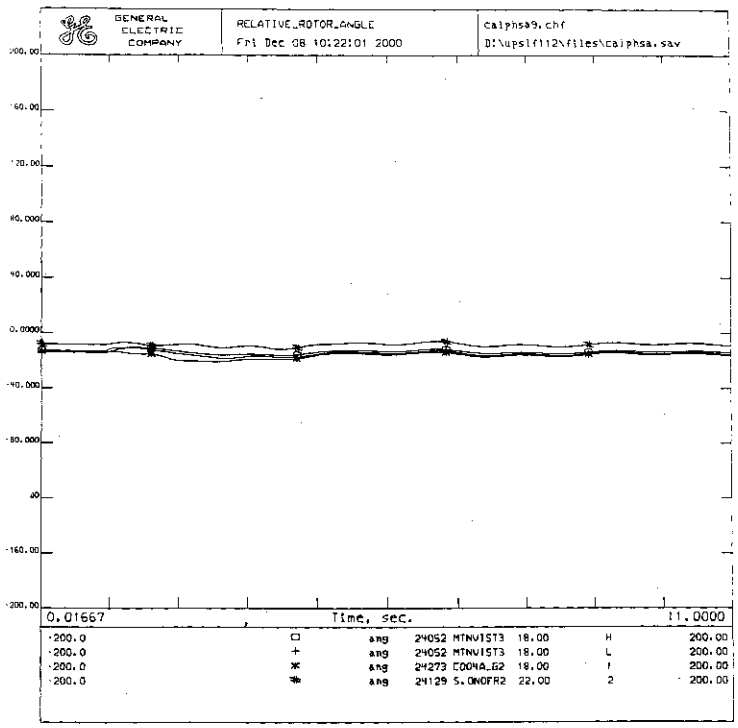
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 1:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa1.swt



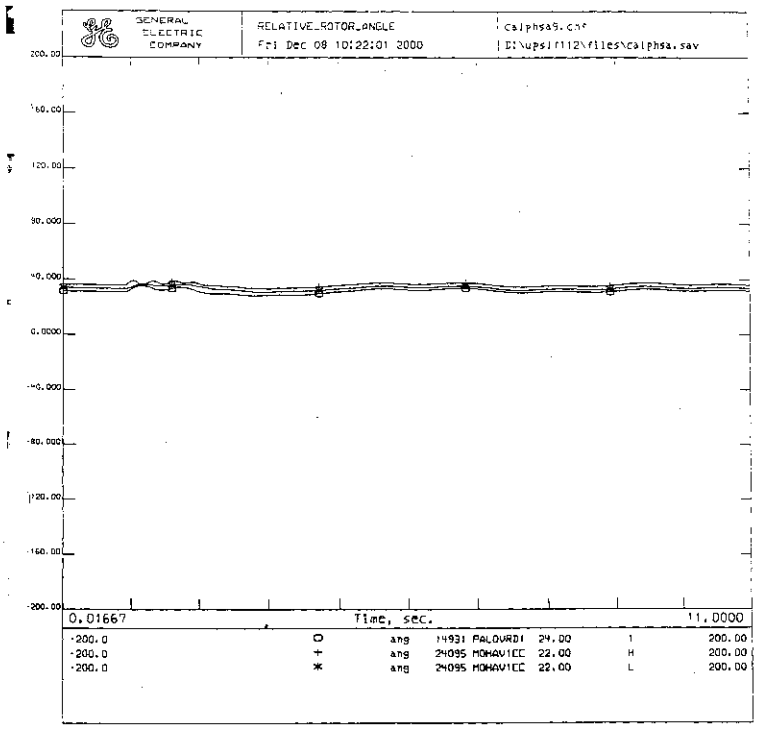
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #2 & Devers-Vista #2 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 10:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa10.swt

CASE 10

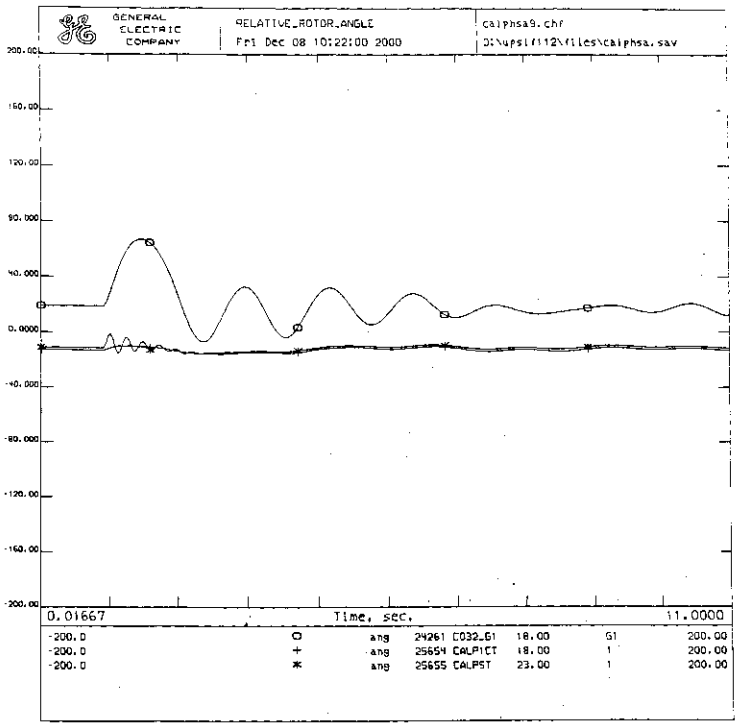
```
calphsa.sav
calphsa.dyd
TITLE
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #2 & Devers-Vista #2
230-KV Lines
SYSTEM STABILITY STUDY CASE-Case 10:With Calpine(679 MW)
calphsa.sav + calphsa.dyd + calphsa10.swt
RUN 10.0
CC
CC  ***** CALPINE: MORENO VALLEY SYSTEM IMPACT STUDY ******
CC  APPLY A 5 CYCLE 3-PHASE FAULT ON THE DEVERS 230 BUS
CC
FB  0.0 "DEVERS  " 230
CC  CLEAR FAULT
CFB 5.0 "DEVERS  " 230
CC   REMOVE DEVERS-SAN BERNARDINO NO. 2 230KV LINE
CC   REMOVE DEVERS-VISTA NO. 2 230KV LINE
DL   5.0 "DEVERS  " 230. "SANBRDNO" 230. "2 "
DL   5.0 "DEVERS  " 230. "VSTA    " 230. "2 "
```



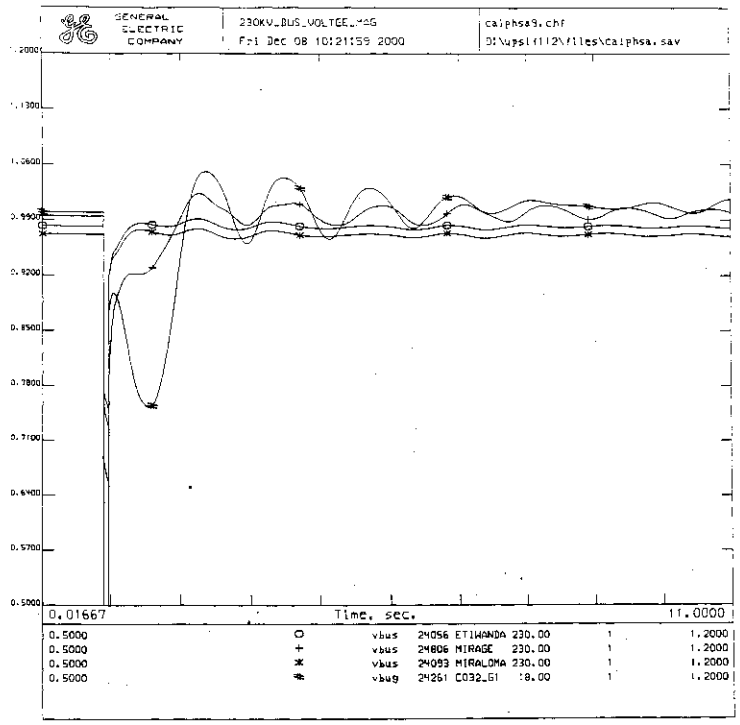
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 & Devers-Vista #1 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 9:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa9.swt



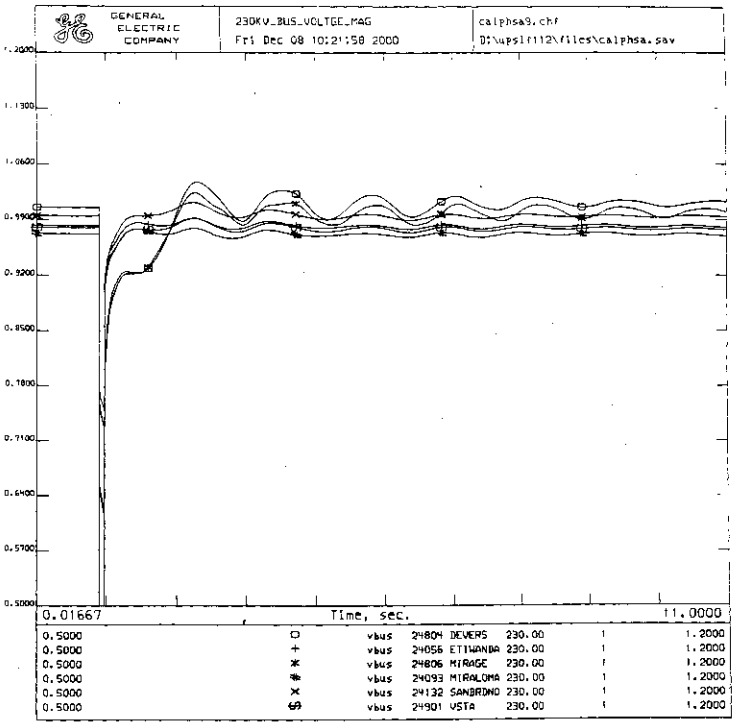
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 & Devers-Vista #1 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 9:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa9.swt



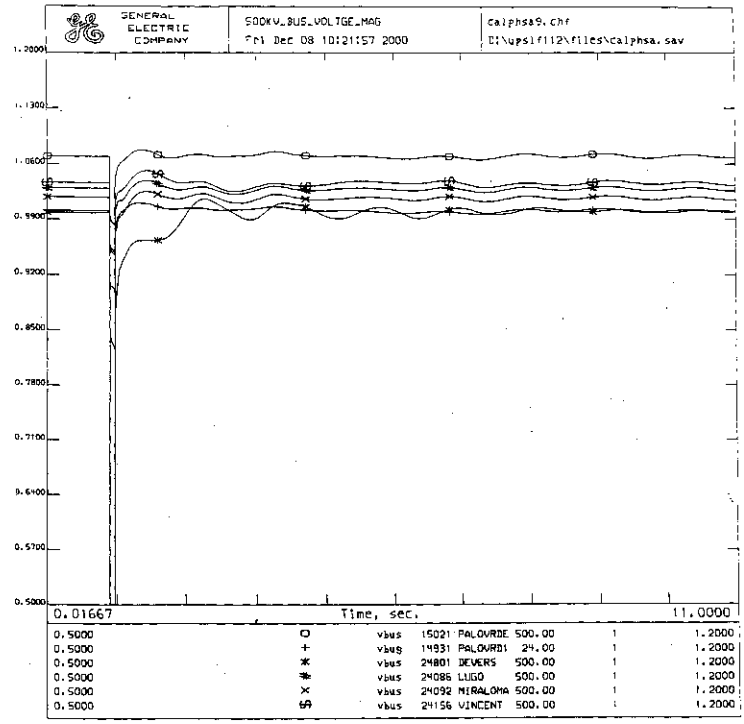
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 & Devers-Vista #1 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 9:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa9.swt



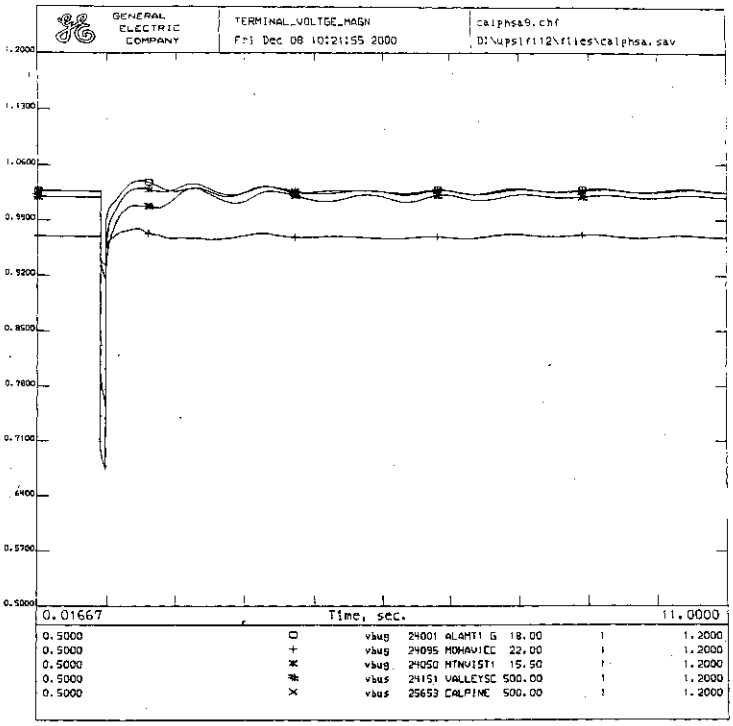
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 & Devers-Vista #1 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 9:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa9.swt



2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 & Devers-Vista #1 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 9:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa9.swt

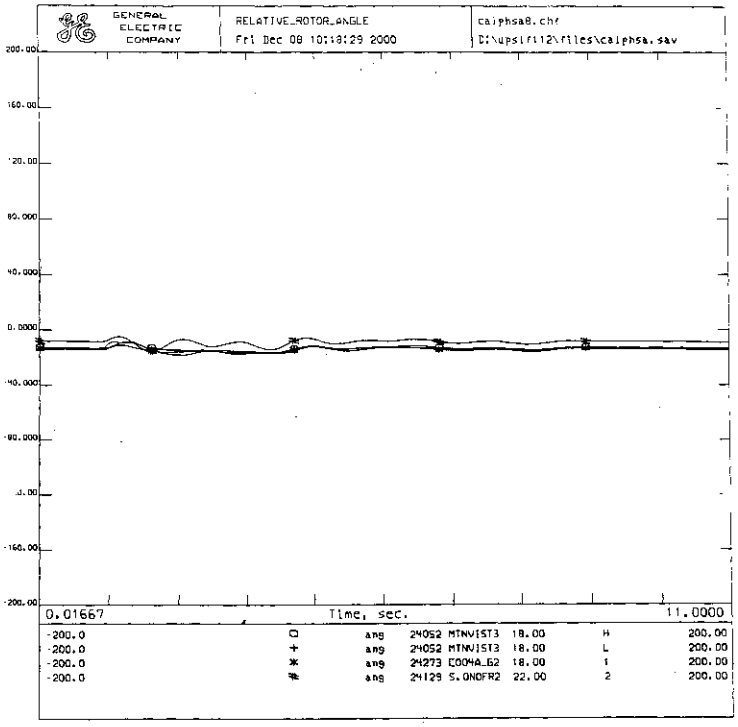


2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 & Devers-Vista #1 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 9:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa9.swt

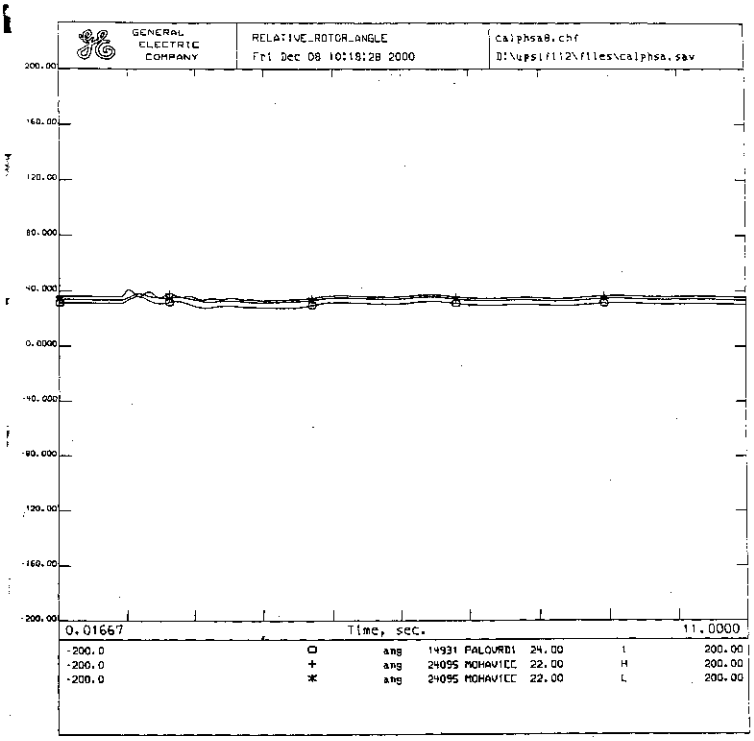


2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 & Devers-Vista #1 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 9:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa9.swt

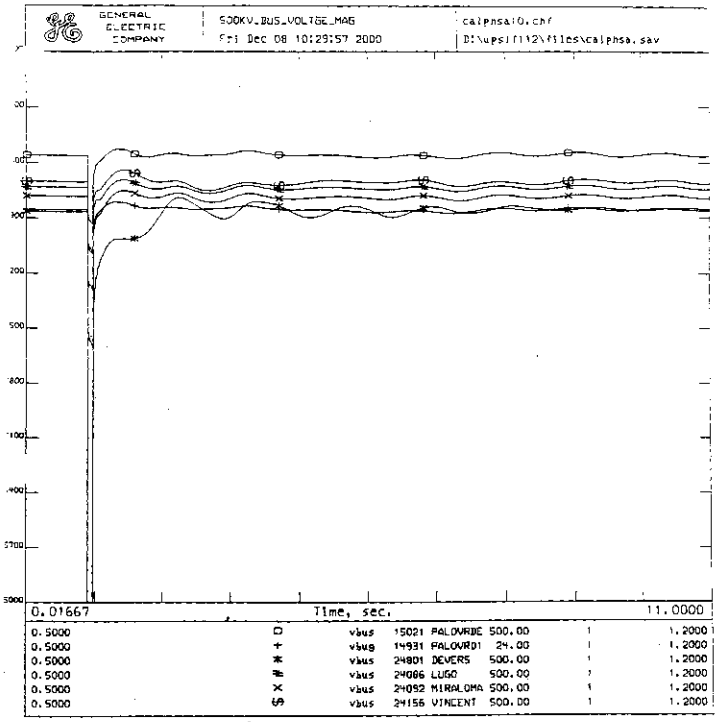
```
calphsa.sav
calphsa.dyd
TITLE
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 & Devers-Vista #1
230-KV Lines
SYSTEM STABILITY STUDY CASE-Case 9:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa9.swt
RUN 10.0
CC
CC  ***** CALPINE: MORENO VALLEY SYSTEM IMPACT STUDY ******
CC  APPLY A 5 CYCLE 3-PHASE FAULT ON THE DEVERS 230 BUS
CC
FB  0.0 "DEVERS  " 230
CC  CLEAR FAULT
CFB 5.0 "DEVERS  " 230
CC   REMOVE DEVERS-SAN BERNARDINO NO. 1 230KV LINE
CC   REMOVE DEVERS-VISTA NO. 1 230KV LINE
DL   5.0 "SANBRDNO" 230. "DEVERS  " 230. "1 "
DL   5.0 "VSTA    " 230. "DEVERS  " 230. "1 "
```



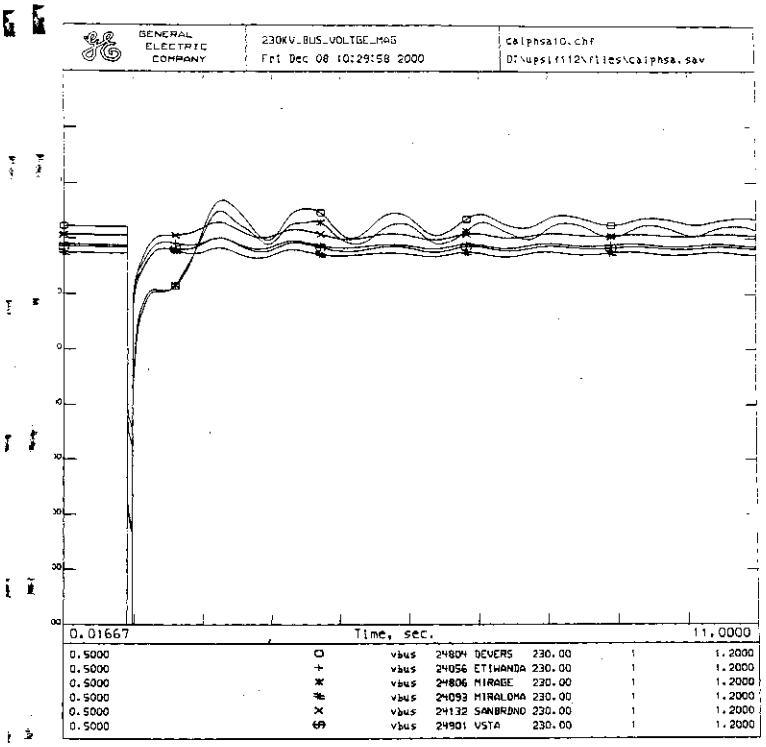
2004 Heavy Summer
4-CYCLE 3-Phase Fault on Valley 500-KV Bus
Contingency - Serrano-Valley 500KV Line
SYSTEM STABILITY STUDY CASES - Case 8:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa8.swt



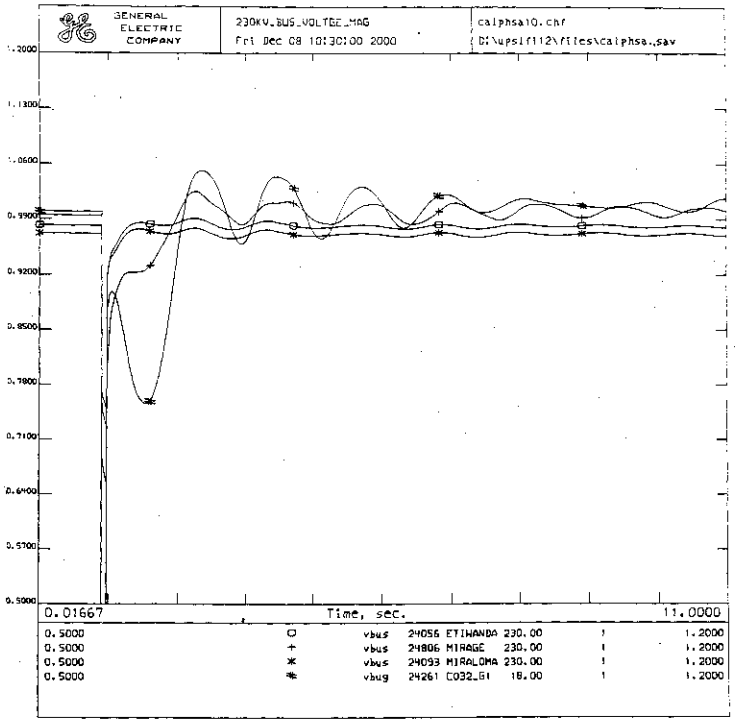
2004 Heavy Summer
4-CYCLE 3-Phase Fault on Valley 500-KV Bus
Contingency - Serrano-Valley 500KV Line
SYSTEM STABILITY STUDY CASES - Case 8:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa8.swt



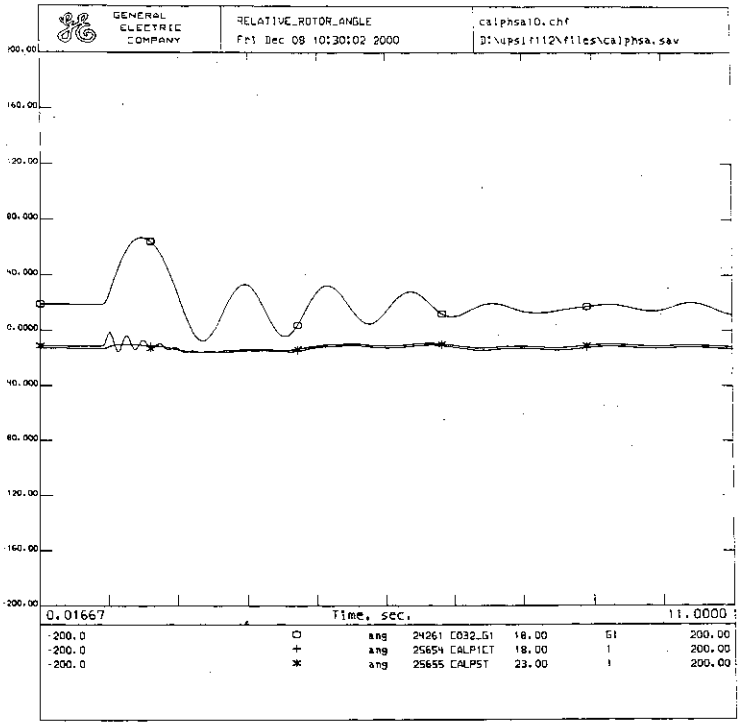
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #2 & Devers-Vista #2 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 10:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa10.swt



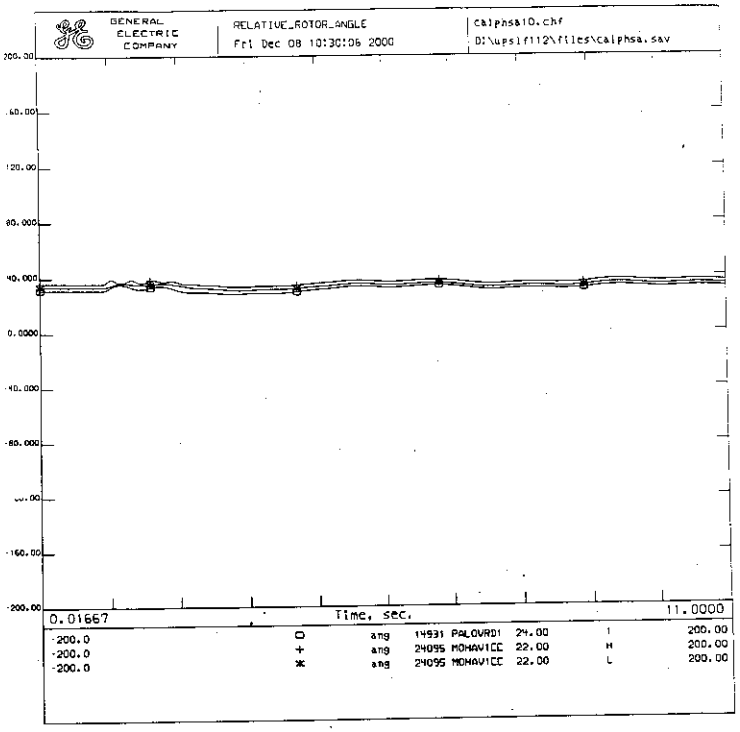
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #2 & Devers-Vista #2 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 10:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa10.swt



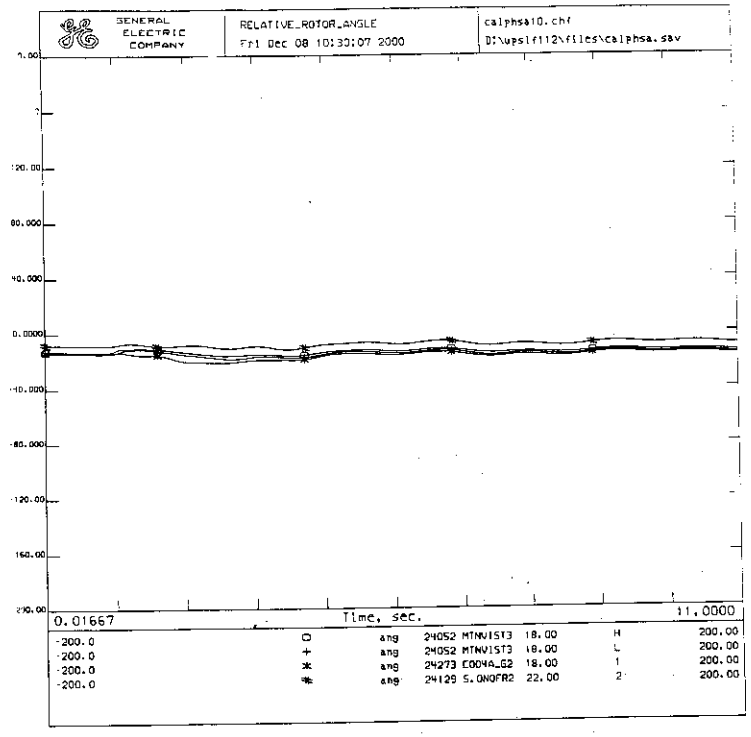
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #2 & Devers-Vista #2 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 10:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa10.swt



2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #2 & Devers-Vista #2 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 10:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa10.swt



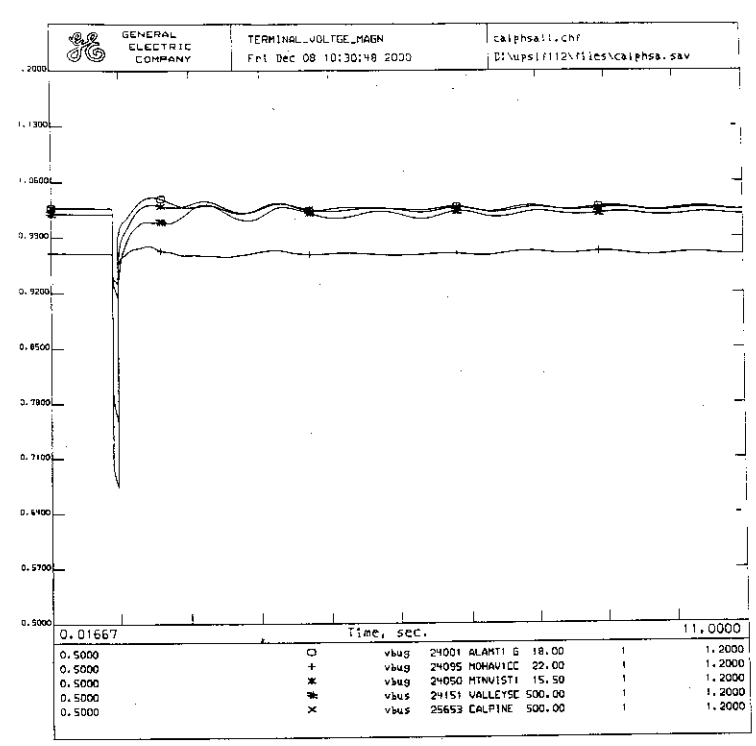
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #2 & Devers-Vista #2 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 10:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa10.swt



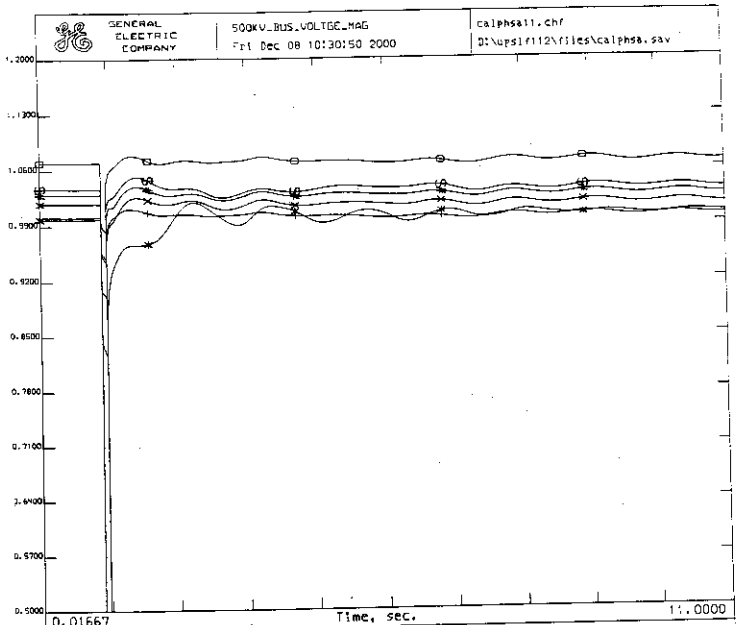
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #2 & Devers-Vista #2 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 10:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa10.swt

CASE 11

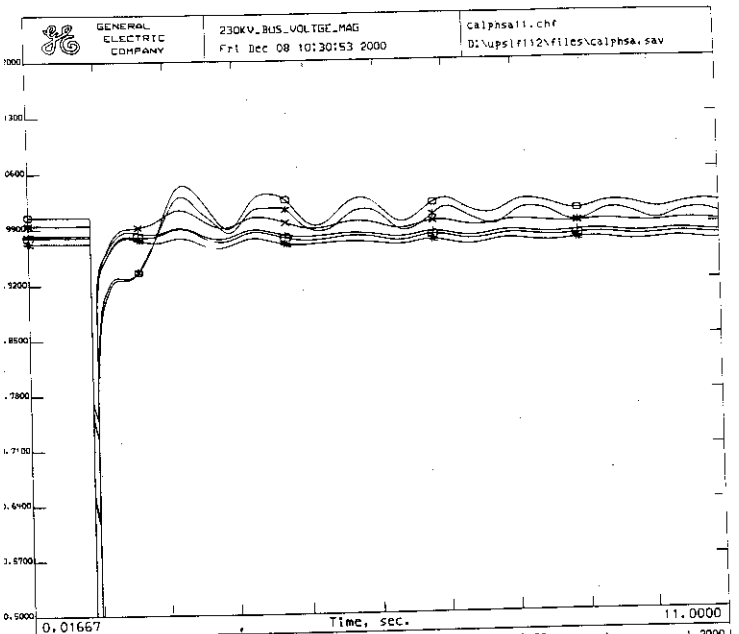
```
calphsa.sav
calphsa.dyd
TITLE
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista #1 & #2 230-KV Lines
SYSTEM STABILITY STUDY CASE-Case 11:Without Calpine(679 MW)
calphsa.sav + calphsa.dyd - calphsa11.swt
RUN 10.0
CC
CC  ***** CALPINE: MORENO VALLEY SYSTEM IMPACT STUDY ******
CC  APPLY A 5 CYCLE 3-PHASE FAULT ON THE DEVERS 230 BUS
CC
FB  0.0 "DEVERS  " 230
CC  CLEAR FAULT
CFB 5.0 "DEVERS  " 230
CC   REMOVE DEVERS-VISTA NO. 1 230KV LINE
CC   REMOVE DEVERS-VISTA NO. 2 230KV LINE
DL   5.0 "VSTA    " 230. "DEVERS  " 230. "1 "
DL   5.0 "DEVERS  " 230. "VSTA    " 230. "2 "
```



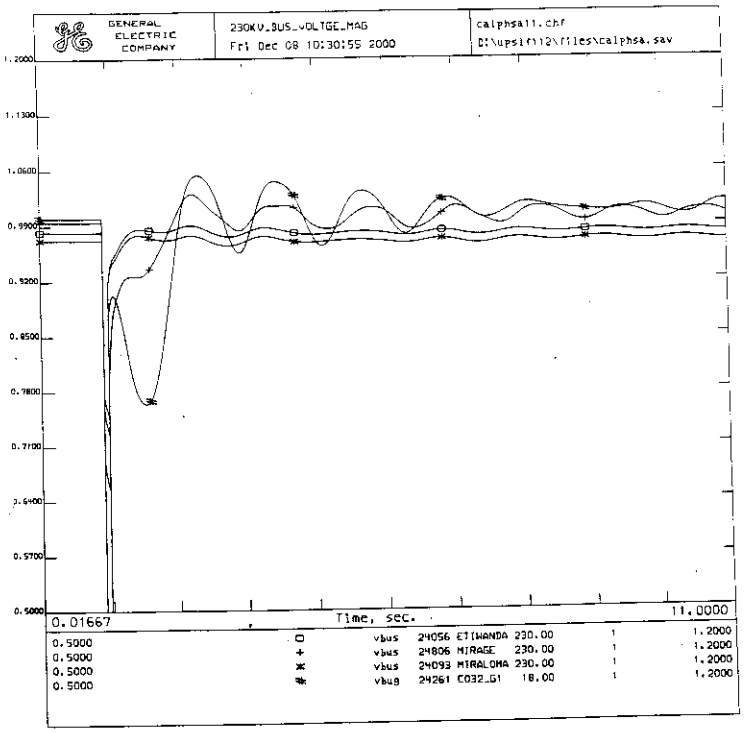
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista #1 & #2 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 11:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa11.swt



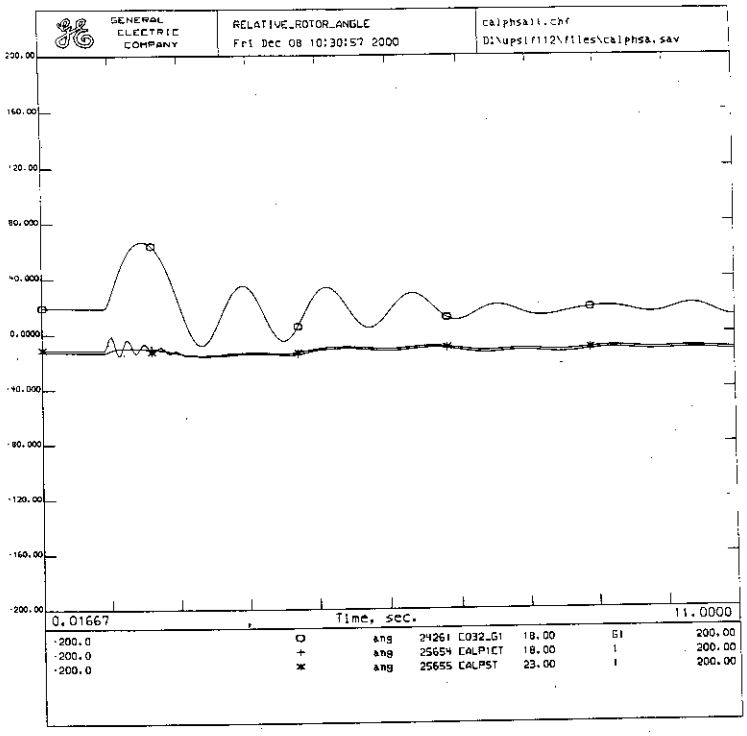
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista #1 & #2 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 11:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa11.swt



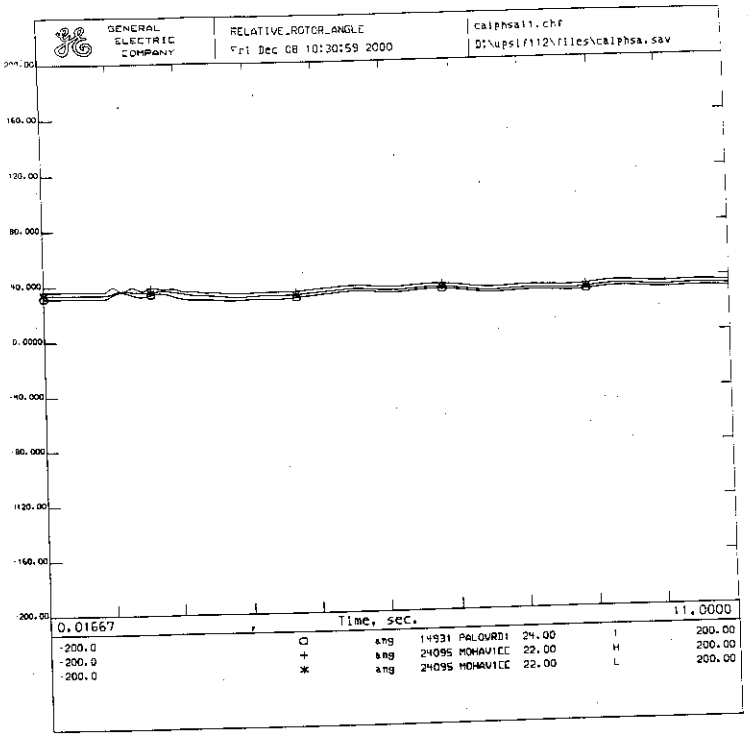
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista #1 & #2 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 11:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa11.swt



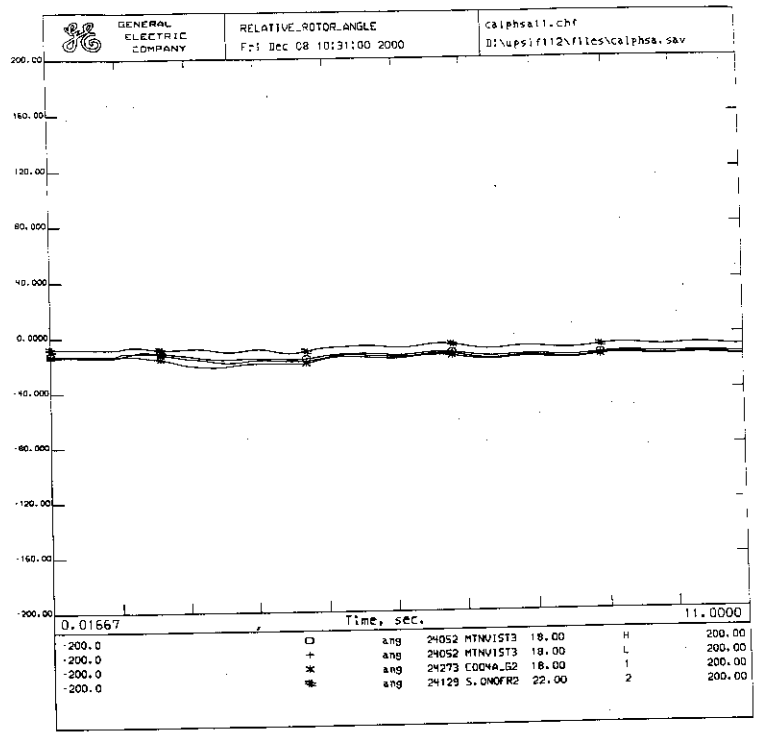
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista #1 & #2 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 11:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa11.swt



2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista #1 & #2 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 11:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa11.swt



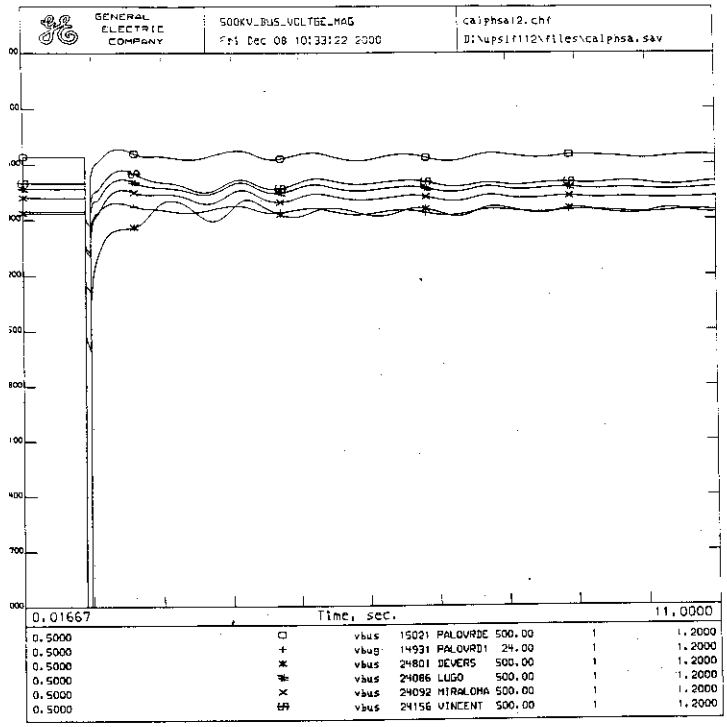
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista #1 & #2 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 11:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa11.swt



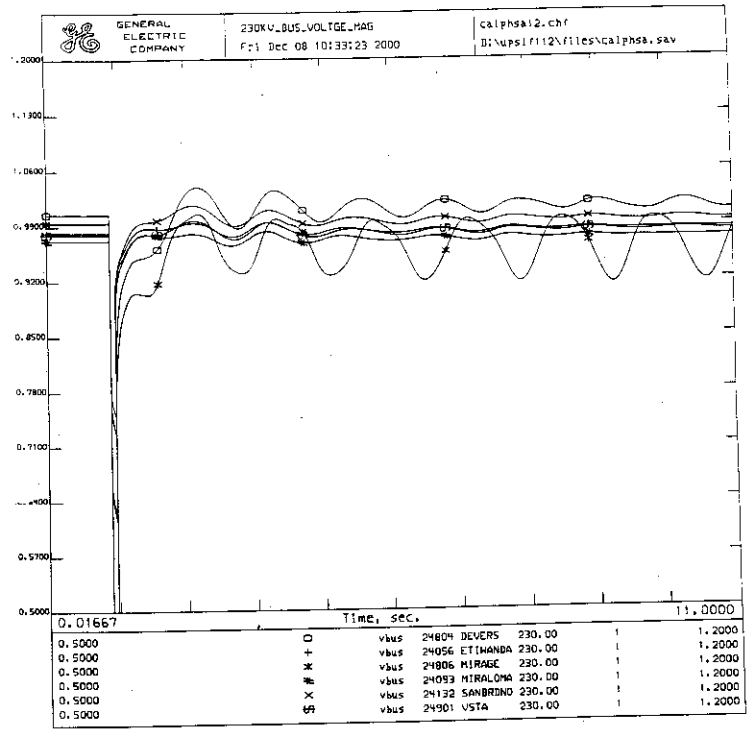
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista #1 & #2 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 11:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa11.swt

CASE 12

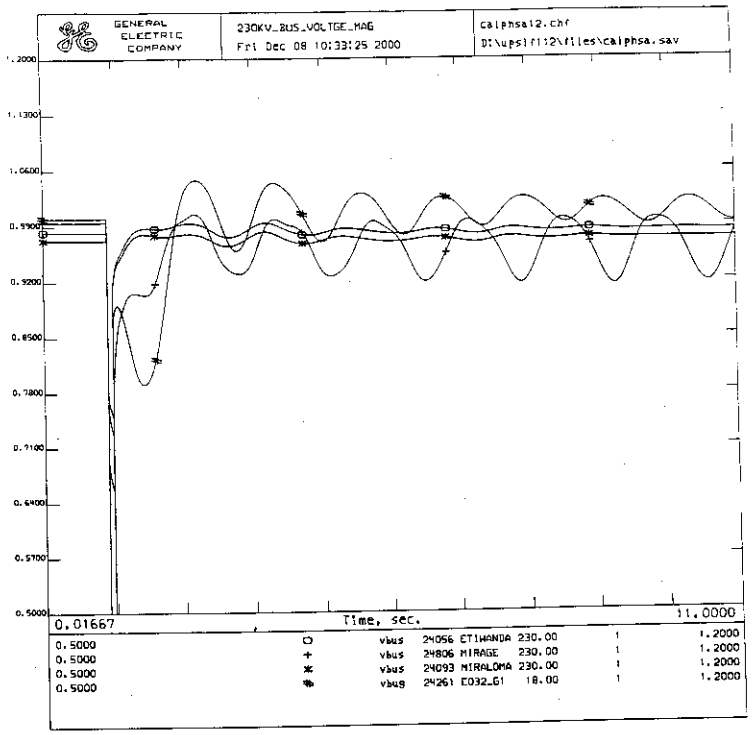
```
calphsa.sav
calphsa.dyd
TITLE
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage & Devers-Coachella 230-KV Lines
SYSTEM STABILITY STUDY CASE-Case 12:With Calpine(679 MW)
calphsa.sav + calphsa.dyd + calphsa12.swt
RUN 10.0
CC
CC  ***** CALPINE: MORENO VALLEY SYSTEM IMPACT STUDY ******
CC  APPLY A 5 CYCLE 3-PHASE FAULT ON THE DEVERS 230 BUS
CC
FB  0.0 "DEVERS  " 230
CC  CLEAR FAULT
CFB 5.0 "DEVERS  " 230
CC   REMOVE DEVERS-MIRAGE 230KV LINE
CC   REMOVE DEVERS-COACHELLA 230KV LINE
DL   5.0 "DEVERS  " 230. "MIRAGE  " 230. "1 "
DL   5.0 "COACHELV" 230. "DEVERS  " 230. "1 "
```



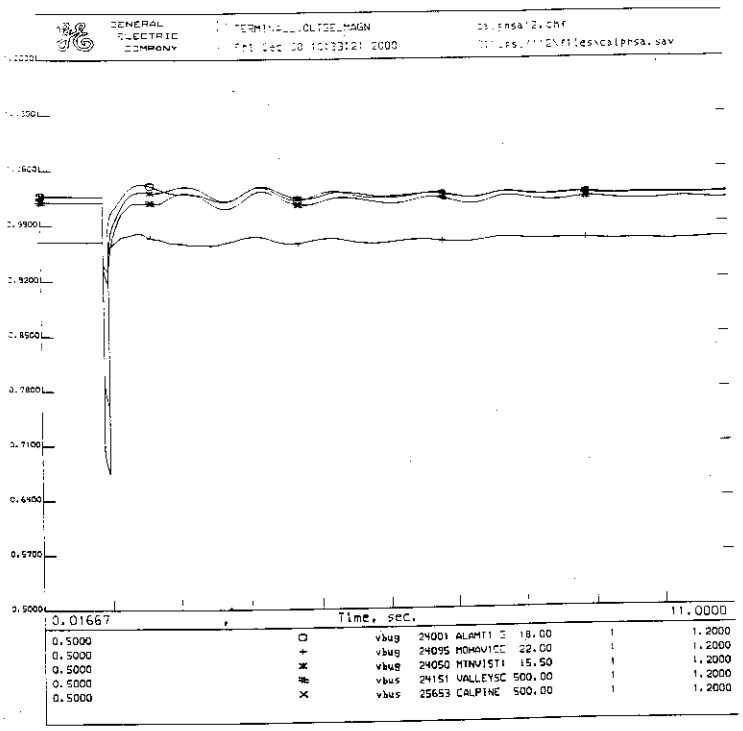
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage & Devers-Coachella 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 12:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa12.swt



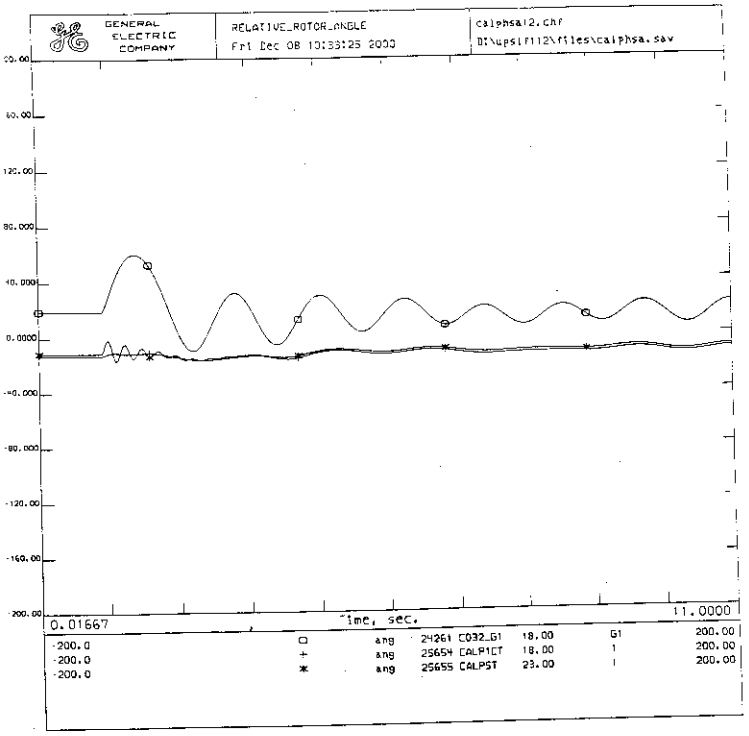
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage & Devers-Coachella 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 12:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa12.swt



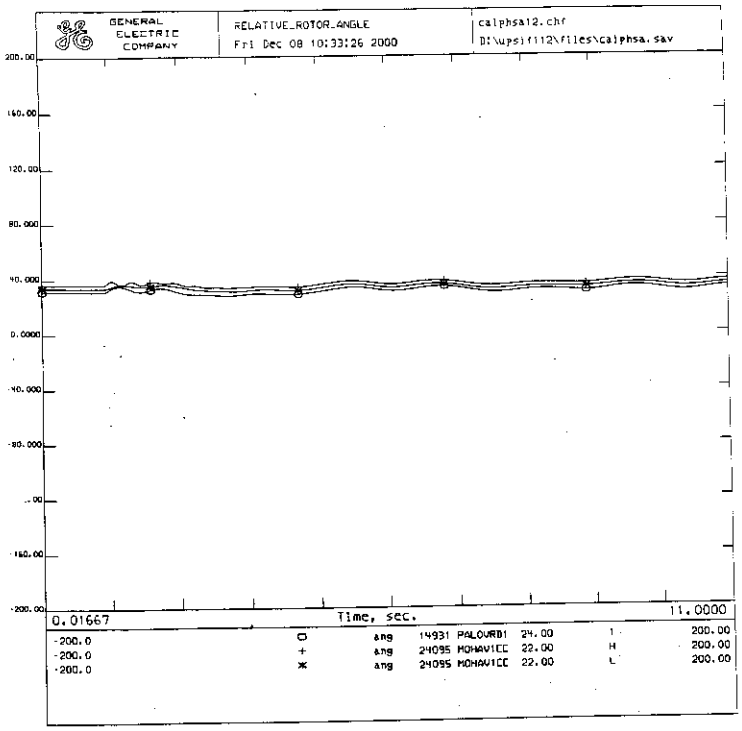
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage & Devers-Coachella 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 12:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa12.swt



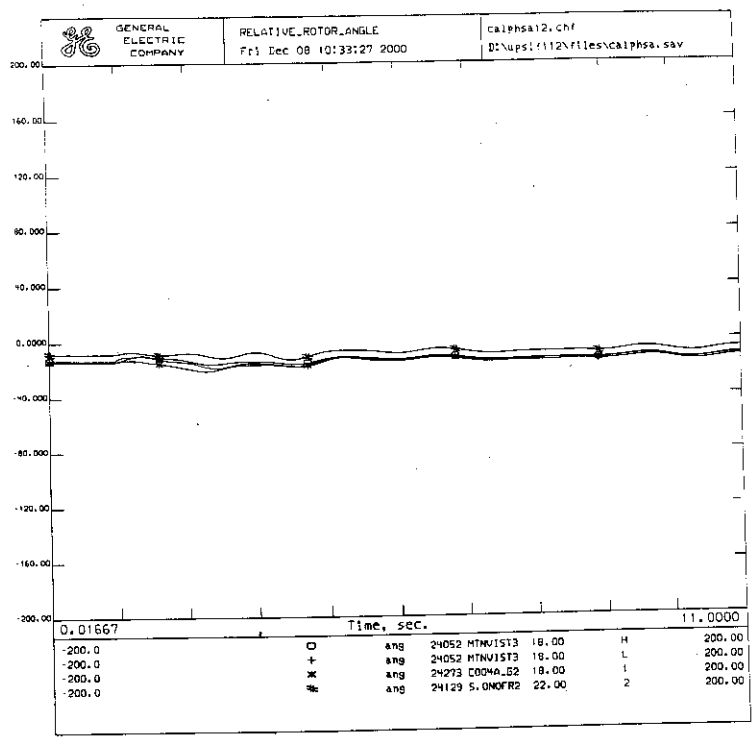
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage & Devers-Coachella 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 12:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa12.swt



2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage & Devers-Coachella 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 12:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa12.swt



2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage & Devers-Coachella 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 12:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa12.swt



2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage & Devers-Coachella 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 12:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa12.swt

CASE 13

```
Calphsa.sav
calphsa.dyd
TITLE
2004 HEAVY SUMMER
4-CYCLE 3-Phase Fault on LUGO 500-KV Bus
Contingency-Remove two Lugo-Mira Loma Lines 2&3
SYSTEM STABILITY STUDY CASE-Case 13:With Calpine(679 MW)
calphsa.sav + calphsa.dyd + calphsa13.swt
RUN 10.0
CC
CC  ***** CALPINE: MORENO VALLEY SYSTEM IMPACT STUDY ******
CC  APPLY A 4 CYCLE 3-PHASE FAULT ON THE LUGO 500 BUS
FB  0.0 "LUGO     " 500
CC  FLASH SERIES CAPACITORS IN: MOHAVE-LUGO
FC  0.0 "LUGO     " 500. "MOHAVE   " 500. "1 " 1
FC  0.0 "LUGO     " 500. "MOHAVE   " 500. "1 " 3
CC  FLASH SERIES CAPACITORS IN: ELDORADO-LUGO
FC  0.0 "ELDORADO" 500. "LUGO     " 500. "1 " 1
FC  0.0 "ELDORADO" 500. "LUGO     " 500. "1 " 3
CC  CLEAR FAULT
CFB 4.0 "LUGO     " 500
CC  REMOVE TWO LUGO-MIRALOMA LINES 2&3
DL  4.0 "LUGO     " 500 "MIRALOMA" 500 "2 "
DL  4.0 "LUGO     " 500 "MIRALOMA" 500 "3 "
CC  REINSERT CAPACITORS IN: MOHAVE-LUGO
RC  8.0 "LUGO     " 500. "MOHAVE   " 500. "1 " 1
RC  8.0 "LUGO     " 500. "MOHAVE   " 500. "1 " 3
CC  REINSERT CAPACITORS IN: ELDORADO-LUGO
RC  8.0 "ELDORADO" 500. "LUGO     " 500. "1 " 1
RC  8.0 "ELDORADO" 500. "LUGO     " 500. "1 " 3
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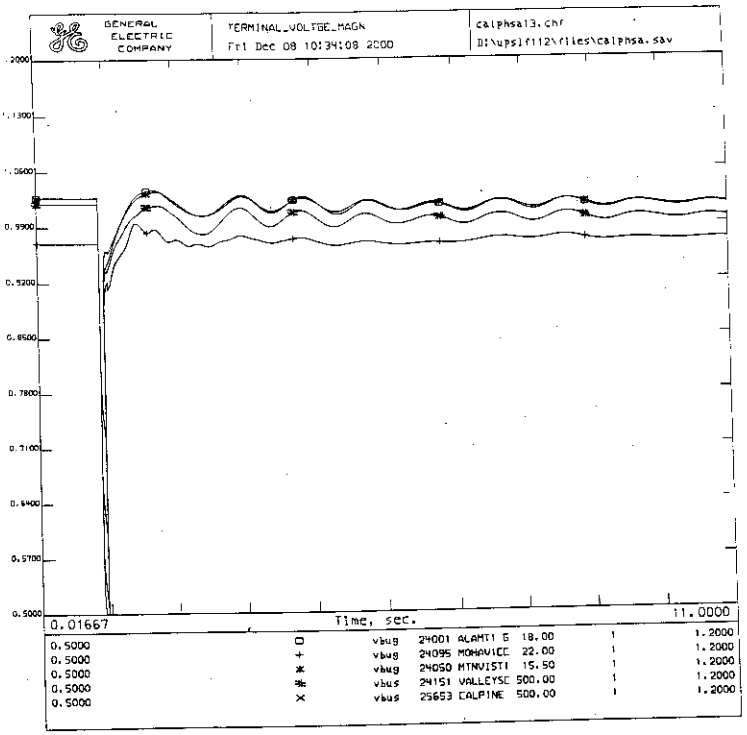
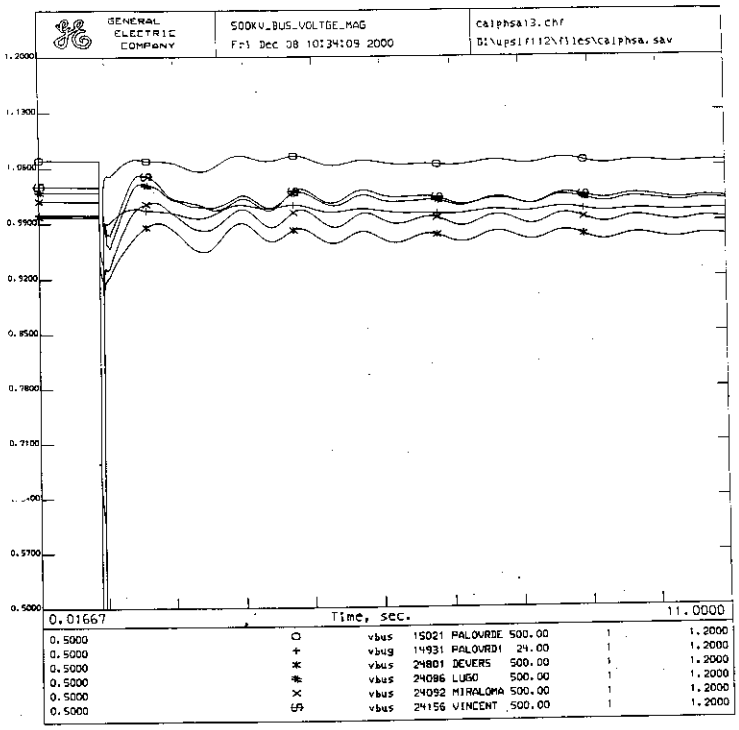
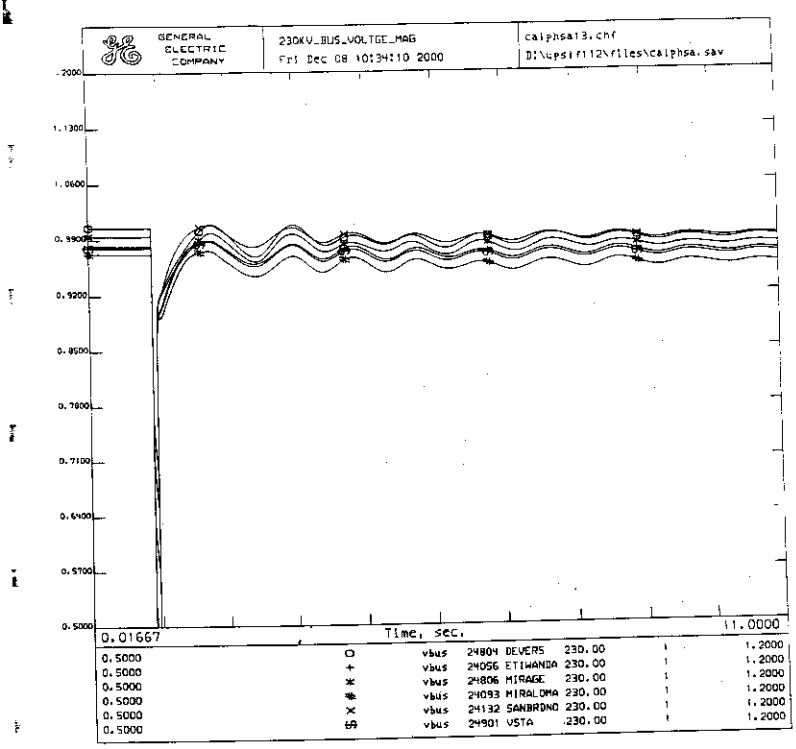


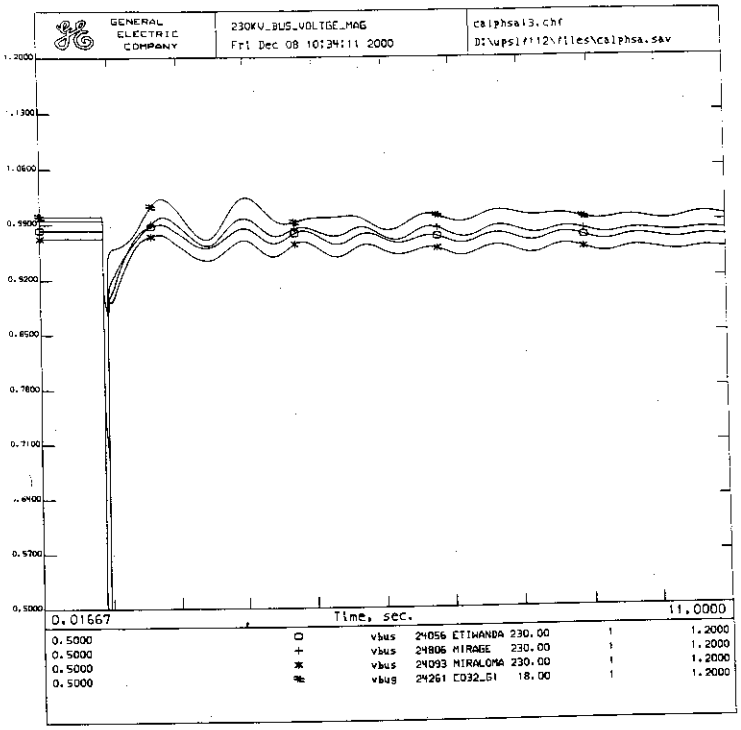
2004 HEAVY SUMMER
4-CYCLE 3-Phase Fault on LUGO 500-KV Bus
Contingency-Remove two Lugo-Mira Loma Lines 2&3
SYSTEM STABILITY STUDY CASES - Case 13:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa13.swt



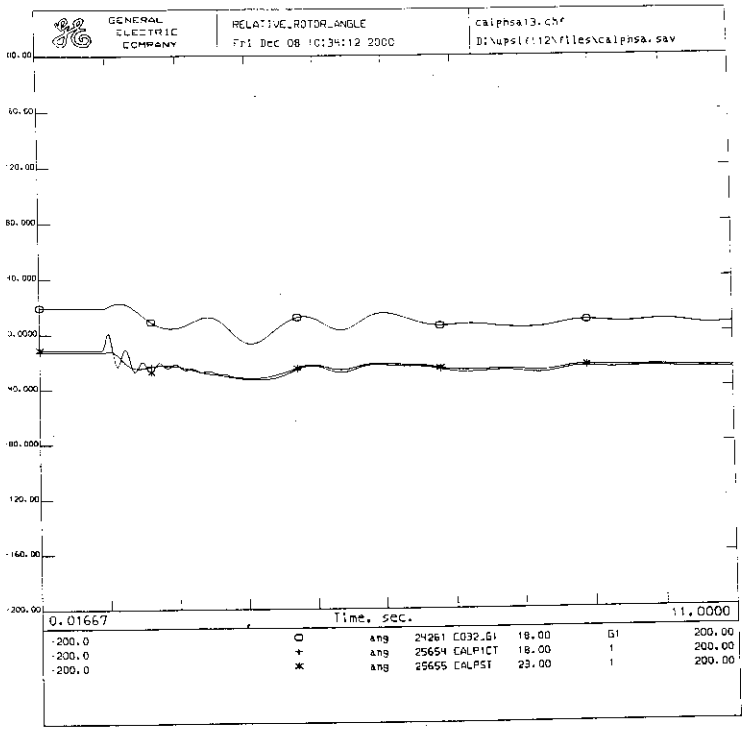
2004 HEAVY SUMMER
4-CYCLE 3-Phase Fault on LUGO 500-KV Bus
Contingency-Remove two Lugo-Mira Loma Lines 2&3
SYSTEM STABILITY STUDY CASES - Case 13:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa13.swt



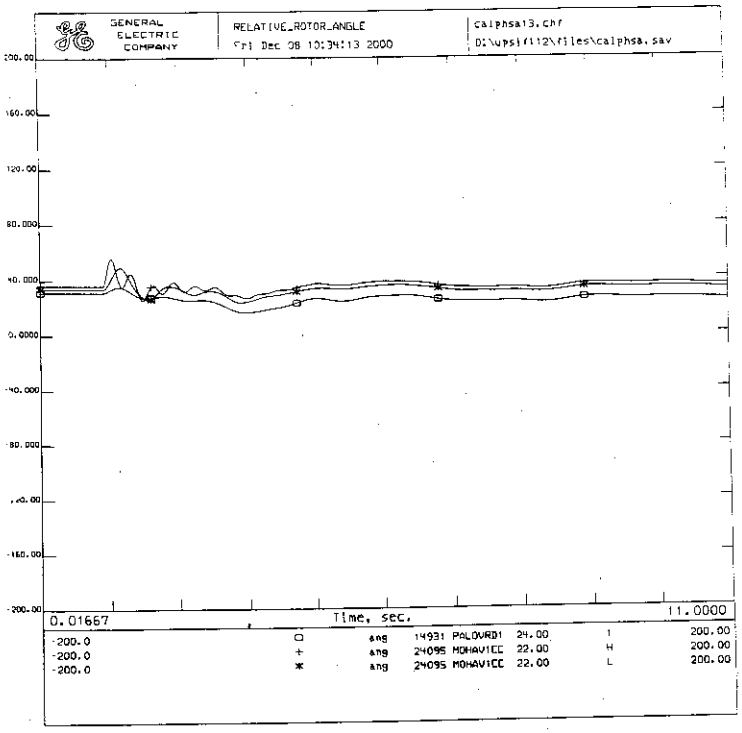
2004 HEAVY SUMMER
4-CYCLE 3-Phase Fault on LUGO 500-KV Bus
Contingency-Remove two Lugo-Mira Loma Lines 2&3
SYSTEM STABILITY STUDY CASES - Case 13:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa13.swt



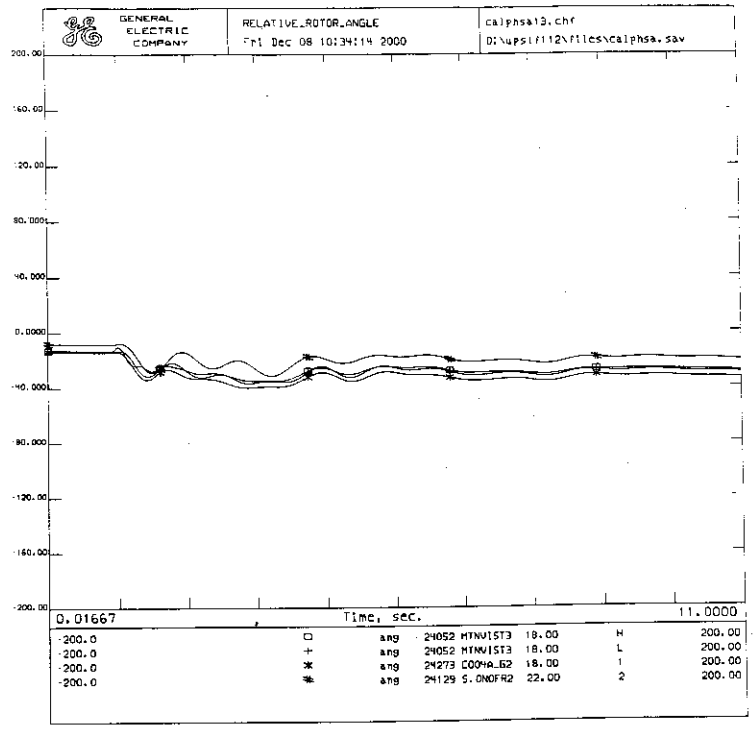
2004 HEAVY SUMMER
4-CYCLE 3-Phase Fault on LUGO 500-KV Bus
Contingency-Remove two Lugo-Mira Loma Lines 2&3
SYSTEM STABILITY STUDY CASES - Case 13:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa13.swt



2004 HEAVY SUMMER
4-CYCLE 3-Phase Fault on LUGO 500-KV Bus
Contingency-Remove two Lugo-Mira Loma Lines 2&3
SYSTEM STABILITY STUDY CASES - Case 13:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa13.swt



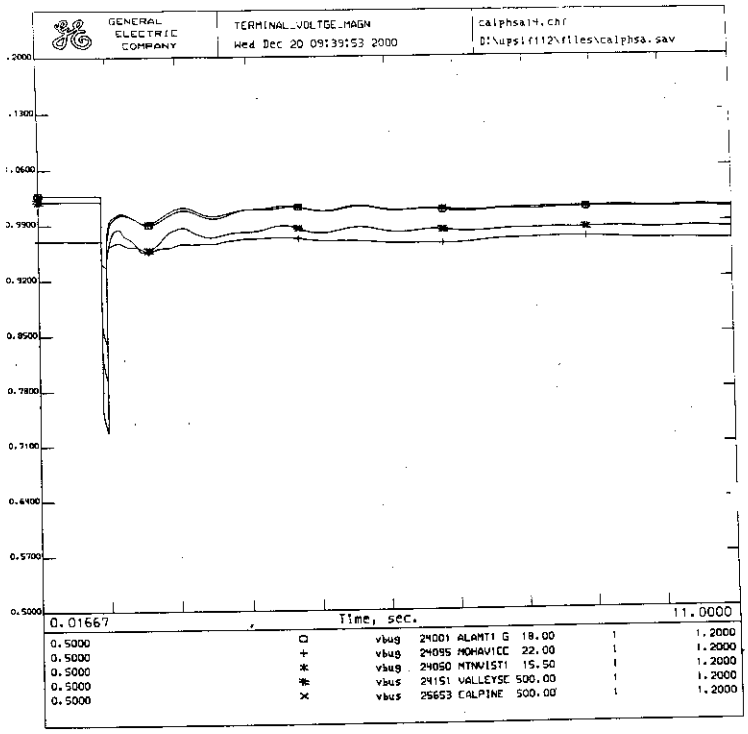
2004 HEAVY SUMMER
4-CYCLE 3-Phase Fault on LUGO 500-KV Bus
Contingency-Remove two Lugo-Mira Loma Lines 2&3
SYSTEM STABILITY STUDY CASES - Case 13:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa13.swt



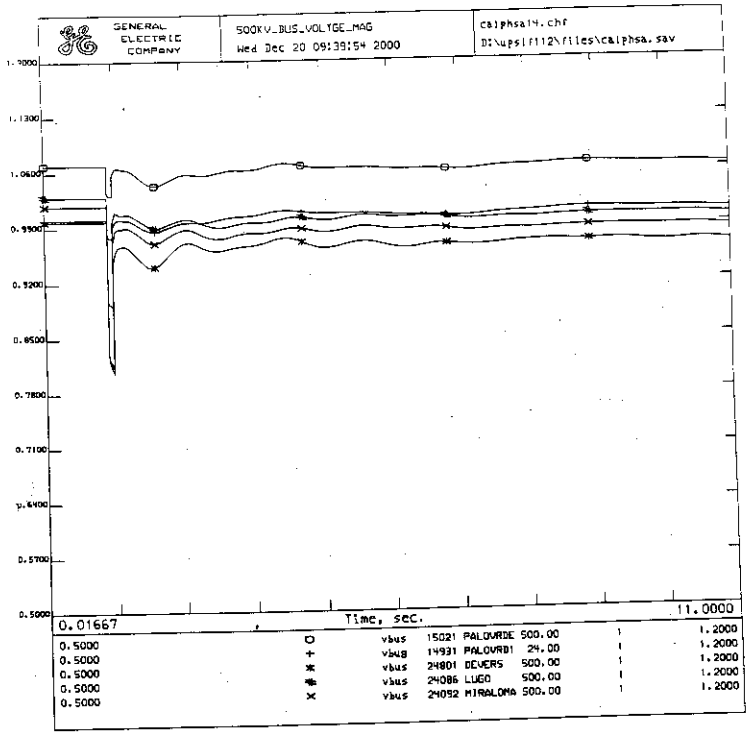
2004 HEAVY SUMMER
4-CYCLE 3-Phase Fault on LUGO 500-KV Bus
Contingency-Remove two Lugo-Mira Loma Lines 2&3
SYSTEM STABILITY STUDY CASES - Case 13:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa13.swt

CASE 14

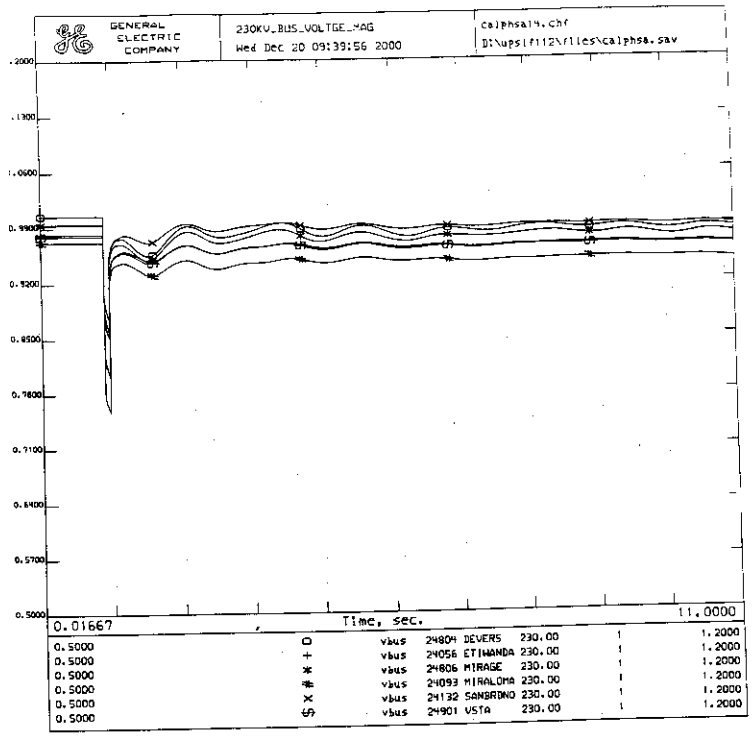
```
calphsa.sav
calphsa.dyd
TITLE
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on SONGS 230 Bus
Contingency-Remove Both SONGS-Units 2&3
SYSTEM STABILITY STUDY CASE-Case 14:Without Calpine(679 MW)
calphsa.sav + calphsa.dyd + calphsa14.swt
RUN 10.0
CC
CC  ***** CALPINE: MORENO VALLEY SYSTEM IMPACT STUDY ******
CC
CC  APPLY A 5 CYCLE 3-PHASE FAULT ON THE SONGS 230 BUS
FB  0.0 "S.ONOFRE " 230
CC  CLEAR FAULT
CFB 5.0 "S.ONOFRE " 230
CC   REMOVE SONGS Units 2&3
TG  5.0 "S.ONOFR2 " 22.00 "2 "
TG  5.0 "S.ONOFR3 " 22.00 "3 "
```



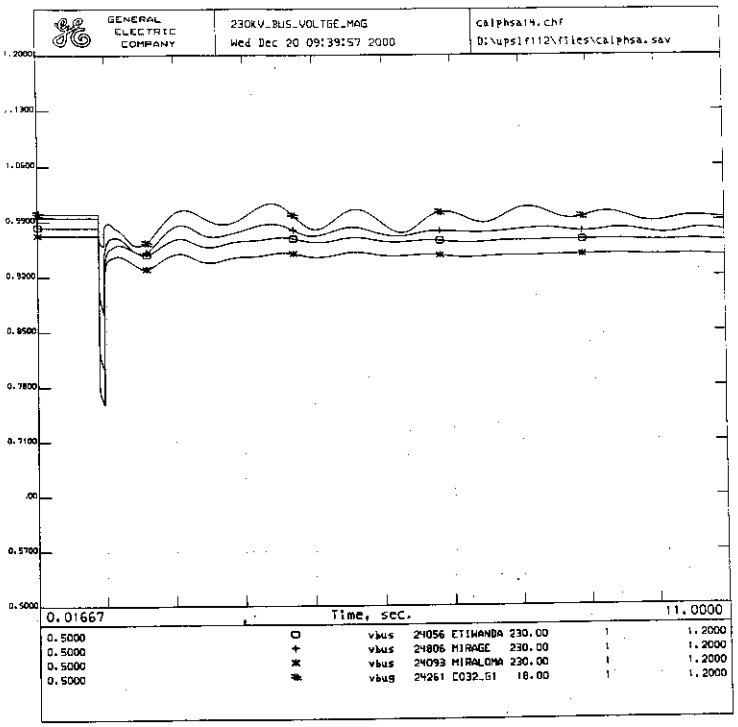
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on SONGS 230 Bus
Contingency-Remove Both SONGS-Units 2&3
SYSTEM STABILITY STUDY CASES - Case 14:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa14.swt



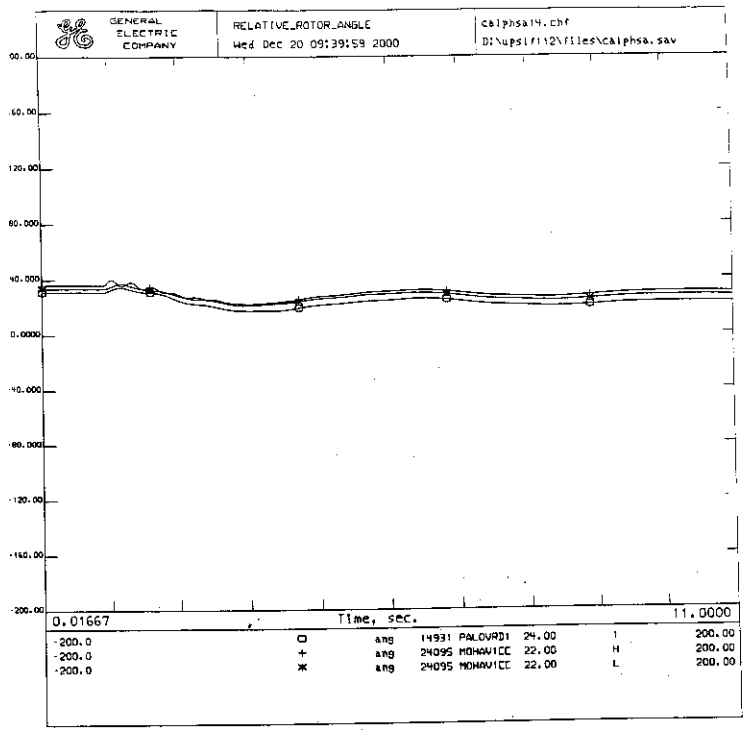
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on SONGS 230 Bus
Contingency-Remove Both SONGS-Units 2&3
SYSTEM STABILITY STUDY CASES - Case 14:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa14.swt



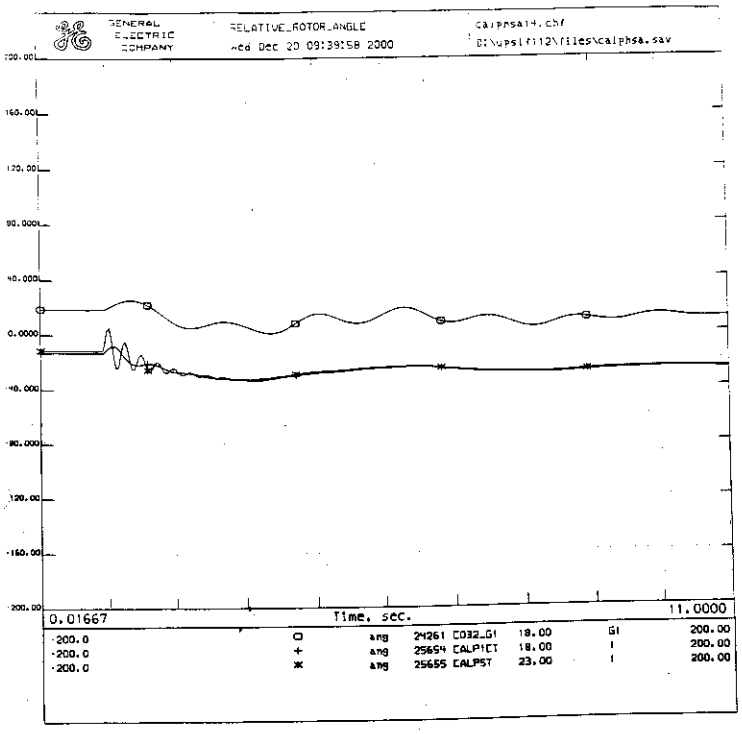
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on SONGS 230 Bus
Contingency-Remove Both SONGS-Units 2&3
SYSTEM STABILITY STUDY CASES - Case 14:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa14.swt



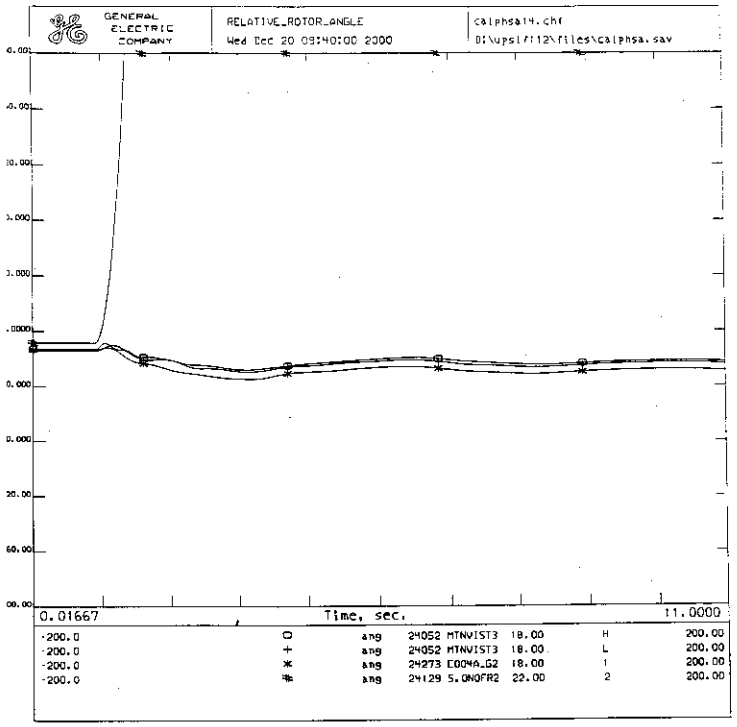
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on SONGS 230 Bus
Contingency-Remove Both SONGS-Units 2&3
SYSTEM STABILITY STUDY CASES - Case 14:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa14.swt



2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on SONGS 230 Bus
Contingency-Remove Both SONGS-Units 2&3
SYSTEM STABILITY STUDY CASES - Case 14:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa14.swt



2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on SONGS 230 Bus
Contingency-Remove Both SONGS-Units 2&3
SYSTEM STABILITY STUDY CASES - Case 14:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa14.swt



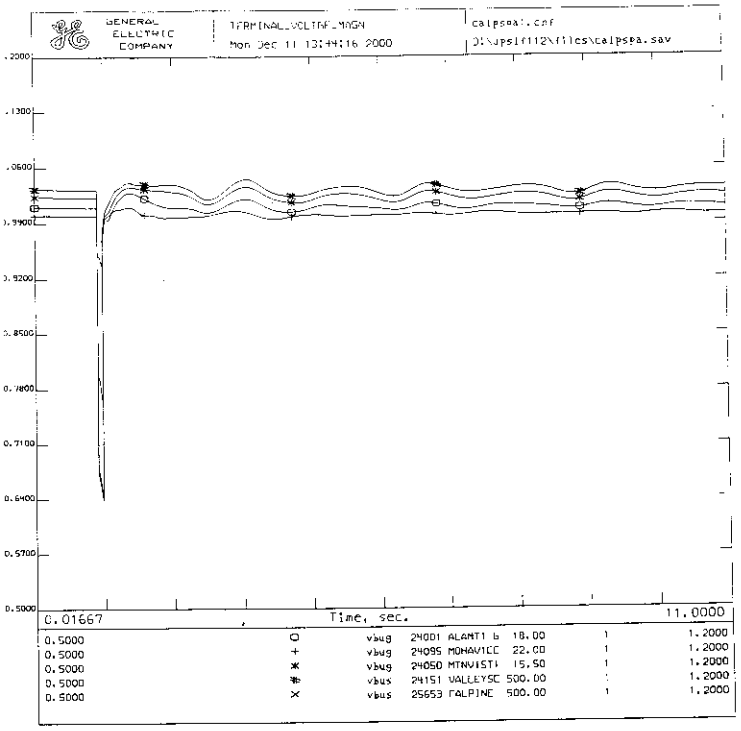
2004 HEAVY SUMMER
5-CYCLE 3-Phase Fault on SONGS 230 Bus
Contingency-Remove Both SONGS-Units 2&3
SYSTEM STABILITY STUDY CASES - Case 14:With Calpine (679 MW)
calphsa.sav + calphsa.dyd + calphsa14.swt

Transient Stability

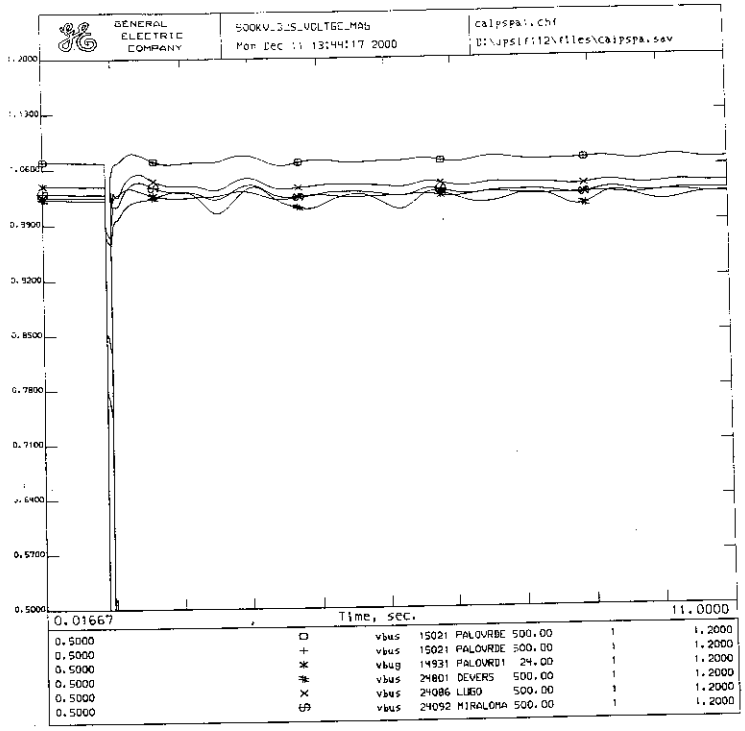
B-2: Light Spring – With Calpine

CASE 1

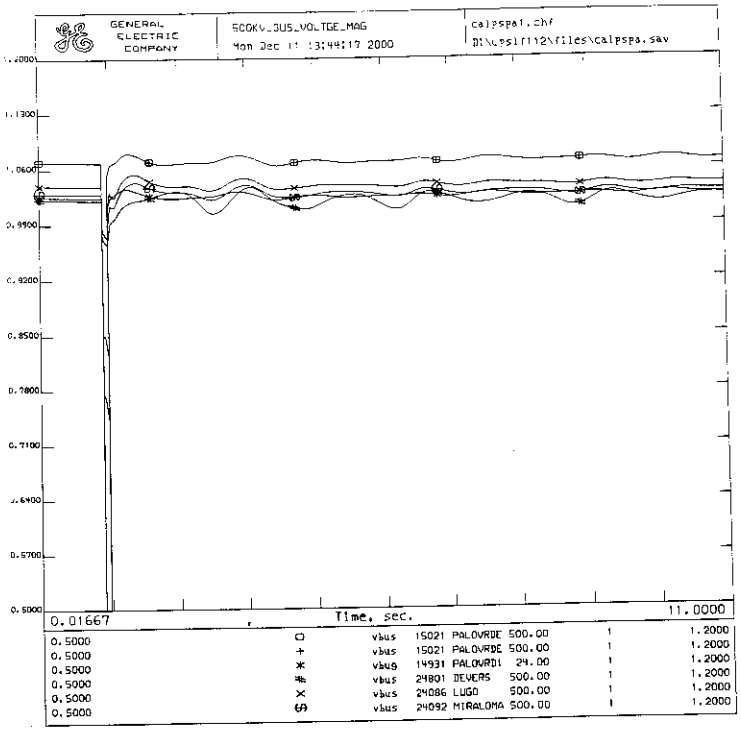
```
calpspa.sav
calpspa.dyd
TITLE
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 230-KV Line
SYSTEM STABILITY STUDY CASE-Case 1:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspal.swt
RUN 10.0
CC
CC  ***** CALPINE: MORENO VALLEY SYSTEM IMPACT STUDY ******
CC  APPLY A 5 CYCLE 3-PHASE FAULT ON THE DEVERS 230 BUS
CC
FB  0.0 "DEVERS  " 230
CC  CLEAR FAULT
CFB 5.0 "DEVERS  " 230
CC   REMOVE DEVERS-SAN BERNARDINO NO. 1 230KV LINE
DL   5.0 "SANBRDNO" 230. "DEVERS  " 230. "1 "
```



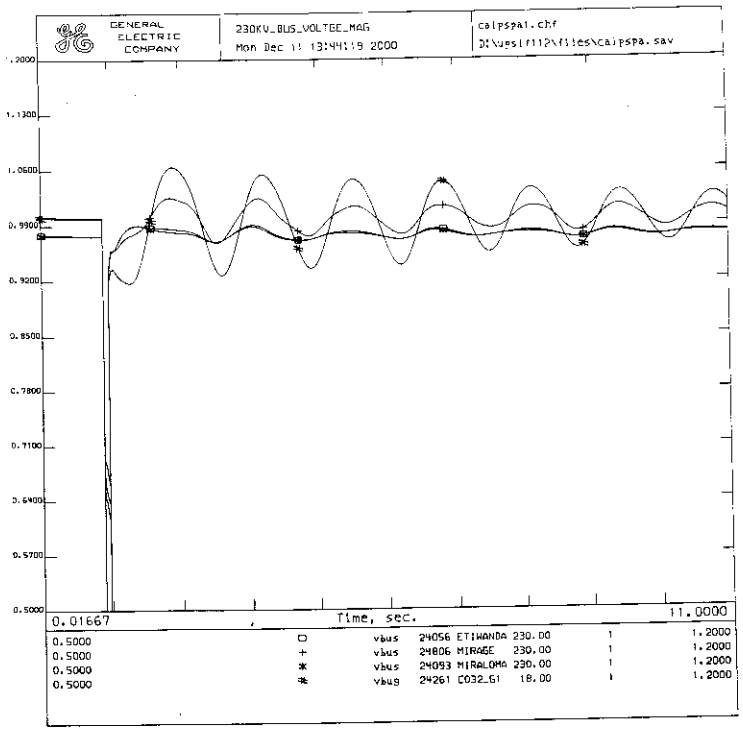
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 1:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa1.swt



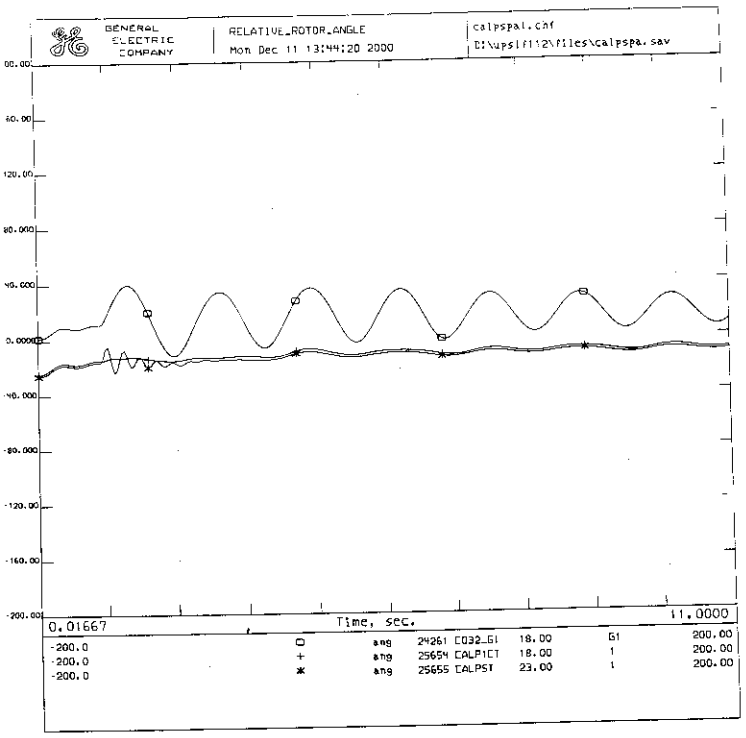
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 1:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa1.swt



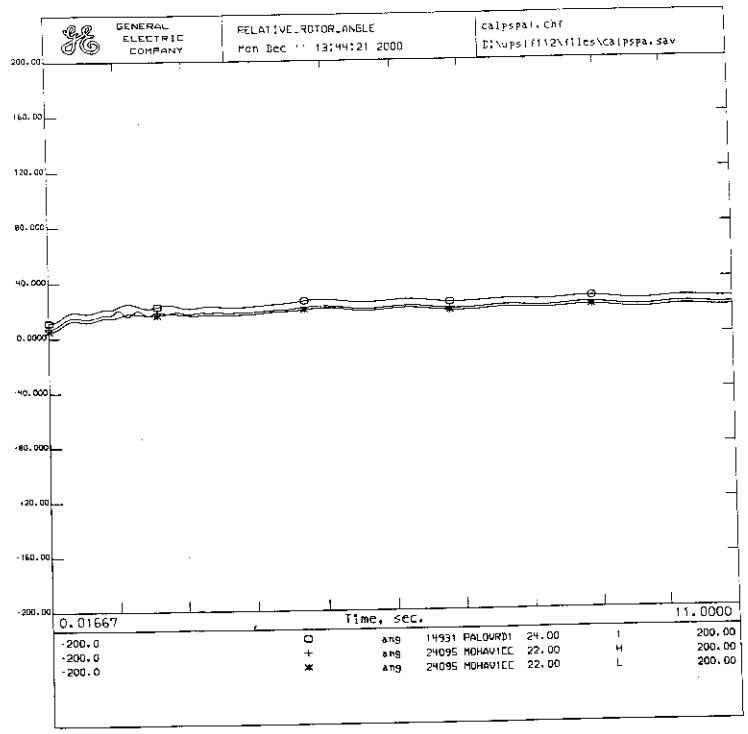
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 1:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa1.swt



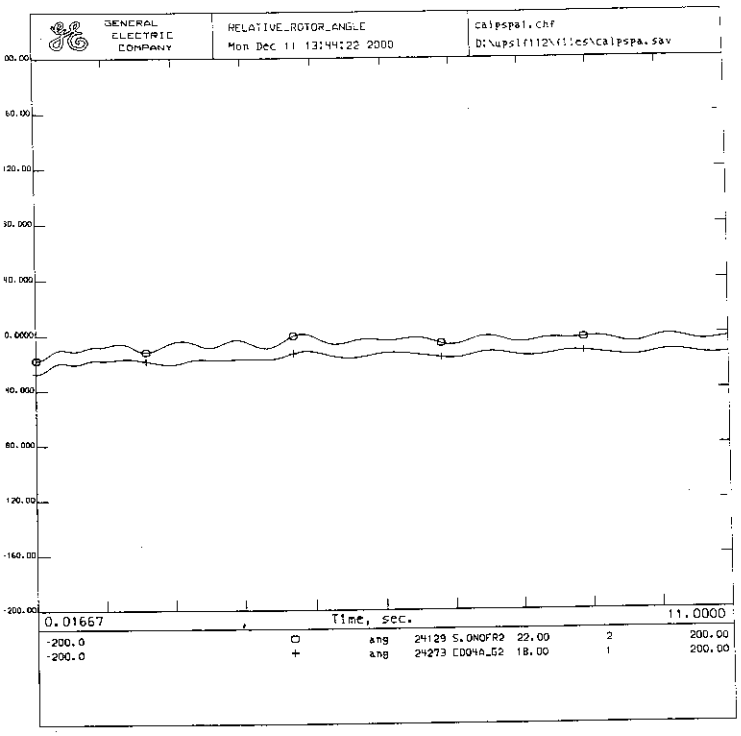
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 1:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa1.swt



2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 1:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa1.swt



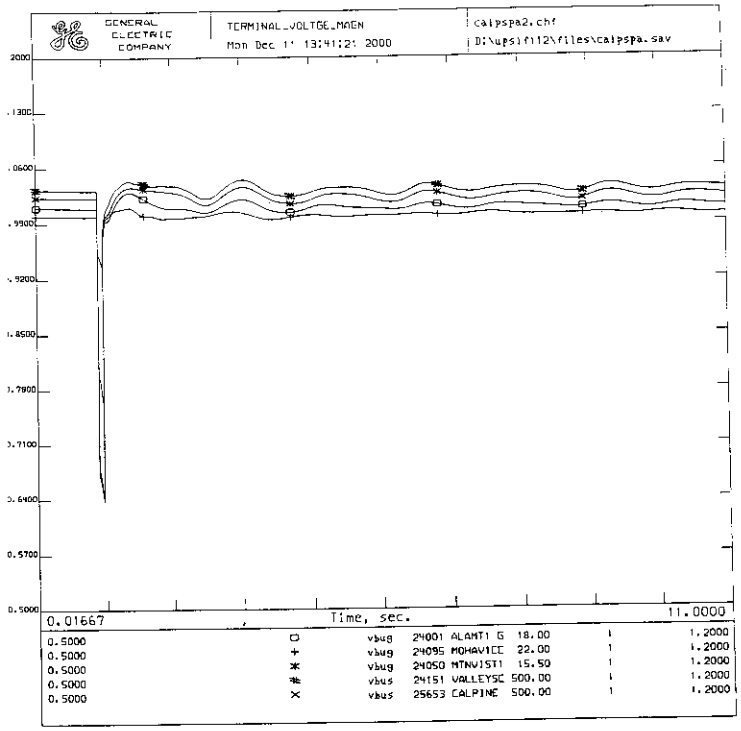
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 1:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa1.swt



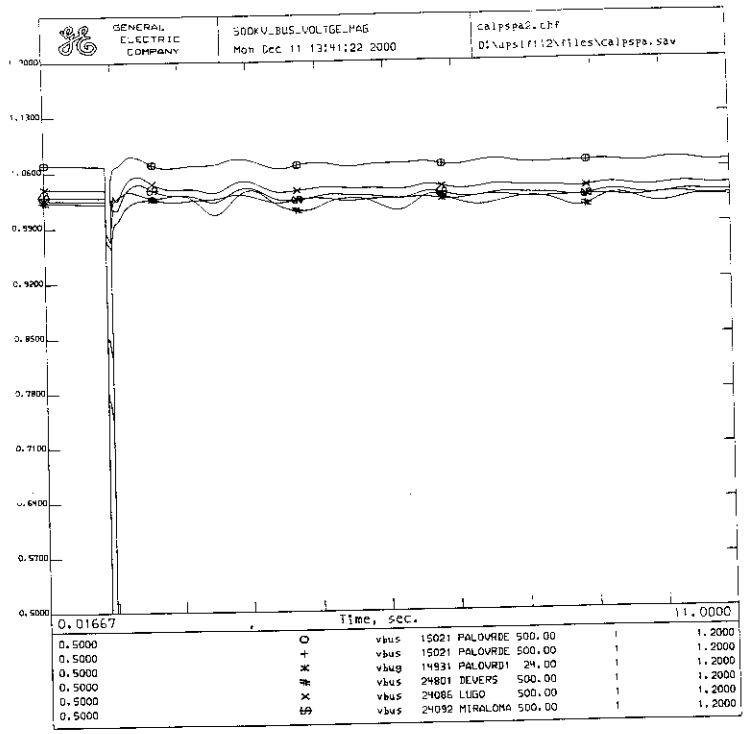
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 1:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa1.swt

CASE 2

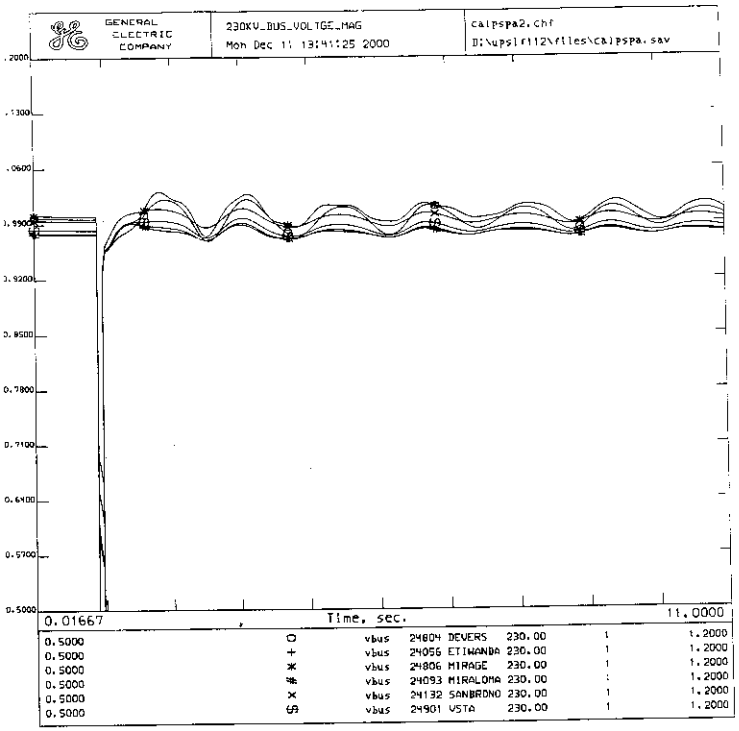
```
calpspa.sav
calpspa.dyd
TITLE
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage 230-KV Line
SYSTEM STABILITY STUDY CASE-Case 2:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa2.swt
RUN 10.0
CC
CC  ***** CALPINE: MORENO VALLEY SYSTEM IMPACT STUDY ******
CC  APPLY A 5 CYCLE 3-PHASE FAULT ON THE DEVERS 230 BUS
CC
FB  0.0 "DEVERS  " 230
CC  CLEAR FAULT
CFB 5.0 "DEVERS  " 230
CC   REMOVE DEVERS-MIRAGE 230KV LINE
DL   5.0 "DEVERS  " 230. "MIRAGE  " 230. "1 "
```



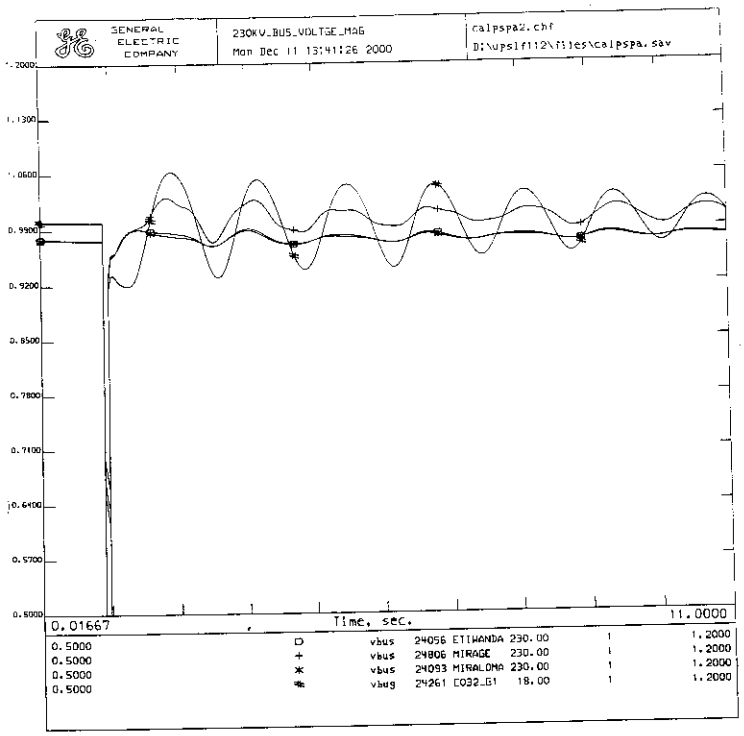
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 2:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa2.swt



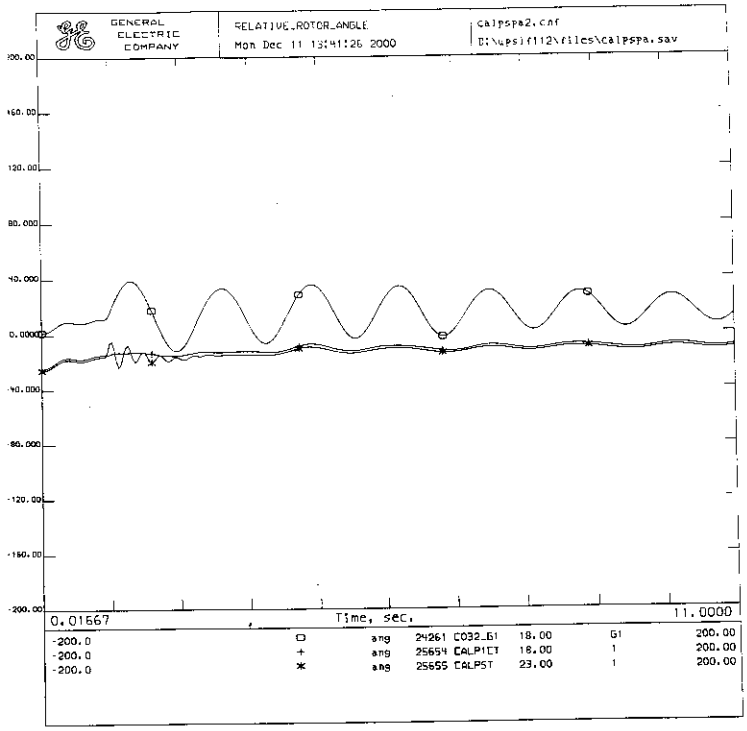
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 2:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa2.swt



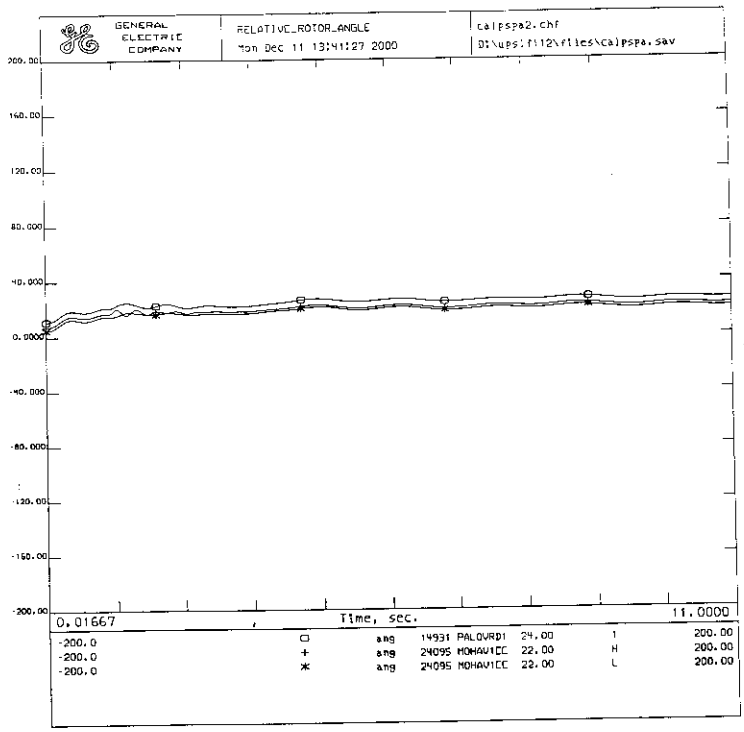
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 2:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa2.swt



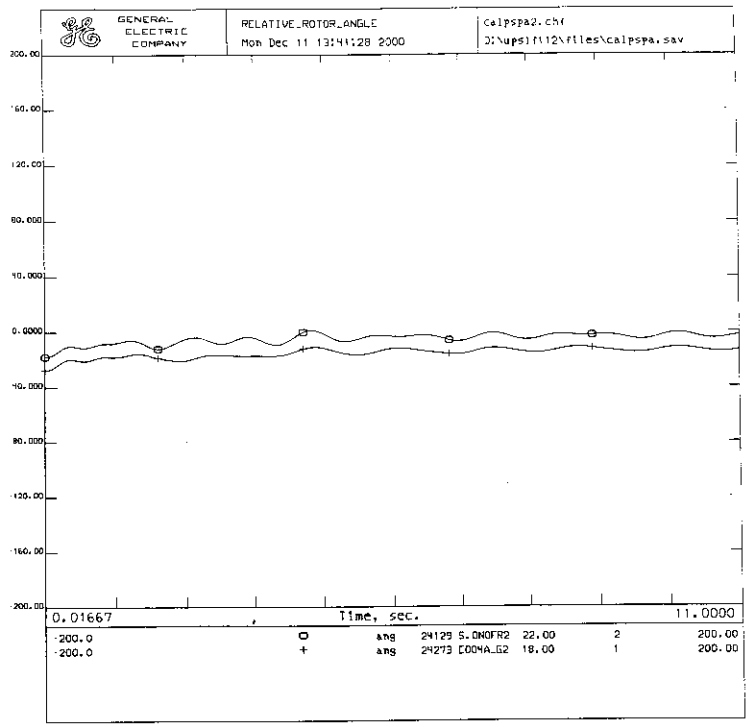
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 2:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa2.swt



2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 2:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa2.swt



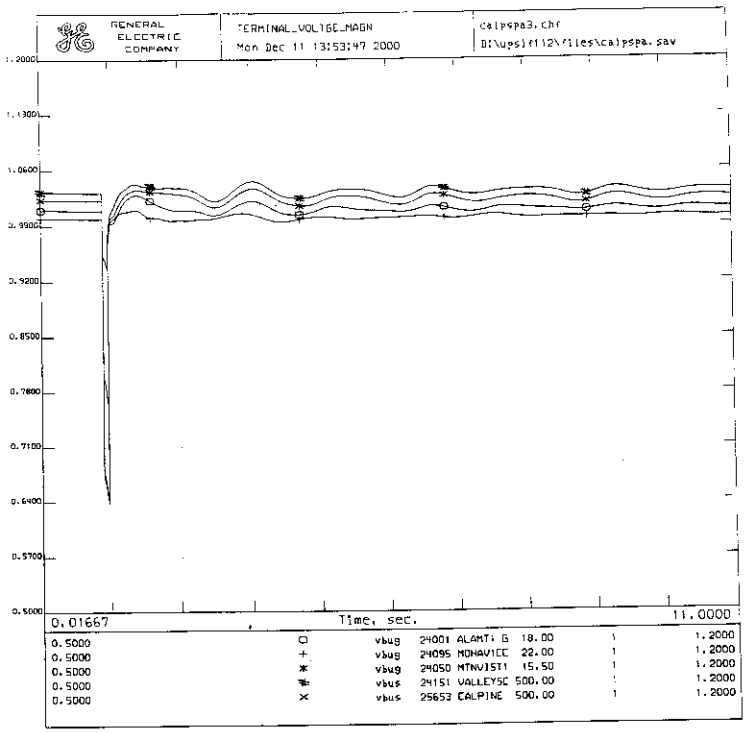
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 2:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa2.swt



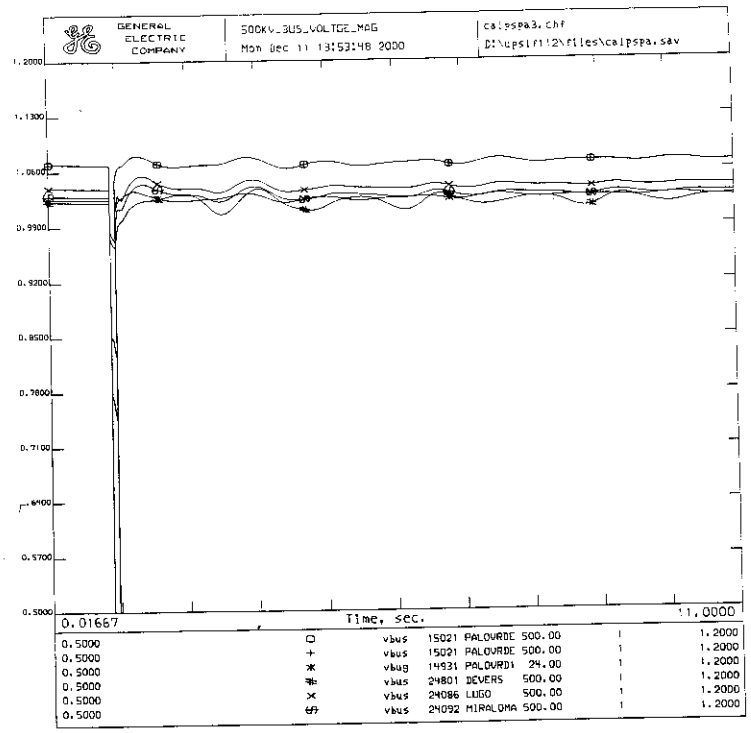
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 2:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa2.swt

CASE 3

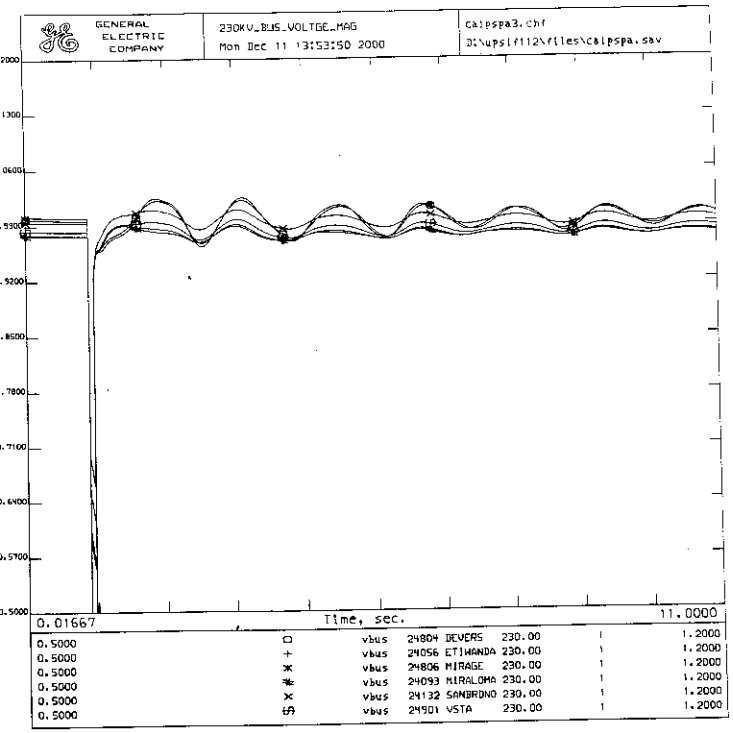
```
calpspa.sav
calpspa.dyd
TITLE
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Coachella 230-KV Line
SYSTEM STABILITY STUDY CASE-Case 3:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa3.swt
RUN 10.0
CC
CC  ***** CALPINE: MORENO VALLEY SYSTEM IMPACT STUDY ******
CC  APPLY A 5 CYCLE 3-PHASE FAULT ON THE DEVERS 230 BUS
CC
FB  0.0 "DEVERS  " 230
CC  CLEAR FAULT
CFB 5.0 "DEVERS  " 230
CC   REMOVE DEVERS-COACHELLA 230KV LINE
DL   5.0 "COACHELV" 230. "DEVERS  " 230. "1 "
```



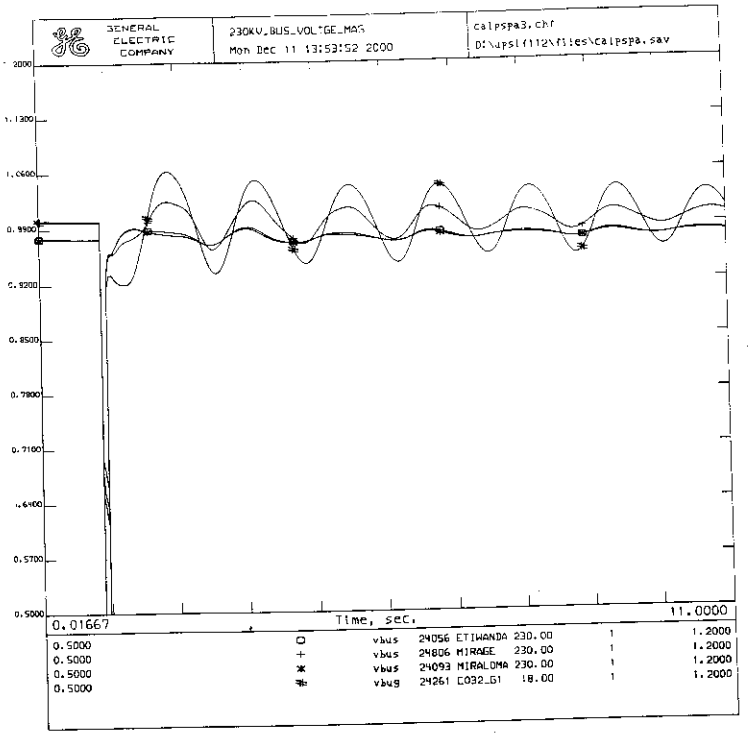
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Coachella 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 3:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa3.swt



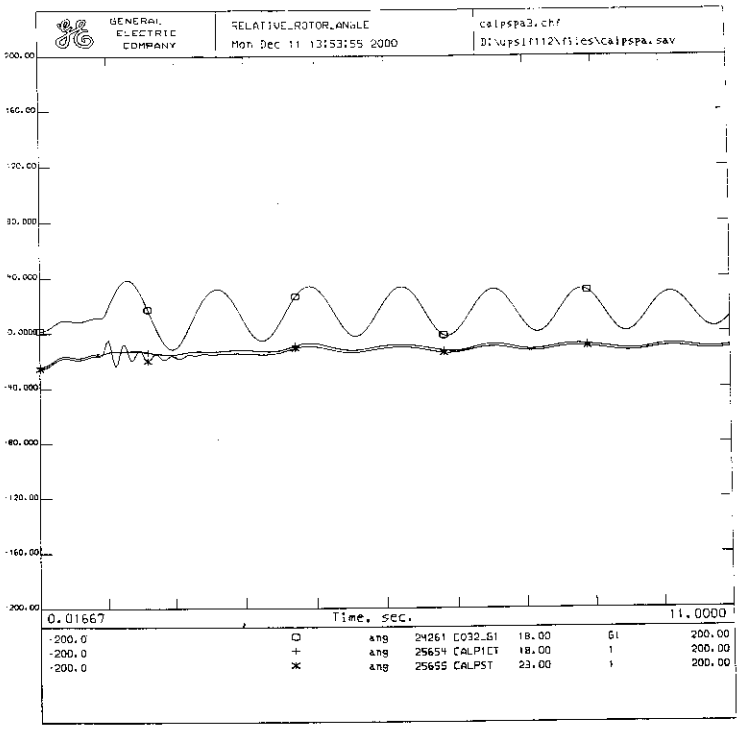
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Coachella 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 3:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa3.swt



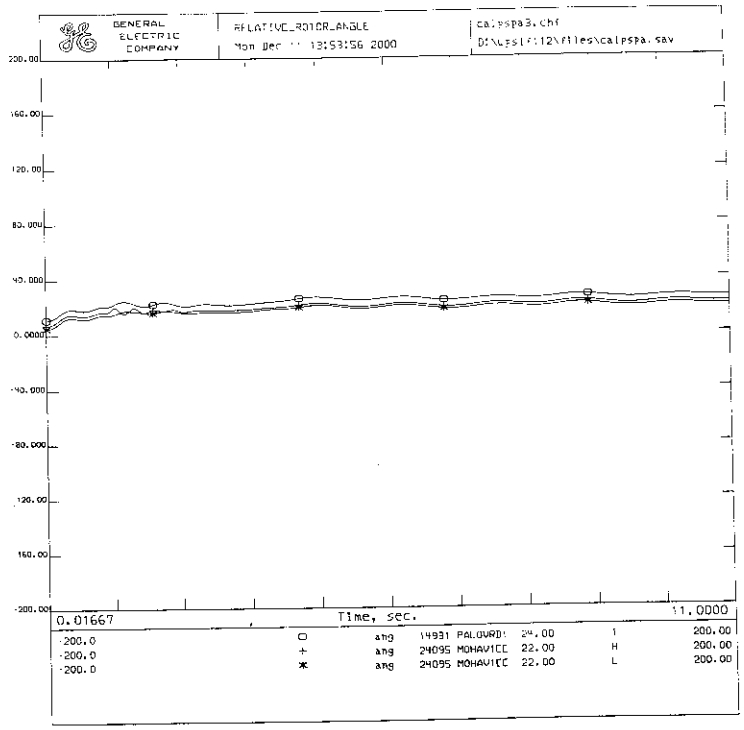
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Coachella 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 3:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa3.swt



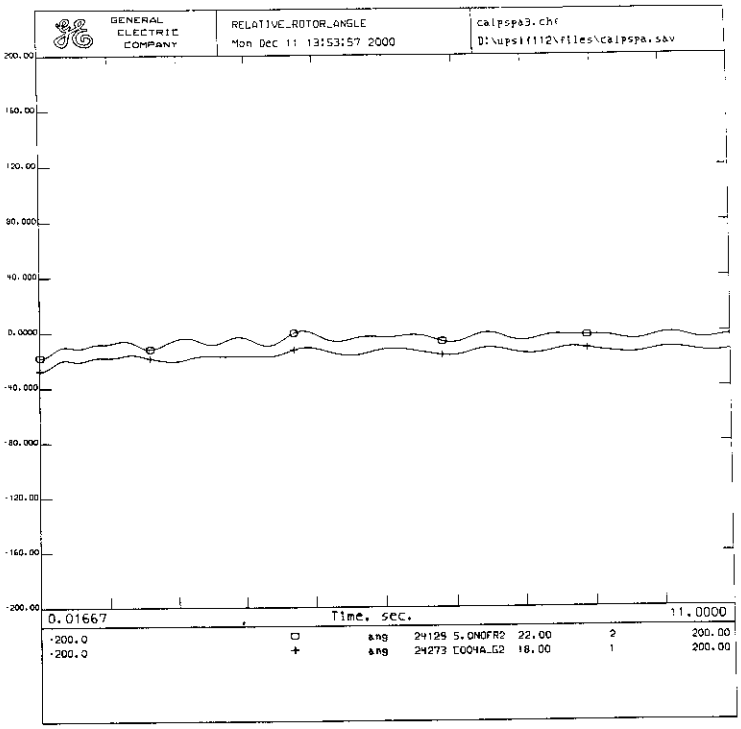
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Coachella 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 3:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa3.swt



2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Coachella 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 3:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa3.swt



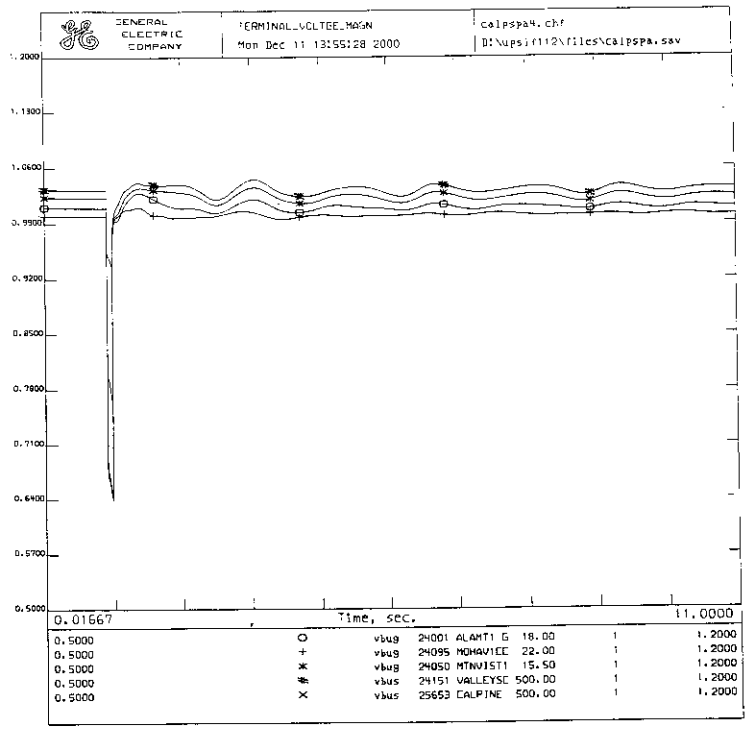
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Coachella 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 3:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa3.swt



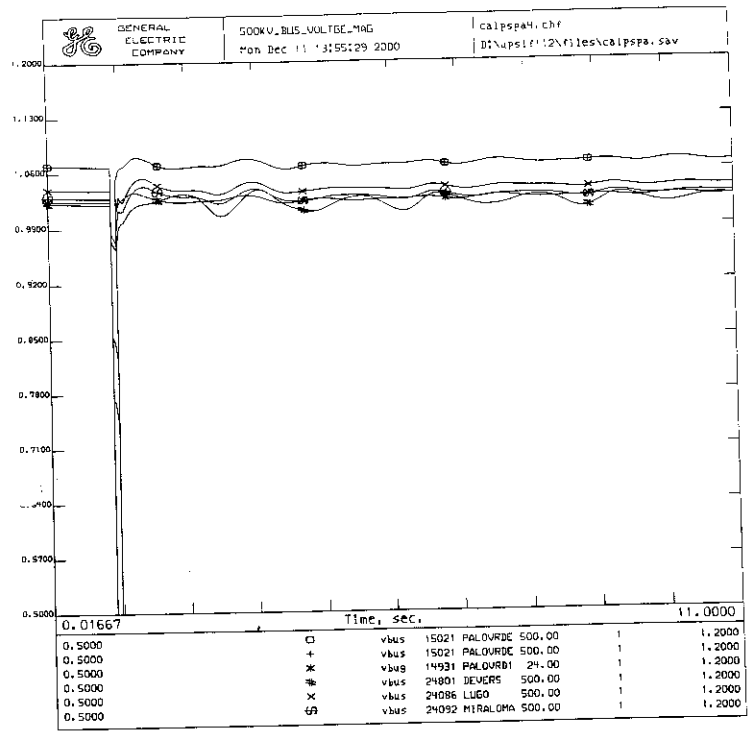
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Coachella 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 3:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa3.swt

CASE 4

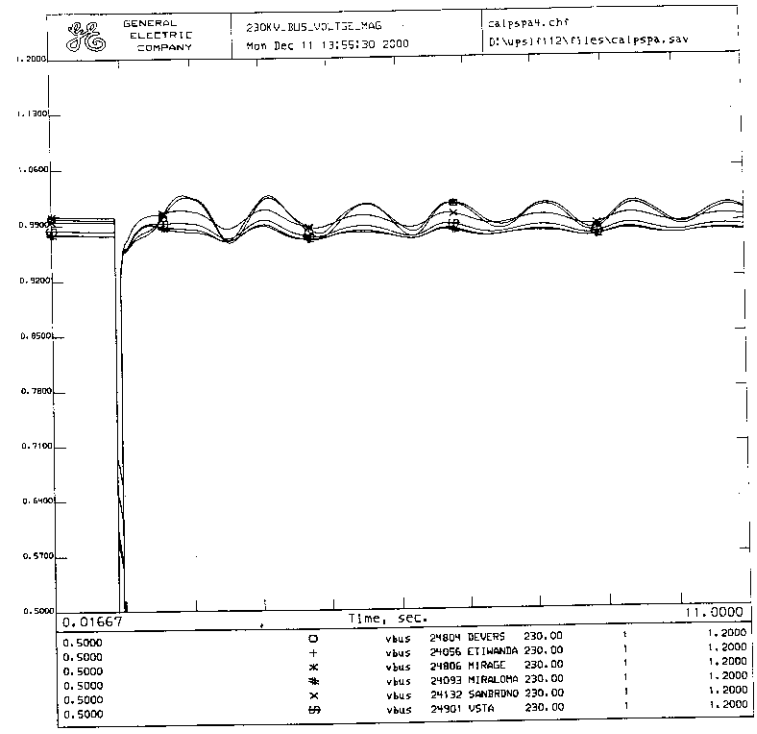
```
calpspa.sav
calpspa.dyd
TITLE
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista 230-KV Line
SYSTEM STABILITY STUDY CASE-Case 4:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa4.swt
RUN 10.0
CC
CC  ***** CALPINE: MORENO VALLEY SYSTEM IMPACT STUDY ******
CC  APPLY A 5 CYCLE 3-PHASE FAULT ON THE DEVERS 230 BUS
CC
FB  0.0 "DEVERS  " 230
CC  CLEAR FAULT
CFB 5.0 "DEVERS  " 230
CC   REMOVE DEVERS-VISTA 230KV LINE
DL   5.0 "VSTA    " 230. "DEVERS  " 230. "1 "
```



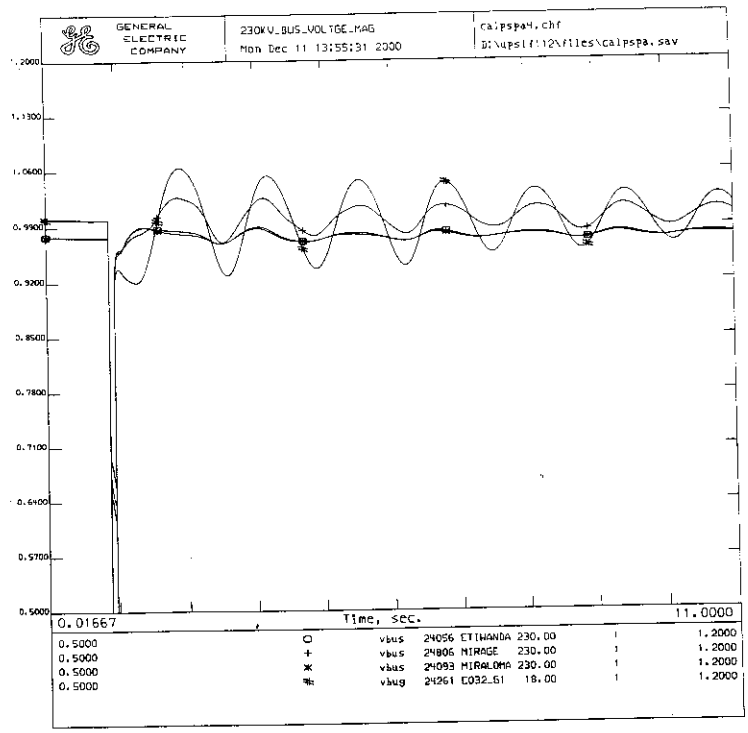
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 4:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa4.swt



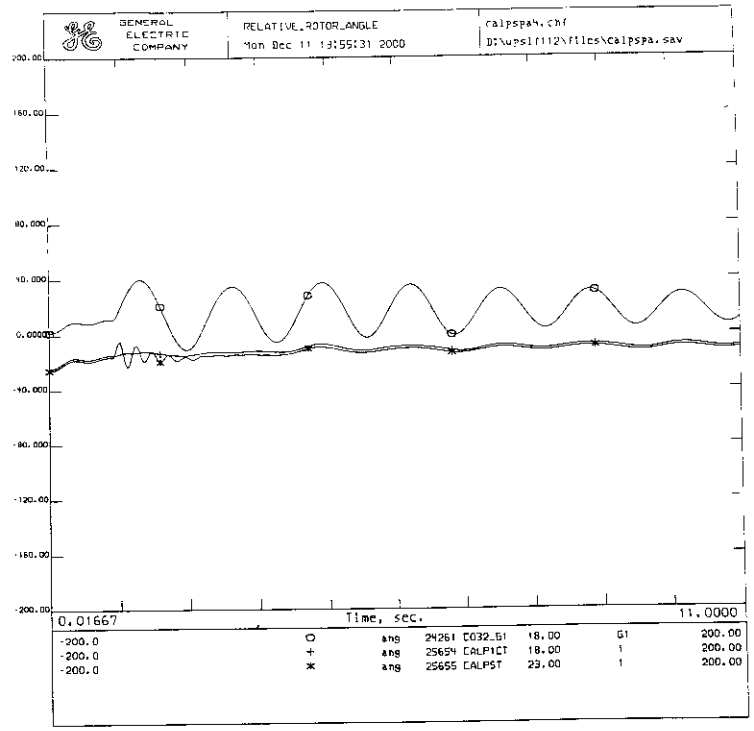
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 4:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa4.swt



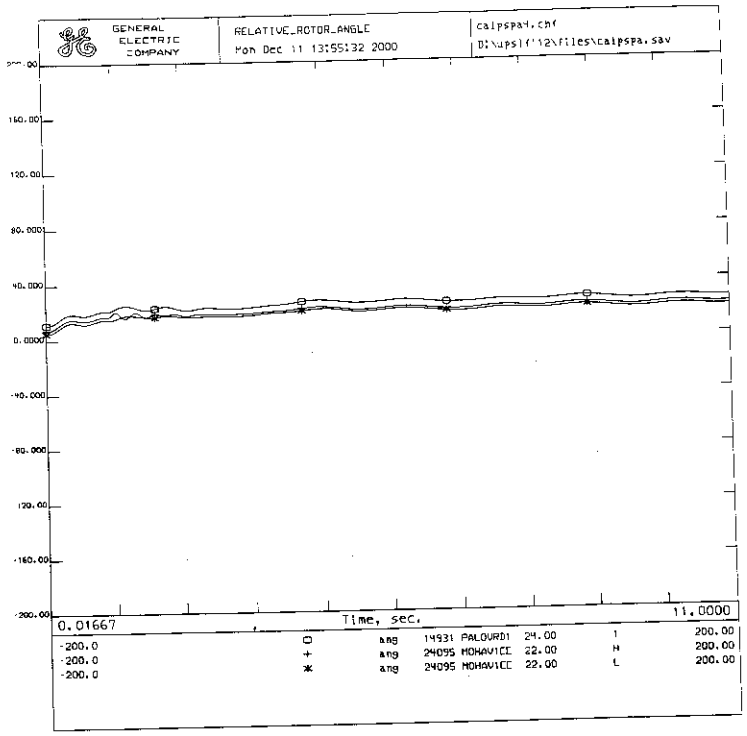
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 4:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa4.swt



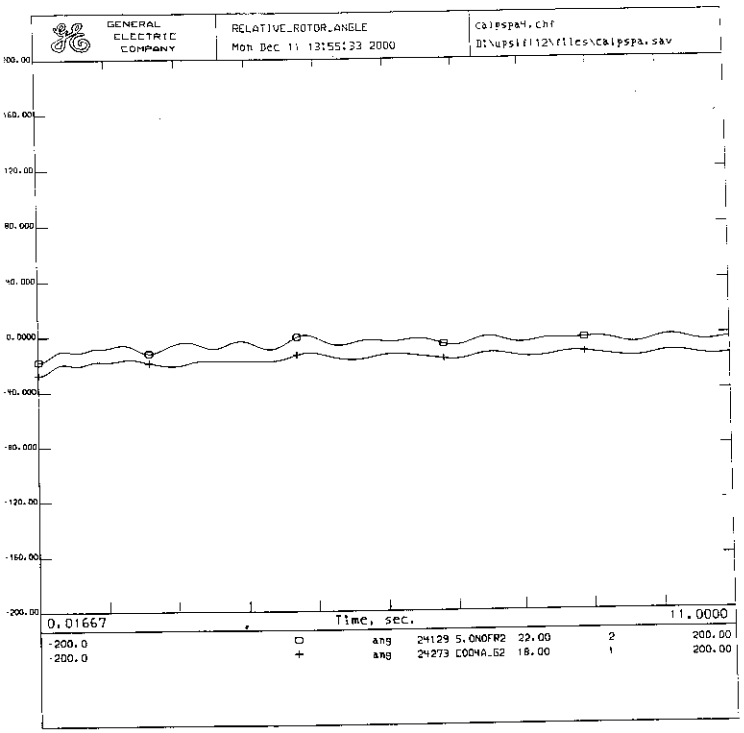
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 4:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa4.swt



2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 4:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa4.swt



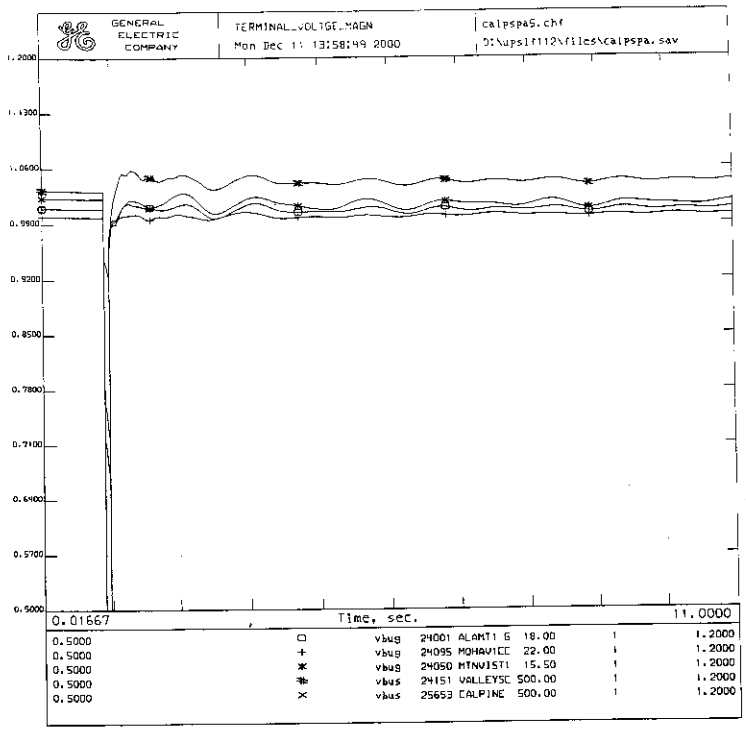
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 4:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa4.swt



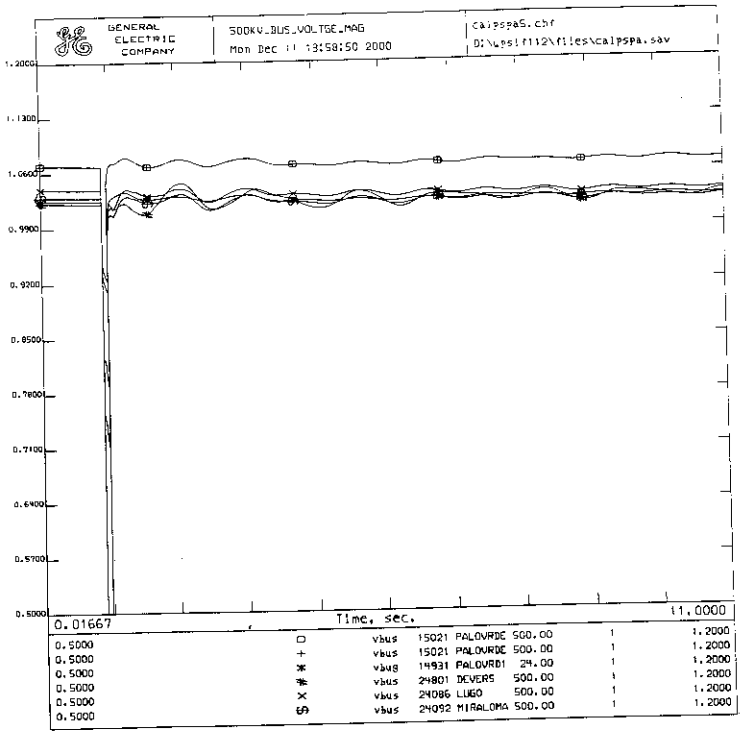
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista 230-KV Line
SYSTEM STABILITY STUDY CASE - Case 4:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa4.swt

CASE 5

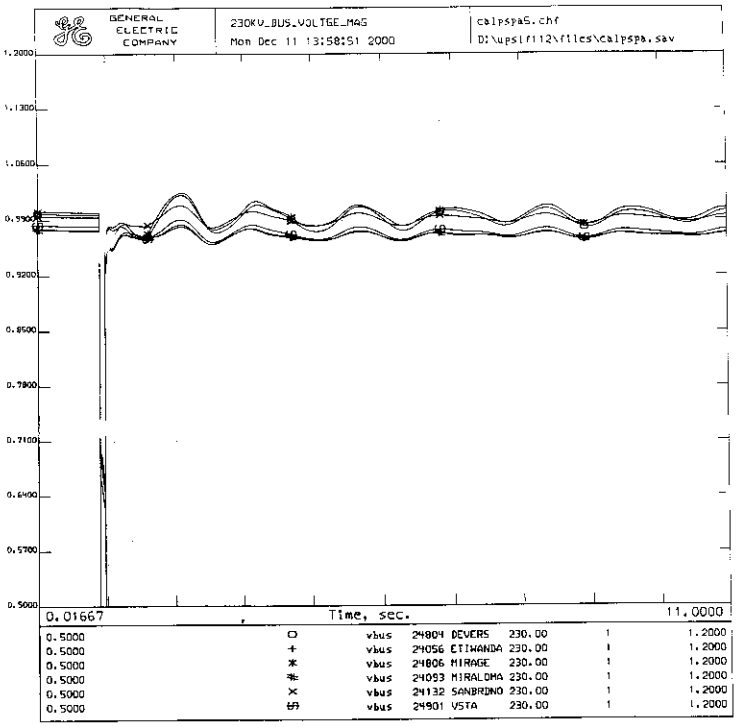
```
calpspa.sav
calpspa.dyd
TITLE
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 500-KV Bus
Contingency - Devers-Valley 500-KV Line
SYSTEM STABILITY STUDY CASE-Case 5:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa5.swt
RUN 10.0
CC
CC  ***** CALPINE: MORENO VALLEY SYSTEM IMPACT STUDY ******
CC  APPLY A 5 CYCLE 3-PHASE FAULT ON THE DEVERS 500 BUS
CC
FB  0.0 "DEVERS  " 500
CC  CLEAR FAULT
CFB 5.0 "DEVERS  " 500
CC   REMOVE DEVERS-VALLEY 500KV LINE
DL   5.0 "DEVERS  " 500. "VALLEYSC" 500. "1 "
```



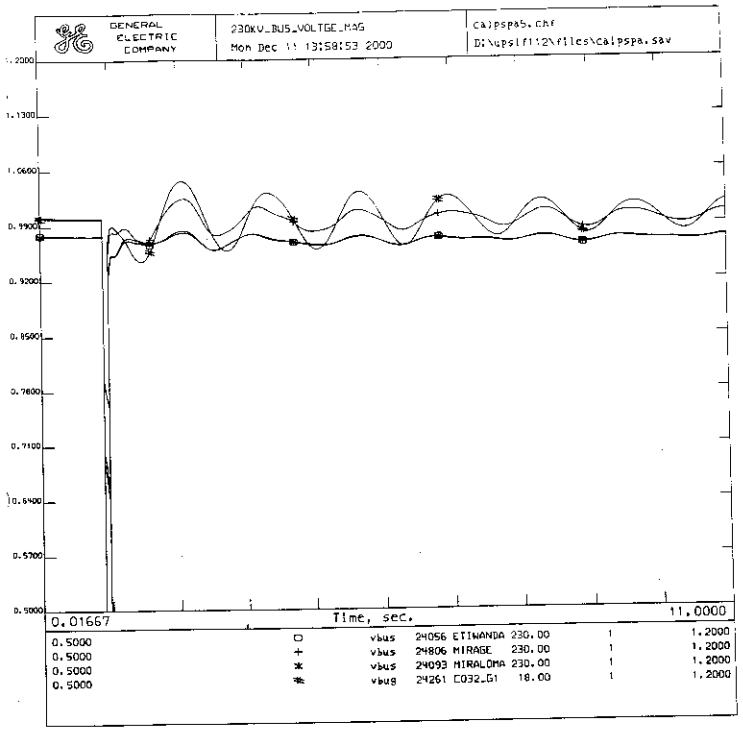
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 500-KV Bus
Contingency - Devers-Valley 500-KV Line
SYSTEM STABILITY STUDY CASE - Case 5:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa5.swt



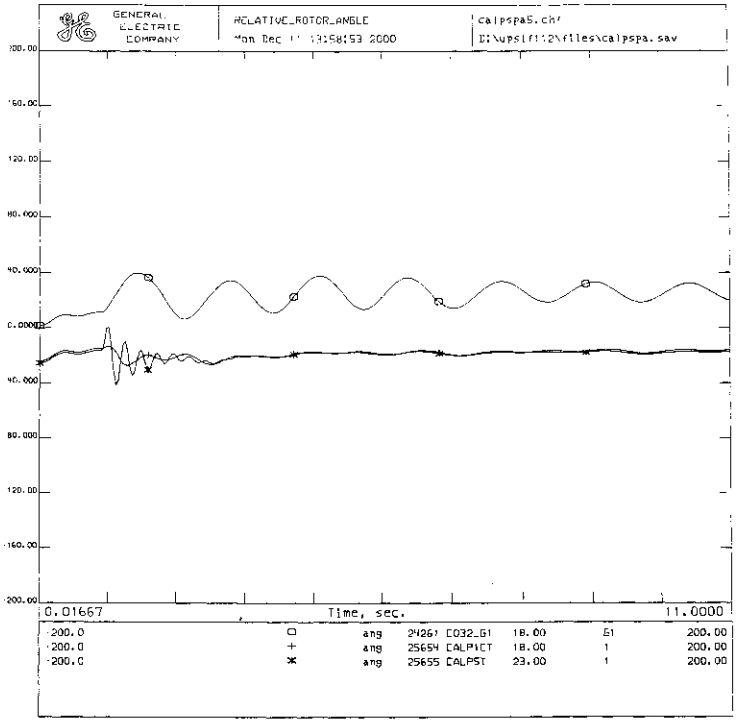
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 500-KV Bus
Contingency - Devers-Valley 500-KV Line
SYSTEM STABILITY STUDY CASE - Case 5:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa5.swt



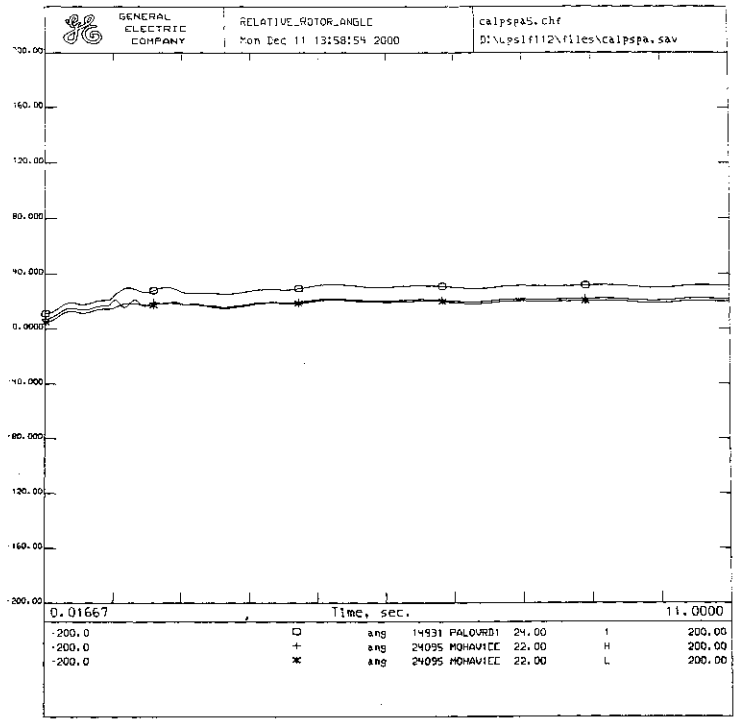
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 500-KV Bus
Contingency - Devers-Valley 500-KV Line
SYSTEM STABILITY STUDY CASE - Case 5:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa5.swt



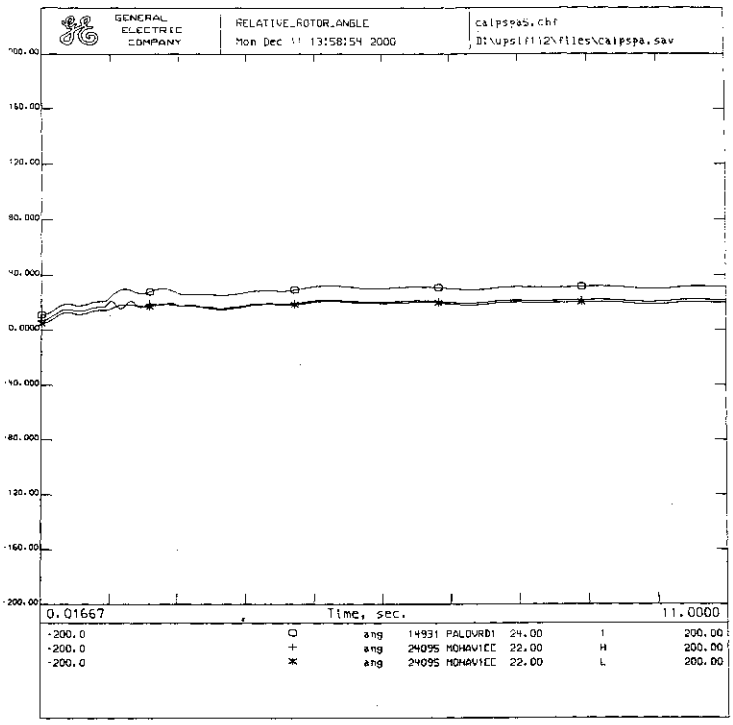
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 500-KV Bus
Contingency - Devers-Valley 500-KV Line
SYSTEM STABILITY STUDY CASE - Case 5:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa5.swt



2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 500-KV Bus
Contingency - Devers-Valley 500-KV Line
SYSTEM STABILITY STUDY CASE - Case 5:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa5.swt



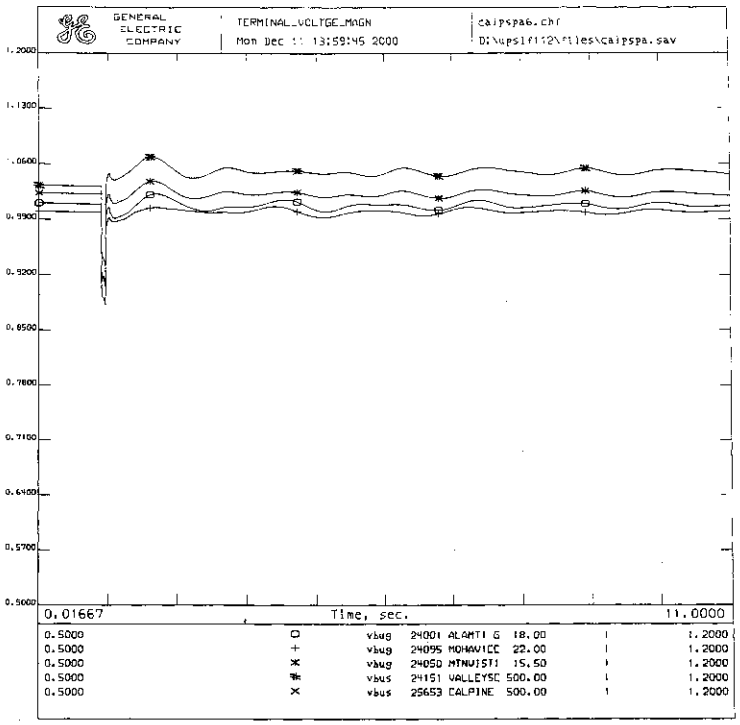
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 500-KV Bus
Contingency - Devers-Valley 500-KV Line
SYSTEM STABILITY STUDY CASE - Case 5:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa5.swt



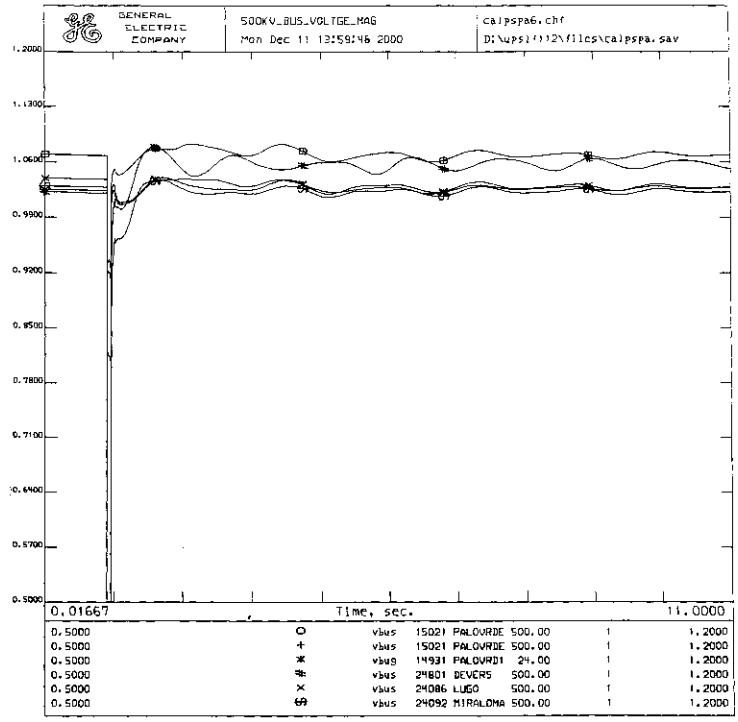
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 500-KV Bus
Contingency - Devers-Valley 500-KV Line
SYSTEM STABILITY STUDY CASE - Case 5:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa5.swt

CASE 6

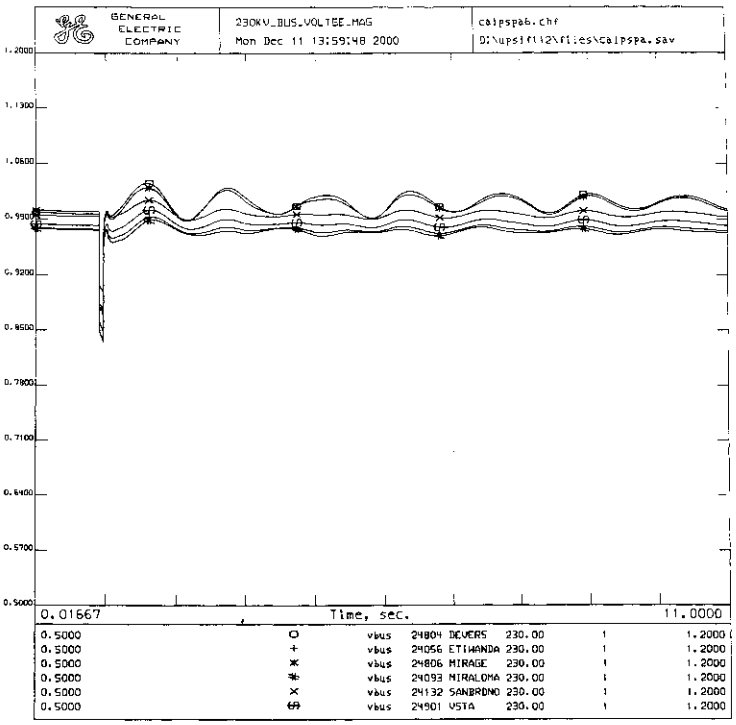
```
calpspa.sav
calpspa.dyd
TITLE
2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-DEVERS 500 KV LINE
SYSTEM STABILITY STUDY CASES-CASE 6:With Calpine(679 MW)
calpspa.sav + calpspa.dyd + calpspa6.swt
RUN 10.0
*   CC  RG  0.0 "DALLES 3"  13.8 "1 "  180. -270.
*   Fault bus at Palo Verde
FB   0.0 "PALOVRDE" 500.
*  Apply fault damping to each Palo Verde Unit
GFD   0.0 "PALOVRD1" 24. "1 "  0.072485
GFD   0.0 "PALOVRD2" 24. "1 "  0.072485
GFD   0.0 "PALOVRD3" 24. "1 "  0.072485
*   Flash series capacitors in following 500 kV Lines
FC   0.0 "CO17    " 500. "DEVERS  " 500. "1 "  1
FC   0.0 "CO17    " 500. "DEVERS  " 500. "1 "  3
FC   0.0 "PALOVRDE" 500. "N.GILA  " 500. "1 "  1
FC   0.0 "PALOVRDE" 500. "N.GILA  " 500. "1 "  3
FC   0.0 "N.GILA  " 500. "IMPRLVLY" 500. "1 "  2
FC   0.0 "IMPRLVLY" 500. "MIGUEL  " 500. "1 "  1
FC   0.0 "MOENKOPI" 500. "YAVAPAI " 500. "1 "  1
FC   0.0 "YAVAPAI " 500. "WESTWING" 500. "1 "  2
FC   0.0 "NAVAJO  " 500. "WESTWING" 500. "1 "  1
FC   0.0 "NAVAJO  " 500. "WESTWING" 500. "1 "  3
FC   0.0 "MEAD    " 500. "PERKINS " 500. "1 "  1
FC   0.0 "MEAD    " 500. "PERKINS " 500. "1 "  3
*   Clear fault at Palo Verde
CFB  4.0 "PALOVRDE" 500.
*   Trip Palo Verde - Devers 500 kV Line
DL   4.0 "CO17    " 500. "DEVERS " 500. "1 "
DL   4.0 "PALOVRDE" 500. "CO17   " 500. "1 "
DB   4.0 "CO17    " 500.
DB   4.0 "CO171C1G"  15.
DB   4.0 "CO171C2G"  15.
DB   4.0 "CO171S1G"  15.
DB   4.0 "CO172C1G"  15.
DB   4.0 "CO172C2G"  15.
DB   4.0 "CO172S1G"  15.
*  Remove fault damping to each Palo Verde Unit
GFD   4.0 "PALOVRD1" 24. "1 "  0.0
GFD   4.0 "PALOVRD2" 24. "1 "  0.0
GFD   4.0 "PALOVRD3" 24. "1 "  0.0
*   Reinsert series capacitors in following 500 kV Lines
RC   4.0 "PALOVRDE" 500. "N.GILA  " 500. "1 "  1
RC   4.0 "PALOVRDE" 500. "N.GILA  " 500. "1 "  3
RC   4.0 "N.GILA  " 500. "IMPRLVLY" 500. "1 "  2
RC   4.0 "IMPRLVLY" 500. "MIGUEL  " 500. "1 "  1
RC   4.0 "MEAD    " 500. "PERKINS " 500. "1 "  1
RC   4.0 "MEAD    " 500. "PERKINS " 500. "1 "  3
RC   8.0 "MOENKOPI" 500. "YAVAPAI " 500. "1 "  1
RC   8.0 "YAVAPAI " 500. "WESTWING" 500. "1 "  2
RC   8.0 "NAVAJO  " 500. "WESTWING" 500. "1 "  1
RC   8.0 "NAVAJO  " 500. "WESTWING" 500. "1 "  3
```



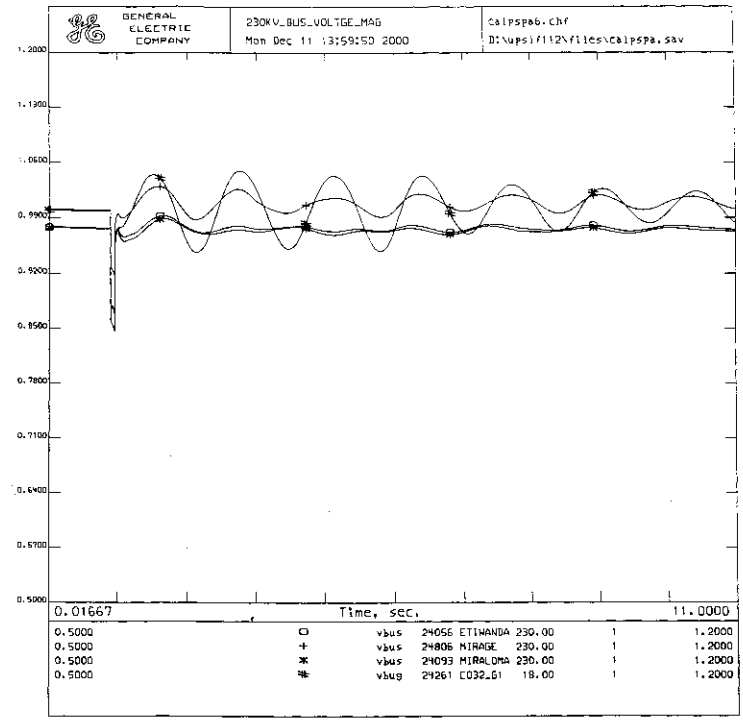
2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-DEVERS 500 KV LINE
SYSTEM STABILITY STUDY CASES -CASE 6:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa6.swt



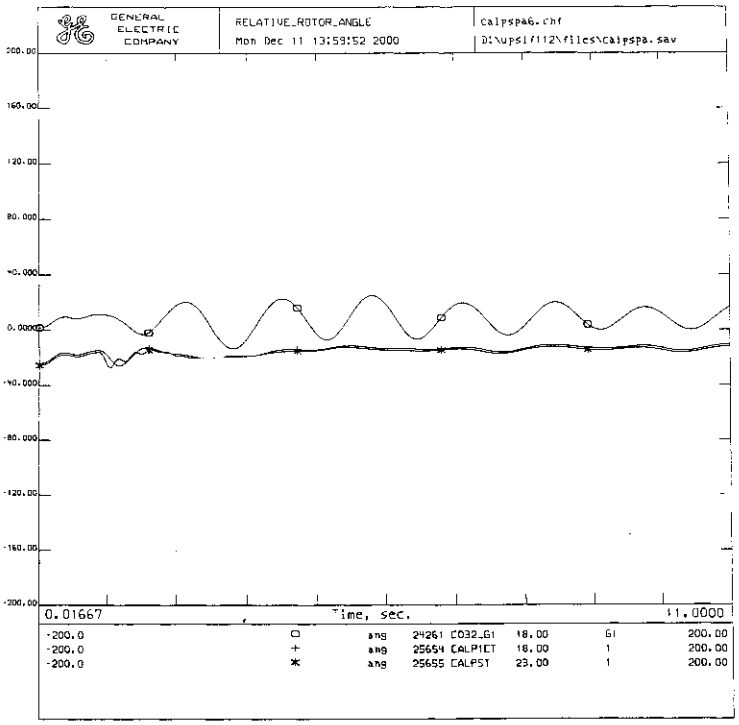
2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-DEVERS 500 KV LINE
SYSTEM STABILITY STUDY CASES -CASE 6:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa6.swt



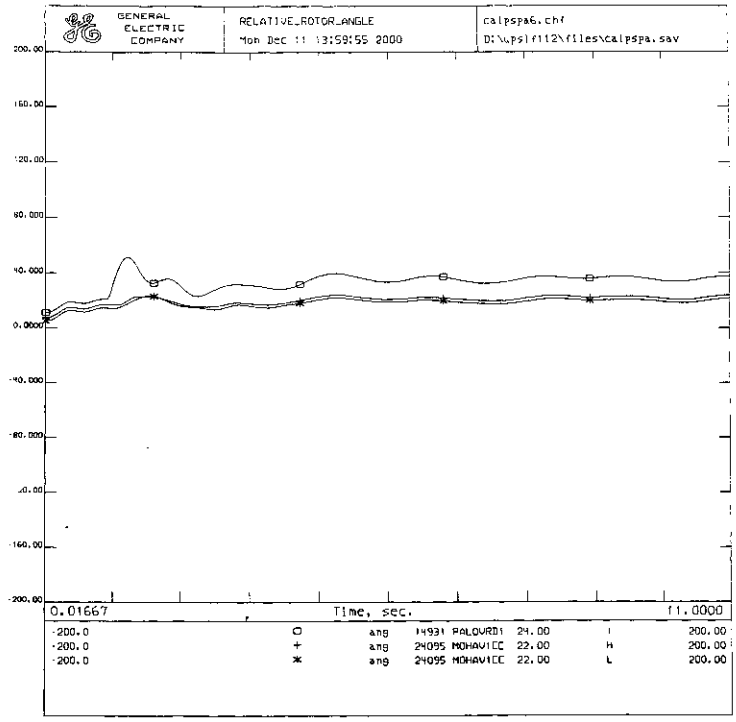
2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-DEVERS 500 KV LINE
SYSTEM STABILITY STUDY CASES -CASE 6:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa6.swt



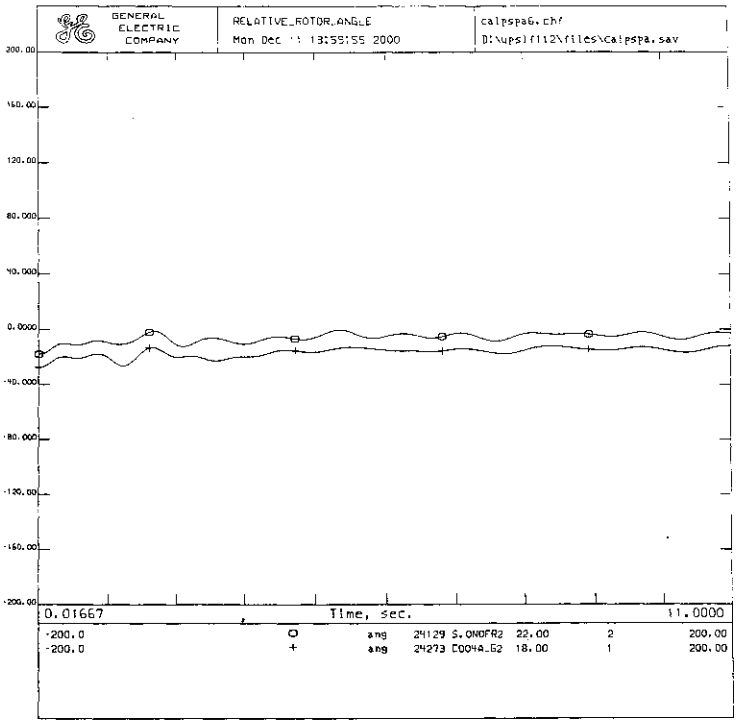
2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-DEVERS 500 KV LINE
SYSTEM STABILITY STUDY CASES -CASE 6:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa6.swt



2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-DEVERS 500 KV LINE
SYSTEM STABILITY STUDY CASES -CASE 6:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa6.swt



2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-DEVERS 500 KV LINE
SYSTEM STABILITY STUDY CASES -CASE 6:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa6.swt



2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-DEVERS 500 KV LINE
SYSTEM STABILITY STUDY CASES -CASE 6:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa6.swt

CASE 7

```
calpspa.sav
calphsa.dyd
TITLE
2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-N.GILA 500 KV LINE
SYSTEM STABILITY STUDY CASES-Case 7:With Calpine(679 MW)
calpspa.sav + calpspa.dyd + calpspa7.swt
RUN 10.0
CC
CC  ***** CALPINE: MORENO VALLEY SYSTEM IMPACT STUDY ******
CC  APPLY A 4 CYCLE 3-PHASE FAULT ON THE PALOVERDE 500 KV BUS
CC
FB  0.0 "PALOVRDE" 500
CC  FLASH SERIES CAPACITORS IN: MOENKOPI-YAVAPAI-WESTWING LINE
FC  0.0 "MOENKOPI" 500. "YAVAPAI " 500. "1 " 1
FC  0.0 "YAVAPAI " 500. "WESTWING" 500. "1 " 2
CC  FLASH SERIES CAPACITORS IN: NAVAJO-WESTWING LINE
FC  0.0 "NAVAJO  " 500. "WESTWING" 500. "1 " 1
FC  0.0 "NAVAJO  " 500. "WESTWING" 500. "1 " 3
CC  FLASH SERIES CAPACITORS IN: PALO VERDE-DEVERS LINE
FC  0.0 "PALOVRDE" 500. "DEVERS  " 500. "1 " 1
FC  0.0 "PALOVRDE" 500. "DEVERS  " 500. "1 " 3
CC  FLASH SERIES CAPACITORS   IN: PALO VERDE-N.GILA-IMPERIAL
CC  VALLEY-MIGUEL 500 KV LINES
FC  0.0 "PALOVRDE" 500. "N.GILA  " 500. "1 " 3
FC  0.0 "N.GILA  " 500. "IMPRLVLY" 500. "1 " 2
FC  0.0 "IMPRLVLY" 500. "MIGUEL  " 500. "1 " 1
CC  APPLY A 98MW(7.2%) MACHINE FAULT DAMPING TO PALO VERDE UNITS
GFD 0.0 "PALOVRD1" 24.00 "1 " 0.072485
GFD 0.0 "PALOVRD2" 24.00 "1 " 0.072485
GFD 0.0 "PALOVRD3" 24.00 "1 " 0.072485
CC  CLEAR FAULT
CFB 4.0 "PALOVRDE" 500
CC    REMOVE PALO VERDE-NORTH GILA LINE
DL    4.0 "PALOVRDE" 500. "N.GILA  " 500. "1 "
CC  REINSERT SERIES CAPACITORS IN: PALO VERDE-N.GILA-IMPERIAL
CC  VALLEY-MIGUEL 500 KV LINES
RC  4.0 "PALOVRDE" 500. "N.GILA  " 500. "1 " 3
RC  4.0 "N.GILA  " 500. "IMPRLVLY" 500. "1 " 2
RC  4.0 "IMPRLVLY" 500. "MIGUEL  " 500. "1 " 1
CC  REMOVE FAULT DAMPING TO PALO VERDE UNITS
GFD 4.0 "PALOVRD1" 24.00 "1 " 0.0
GFD 4.0 "PALOVRD2" 24.00 "1 " 0.0
GFD 4.0 "PALOVRD3" 24.00 "1 " 0.0
CC  REINSERT SERIES CAPACITORS IN: MOENKOPI-YAVAPAI-WESTWING LINE
RC  8.0 "MOENKOPI" 500. "YAVAPAI " 500. "1 " 1
RC  8.0 "YAVAPAI " 500. "WESTWING" 500. "1 " 2
CC  REINSERT SERIES CAPACITORS IN: NAVAJO-WESTWING LINE
RC  8.0 "NAVAJO  " 500. "WESTWING" 500. "1 " 1
RC  8.0 "NAVAJO  " 500. "WESTWING" 500. "1 " 3
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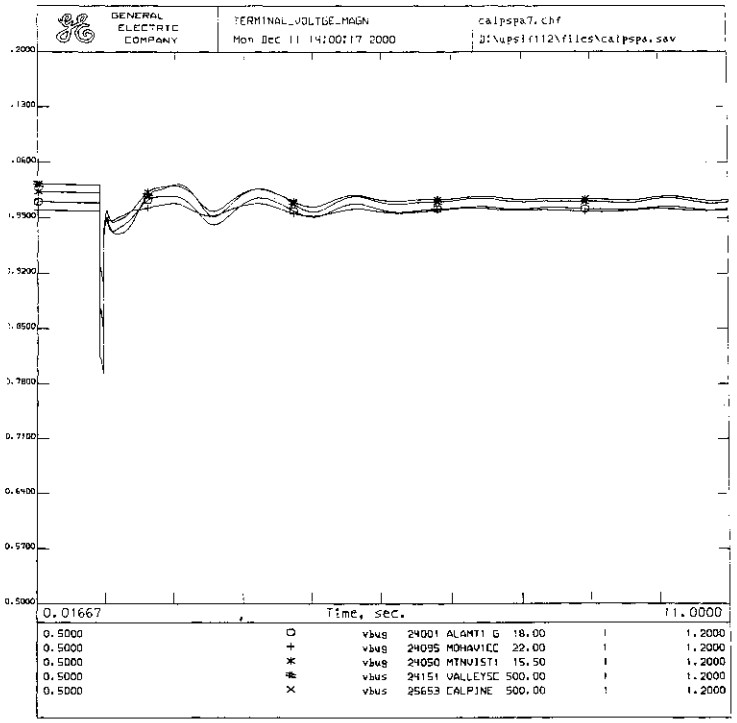
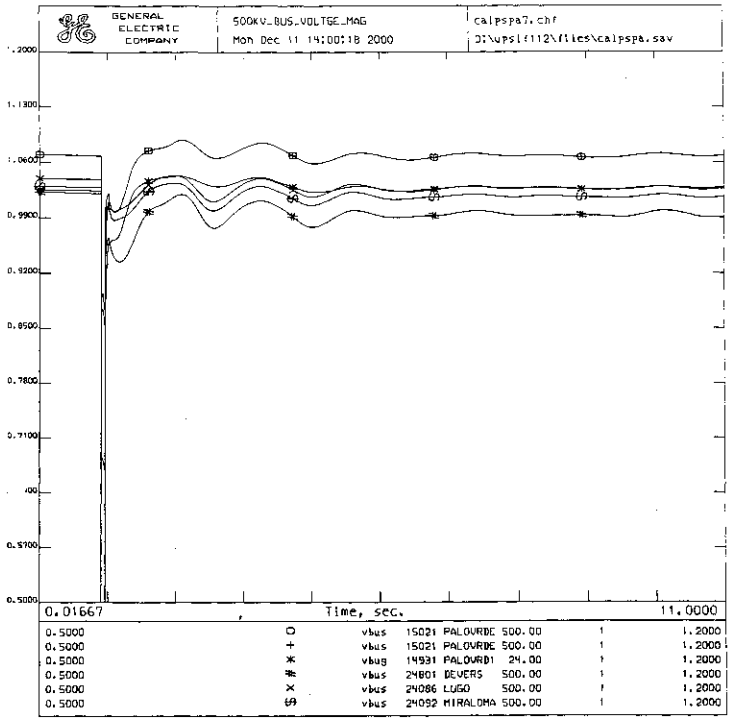
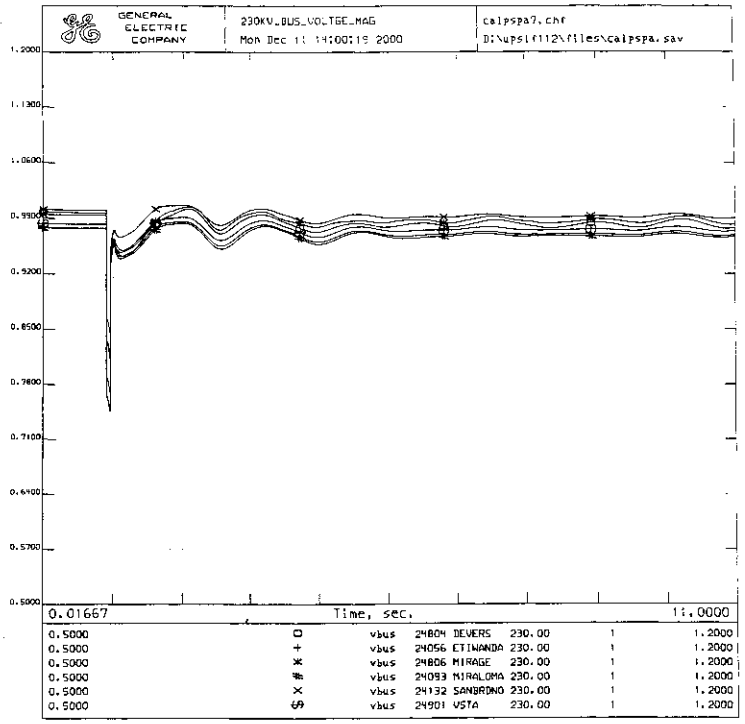


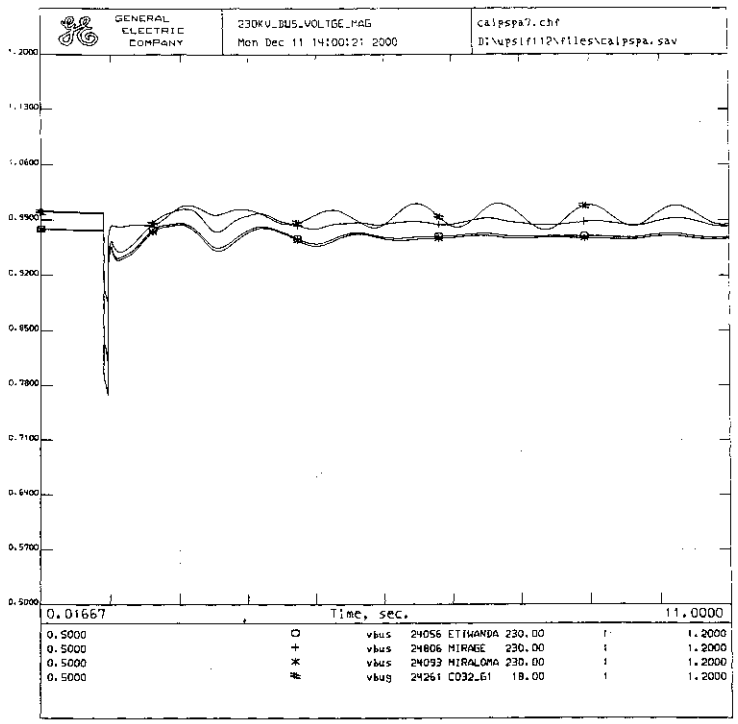
2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-N.GILA 500 KV LINE
SYSTEM STABILITY STUDY CASES - Case 07:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa7.swt



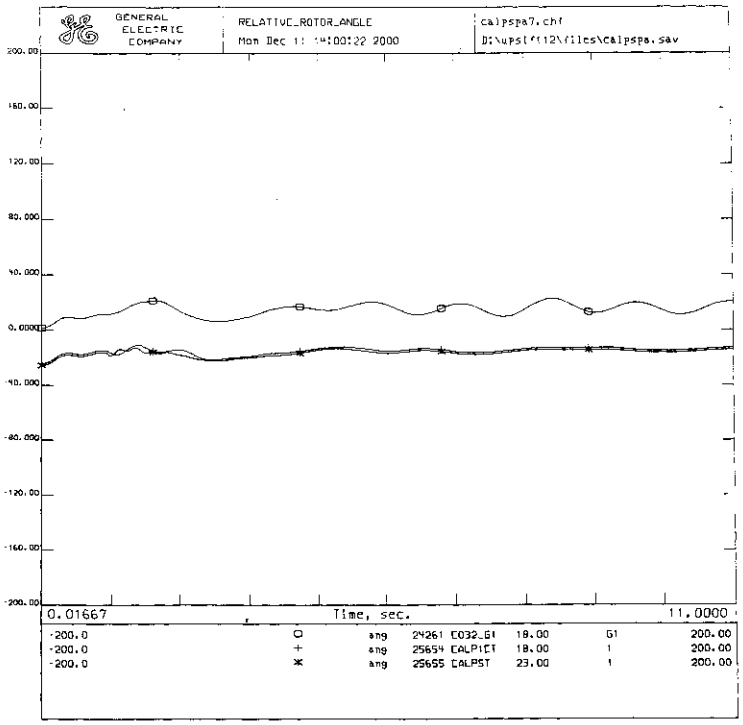
2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-N.GILA 500 KV LINE
SYSTEM STABILITY STUDY CASES - Case 07:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa7.swt



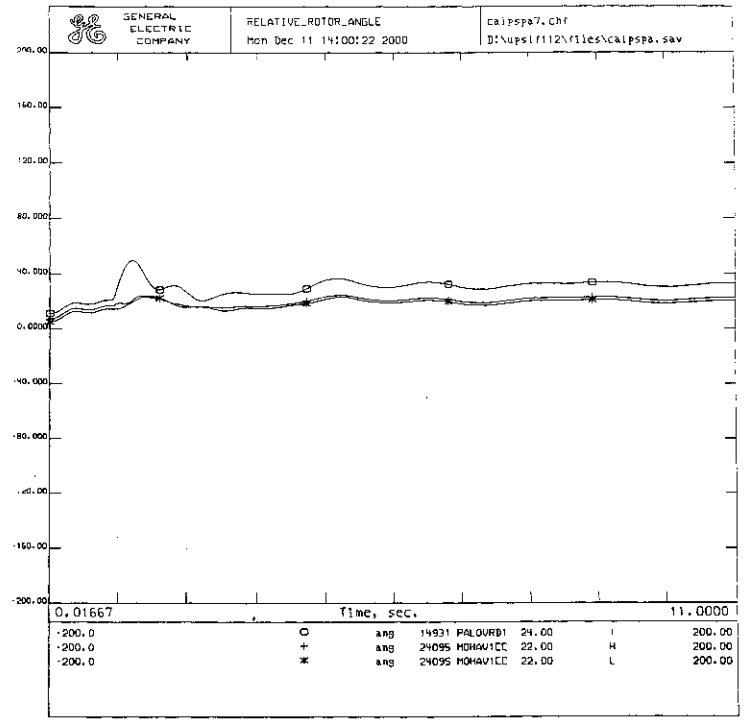
2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-N.GILA 500 KV LINE
SYSTEM STABILITY STUDY CASES - Case 07:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa7.swt



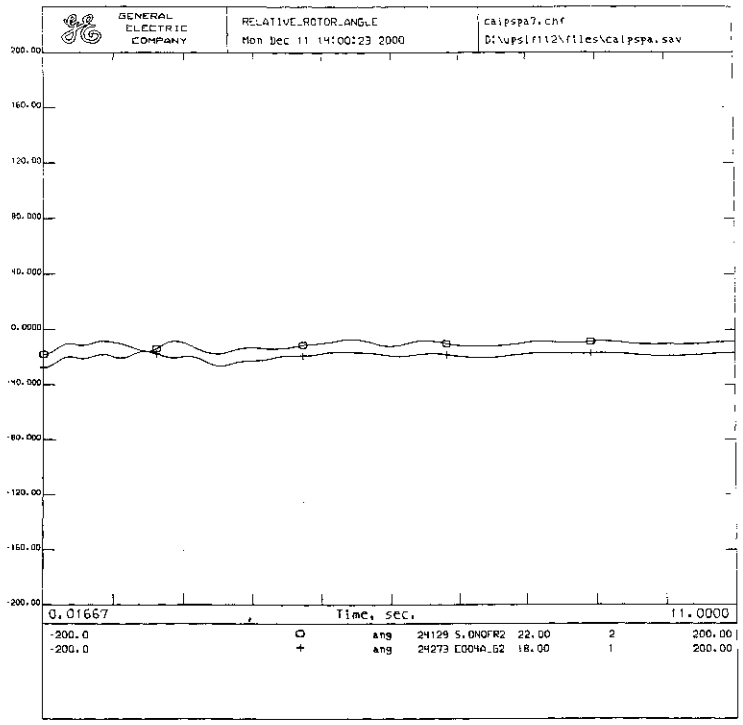
2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-N.GILA 500 KV LINE
SYSTEM STABILITY STUDY CASES - Case 07:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa7.swt



2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-N.GILA 500 KV LINE
SYSTEM STABILITY STUDY CASES - Case 07:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa7.swt



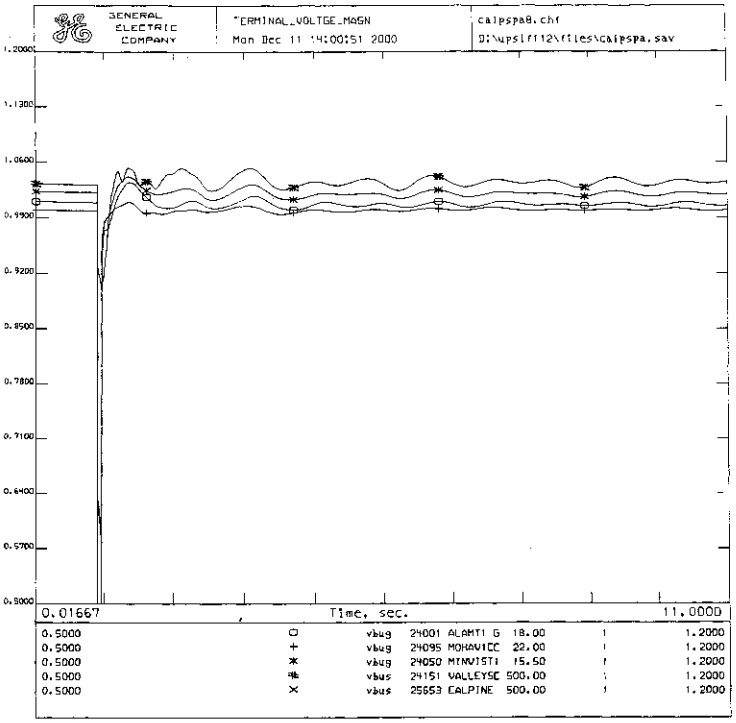
2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-N.GILA 500 KV LINE
SYSTEM STABILITY STUDY CASES - Case 07:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa7.swt



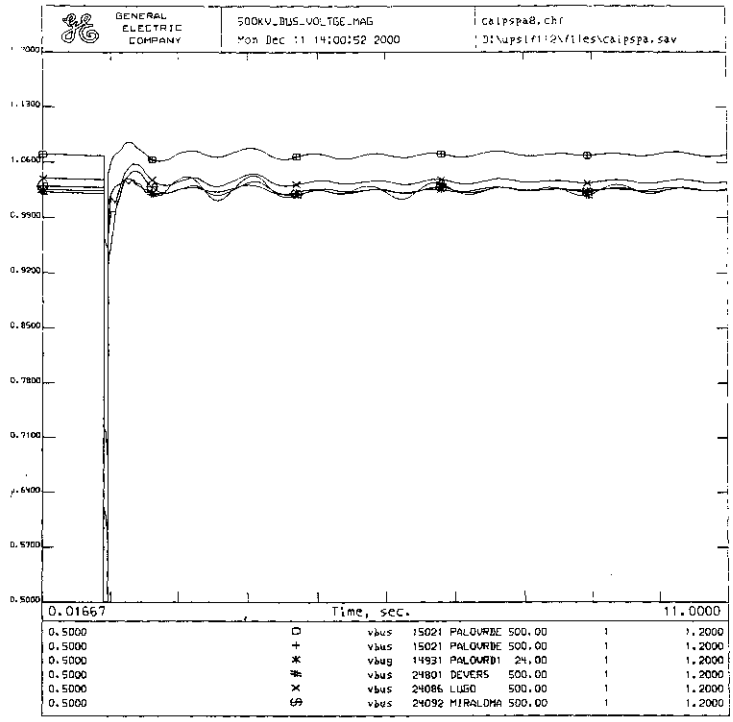
2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on Paloverde 500KV Bus
Contingency-REMOVE PALOVERDE-N.GILA 500 KV LINE
SYSTEM STABILITY STUDY CASES - Case 07:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa7.swt

CASE 8

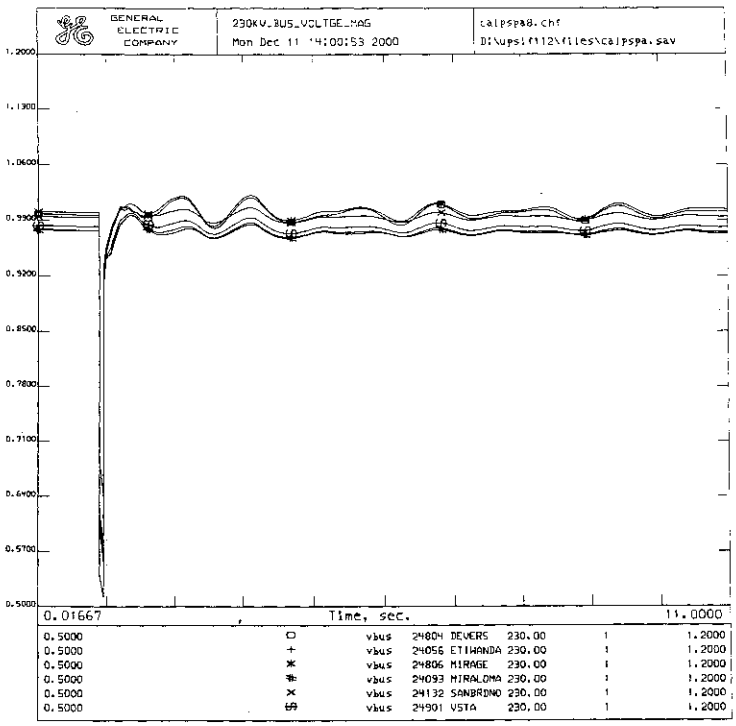
```
calpspa.sav
calpspa.dyd
TITLE
2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on Valley 500-KV Bus
Contingency - Serrano-Valley 500KV Line
SYSTEM STABILITY STUDY CASES-Case 8:With Calpine(679 MW)
calpspa.sav + calpspa.dyd + calpspa8.swt
RUN 10
CC
CC  ***** CALPINE: MORENO VALLEY SYSTEM IMPACT STUDY ******
CC
CC  APPLY A 4 CYCLE 3-PHASE FAULT ON THE VALLEYSC 500 BUS
CC
FB  0.0 "VALLEYSC" 500
CC  CLEAR FAULT
CFB 4.0 "VALLEYSC" 500
CC   REMOVE SERRANO - VALLEY 500 KV LINE
DL   4.0 "SERRANO " 500. "VALLEYSC" 500. "1 "
```



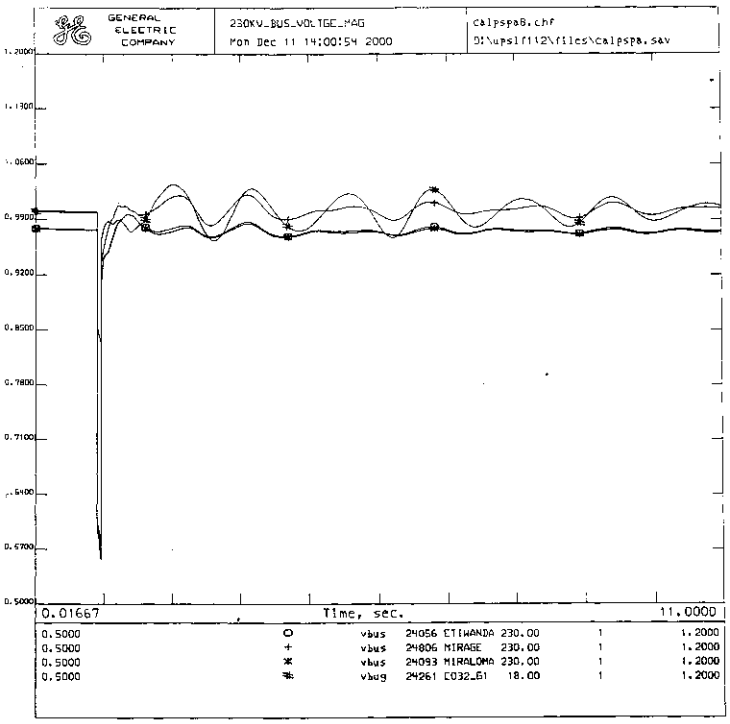
2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on Valley 500-KV Bus
Contingency - Serrano-Valley 500KV Line
SYSTEM STABILITY STUDY CASES - Case 8:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa8.swt



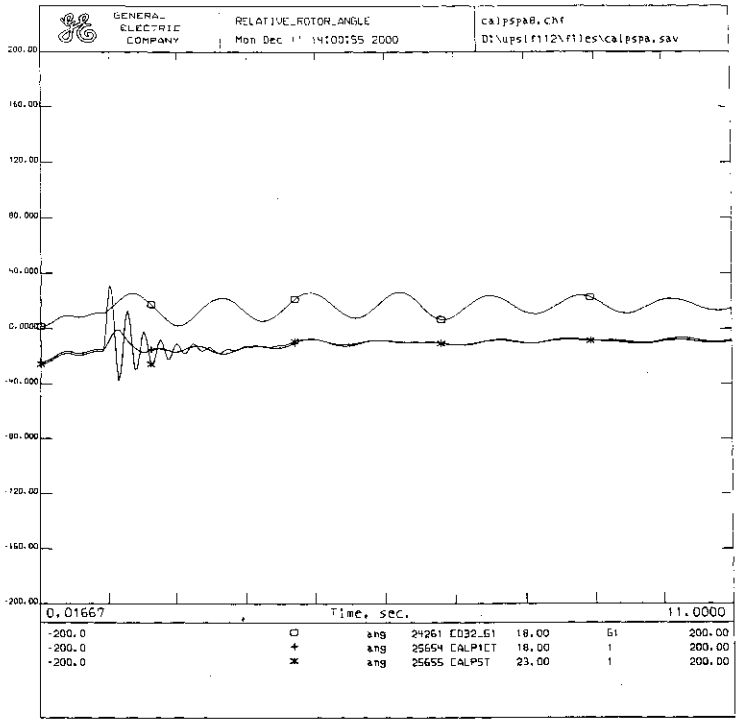
2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on Valley 500-KV Bus
Contingency - Serrano-Valley 500KV Line
SYSTEM STABILITY STUDY CASES - Case 8:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa8.swt



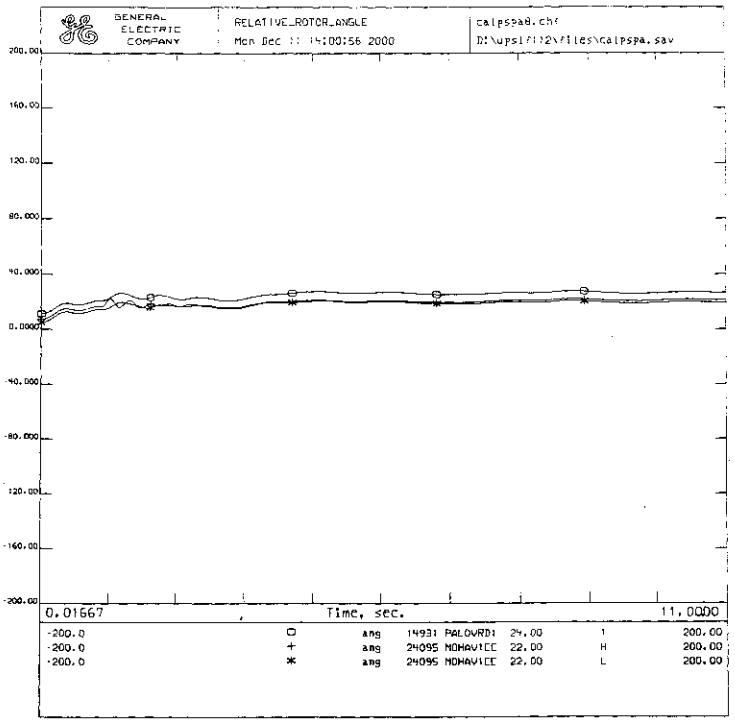
2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on Valley 500-KV Bus
Contingency - Serrano-Valley 500KV Line
SYSTEM STABILITY STUDY CASES - Case 8:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa8.swt



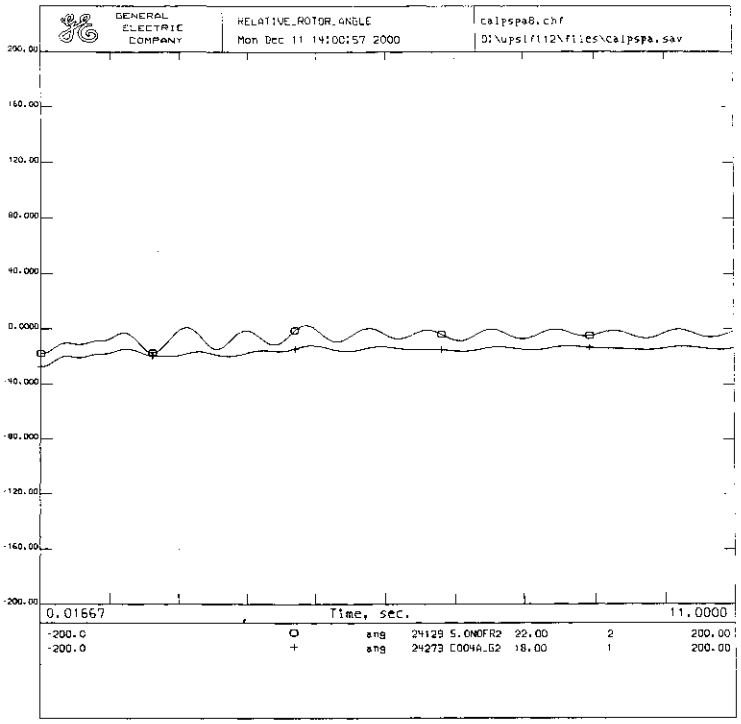
2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on Valley 500-KV Bus
Contingency - Serrano-Valley 500KV Line
SYSTEM STABILITY STUDY CASES - Case 8:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa8.swt



2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on Valley 500-KV Bus
Contingency - Serrano-Valley 500KV Line
SYSTEM STABILITY STUDY CASES - Case 8:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa8.swt



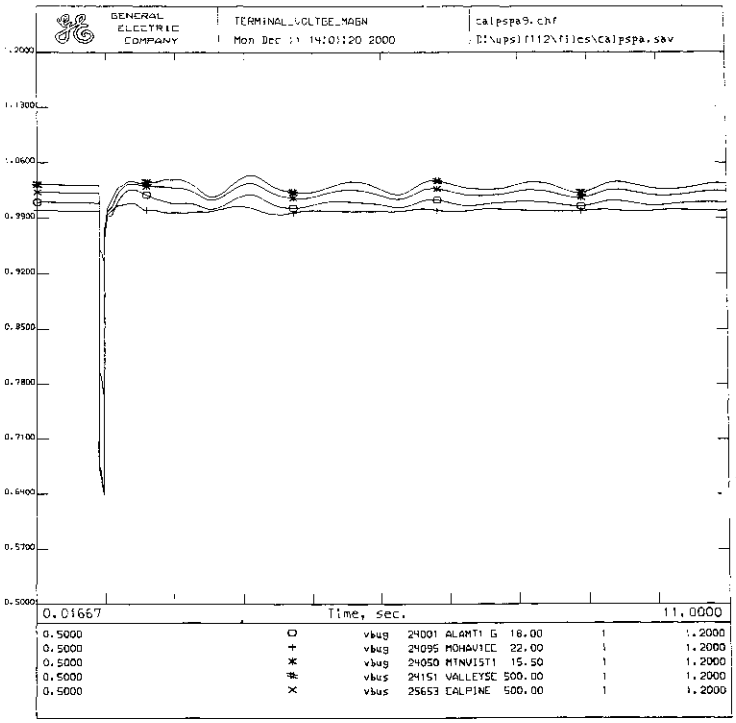
2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on Valley 500-KV Bus
Contingency - Serrano-Valley 500KV Line
SYSTEM STABILITY STUDY CASES - Case 8:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa8.swt



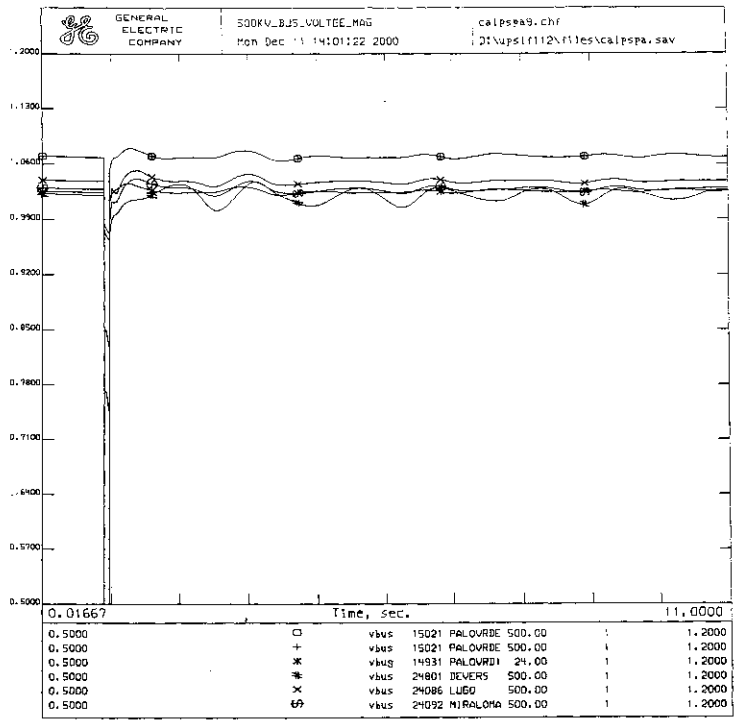
2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on Valley 500-KV Bus
Contingency - Serrano-Valley 500KV Line
SYSTEM STABILITY STUDY CASES - Case 8:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa8.swt

CASE 9

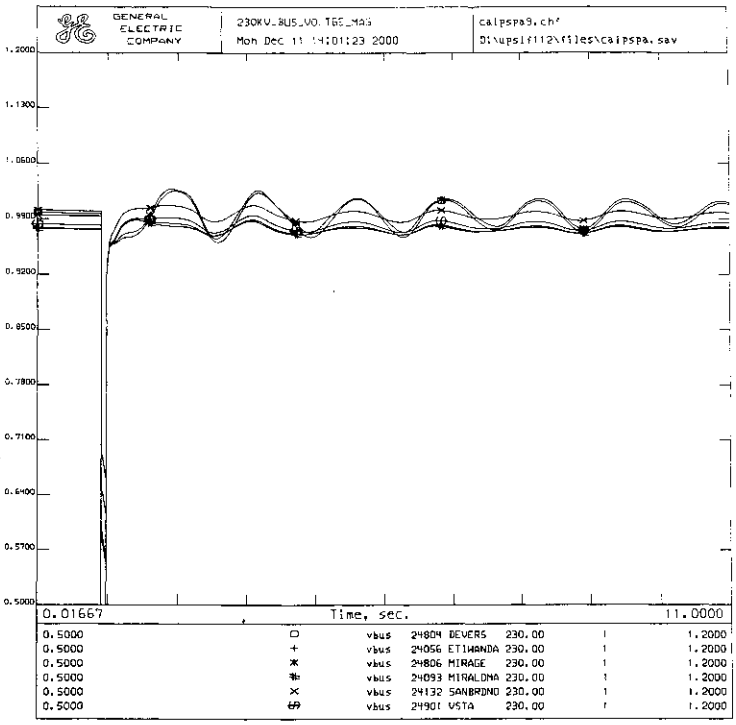
```
calpspa.sav
calpspa.dyd
TITLE
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 & Devers-Vista #1
230-KV Lines
SYSTEM STABILITY STUDY CASE-Case 9:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa9.swt
RUN 10.0
CC
CC  ***** CALPINE: MORENO VALLEY SYSTEM IMPACT STUDY ******
CC  APPLY A 5 CYCLE 3-PHASE FAULT ON THE DEVERS 230 BUS
CC
FB  0.0 "DEVERS  " 230
CC  CLEAR FAULT
CFB 5.0 "DEVERS  " 230
CC   REMOVE DEVERS-SAN BERNARDINO NO. 1 230KV LINE
CC   REMOVE DEVERS-VISTA NO. 1 230KV LINE
DL   5.0 "SANBRDNO" 230. "DEVERS  " 230. "1 "
DL   5.0 "VSTA    " 230. "DEVERS  " 230. "1 "
```



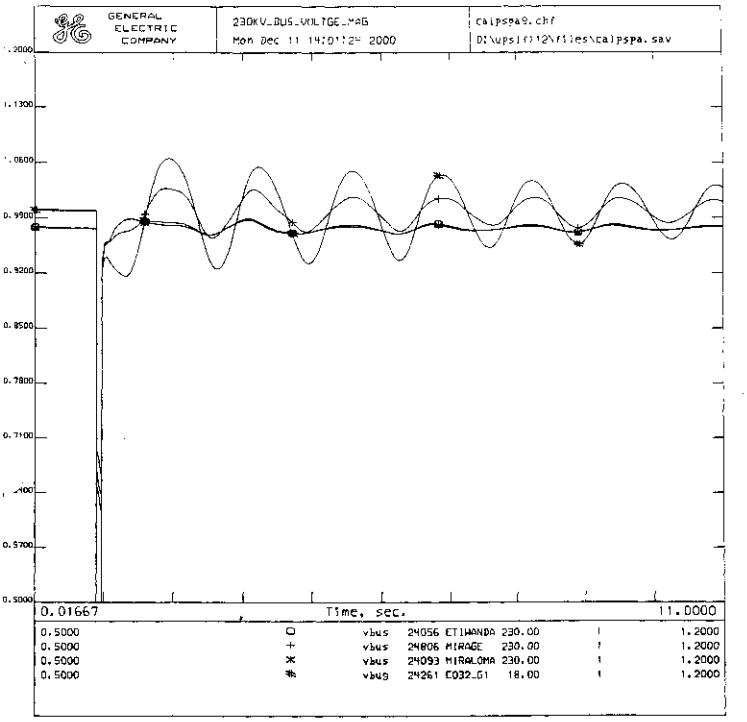
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 & Devers-Vista #1 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 9:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa9.swt



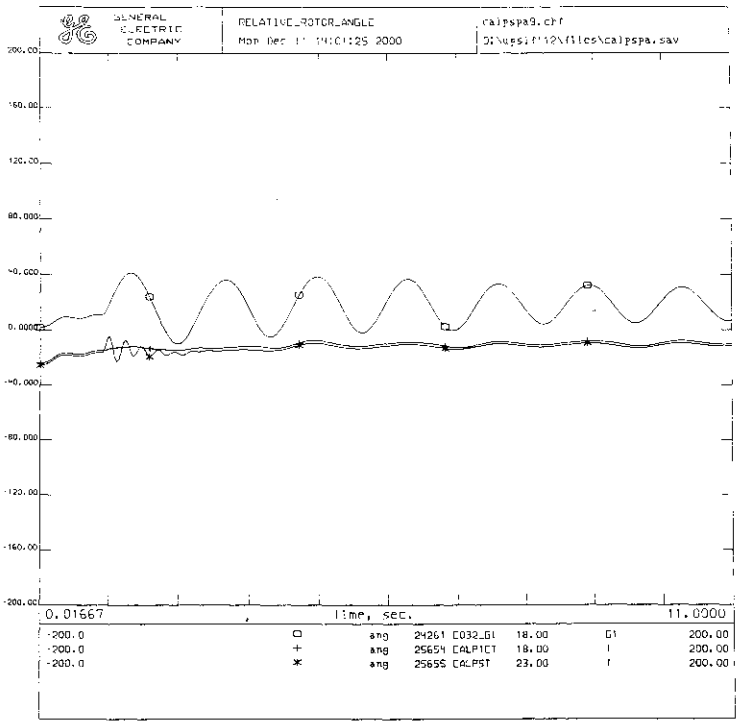
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 & Devers-Vista #1 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 9:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa9.swt



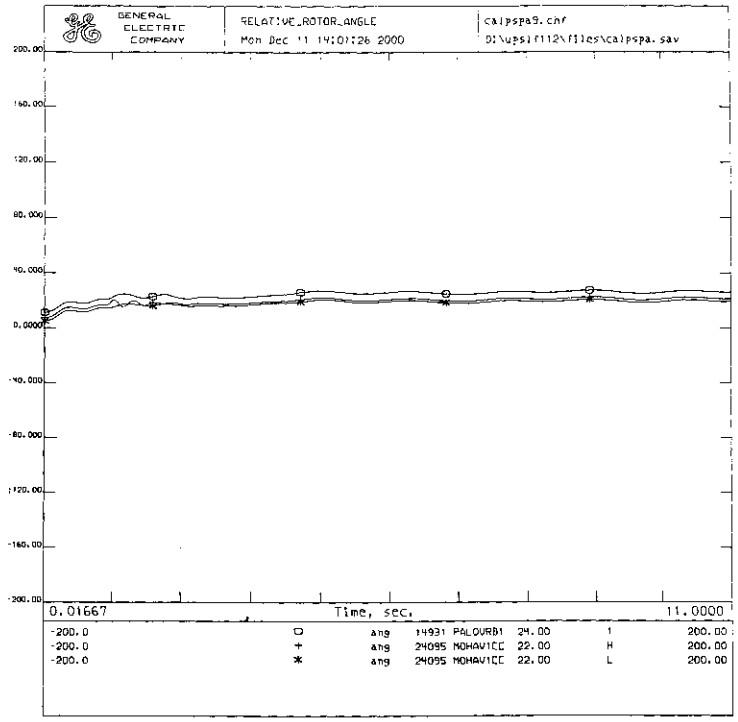
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 & Devers-Vista #1 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 9:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa9.swt



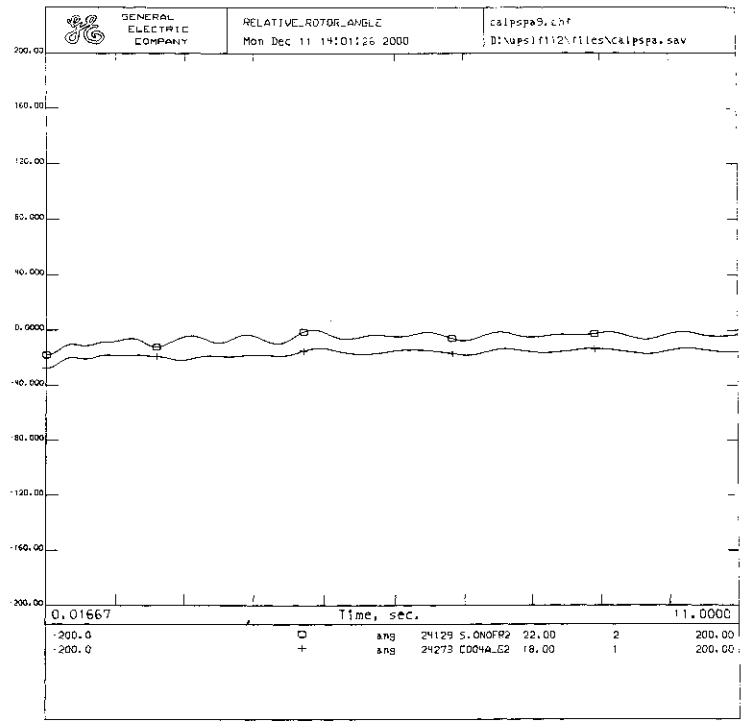
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 & Devers-Vista #1 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 9:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa9.swt



2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 & Devers-Vista #1 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 9:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa9.swt



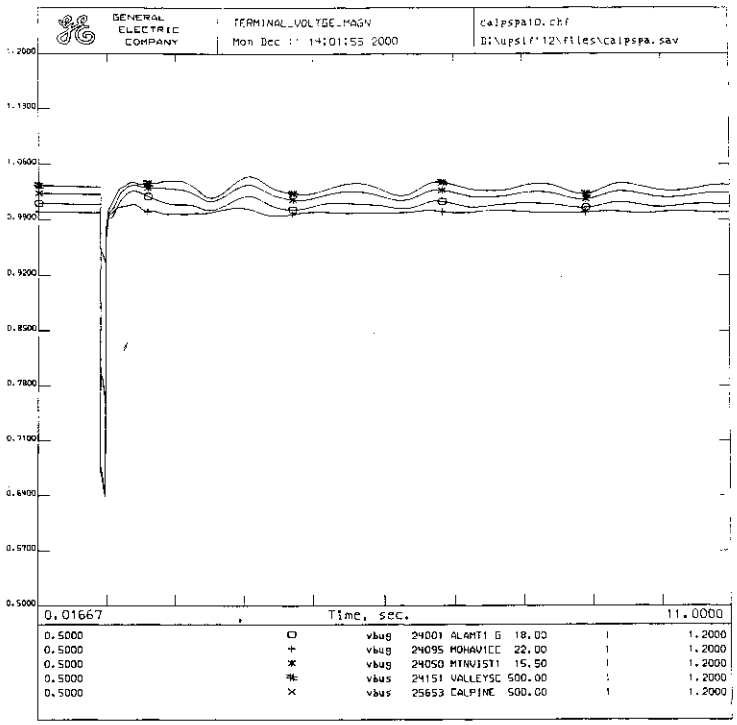
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 & Devers-Vista #1 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 9:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa9.swt



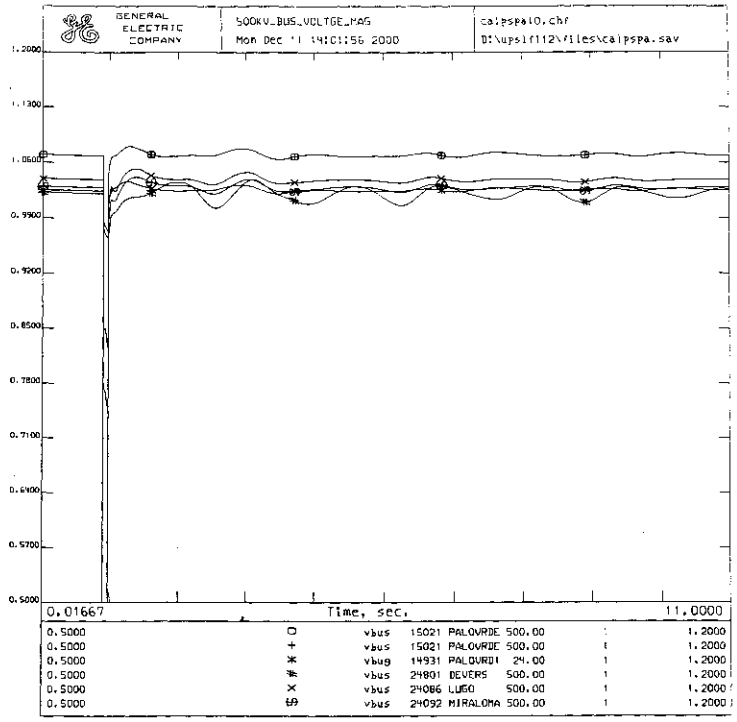
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #1 & Devers-Vista #1 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 9:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa9.swt

CASE 10

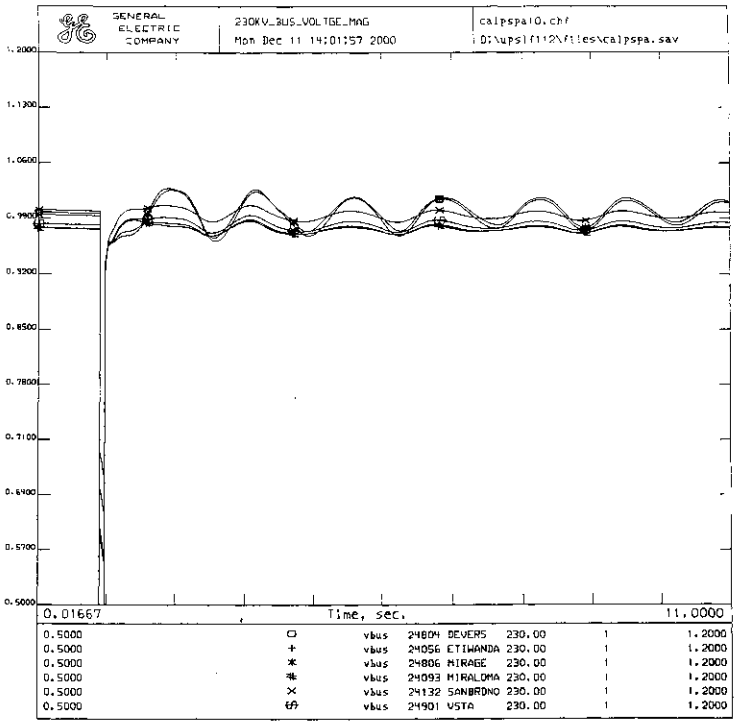
```
calpspa.sav
calpspa.dyd
TITLE
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #2 & Devers-Vista #2
230-KV Lines
SYSTEM STABILITY STUDY CASE-Case 10:With Calpine(679 MW)
calpspa.sav + calpspa.dyd + calpspa10.swt
RUN 10.0
CC
CC  ***** CALPINE: MORENO VALLEY SYSTEM IMPACT STUDY ******
CC  APPLY A 5 CYCLE 3-PHASE FAULT ON THE DEVERS 230 BUS
CC
FB  0.0 "DEVERS  " 230
CC  CLEAR FAULT
CFB 5.0 "DEVERS  " 230
CC   REMOVE DEVERS-SAN BERNARDINO NO. 2 230KV LINE
CC   REMOVE DEVERS-VISTA NO. 2 230KV LINE
DL   5.0 "DEVERS  " 230. "SANBRDNO" 230. "2 "
DL   5.0 "DEVERS  " 230. "VSTA    " 230. "2 "
```



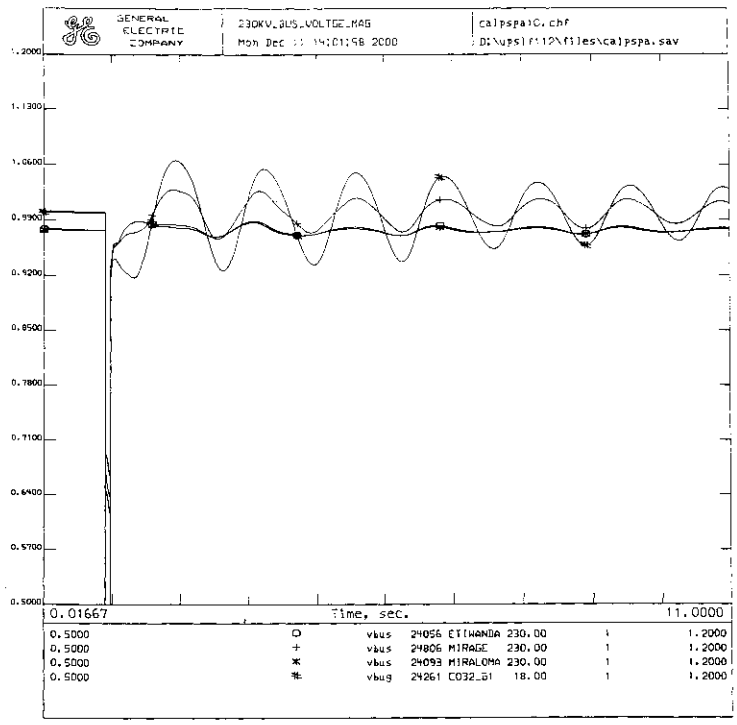
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #2 & Devers-Vista #2 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 10:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa10.swt



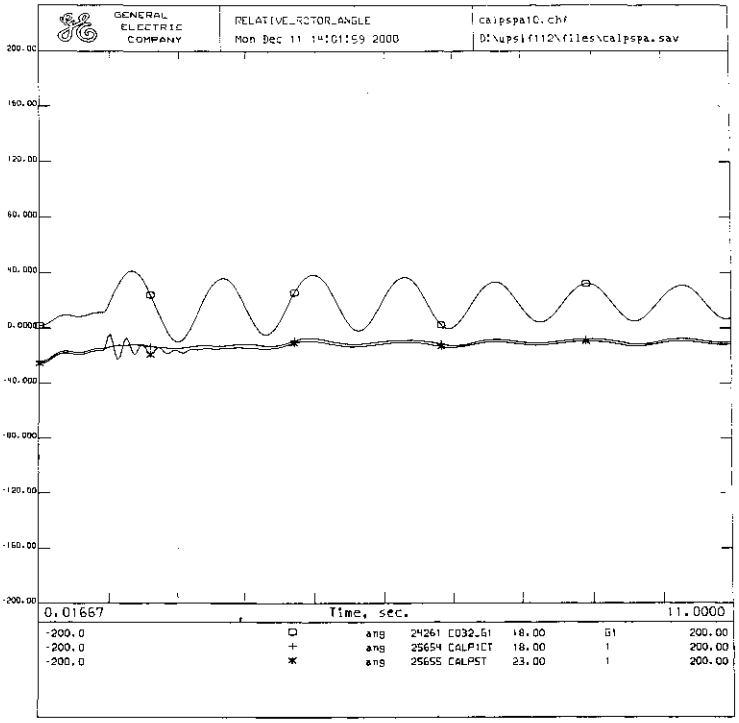
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #2 & Devers-Vista #2 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 10:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa10.swt



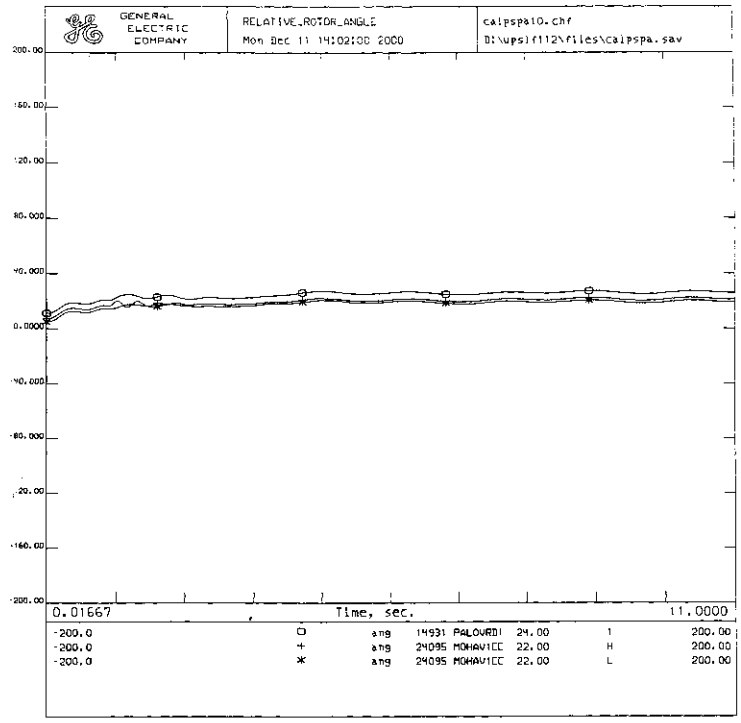
2004 LIGHT SPRING
5-CYC -Phase Fault on Devers 230-KV Bus
Conti. ncy - Devers-San Bernardino #2 & Devers-Vista #2 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 10:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa10.swt



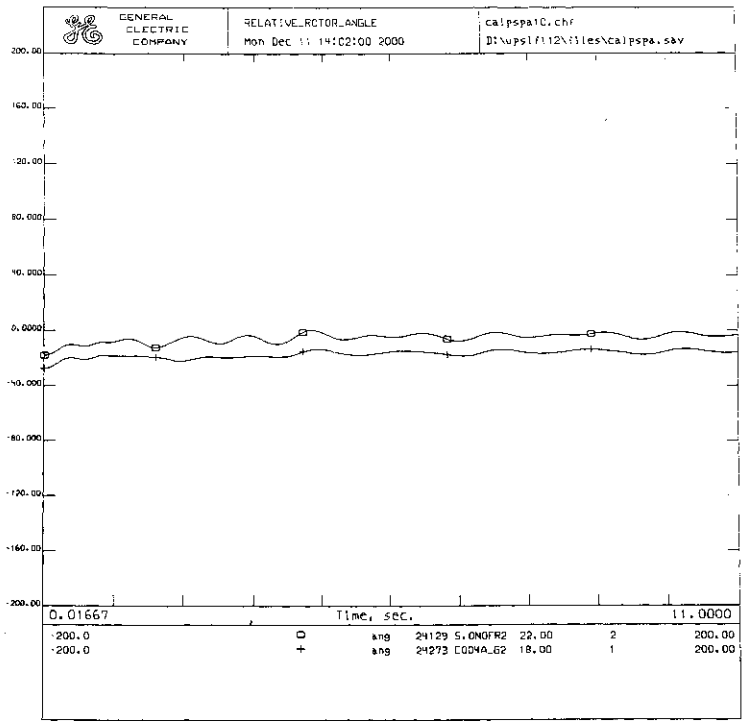
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #2 & Devers-Vista #2 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 10:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa10.swt



2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #2 & Devers-Vista #2 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 10:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa10.swt



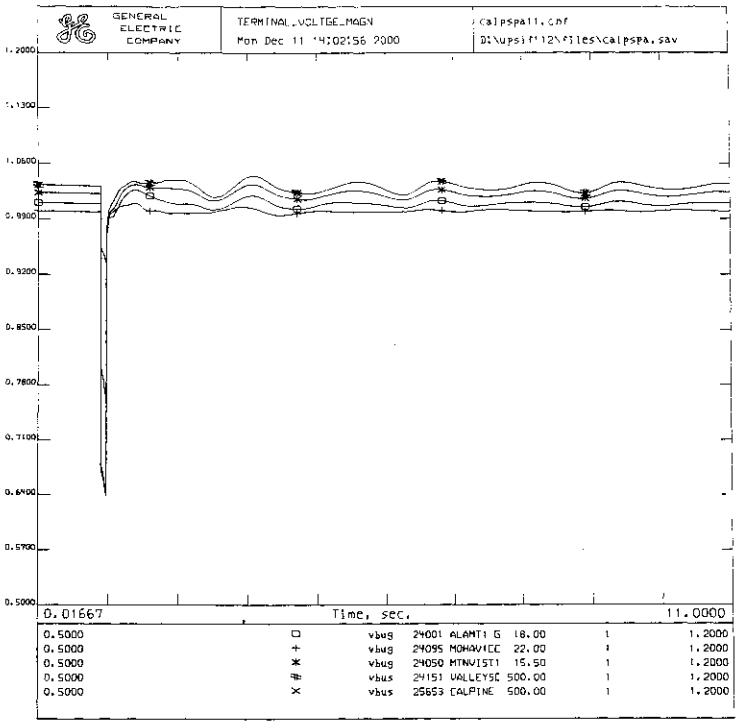
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #2 & Devers-Vista #2 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 10:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa10.swt



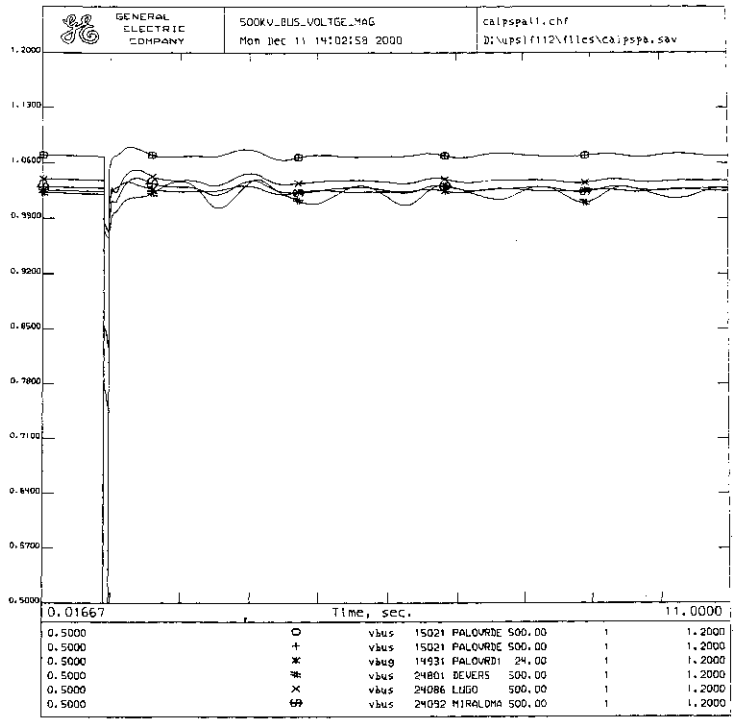
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-San Bernardino #2 & Devers-Vista #2 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 10:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa10.swt

CASE 11

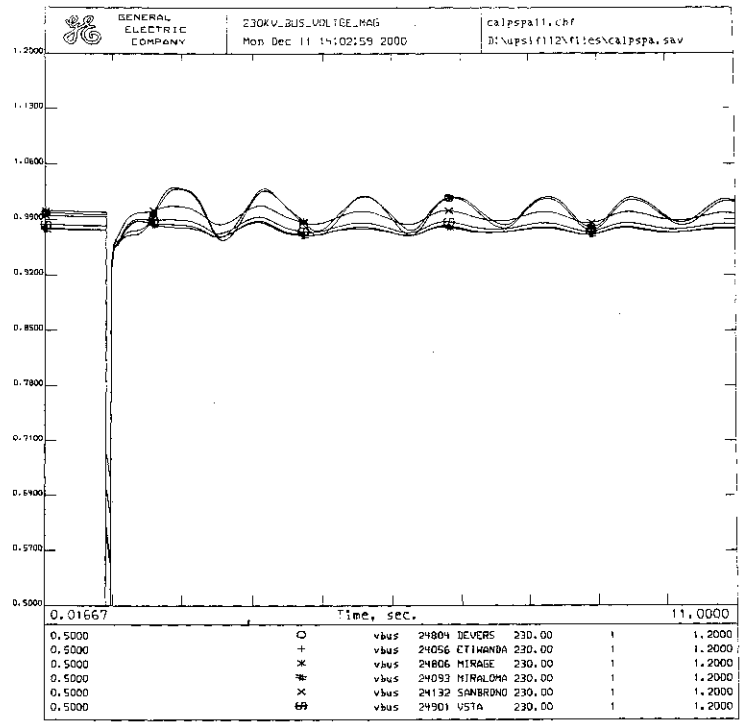
```
calpspa.sav
calpspa.dyd
TITLE
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista #1 & #2 230-KV Lines
SYSTEM STABILITY STUDY CASE-Case 11:Without Calpine(679 MW)
calpspa.sav + calpspa.dyd + calpspa11.swt
RUN 10.0
CC
CC  ***** CALPINE: MORENO VALLEY SYSTEM IMPACT STUDY ******
CC  APPLY A 5 CYCLE 3-PHASE FAULT ON THE DEVERS 230 BUS
CC
FB  0.0 "DEVERS  " 230
CC  CLEAR FAULT
CFB 5.0 "DEVERS  " 230
CC   REMOVE DEVERS-VISTA NO. 1 230KV LINE
CC   REMOVE DEVERS-VISTA NO. 2 230KV LINE
DL   5.0 "VSTA    " 230. "DEVERS  " 230. "1 "
DL   5.0 "DEVERS  " 230. "VSTA    " 230. "2 "
```



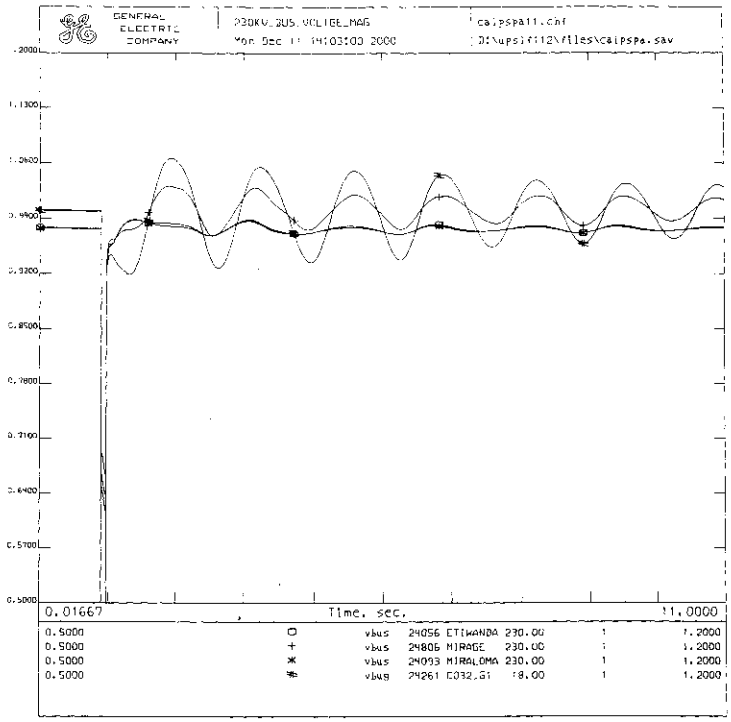
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista #1 & #2 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 11:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa11.swt



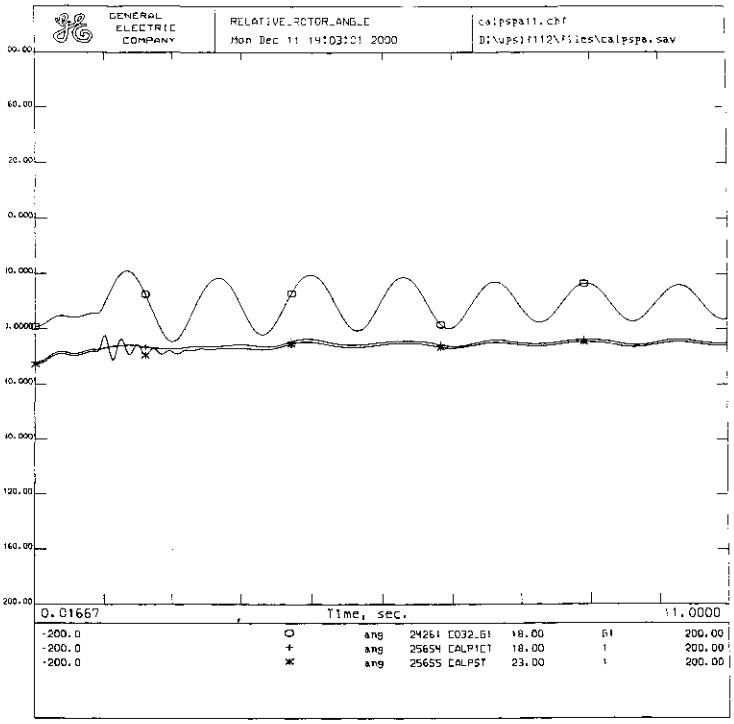
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista #1 & #2 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 11:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa11.swt



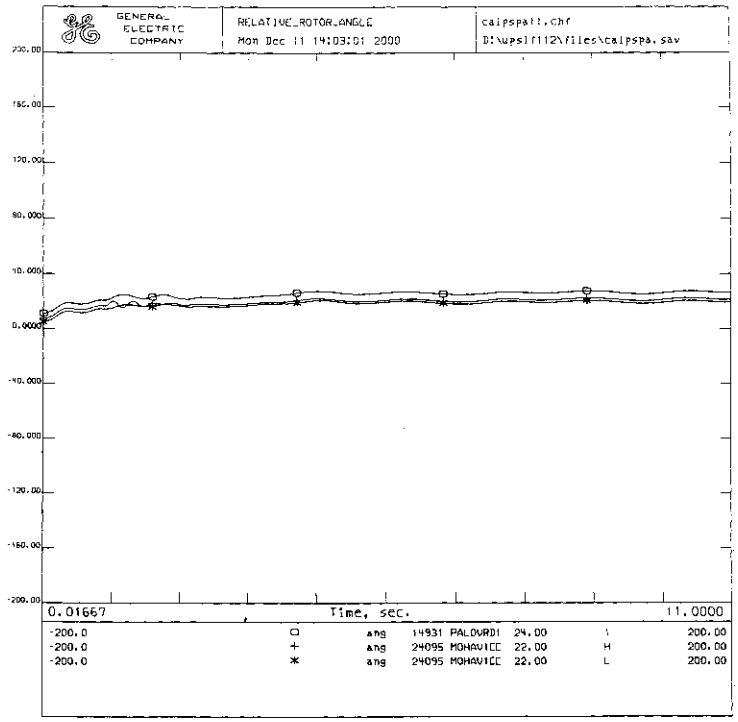
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista #1 & #2 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 11:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa11.swt



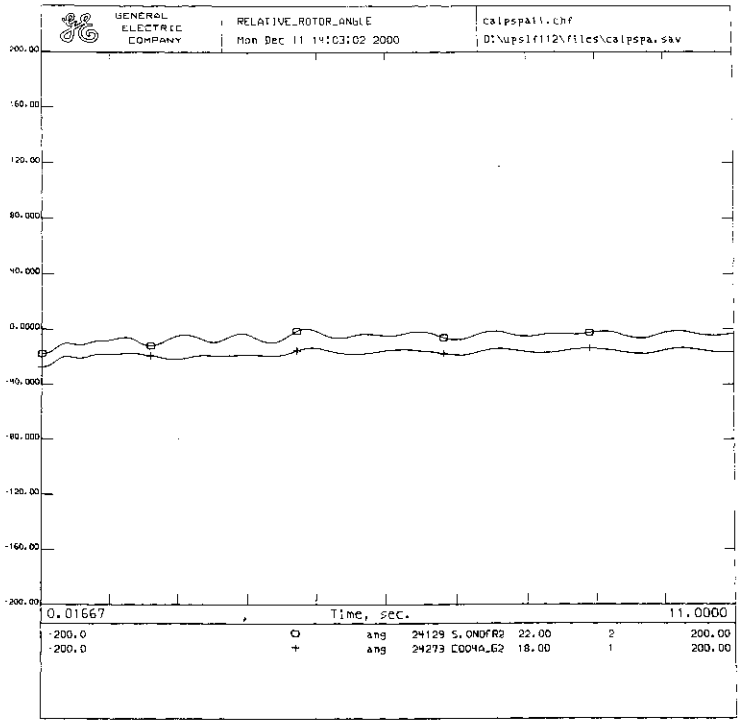
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista #1 & #2 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 11:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa11.swt



2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista #1 & #2 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 11:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa11.swt



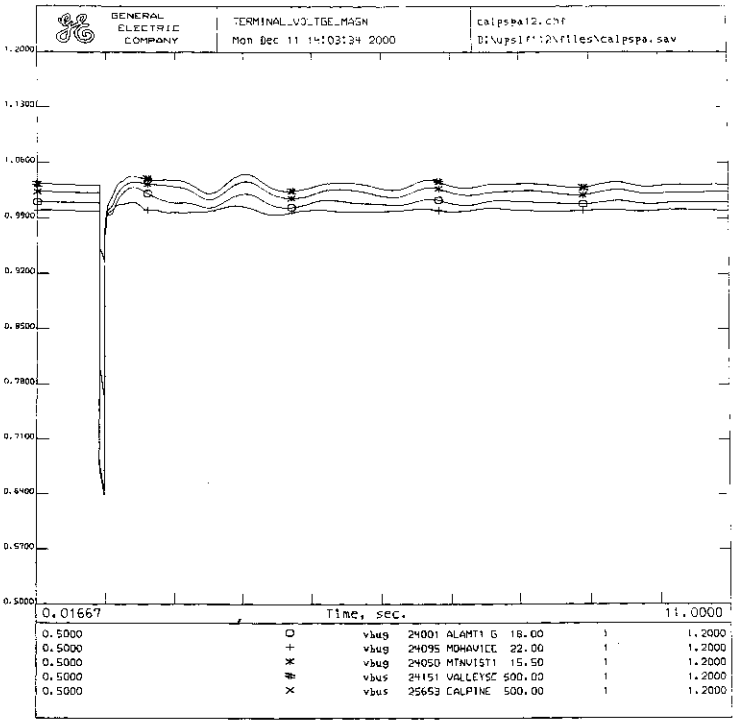
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista #1 & #2 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 11:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa11.swt



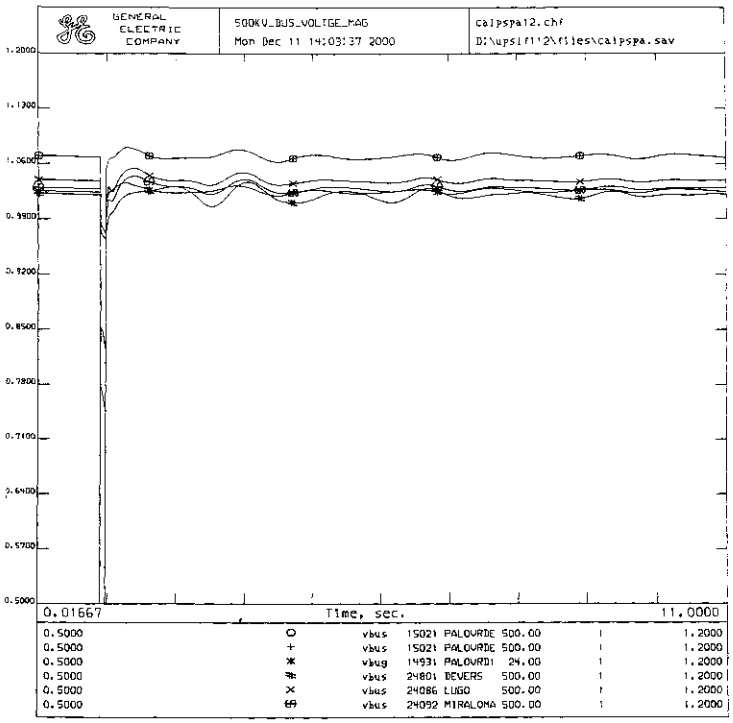
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Vista #1 & #2 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 11:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa11.swt

CASE 12

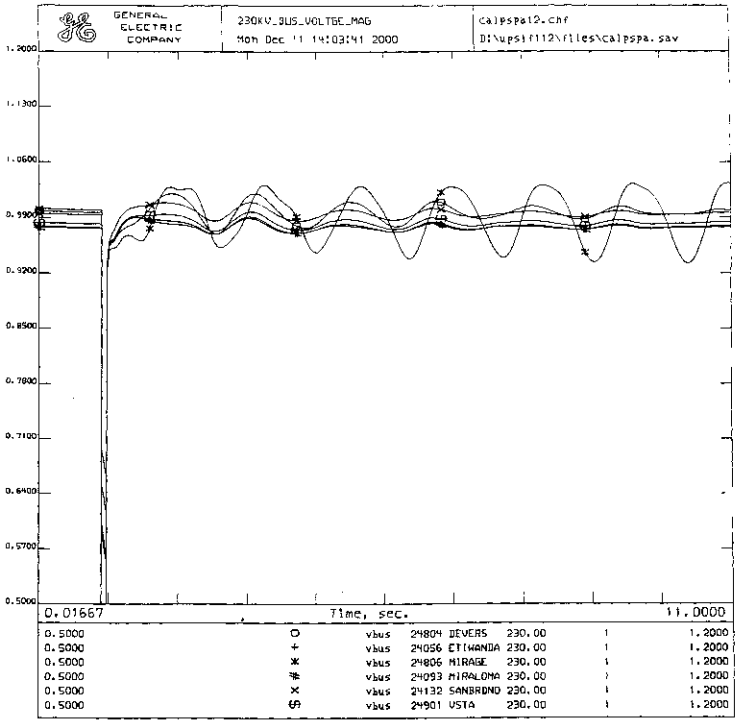
```
calpspa.sav
calpspa.dyd
TITLE
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage & Devers-Coachella 230-KV Lines
SYSTEM STABILITY STUDY CASE-Case 12:With Calpine(679 MW)
calpspa.sav + calpspa.dyd + calpspa12.swt
RUN 10.0
CC
CC  ***** CALPINE: MORENO VALLEY SYSTEM IMPACT STUDY ******
CC  APPLY A 5 CYCLE 3-PHASE FAULT ON THE DEVERS 230 BUS
CC
FB  0.0 "DEVERS  " 230
CC  CLEAR FAULT
CFB 5.0 "DEVERS  " 230
CC   REMOVE DEVERS-MIRAGE 230KV LINE
CC   REMOVE DEVERS-COACHELLA 230KV LINE
DL   5.0 "DEVERS  " 230. "MIRAGE  " 230. "1 "
DL   5.0 "COACHELV" 230. "DEVERS  " 230. "1 "
```



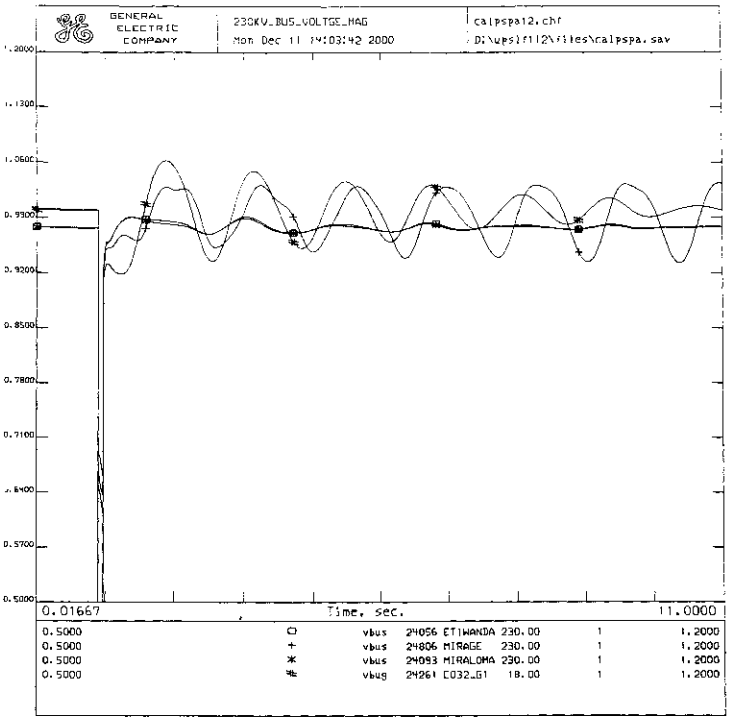
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage & Devers-Coachella 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 12:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa12.swt



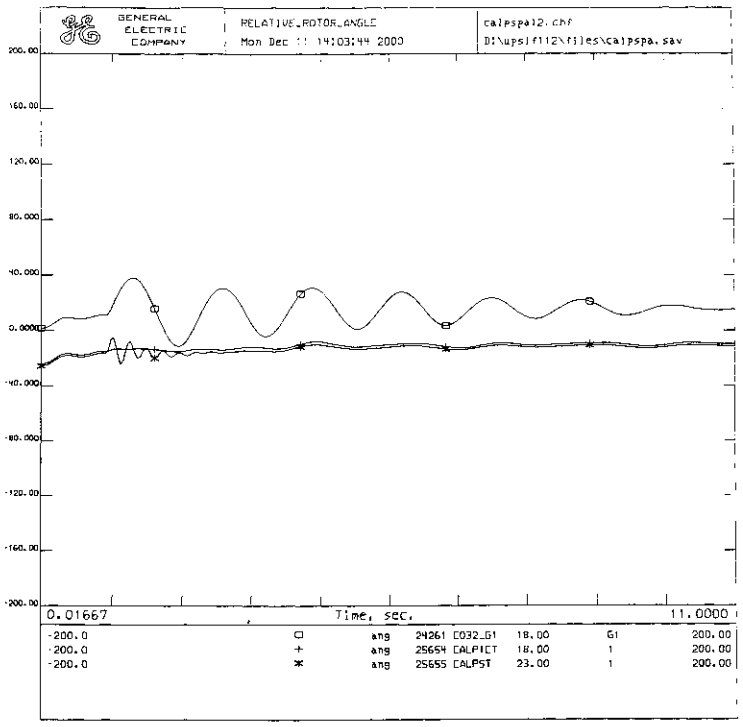
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage & Devers-Coachella 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 12:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa12.swt



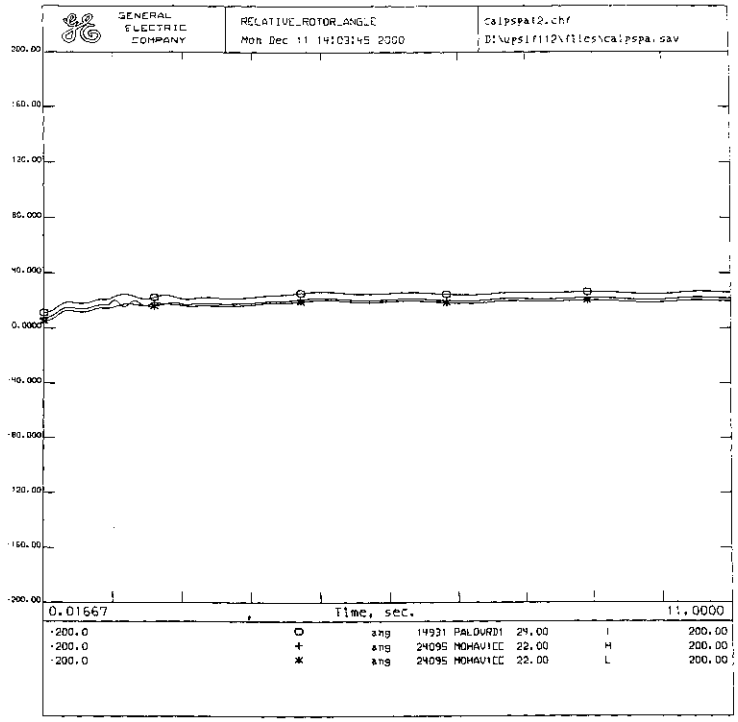
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage & Devers-Coachella 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 12:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa12.swt



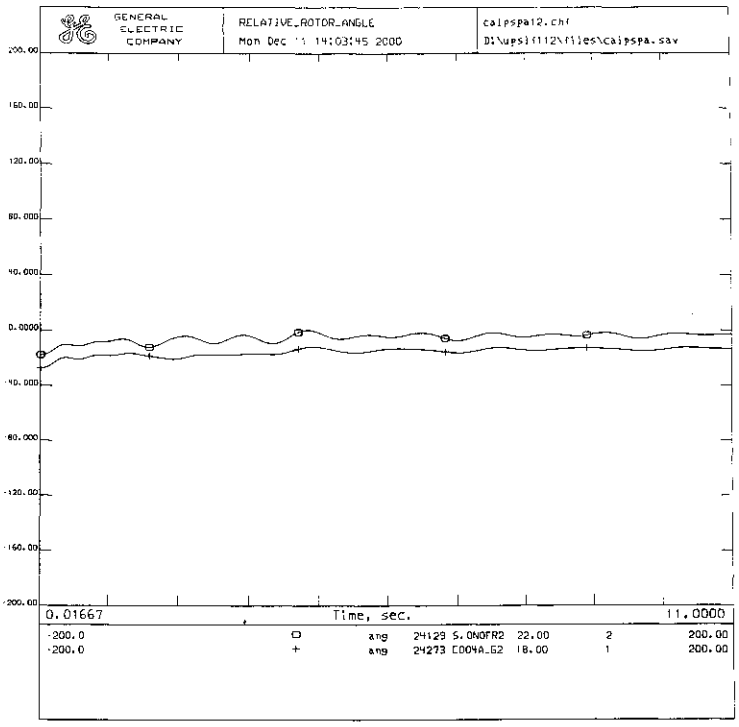
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage & Devers-Coachella 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 12:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa12.swt



2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage & Devers-Coachella 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 12:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa12.swt



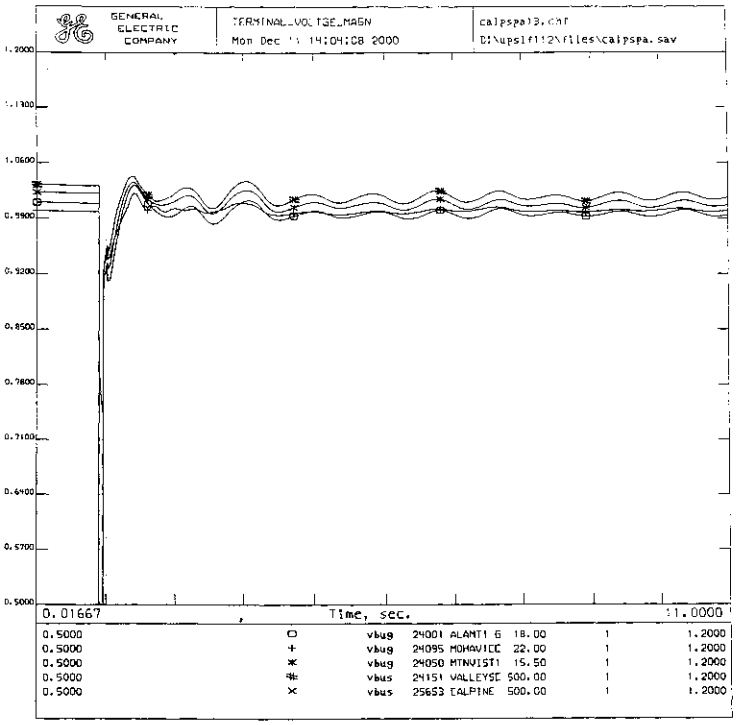
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage & Devers-Coachella 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 12:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa12.swt



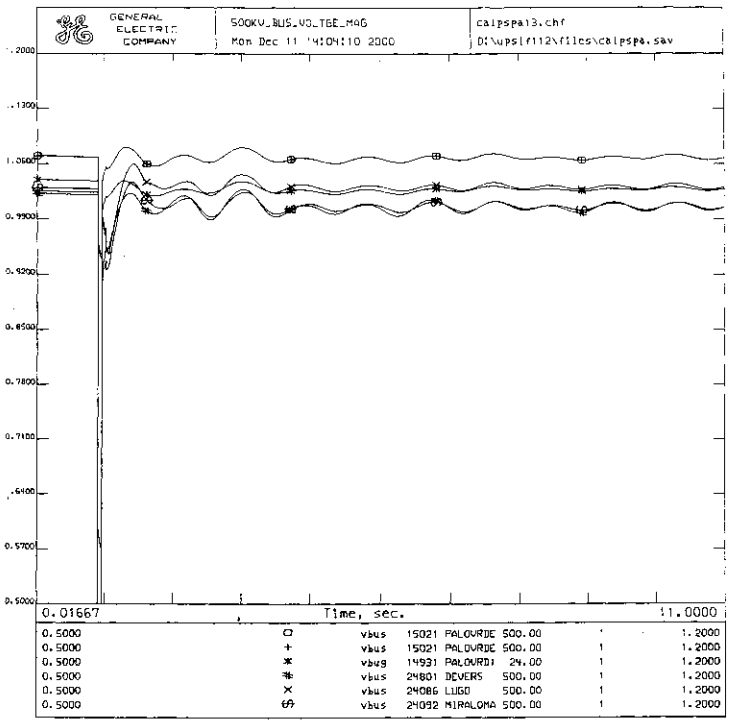
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on Devers 230-KV Bus
Contingency - Devers-Mirage & Devers-Coachella 230-KV Lines
SYSTEM STABILITY STUDY CASE - Case 12:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa12.swt

CASE 13

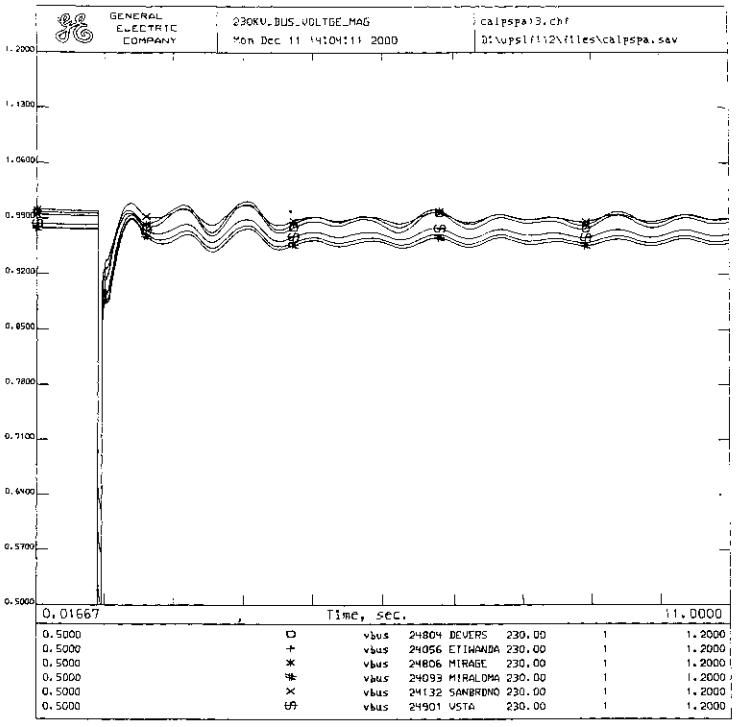
```
Calpspa.sav
calpspa.dyd
TITLE
2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on LUGO 500-KV Bus
Contingency-Remove two Lugo-Mira Loma Lines 2&3
SYSTEM STABILITY STUDY CASE-Case 13:With Calpine(679 MW)
calpspa.sav + calpspa.dyd + calpspa13.swt
RUN 10.0
CC
CC  ***** CALPINE: MORENO VALLEY SYSTEM IMPACT STUDY ******
CC  APPLY A 4 CYCLE 3-PHASE FAULT ON THE LUGO 500 BUS
FB  0.0 "LUGO     " 500
CC  FLASH SERIES CAPACITORS IN: MOHAVE-LUGO
FC  0.0 "LUGO     " 500. "MOHAVE  " 500. "1 " 1
FC  0.0 "LUGO     " 500. "MOHAVE  " 500. "1 " 3
CC  FLASH SERIES CAPACITORS IN: ELDORADO-LUGO
FC  0.0 "ELDORADO" 500. "LUGO     " 500. "1 " 1
FC  0.0 "ELDORADO" 500. "LUGO     " 500. "1 " 3
CC  CLEAR FAULT
CFB 4.0 "LUGO     " 500
CC  REMOVE TWO LUGO-MIRALOMA LINES 2&3
DL  4.0 "LUGO     " 500 "MIRALOMA" 500 "2 "
DL  4.0 "LUGO     " 500 "MIRALOMA" 500 "3 "
CC  REINSERT CAPACITORS IN: MOHAVE-LUGO
RC  8.0 "LUGO     " 500. "MOHAVE  " 500. "1 " 1
RC  8.0 "LUGO     " 500. "MOHAVE  " 500. "1 " 3
CC  REINSERT CAPACITORS IN: ELDORADO-LUGO
RC  8.0 "ELDORADO" 500. "LUGO     " 500. "1 " 1
RC  8.0 "ELDORADO" 500. "LUGO     " 500. "1 " 3
```



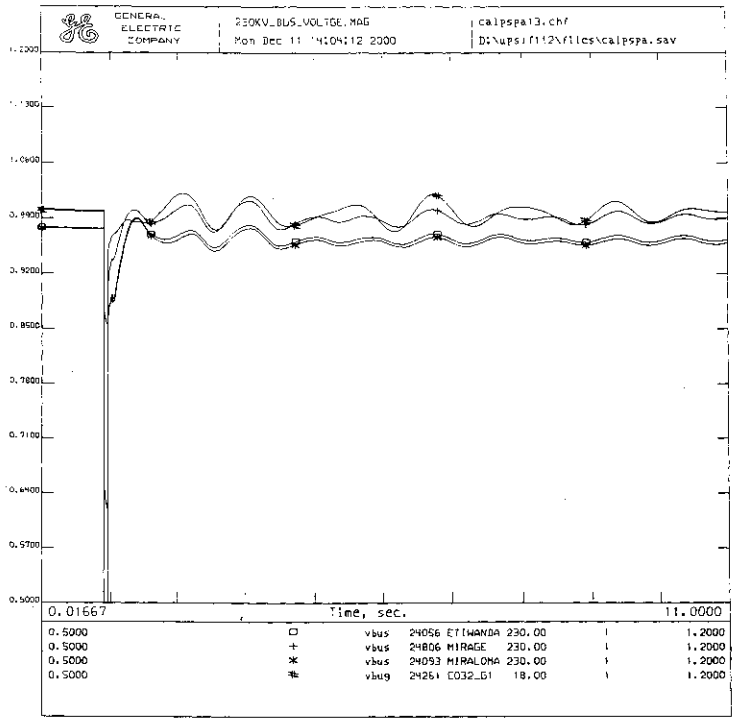
2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on LUGO 500-KV Bus
Contingency-Remove two Lugo-Mira Loma Lines 283
SYSTEM STABILITY STUDY CASES - Case 13:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa13.swt



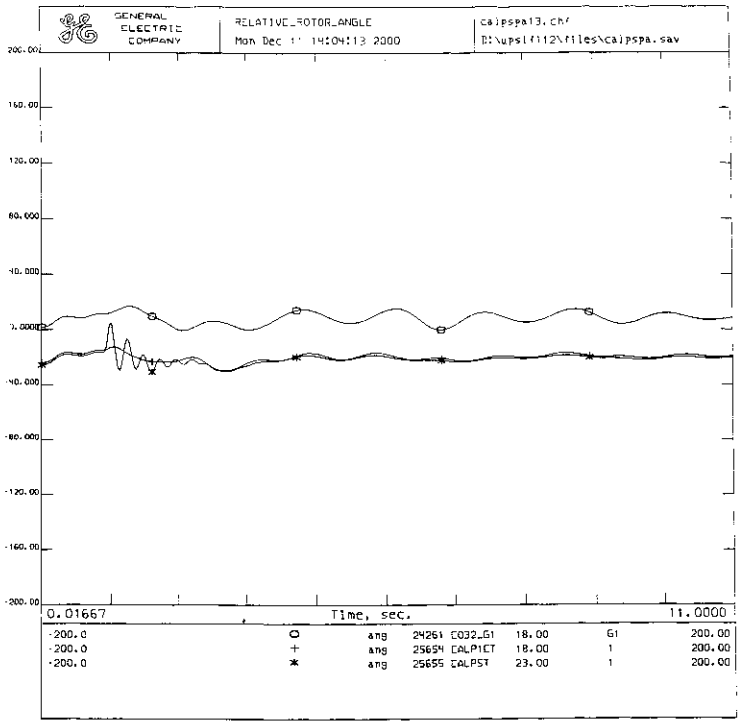
2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on LUGO 500-KV Bus
Contingency-Remove two Lugo-Mira Loma Lines 283
SYSTEM STABILITY STUDY CASES - Case 13:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa13.swt



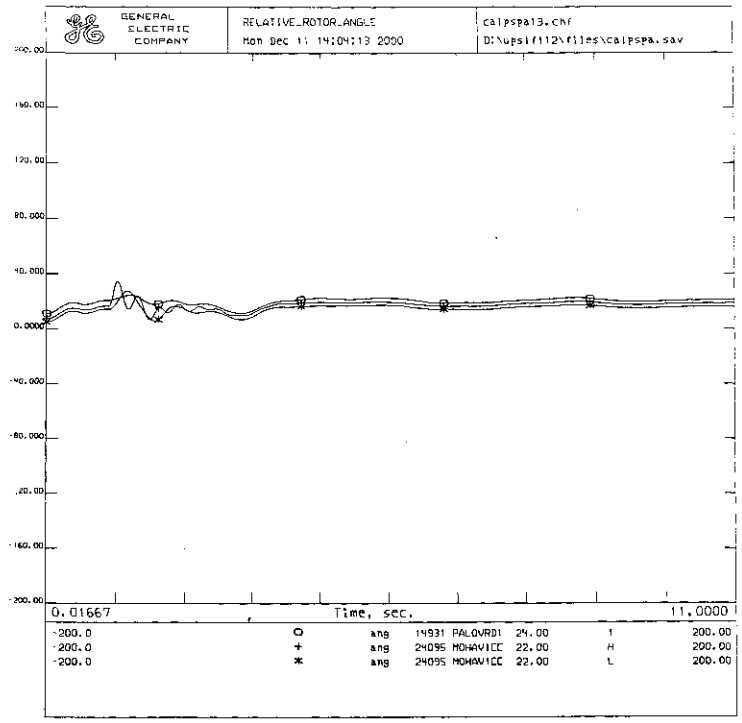
2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on LUGO 500-KV Bus
Contingency-Remove two Lugo-Mira Loma Lines 283
SYSTEM STABILITY STUDY CASES - Case 13:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa13.swt



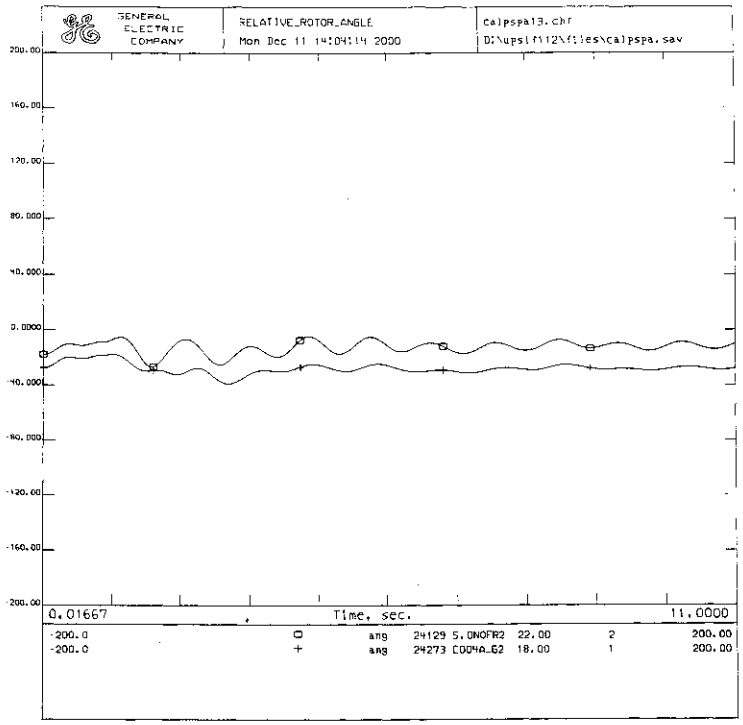
2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on LUGO 500-KV Bus
Contingency-Remove two Lugo-Mira Loma Lines 283
SYSTEM STABILITY STUDY CASES - Case 13:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa13.swt



2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on LUGO 500-KV Bus
Contingency-Remove two Lugo-Mira Loma Lines 2&3
SYSTEM STABILITY STUDY CASES - Case 13:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa13.swt



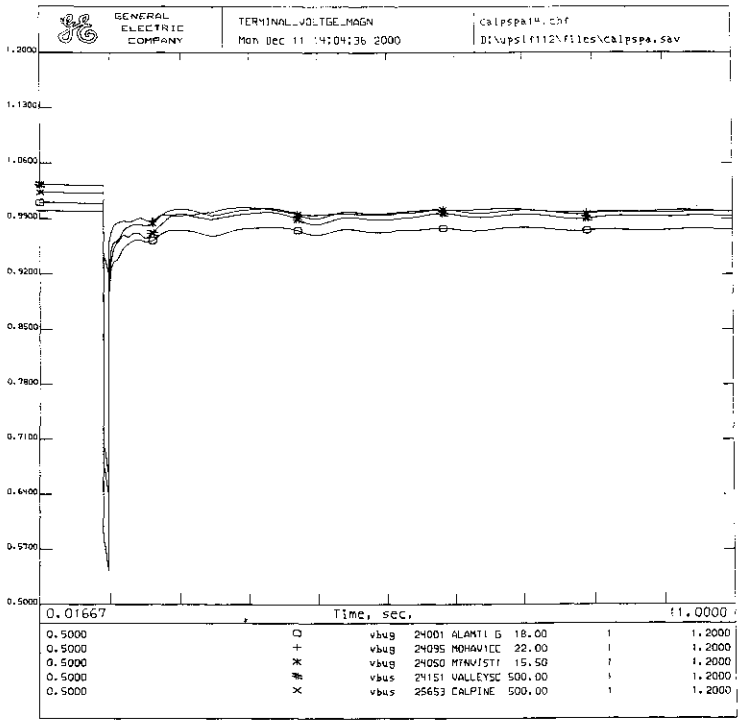
2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on LUGO 500-KV Bus
Contingency-Remove two Lugo-Mira Loma Lines 2&3
SYSTEM STABILITY STUDY CASES - Case 13:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa13.swt



2004 LIGHT SPRING
4-CYCLE 3-Phase Fault on LUGO 500-KV Bus
Contingency-Remove two Lugo-Mira Loma Lines 2&3
SYSTEM STABILITY STUDY CASES - Case 13:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa13.swt

CASE 14

```
calpspa.sav
calpspa.dyd
TITLE
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on SONGS 230 Bus
Contingency-Remove Both SONGS-Units 2&3
SYSTEM STABILITY STUDY CASE-Case 14:Without Calpine(679 MW)
calpspa.sav + calpspa.dyd + calpspa14.swt
RUN 10.0
CC
CC  ***** CALPINE: MORENO VALLEY SYSTEM IMPACT STUDY ******
CC
CC  APPLY A 5 CYCLE 3-PHASE FAULT ON THE SONGS 230 BUS
FB  0.0 "S.ONOFRE " 230
CC  CLEAR FAULT
CFB 5.0 "S.ONOFRE " 230
CC   REMOVE SONGS Units 2&3
TG  5.0 "S.ONOFR2 " 22.00 "2 "
TG  5.0 "S.ONOFR3 " 22.00 "3 "
```



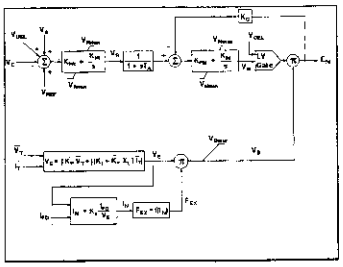
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on SONGS 230 Bus
Contingency-Remove Both SONGS-Units 2&3
SYSTEM STABILITY STUDY CASES - Case 14:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa14.swt

7fh2_1model

Customer			
mit	7FA GT		
enerator	7FH2 GTGenerator		
	F317P19 7FH2		
ating	234	KV Rating	18
PM	3600	PF	0.85
CR	0.49	H2PSI	30
olts DC	350	RFG at 100 C	0.19
FAG amps	548.9	AFFL amps	1619.9

EX2000 Busfed Exciter Model Parameters

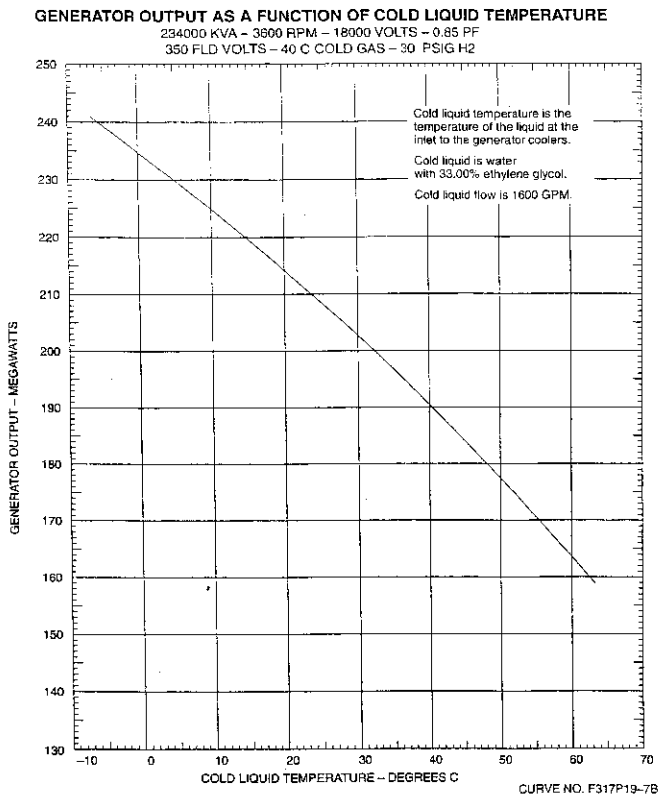
IEEE ST4B Model Format		Exciter Nominal Response at rated input	2
TR	0	KC	0.13
PR	3.96	KIR	3.96
RMAX	1	VRMIN	-0.87
A	0.01	KG	0
PM	1	KIM	0
MMAX	1	VMIMIN	-0.87
P	5.05	KI	0
BMAX	6.31	XL	0



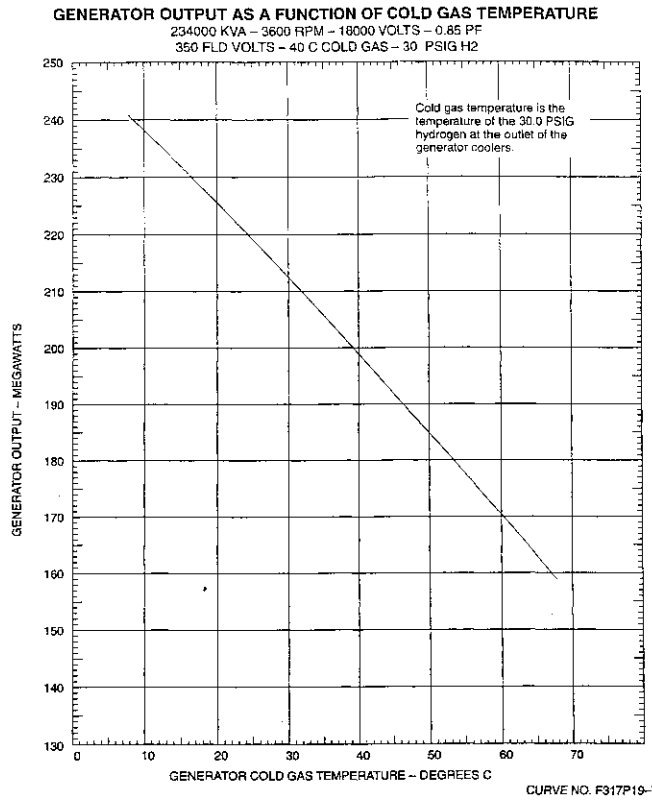
Harold C. Sanderson 1/11/99 9:21
GE Excitation/Controls Engineering
ex2000/ 7FH2_1 .xls

TR	AC sensor time constant
PR	AVR proportional gain
IR	AVR integral gain
RMAX	Maximum AVR Output
RMIN	Minimum AVR output
A	AVR time constant
G	Field voltage feedback gain
PM	Inner loop proportional gain
IM	Inner loop integral gain
MMAX	Maximum inner loop output
MIMIN	Minimum inner loop output
BMAX	Maximum source voltage
P	Potential source constant
	Current source constant
	Source leakage reactance
C	Rectifier loading factor
S	Stabilizing input
OEL	Over Excitation limit input
UEL	Under excitation limit input
	Compensated terminal voltage
	Terminal voltage setpoint
FD	Field voltage
FD	Field current
T	Terminal voltage
T	Terminal current

Page 1



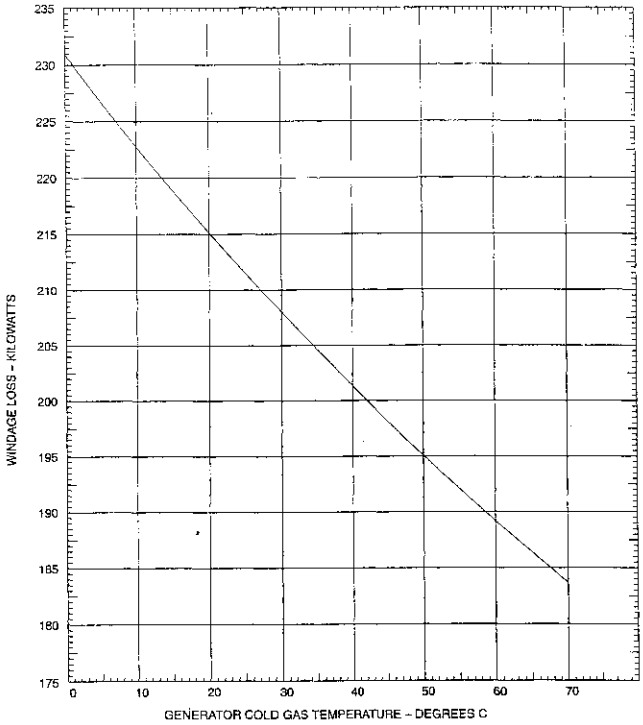
CURVE NO. F317P19–7B



CURVE NO. F317P19–7A

ESTIMATED WINDAGE LOSS CURVE

234000 KVA – 3600 RPM – 18000 VOLTS – 0.85 PF
350 FLD VOLTS – 40 C COLD GAS – 30 PSIG H2

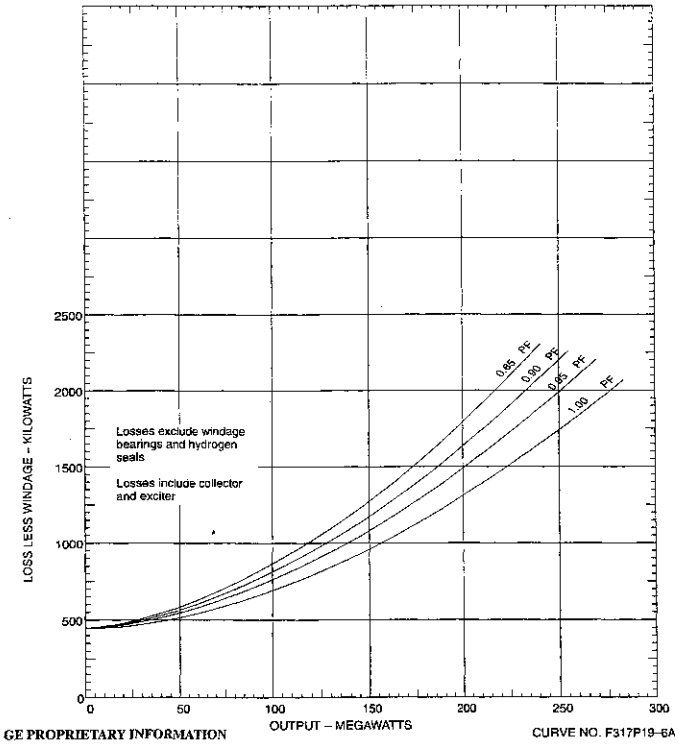


GE PROPRIETARY INFORMATION

CURVE NO. F317P19–6B

ESTIMATED LOSS CURVE

234000 KVA – 3600 RPM – 18000 VOLTS – 0.85 PF
350 FLD VOLTS – 40 C COLD GAS – 30 PSIG H2

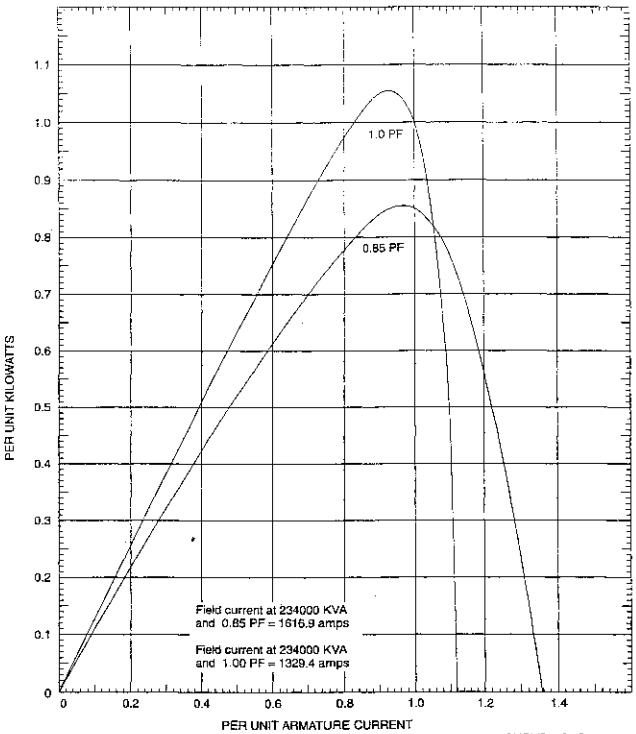


GE PROPRIETARY INFORMATION

CURVE NO. F317P19–6A

ESTIMATED POWER LIMIT CURVE

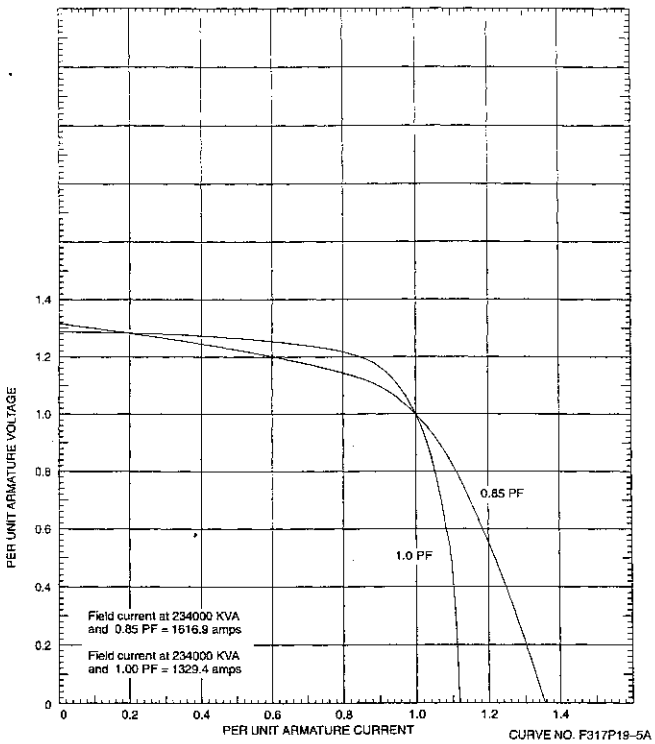
234000 KVA – 3600 RPM – 18000 VOLTS – 0.85 PF
350 FLD VOLTS – 40 C COLD GAS – 30 PSIG H2



CURVE NO. F317P19–5B

ESTIMATED VOLTAGE REGULATION CURVE

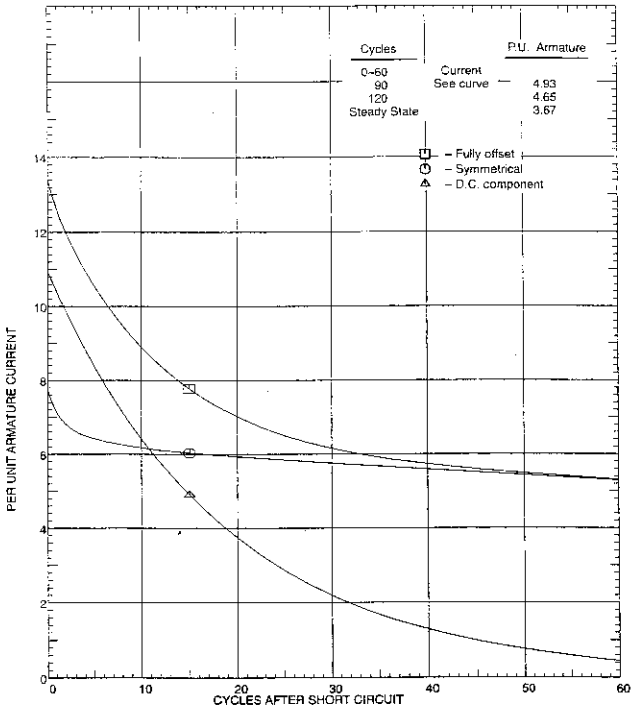
234000 KVA – 3600 RPM – 18000 VOLTS – 0.85 PF
350 FLD VOLTS – 40 C COLD GAS – 30 PSIG H2



CURVE NO. F317P19–5A

ESTIMATED LINE TO NEUTRAL SHORT CIRCUIT DECREMENT CURVE

234000 KVA – 3600 RPM – 18000 VOLTS – 0.85 PF
350 FLD VOLTS – 40 C COLD GAS – 30 PSIG H2



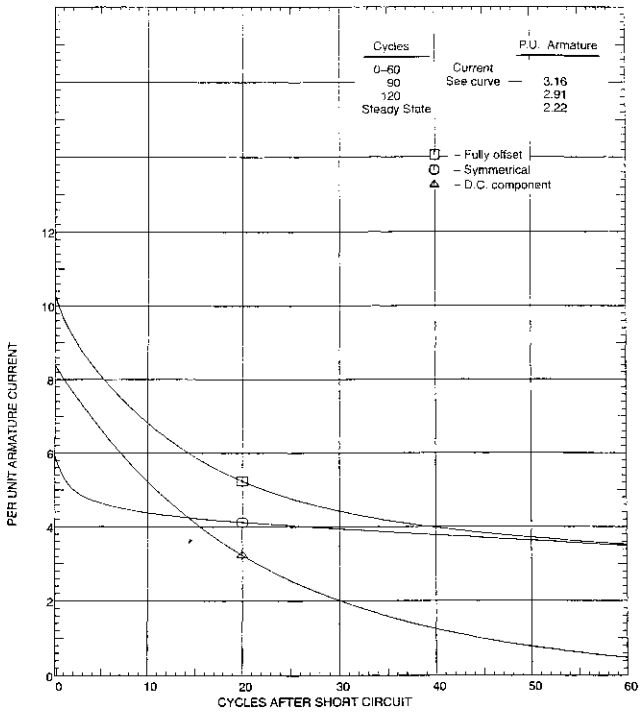
Short circuit decrement curves are based upon field current corresponding to rated load, voltage, and power factor.

CURVE NO. F317P19–4C

CT

ESTIMATED LINE TO LINE SHORT CIRCUIT DECREMENT CURVE

234000 KVA – 3600 RPM – 18000 VOLTS – 0.85 PF
350 FLD VOLTS – 40 C COLD GAS – 30 PSIG H2



Short circuit decrement curves are based upon field current corresponding to rated load, voltage, and power factor.

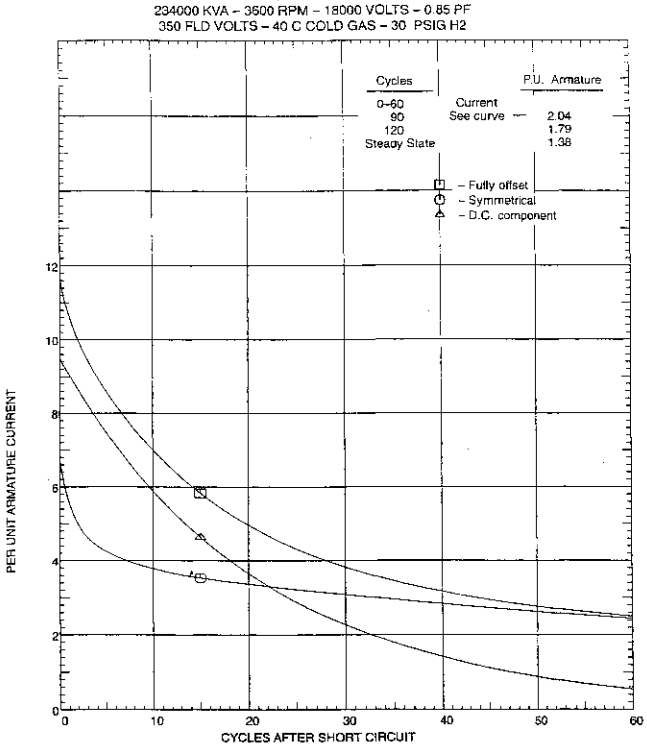
CURVE NO. F317P19–4B

CT

3

ESTIMATED THREE PHASE SHORT CIRCUIT DECREMENT CURVE

234000 KVA – 3600 RPM – 18000 VOLTS – 0.85 PF
350 FLD VOLTS – 40 C COLD GAS – 30 PSIG H2



Short circuit decrement curves are based upon field current corresponding to rated load, voltage, and power factor.

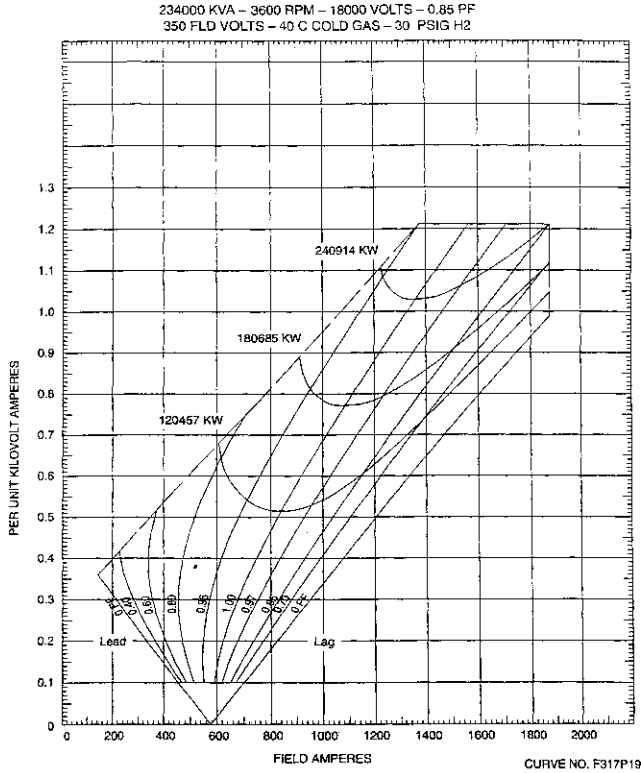
CURVE NO. F317P19–4A

C.T

3

ESTIMATED EXCITATION V CURVES

234000 KVA – 3600 RPM – 18000 VOLTS – 0.85 PF
350 FLD VOLTS – 40 C COLD GAS – 30 PSIG H2

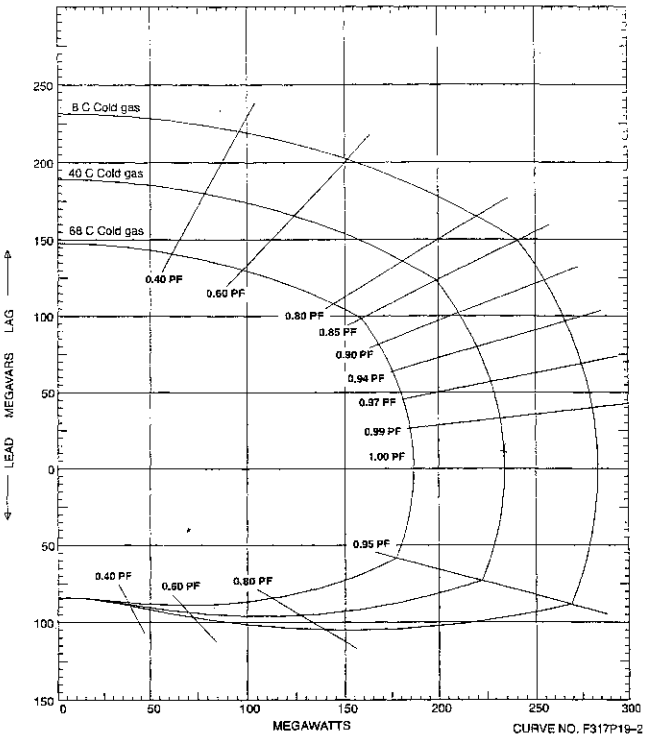


CURVE NO. F317P19–3

C.T

ESTIMATED REACTIVE CAPABILITY CURVES

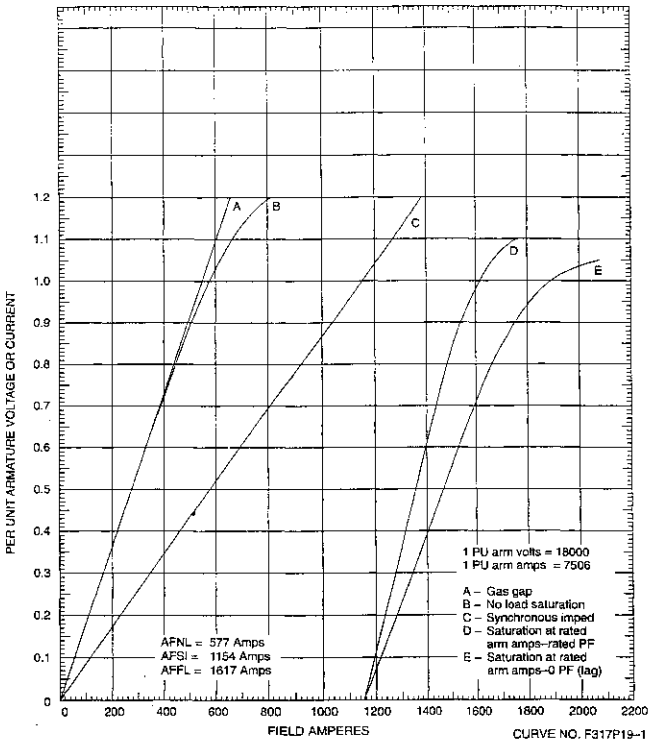
234000 KVA – 3600 RPM – 18000 VOLTS – 0.85 PF
350 FLD VOLTS – 40 C COLD GAS – 30 PSIG H2



CURVE NO. F317P19–2

ESTIMATED SATURATION AND SYNCHRONOUS IMPEDANCE CURVES

234000 KVA – 3600 RPM – 18000 VOLTS – 0.85 PF
350 FLD VOLTS – 40 C COLD GAS – 30 PSIG H2



CURVE NO. F317P19–1

CT

CT

SIZE	DWG NO	SH	REV
A	363AXXXX	3	-

ANSI ROTOR SHORT-TIME THERMAL CAPACITY, I2SQT = 10.0
GAS TURBINE-GENERATOR COMBINED INERTIA CONSTANT, H = 4.85 kW SEC/kVA
THREE PHASE ARMATURE WINDING CAPACITANCE = 1.103 MICROFARADS
ARMATURE WINDING DC RESISTANCE (PER PHASE) = 0.0017 OHMS (100 C)
FIELD WINDING DC RESISTANCE = 0.199 OHMS (125 C)
FIELD CURRENT AT RATED kVA, ARM VOLTAGE, AND PF = 1616.9 AMPS
FIELD CURRENT AT RATED kVA AND ARM VOLTAGE, 0 PF LAGGING (FOR SYSTEMS STUDY ONLY - NOT ALLOWABLE OPERATING POINT) = 1892 AMPS

GENERATOR RATING

BASE LOAD	0 FT ALTITUDE -	40 DEG C 30 PSIG H2-
234000 KVA	0.85 PF -	198900 KW -
3600 RPM -	2 POLE -	3 PHASE
60 HERTZ -	18000 A.C. VOLTS -	7506 A.C. AMPS -
WYE CONNECTED	0.49 SCR -	

TOTAL TEMPERATURES ARE GUARANTEED NOT TO EXCEED
STATOR COILS 100. DEG C BY EMBEDDED DETECTOR
FIELD COILS 110. DEG C BY RESISTANCE

INSULATION MATERIAL
ARMATURE - CLASS F
FIELD - CLASS F

DIELECTRIC TESTS - BETWEEN COILS AND GROUND, 60 HERTZ AC FOR 1 MIN
STATOR 37000 VOLTS RMS
ROTOR 3500 VOLTS RMS

ELECTRICAL DESIGN NUMBERS OF THE GENERATOR COMPONENTS

GENERATOR DESIGN CURVES
SAT AND IMPED F317P19 -1
REACTIVE CAP F317P19 -2
EXCITATION V F317P19 -3
SHRT CIRC DEC F317P19-4A,4B,4C
LOSS F317P19 -6A, -6B
TEMPERATURE F317P19 -7A, -7B

FRAME SIZE
89.0-42.300 X 168.00 (CORE OD - CORE ID X CORE LENGTH) MODEL 7FH2

GENERAL ELECTRIC COMPANY	SIZE	CAGE CODE	DWG NO
GE Power Generation SCHENECTADY, NY	A		363AXXXX
DRAWN			
ISSUED	SCALE		SHEET 3

CT

SIZE	DWG NO	SH	REV
A	363AXXXX	2	-

ESTIMATED GENERATOR ELECTRICAL DATA

This data is an estimate only, and is based on the generator electrical design
Actual manufacturing tolerances will cause some variation from these values.
Armature "VOLTS" and "AMPS" are rms values.

MGD309 GENERATOR DESIGN NUMBER F317P19 DATE 08-JAN-99

ATB-2-234000 KVA, 3600 RPM, 18000 VOLTS, 0.85PF, 40.0 C H2
198900 KW,7506 AMPS, 0.49 SCR, 350 FLD VOLTS, 0 FT ALT, WYE CONN

REACTANCE DATA - (PER UNIT)	DIRECT AXIS		QUADRATURE AXIS	
SATURATED SYNCHRONOUS	X/DV	2.140	V	2.042
UNSATURATED SYNCHRONOUS	X/DI	2.140	X/QI	2.042
SATURATED TRANSIENT	XP/DV	0.238		
UNSATURATED TRANSIENT	XP/DI	0.322	XP/Q	0.497
SATURATED SUBTRANSIENT	XPP/DV	0.166	XPP/QV	0.161
UNSATURATED SUBTRANSIENT	XPP/DI	0.228	XPP/QI	0.220
SATURATED NEGATIVE SEQUENCE	X/2V	0.159		
UNSATURATED NEGATIVE SEQUENCE	X/2I	0.217		
SATURATED ZERO SEQUENCE	X/0V	0.107		
UNSATURATED ZERO SEQUENCE	X/0I	0.140		
LEAKAGE REACTANCE, OVEREXCITED	X/LM,OEX	0.189		
LEAKAGE REACTANCE, UNDEREXCITED	X/LM,UEX	0.189		

FIELD TIME CONSTANT DATA - (SEC AT 125C)	DIRECT AXIS		QUADRATURE AXIS	
OPEN CIRCUIT	TP/D0	4.767	P/QO	0.409
THREE PHASE SHORT CIRCUIT TRANSIENT	TP/D3	0.530	TP/Q	0.409
LINE TO LINE SHORT CIRCUIT TRANSIENT	TP/D2	0.822		
LINE TO NEUTRAL SHORT CIRCUIT TRANS'NT	TP/D1	0.998		
SHORT CIRCUIT SUBTRANSIENT	TPP/D	0.023	TPP/Q	0.023
OPEN CIRCUIT SUBTRANSIENT	TPP/D0	0.033	TPP/QO	0.071

ARMATURE DC COMPONENT TIME CONSTANT DATA - (SEC AT 100C)		
THREE PHASE SHORT CIRCUIT	T/A3	0.349
LINE TO LINE SHORT CIRCUIT	T/A2	0.349
LINE TO NEUTRAL SHORT CIRCUIT ,	T/A1	0.311

ARMATURE WINDING SEQUENCE RESISTANCE DATA - (PER UNIT)		
POSITIVE	R/1	0.004
NEGATIVE	R/2	0.014
ZERO	R/0	0.007

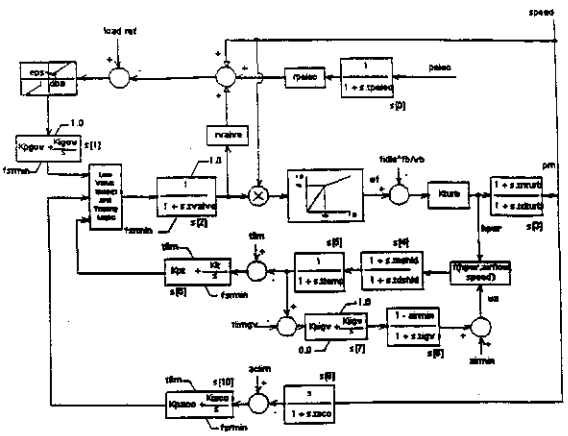
Reactance, Resistance and Time Constant data may be interpreted per IEEE 115, section VII.

R&P-12

OTHER DATA

GENERAL ELECTRIC COMPANY	SIZE	CAGE CODE	DWG NO
GE Power Generation SCHENECTADY, NY	A		363AXXXX
DRAWN			
ISSUED	SCALE		SHEET 2

CT



Notes:

a) Per unit parameters are on base of turbine MW capability. If no value is entered for "mwcap", the generator MVA base is used.

b) The speed/load reference setting of the control is specified by

genbc[].pref. This signal is interpreted as being either the governor speed/load reference and has a value between 1.0 pu at no-load to (1 + droop) pu at full-load (a bias is added to the reference to account for fidle when rvalve is non-zero).

c) The governor droop should be set by either using valve feedback, rvalve, or electrical power feedback, rpelec, as appropriate.

d) The parameter tlim can be used to represent variations of operating condition, ambient temperature and turbine condition. Tlim is the per unit power output achieved with the turbine exhaust temperature at its maximum continuous value. This value may be less than unity if the ambient air temperature is above ISO or if the compressor blades have not been cleaned for some time.

e) The deadband parameters dba and eps describe the input deadband that can be applied in some governors to deliberately reduce sensitivity to normal variations of system frequency. They should be left as zero in normal situations.

f) The deadband parameter dbb describes mechanical backlash in the fuel valve actuator. This deadband may be taken as zero for gas fired and liquid fueled engines whose controls are in good condition. A fuel control system in poor condition could have a deadband corresponding to a value of dbb as large as 0.005.

g) The parameter afmin represents the minimum airflow through the compressor/turbine at the point when the IGVs are at their minimum angular position. Thus, this paraw can not be zero and is typically 0.8 per unit.

h) To simulate a simple cycle gas turbine the IGVs should be wide open. To achieve this set tlimgv equal to a small value, for example 0.1. The gains kpigv and kiigv must be non zero.

i) The parameters ropen and rclose specify the opening and closing rates of the fuel valve.

j) The parameter rrmax is a + or - rate limit on the governor speed/load reference.

General Description:

This model is a representation of a generic gas turbine control system. The main speed governor, the temperature limit controller and the acceleration limit controller represent principal elements of most turbine controllers.

The first parameter in the parameter list may be used by the user to choose default data. That is,

data = 0 then the user must enter appropriate data
data = 1 simple-cycle, single-shaft turbine
data = 2 combined-cycle, single-shaft turbine
data = 3 simple-cycle, multi-shaft turbine
data = 4 combined-cycle, multi-shaft turbine

Default Data Set

Parameter	simple-cycle single-shaft	combined-cycle single-shaft	simple-cycle multi-shaft	combined-cycle multi-shaft
rvalve	0.0000	0.0000	0.0000	0.0000
rpelec	0.0400	0.0400	0.0400	0.0400
tpelec	5.0000	5.0000	5.0000	5.0000
kturb	1.5000	1.5000	1.5000	1.5000
tnturb	0.0000	0.0000	2.5000	2.5000
tdturb	0.3000	0.3000	3.0000	3.0000
ta	0.2000	0.2000	0.2000	0.2000
ropen	1.0000	1.0000	1.0000	1.0000
rclose	-999.0000	-999.0000	-999.0000	-999.0000
fidle	0.1800	0.1800	0.1800	0.1800
fsrmin	0.1500	0.1500	0.1500	0.1500
vb	1.0000	1.0000	1.0000	1.0000
fb	1.0000	1.0000	1.0000	1.0000
kpgov	10.0000	10.0000	10.0000	10.0000
kigov	2.0000	2.0000	2.0000	2.0000
tlim	1.0000	1.0000	1.0000	1.0000
tnshld	1.0000	1.0000	1.0000	1.0000
tdshld	4.0000	4.0000	4.0000	4.0000
ttemp	1.5000	1.5000	1.5000	1.5000
kpt	5.0000	5.0000	5.0000	5.0000
kit	1.0000	1.0000	1.0000	1.0000
aclim	0.0100	0.0100	0.0100	0.0100
tacc	0.2000	0.2000	0.2000	0.2000
kpacc	5.0000	5.0000	5.0000	5.0000
kiacc	10.0000	10.0000	10.0000	10.0000
kpigv	5.0000	5.0000	5.0000	5.0000
kiigv	1.2500	1.2500	1.2500	1.2500
tigv	1.0000	1.0000	1.0000	1.0000
tlimgv	0.1000	0.9500	0.1000	0.1000
afmin	0.8000	0.8000	0.8000	0.8000
rrmax	0.000125	0.000125	0.000125	0.000125
dba	0.0000	0.0000	0.0000	0.0000
eps	0.0000	0.0000	0.0000	0.0000
dbb	0.0000	0.0000	0.0000	0.0000

Model Name: gasp

Description: Generic Gas Turbine Model

Prerequisites: Generator model ahead of this model in the dynamic model table

Inputs: Shaft speed
Turbine load reference

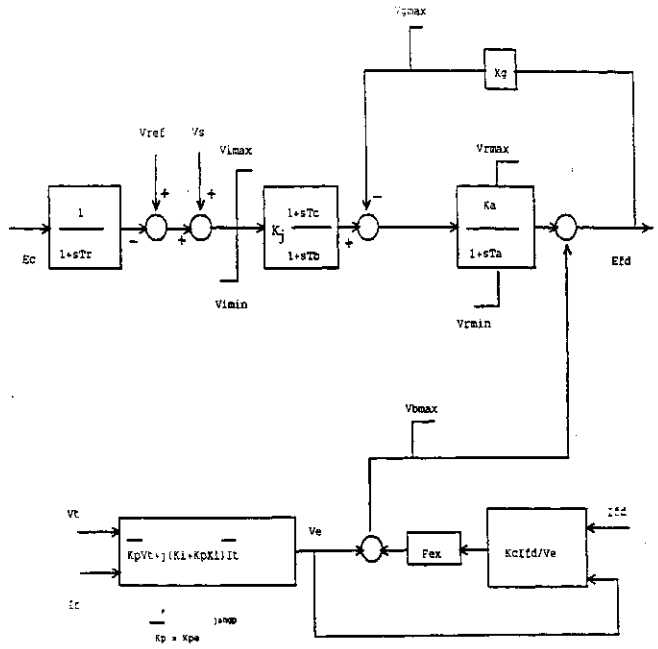
Output Channels:

Record Level	Name	Description
1	pm	Turbine power, MW
1	gv	Fuel valve opening, pu
9	wf	Fuel flow, pu
9	fsr	Fuel command, pu
9	fsrg	Fuel command from governor, pu
9	fsrt	Fuel command from temperature controller, pu
9	fsra	Fuel command from acceleration controller, pu
9	wa	Air flow, pu

Invocation: gasp [<n>] [<name> <kv>] <id> : [mwcap=<value>]

Parameters

Name	*Description*
data	Choose default data.
rvalve	Governor Permanent droop, valve position feedback, pu
rpelec	Governor Permanent droop, electrical power feedback, pu
tpelec	Electrical Power Transducer time constant, sec
kturb	Turbine gain, pu
tnturb	Turbine numerator time constant, sec
tdturb	Turbine denominator time constant, sec
ta	Fuel valve time constant, sec
ropen	Maximum valve opening rate, sec
rclose	Maximum valve closing rate, sec
fidle	full-speed'no-load fuel flow, pu
fsrmin	Minimum allowable valve opening, pu
vb	Valve opening at valve breakpoint, pu
fb	Fuel flow at valve breakpoint, pu
kpgov	Governor proportional gain,
kigov	Governor integral gain,
tlim	Load at exhaust temperature limit, pu
tnshld	Radiation sheild numerator time constant, sec
tdshld	Radiation sheild denominator time constant, sec
ttemp	Temperature transducer time constant, sec
kpt	Temperature limit controller proportional gain,
kit	Temperature limit controller integral gain,
aclim	Acceleration limit, pu speed/sec
tacc	Acceleration detector time constant, sec
kpacc	Acceleration limit controller proportional gain,
kiacc	Acceleration limit controller integral gain,
kpigv	IGV controller proportional gain,
kiigv	IGV controller integral gain,
tigv	IGV actuator time constant, sec
tlimgv	IGV temperature limit, pu
afmin	Minimum air flow at minimum IGV position, pu
rrmax	Maximum rate of change of speed reference, pu/sec
dba	Input deadband parameter, pu
eps	Input deadband parameter, pu
dbb	Valve actuator backlash parameter, pu



Model Name: exst4b

Description: IEEE type ST4b excitation system

Prerequisites: Generator model ahead of this model in dynamic models table

Inputs: Compounded generator terminal voltage, generator field current, generator speed

Output Channels:

Record Level	Name	Description
1	if	Generator field current, p.u.

Invocation: exst4b [<n>] {<name> <kv>} <id> :

Parameters:

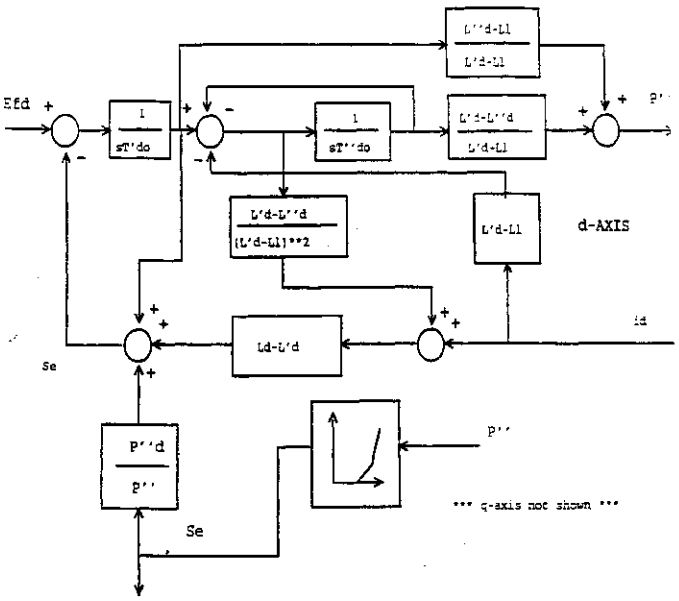
	Name	EPCL Variable	Description
0	Tr	tr	Filter time constant, sec
3.56	Kpr	kpr	Proportional Gain, p.u.
3.56	Kir	kir	Integral Gain, p.u.
0.01	Ta	ta	Time constant, sec
1	Vrmax	vrmax	Maximum control element output, pu
-0.87	Vrmin	vrmin	Minimum control element output, pu
1	Kpm	kpm	Prop. Gain of field voltage regulator, p.u.
0	Kim	kim	Integral Gain of field voltage regulator, p.u.
1	Vmmax	vmmax	Maximum field voltage regulator output, pu
-0.87	Vmmin	vmmin	Minimum field voltage regulator output, pu
0	Kg	kg	Excitation limiter gain, pu
5.05	Kp	kp	Potential source gain, pu
0	Angp	angp	Phase angle of potential source, degrees
	Ki	ki	Current source gain, pu
0.15	Kc	kc	Exciter regulation factor, pu
0	Xl	xl	Main generator leakage reactance, pu
6.31	Vbmax	vbmax	Maximum excitation voltage

Notes:

a) This model represents the GE EX2000 bus fed potential source, static compound and Generrex-PPS or -CPS, and SILCOmatic 5 excitation systems, with proportional plus integral (PI) voltage controller.

b) The inner loop field voltage regulator (Kpm, Kim and Kg) are used for modeling of a compound power source static exciter. Any of these values can be zero. To bypass the inner loop field voltage regulator, set Kpm = 1.0, and Kim and Kg tp zero.

c) Setting Ta or Tr to zero will bypass the time constants.



d) Se1.0 and Se1.2 are defined in Figure 3.10.2, and must be non- zero.

e) (Ra+jL'd) overwrites the load flow machine characteristic impedance when the INIT, RDYD, or RDWS command is executed.

f) Ra, Rcomp, Xcomp must be either all present or all absent in the data record read by RDYD. If absent, Ra is set to the resistance part of the machine characteristic impedance from the load flow data table and rcomp, xcomp are set to zero.

Model Name: genrou

Description: Solid rotor generator represented by equal mutual inductance rotor modeling

Prerequisites: Generator present in load flow working case

Inputs: Network boundary variables, Field Voltage, and Turbine Power

Output Channels:

Record Level	Name	Description
5	spd	Shaft speed, pu
1	ang	Rotor angle, degrees
1	vt	Terminal voltage, pu
4	pg	Electrical power, MW
6	qg	Reactive power, MVAR
2	efd	Field voltage, pu
3	it	Terminal current, pu

Invocation: genrou [<n>] [<name> <kv>] <id> :

Parameters:

	Name	EPCL Variable	Description
4.767	T'do	tpdo	D-axis transient rotor time constant
0.033	T"do	tppdo	D-axis subtransient rotor time constant
0.405	T'qo	tpqo	Q-axis transient rotor time constant
0.071	T"qo	tppqo	Q-axis subtransient rotor time constant
4.85	H w/TURBINE	h	Inertia constant, sec
	D	d	Damping factor, pu
2.140	Ld	ld	D-axis synchronous reactance
2.042	Lq	lq	Q-axis synchronous reactance
0.238	L'd	lpd	D-axis transient reactance
0.457	L'q	lpq	Q-axis transient reactance
0.166	L"d	lppd	D-axis subtransient reactance
0.183	Ll	ll	Stator leakage reactance, pu
	Se1.0	s1	Saturation factor at 1 pu flux
	Se1.2	s12	Saturation factor at 1.2 pu flux
0.004	Ra	ra	Stator resistance, pu
	Rcomp	rcomp	Compounding resistance voltage control, pu
	Xcomp	xcomp	Compounding reactance voltage control, pu

Notes:

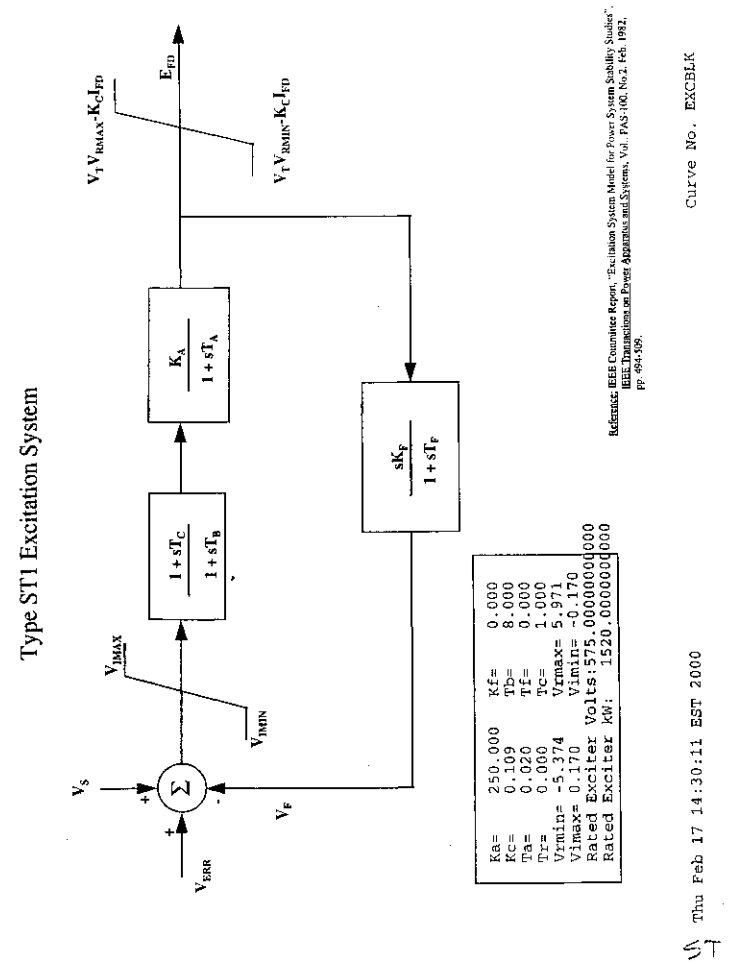
a) All rotor time constants must be non-zero.

b) All reactances must be specified. L"q is taken to be equal to L"d.

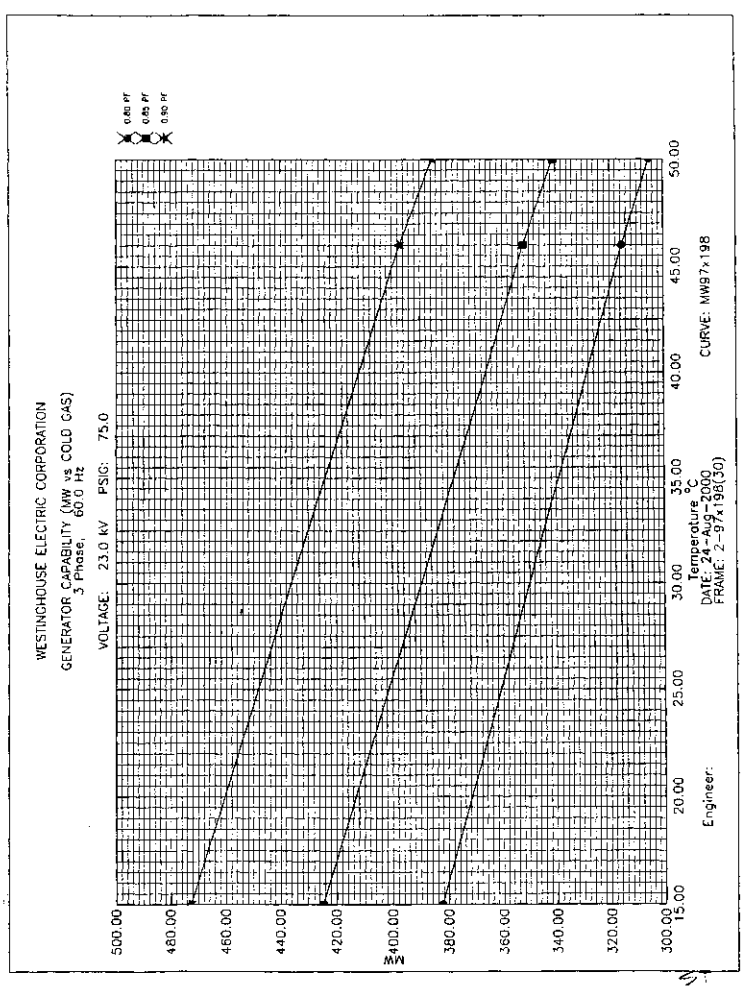
c) D has the dimensions delta P/delta speed.

ST

GENERATOR MODEL



ST



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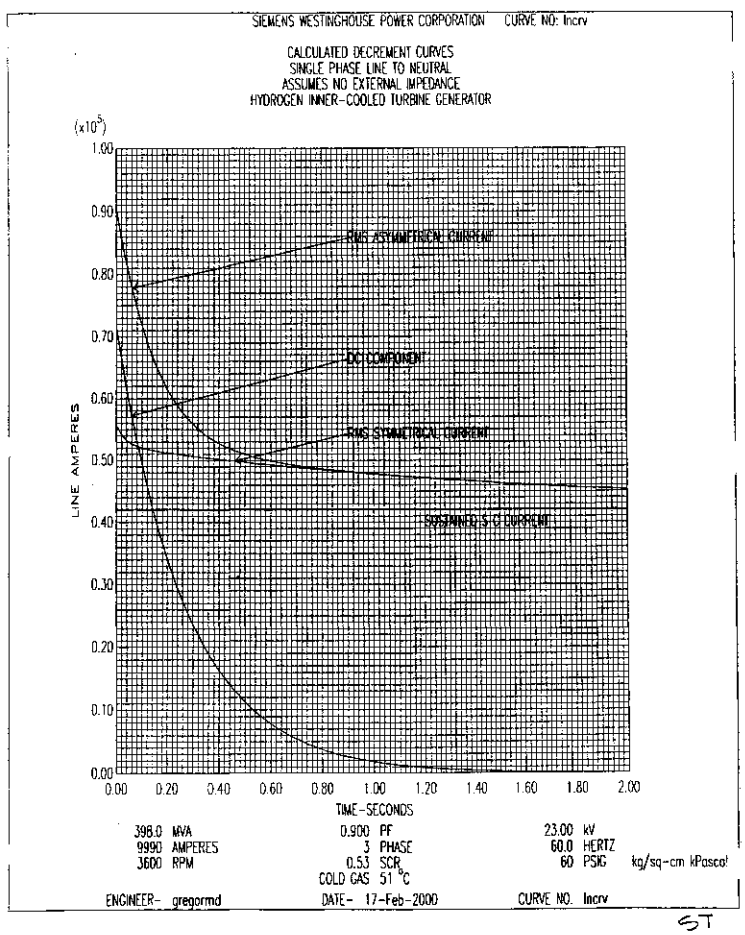

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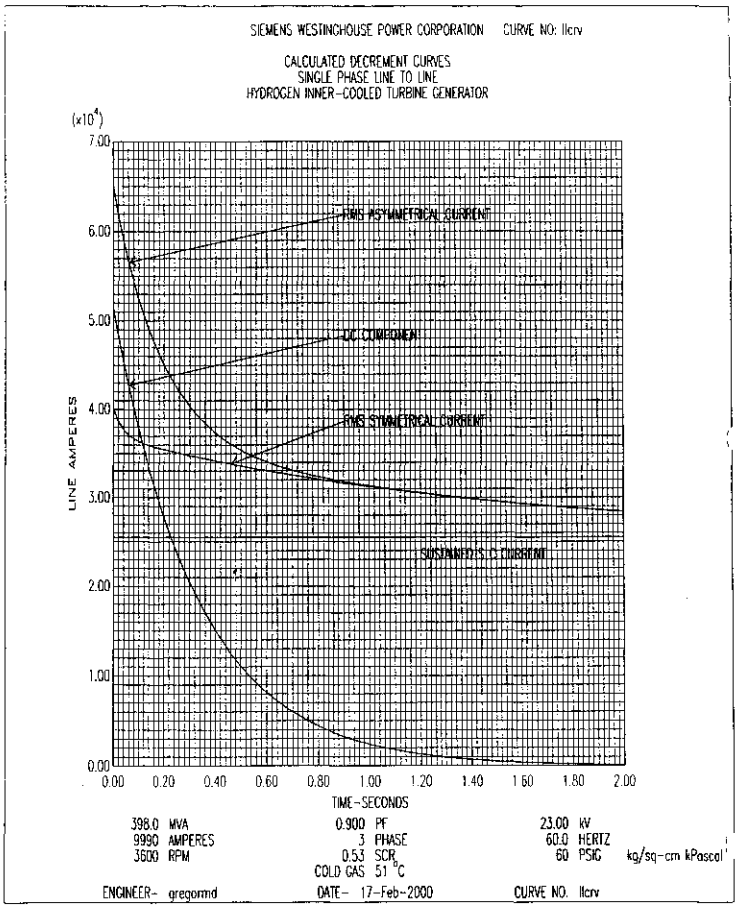
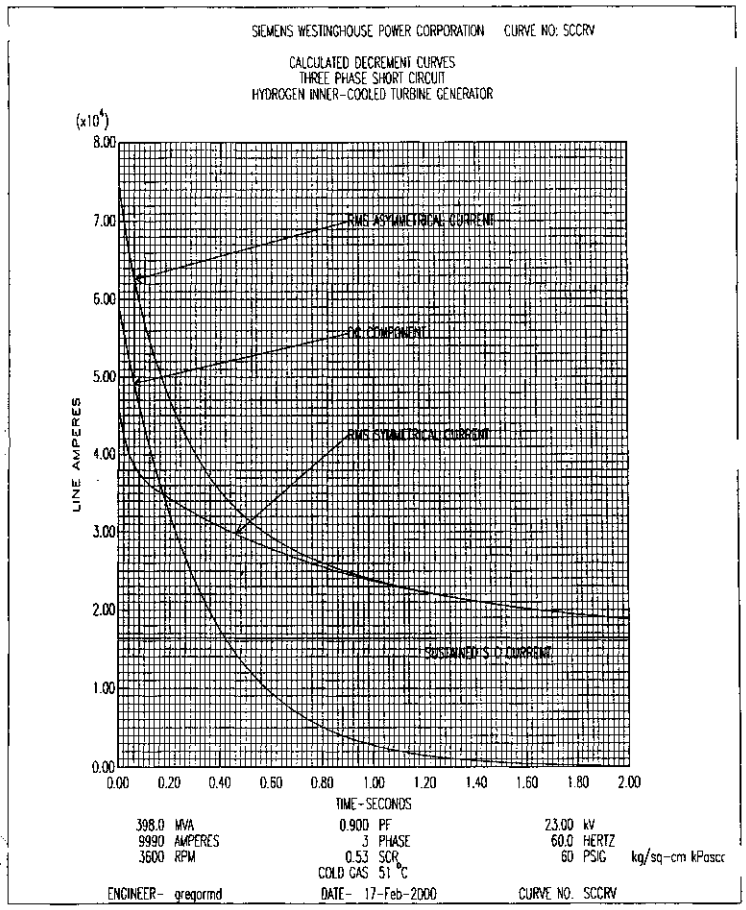
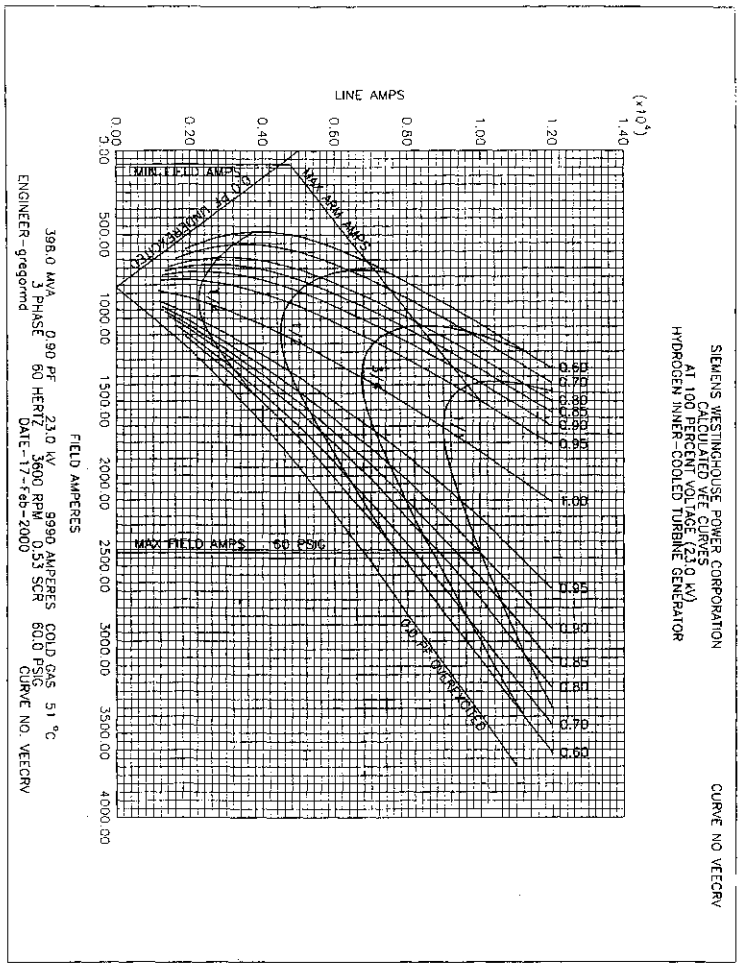

SIEMENS WESTINGHOUSE POWER CORPORATION CURVE NO: llcrv
CALCULATED DECREMENT CURVES
SINGLE PHASE LINE TO LINE
HYDROGEN INNER-COOLED TURBINE GENERATOR
(x10^4)
LINE AMPERES
RMS ASYMMETRICAL CURRENT
DC COMPONENT
RMS SYMMETRICAL CURRENT
SUSTAINED S.C. CURRENT
TIME-SECONDS
398.0 MVA
9990 AMPERES
3600 RPM
0.900 PF
3 PHASE
0.53 SCR
COLD GAS 51 °C
23.00 kV
60.0 HERTZ
60 PSIG
kg/sq-cm kPascal
ENGINEER- gregormd
DATE- 17-Feb-2000
CURVE NO. llcrv

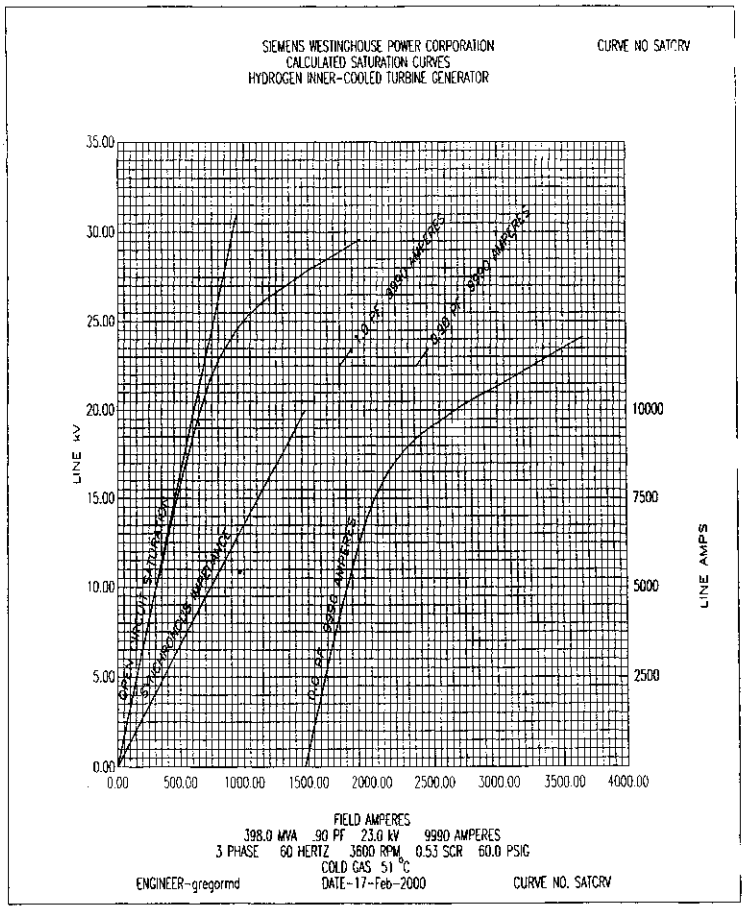
ST


SIEMENS WESTINGHOUSE POWER CORPORATION CURVE NO: SCCRV
CALCULATED DECREMENT CURVES
THREE PHASE SHORT CIRCUIT
HYDROGEN INNER-COOLED TURBINE GENERATOR
(x10^4)
LINE AMPERES
RMS ASYMMETRICAL CURRENT
DC COMPONENT
RMS SYMMETRICAL CURRENT
SUSTAINED S.C. CURRENT
TIME-SECONDS
398.0 MVA
9990 AMPERES
3600 RPM
0.900 PF
3 PHASE
0.53 SCR
COLD GAS 51 °C
23.00 kV
60.0 HERTZ
60 PSIG
kg/sq-cm kPascc
ENGINEER- gregormd
DATE- 17-Feb-2000
CURVE NO. SCCRV

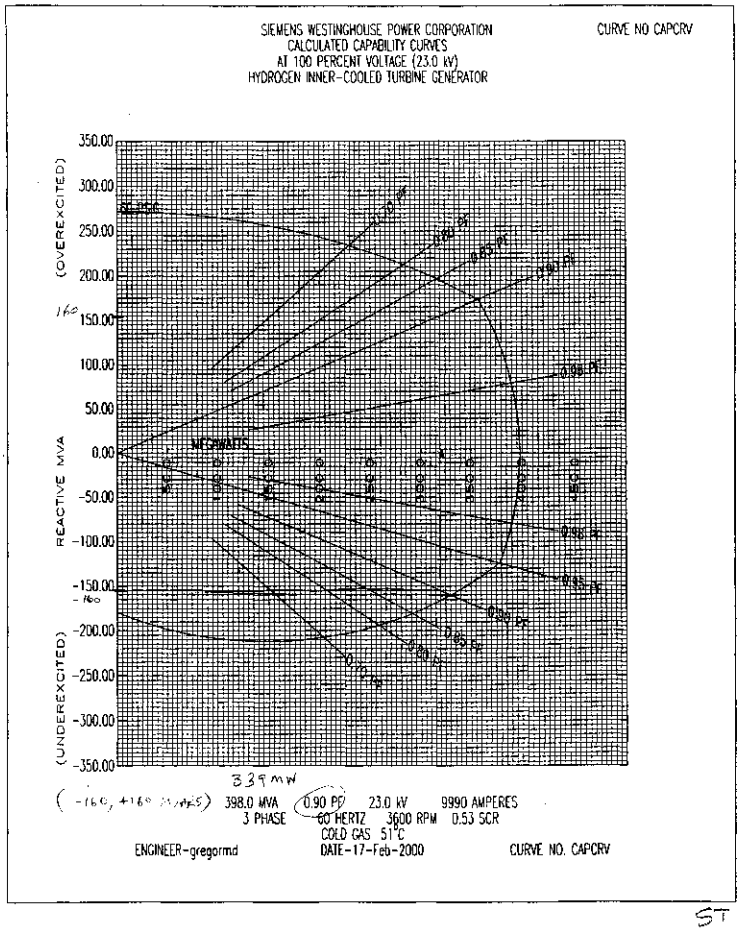
ST


SIEMENS WESTINGHOUSE POWER CORPORATION
CALCULATED VEE CURVES
AT 100 PERCENT VOLTAGE (23.0 kV)
HYDROGEN INNER-COOLED TURBINE GENERATOR
CURVE NO VEECRV
LINE AMPS
(x10^4)
MIN. FIELD AMPS
MAX ARM AMPS
0.0 PF UNDEREXCITED
MAX FIELD AMPS 60 PSIG
FIELD AMPERES
398.0 MVA 0.90 PF 23.0 kV 9990 AMPERES COLD GAS 51 °C
3 PHASE 60 HERTZ 3600 RPM 0.53 SCR 60.0 PSIG
ENGINEER-gregormd
DATE-17-Feb-2000
CURVE NO. VEECRV

ST


SIEMENS WESTINGHOUSE POWER CORPORATION
CALCULATED SATURATION CURVES
HYDROGEN INNER-COOLED TURBINE GENERATOR
CURVE NO SATCRV
LINE kV
LINE AMPS
OPEN CIRCUIT SATURATION
SYNCHRONOUS IMPEDANCE
1.0 PF 9990 AMPERES
0.90 PF 9990 AMPERES
FIELD AMPERES
398.0 MVA .90 PF 23.0 kV 9990 AMPERES
3 PHASE 60 HERTZ 3600 RPM 0.53 SCR 60.0 PSIG
COLD GAS 51 °C
ENGINEER-gregormd
DATE-17-Feb-2000
CURVE NO. SATCRV

ST



ST

Generator Technical Data

Customer: Calpine **Unit:** Delta Energy

Unit Ratings

MVA	398.0	PF	0.9	PSIG	60.0	SCR	0.53
kV	23.0	Hz	60.0	RPM	3600		

Stability Data

Generator Field Data	Volts	Amperes
At Rated Load	540.90	2418.26
At Rated Voltage - Air Gap Line		701.9

Field Resistance at 75° C (Ohms)	0.2102	**Exciter Rated Volts**	575.00
Generator and Exciter WR^2 (lbf×ft²)	100000.0	**Exciter Rated Power (kW)**	1520.0
Generator and Exciter H Constant (kW-sec/kVA) ***(Does not include Turbine)***	0.75	**Saturation at 1.0 pu terminal voltage**	16.042
Generator Saturation Curve	SATCRV	**Saturation at 1.2 pu terminal voltage**	72.015

Reactances and Time Constants

X_d(%)	209.80	X'_{qv} (%)	46.27	X''_{qv} (%)	23.69	X_{Lv} (%)	20.02	R_{2v}(%)	3.40	T_a(sec)	0.326
X_q(%)	204.93	X'_{qi}(%)	52.58	X''_{qi}(%)	25.75	X_p(%)	32.84	R_a(%)	0.19	T''_{do}(sec)	0.043
X'_{dv} (%)	29.11	X''_{dv} (%)	23.89	X_{2v}(%)	23.79	R_o(%)	0.27	T''_{qo} (sec)	0.068	C_w (μF/phase)	0.190
X'_{di}(%)	33.08	X''_{di}(%)	25.96	X_{ov}(%)	11.68	R_{1v} (%)	0.34	T'_{qo}(sec)	0.72	T'_{do}(sec)	6.455

(Items with subscript v are at rated voltage (saturated) and subscript i are at rated current (unsaturated))

Generator Application Engineer:	*Date:*

ST

EXHIBIT A (CONTINUED)

TABLE 2

TRANSFORMER DATA

UNIT COMBUSTION TURBINE

NUMBER OF TRANSFORMERS 2 PHASE 3 HERTZ 60

RATED KVA	H Winding	X Winding	Y Winding
Connection (Delta, Wye Gnd)	WYE GND	DELTA	
55° C Rise			
65° C Rise	234	234	
RATED VOLTAGE	500 KV	18 KV	
BIL	1550 KV	150 KV	
AVAILABLE TAPS	4 (± 2½%)		

(Mark Tap Settings)

TYPE COOLING OA ____ OA/FA ____ OA/FA/FA X OA/FOA ____

FOA ____ W ____ OTHER ____ Specify ____

IMPEDANCE	H-X	H-Y	X-Y
Percent	10%		
MVA Base	140		
Tested Taps	4 (± 2½%)		

WINDING RESISTANCE	H	X	Y
Ohms	.004 pu -		

CURRENT TRANSFORMER RATIOS

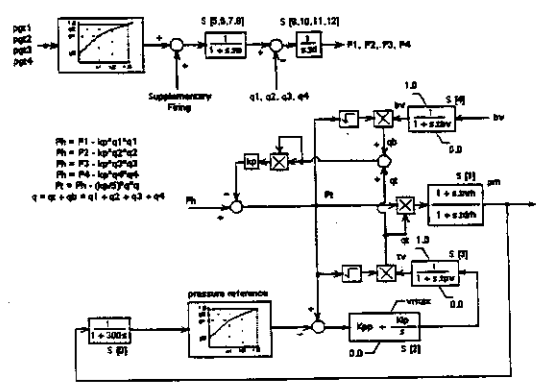
H 600:5 MR X 10,000:5 SR Y ____ N ____

PERCENT EXCITING CURRENT 100% Voltage ____ 110% ____

Supply copy of nameplate and manufacturer's test report when received.

f) If the total mechanical power of the gas turbines connected to a boiler falls to 0 pu, then it is assumed that the respective gas turbines have tripped. Consequently, the steam flow out of the corresponding boiler is shut off, to simulate the action of a stop valve.

g) The parameter stfrac defines the fraction of the steam turbine nameplate rating as a fraction of the total sum of the nameplate ratings of the gas turbines.



ST

steam-generator boilers and the steam turbine in a multi-shaft combined-cycle power plant. The gas turbines are connected to this model by the parameters gt1, gt2, gt3 ar These parameters define the external bus numbers of the respective gas turbines. Note, inherent to this modal is the assumption that all of the gas turbines in the plant are identical. Furthermore, more than one gas turbine may be connected to each of the four buses specified by the parameters gt1 through gt4.

The model of the boilers is relatively simple and is similar to that the ccbt1 and stag1 models. Each boiler is assumed to be identical with its parameters giv in the above list.

The following default data may be chosen by the user by clicking on the 'def' button in the model parameter window.

Default Data Set

Parameter	Default Data
stfrac	0.5000
kpp	10.000
kip	1.0000
vmax	1.0000
tw	2.0000
td	10.000
kp	0.0500
tpv	0.2000
tbv	0.5000
y0	0.1000
x1	0.0000
y1	0.1000
x2	0.5000
y2	0.5500
p0	0.4000
h1	0.2000
p1	0.4000
h2	0.8000
p2	1.0000

Notes:

a) Per unit parameters are on base of turbine MW capability. If no value is entered for "mwcap", the generator MVA base is used.

b) The steam turbine is essentially under pressure control by the PI controller defined by the gains kpp and kip.

c) The pressure reference for the throttle pressure of the steam turbine is scheduled according to the picewise linear function define by p0, h1, p1, h2 and p2. Note the values of h1 and h2 can not be equal, and neither parameter should be set to 1.0.

d) The picewise linear function defined by y0, x1, y2, x2 and y2 characterizes the variation in heat available for steam production as a function of gas turbine power output.

e) During initialization the model will automatically calculate if supplementary firing is required to provide the demanded steam turbine power given the specified gas turbine power outputs. Similarly, if the specified steam turbine power is smaller than the total heat avaliable for steam generation, the bipass valve is opened to allow the excess steam to escape. The calculated value for supplimentary firing at each boiler remains a constant throughout simulations. The position of the bipass valve is not controlled, however, it may be changed by the user at any point during a simulation by changing the parameter bv.

ST

Model Name: ccst

Description: Multi-Shaft Combined Cycle Plant Turbine Model

Prerequisites: Generator model ahead of this model in the dynamic model table

Inputs: Shaft speed
Turbine load reference

Output Channels:

Record Level	Name	Description
1	pm	Turbine power, MW
1	tv	Throttle control valve opening, pu
9	P1	Drum pressure for boiler one, pu
9	P2	Drum pressure for boiler two, pu
9	P3	Drum pressure for boiler three, pu
9	P4	Drum pressure for boiler four, pu
9	Ph	Steam header pressure, pu
9	Pt	Throttle pressure, pu
9	q1	Steam flow out of boiler one, MW
9	q2	Steam flow out of boiler two, MW
9	q3	Steam flow out of boiler three, pu
9	q4	Steam flow out of boiler four, pu
9	qt	Throttle steam flow, pu
9	qb	Bipass steam flow, pu

Invocation: gasp [<n>] [<name> <kv>] <id> : [mwcap=<value>]

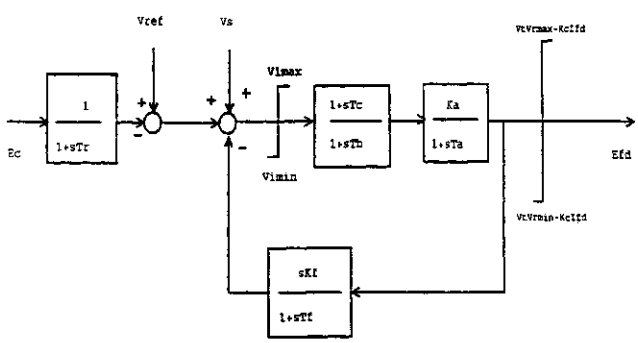
Parameters

Name	Description
gt1	External bus number of first gas turbine.
gt2	External bus number of second gas turbine.
gt3	External bus number of third gas turbine.
gt4	External bus number of fourth gas turbine.
bv	Bipass valve opening, pu
stfrac	Per unit steam turbine output for 1.0 pu GT output, pu
kpp	Pressure controller proportional gain, pu
kip	Pressure controller integral gain, pu
vmax	Maximum output of pressure controller, pu
tw	Boiler steam generation time constant, sec
td	Boiler drum time constant, sec
kp	Superheater pressure drop factor, pu/pu
tpv	Throttle valve time constant, sec
y0	Heat available for steam generation when GT runing at full-speed no-
x1	Steam turbine characteristic break point, pu
y1	Steam turbine characteristic break point, pu
x2	Steam turbine characteristic break point, pu
y2	Steam turbine characteristic break point, pu
p0	Pressure reference at noload, pu$
h1	Pressure reference characteristic break point, pu
p1	Pressure reference characteristic break point, pu
h2	Pressure reference characteristic break point, pu
p2	Pressure reference characteristic break point, pu

General Description:

ST

This model is a representation of the controls associated with the heat-recover



Model Name: exst1

Descriptions: IEEE type ST1 excitation system

Prerequisites: Generator model ahead of this model in dynamic models table

Inputs: Compounded generator terminal voltage, generator field current, generator speed

Output Channels:

Record Level	Name	Description
1	if	Generator field current, pu

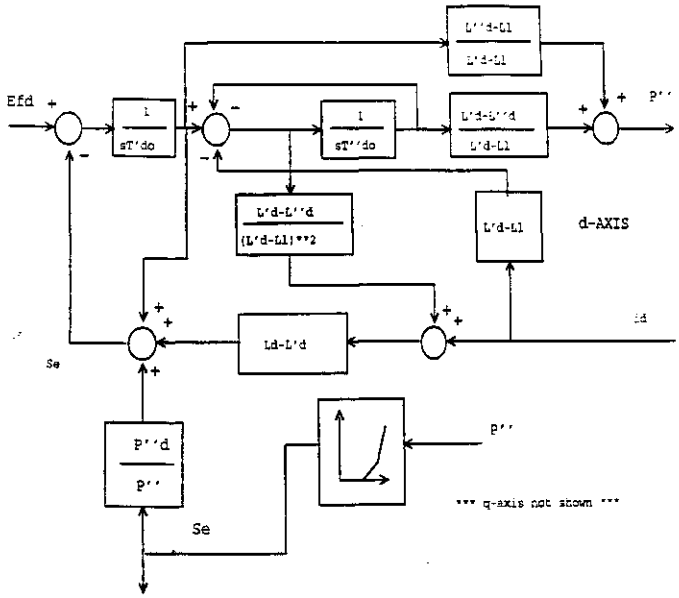
Invocation: exst1 [<n>] [<name> <kv>] <id> :

Parameters:

Name	EPCL Variable	Description
Tr	tr	Filter time constant, sec
Vimax	vimax	Maximum error, pu
Vimin	vimin	Minimum error, pu
Tc	tc	Lead time constant, sec
Tb	tb	Lag time constant, sec
Ka	ka	Gain
Ta	ta	Time constant, sec
Vrmax	vrmax	Maximum controller output
Vrmin	vrmin	Minimum controller output
Kc	kc	Excitation system regulation factor, pu
Kf	kf	Rate feedback gain
Tf	tf	Rate feedback time constant, sec

Notes:

a) This model can be used to represent a controlled-rectifier excitation system whose a.c. power source is a simple power transformer fed from the generator terminals. The voltage regulation of the excitation transformer and rectifier are approximated by the parameter Kc.



d) Sel.0 and Sel.2 are defined in Figure 3.10.2, and must be non- zero.

e) (Ra+jL"d) overwrites the load flow machine characteristic impedance when the INIT, RDYD, or RDWS command is executed.

f) Ra, Rcomp, Xcomp must be either all present or all absent in the data record read by RDYD. If absent, Ra is set to the resistance part of the machine characteristic impedance from the load flow data table and rcomp, xcomp are set to zero.

Model Name: genrou

Description: Solid rotor generator represented by equal mutual inductance rotor modeling

Prerequisites: Generator present in load flow working case

Inputs: Network boundary variables, Field Voltage, and Turbine Power

Output Channels:

Record Level	Name	Description
5	spd	Shaft speed, pu
1	ang	Rotor angle, degrees
1	vt	Terminal voltage, pu
4	pg	Electrical power, MW
6	qg	Reactive power, MVAR
2	efd	Field voltage, pu
3	it	Terminal current, pu

Invocation: genrou [<n>] [<name> <kv>] <id> :

Parameters:

	Name	EPCL Variable	Description
6.485	T'do	tpdo	D-axis transient rotor time constant
.043	T"do	tppdo	D-axis subtransient rotor time constant
.72	T'qo	tpqo	Q-axis transient rotor time constant
.068	T"qo	tppqo	Q-axis subtransient rotor time constant
.75	H	h	Inertia constant, sec
	D	d	Damping factor, pu
2.038	Ld	ld	D-axis synchronous reactance
2.0483	Lq	lq	Q-axis synchronous reactance
.2911	L'd	lpd	D-axis transient reactance
.4627	L'q	lpq	Q-axis transient reactance
.2385	L"d	lppd	D-axis subtransient reactance
.2002	Ll	ll	Stator leakage reactance, pu
.16042	Sel.0	s1	Saturation factor at 1 pu flux
.72015	Sel.2	s12	Saturation factor at 1.2 pu flux
	Ra	ra	Stator resistance, pu
	Rcomp	rcomp	Compounding resistance voltage control, pu
	Xcomp	xcomp	Compounding reactance voltage control, pu

Notes:

a) All rotor time constants must be non-zero.

b) All reactances must be specified. L"q is taken to be equal to L"d.

c) D has the dimensions delta P/delta speed.

EXHIBIT A (CONTINUED)

TABLE 2

TRANSFORMER DATA

UNIT STEAM TURBINE

NUMBER OF TRANSFORMERS 1 PHASE 3 HERTZ 60

RATED KVA	H Winding	X Winding	Y Winding
Connection (Delta, Wye Gnd)	WYE GND	DELTA	
55° C Rise			
65° C Rise	400 MVA		
RATED VOLTAGE	500 KV	23 KV	
BIL	550 KV	150 KV	
AVAILABLE TAPS	4 (±2½%)		
(Mark Tap Settings)			

TYPE COOLING OA ___ OA/FA ___ OA/FA/FA X OA/FOA ___

FOA ___ W ___ OTHER ___ Specify ___

IMPEDANCE	H-X	H-Y	X-Y
Percent	10%		
MVA Base	240		
Tested Taps	4 (±2½%)		

WINDING RESISTANCE	H	X	Y
Ohms	.004 pu		

CURRENT TRANSFORMER RATIOS

H 600 5 MR X 12,000:5 SR Y ___ N ___

PERCENT EXCITING CURRENT 100% Voltage ___ 110% ___

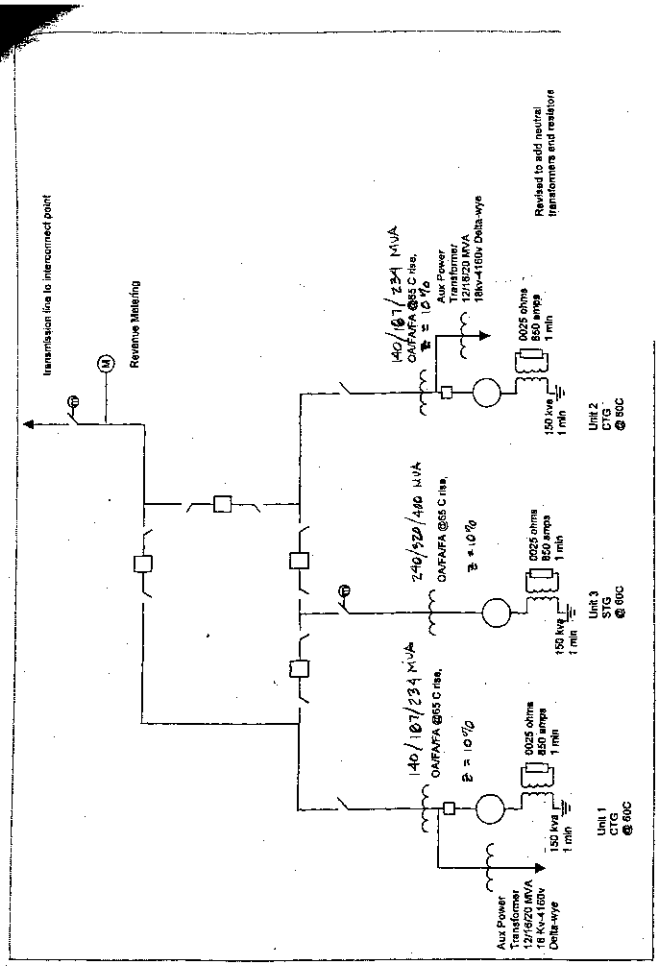
Supply copy of nameplate and manufacturer's test report when received.

EXHIBIT A
TABLE 1

GENERATING STATION - UNIT SIZING AND OPERATING DATES

GENERATING UNIT TYPE 1*: Steam Turbine							GENERATING UNIT TYPE 2*: Gas Turbine							AUXILIARY LOAD	NET OUTPUT	OPERATING DATE
Units or Group of Units	Number of Units	Nominal Rating kV	Nominal Rating MVA	Nominal Rating MW	Operating MW		Units or Group of Units	Number of Units	Nominal Rating kV	Nominal Rating MVA	Nominal Rating MW	Operating MW		MW	MW	
1	1	23	338	339	329*		1	2	18	239	212.5	175		10	169	
TOTAL																

* NOTE : Example of Generating Unit Type : Steam Turbine Units and Gas Turbine Units



CALPINE

WESTERN REGION OFFICE
6700 KOLL CENTER PARKWAY
SUITE 200
PLEASANTON, CALIFORNIA 94566
925.600.2000
925.600.8924 (fax)

September 29, 2000

Mr. Lawren Minor
Program Manager/Contracts
Southern California Edison
2244 Walnut Grove Avenue
Room 460, GO1
Rosemead, CA 91770

Subject: Revised Data for Moreno Valley Interconnection Request

Dear Mr. Minor:

Please find enclosed revised technical data relating to Calpine's proposed interconnection to the Southern California Edison system. As we discussed earlier this week with Mr. Jamal Jafari, the data transmitted to you on August 29, 2000 reflected the use of Siemens Westinghouse combustion turbines. This new data reflects the use of General Electric combustion turbines. The steam turbine remains the same although the output has been reduced slightly to match the use of the General Electrical combustion turbines. I apologize for any inconvenience that this switch may have caused. If you or Jamal require any additional information or have any questions, please contact either Jim McLucas at (925) 600-2313 or myself at (925) 600-2011.

Sincerely,

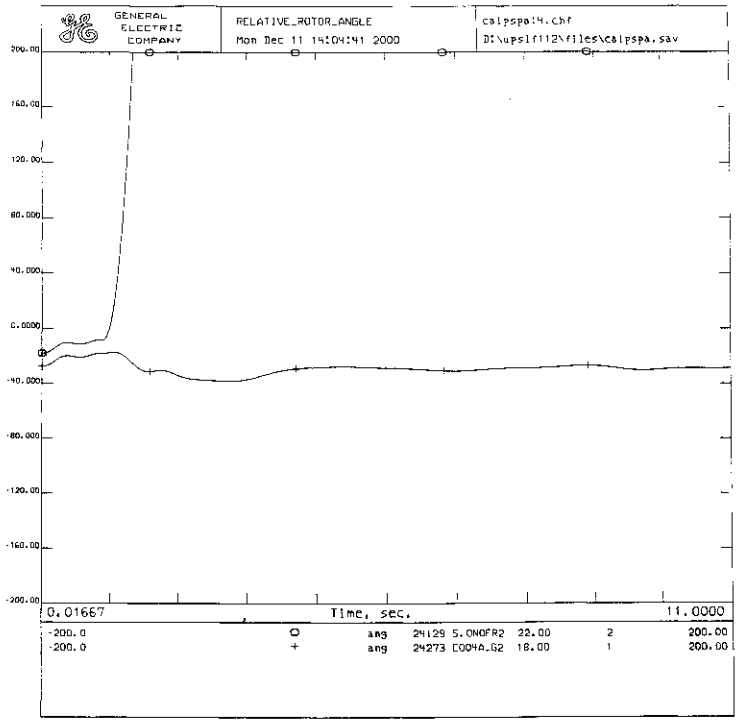
CALPINE CORPORATION

Greg Lamberg
Director, Business Development

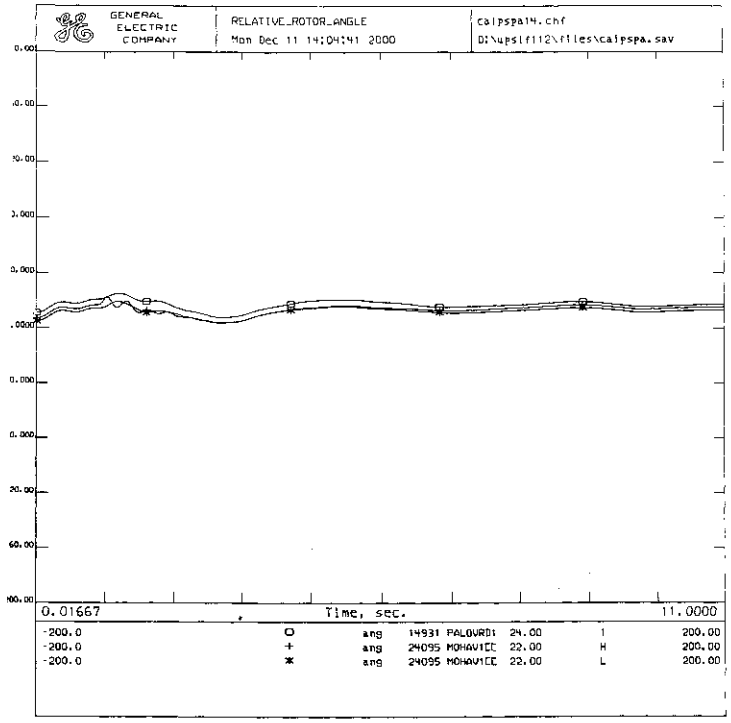
cc: Jim McLucas/Calpine
Alan Roth/Calpine

APPENDIX C

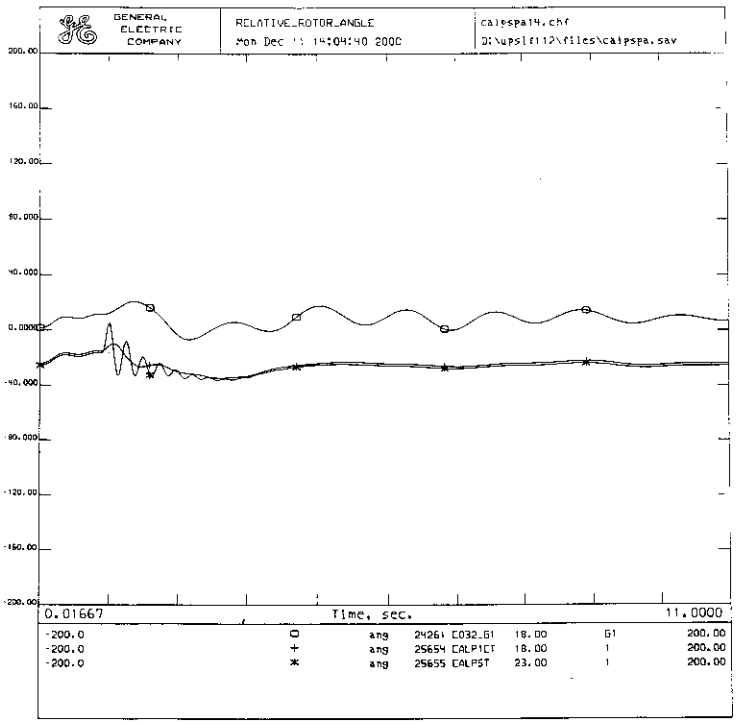
STABILITY MACHINE MODELS & COPIES OF RELEVANT DOCUMENTS PROVIDED BY CUSTOMER



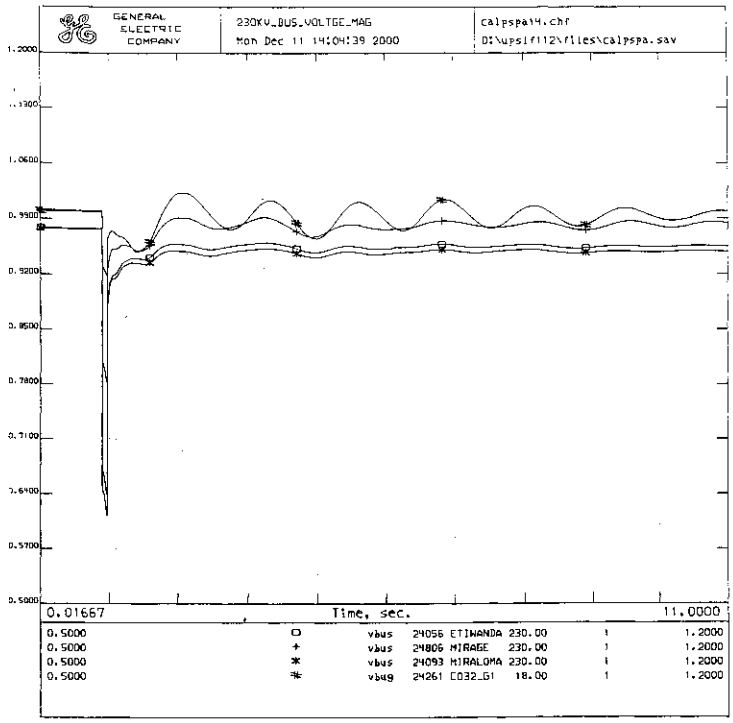
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on SONGS 230 Bus
Contingency-Remove Both SONGS-Units 2&3
SYSTEM STABILITY STUDY CASES - Case 14:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa14.swt



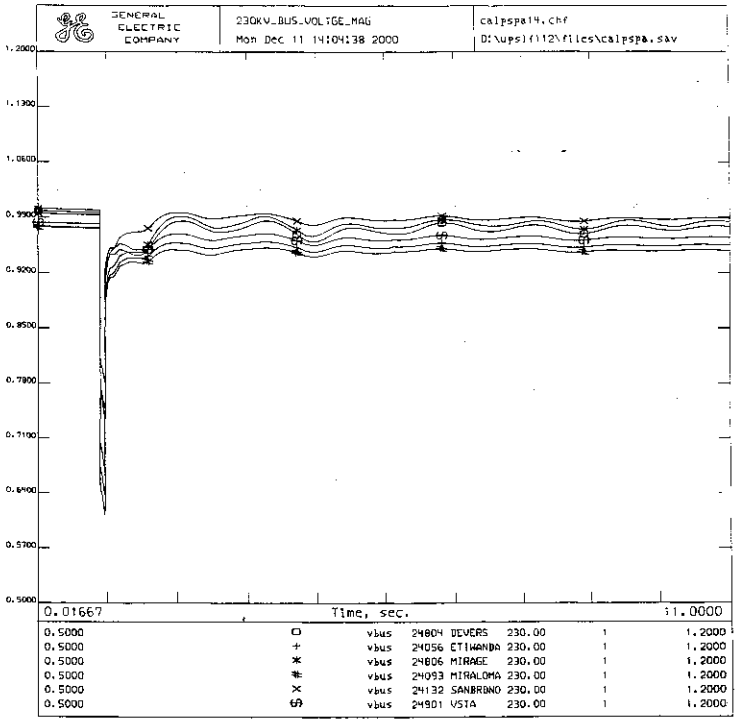
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on SONGS 230 Bus
Contingency-Remove Both SONGS-Units 2&3
SYSTEM STABILITY STUDY CASES - Case 14:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa14.swt



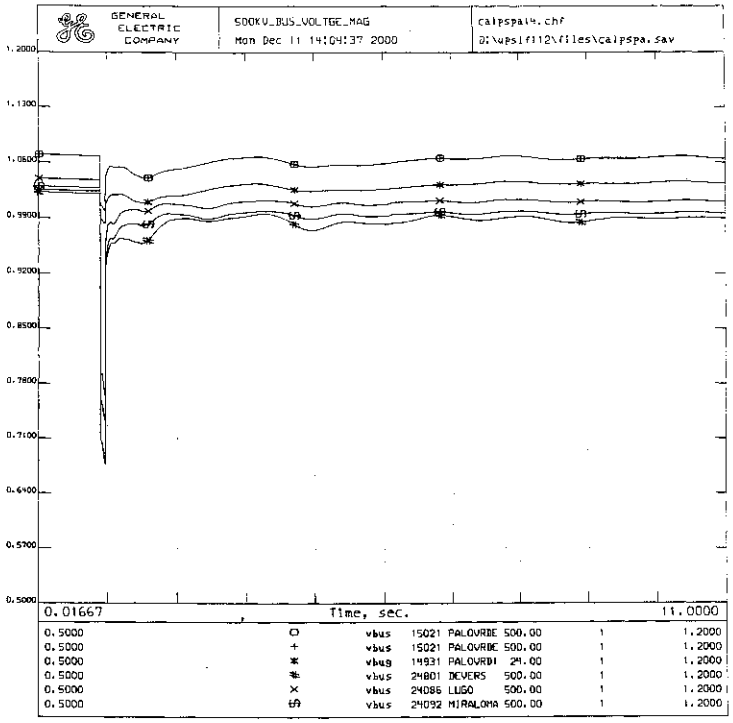
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on SONGS 230 Bus
Contingency-Remove Both SONGS-Units 2&3
SYSTEM STABILITY STUDY CASES - Case 14:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa14.swt



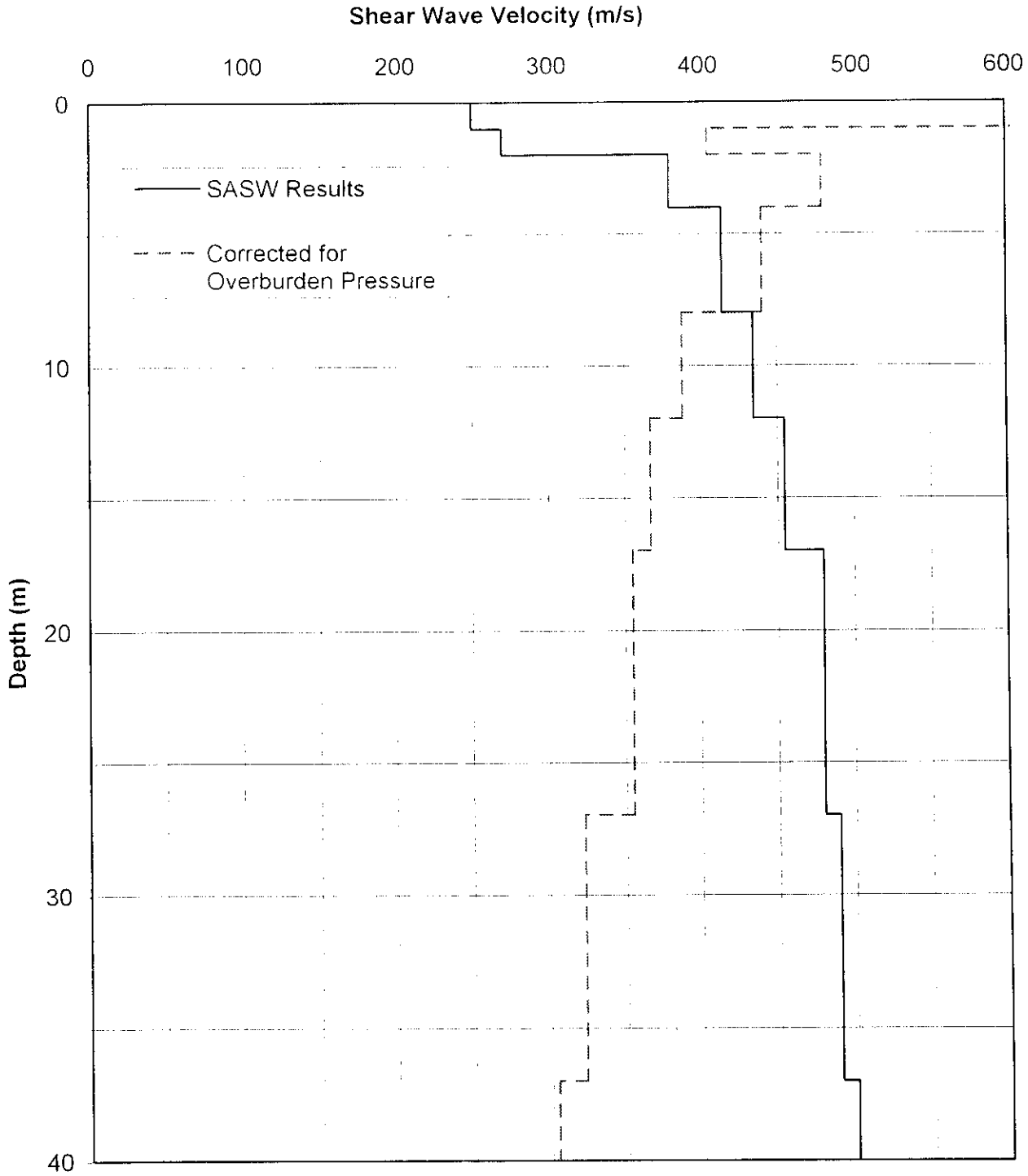
2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on SONGS 230 Bus
Contingency-Remove Both SONGS-Units 2&3
SYSTEM STABILITY STUDY CASES - Case 14:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa14.swt



2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on SONGS 230 Bus
Contingency-Remove Both SONGS-Units 2&3
SYSTEM STABILITY STUDY CASES - Case 14:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa14.swt



2004 LIGHT SPRING
5-CYCLE 3-Phase Fault on SONGS 230 Bus
Contingency-Remove Both SONGS-Units 2&3
SYSTEM STABILITY STUDY CASES - Case 14:With Calpine (679 MW)
calpspa.sav + calpspa.dyd + calpspa14.swt



SITE SHEAR WAVE VELOCITY PROFILE
CALPINE MORENO POWER PLANT

URS	CHECKED BY: MA	DATE: 12-8-00	FIG. NO: 3
	PM: MA	PROJ. NO: 58-00011071.01	

x:\00011071\figures.dwg

APPENDIX A — Borings and Test Pits

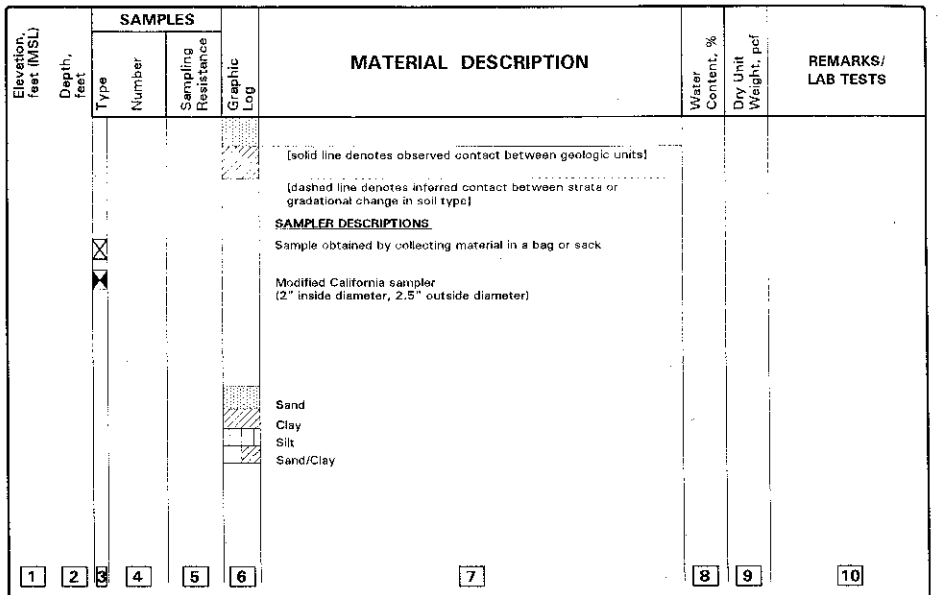
Nine exploratory borings (Borings B-1 through B-9) and nine exploratory test pits (Test Pits TP-1 through TP-9) were advanced and excavated to characterize the subsurface conditions at the project site. The borings were advanced to depths of 20 to 100 feet using a Mobile B-61 drill rig equipped with a mud rotary system. Test pits extended to depths ranging from 5 to 10 feet. The approximate locations of these borings and test pits are shown on the Site Plan (Figure 2).

Relatively undisturbed samples of the subsurface materials were obtained from the boring using a modified California drive sampler (2-inch inside diameter, 2.5-inch outside diameter) with thin stainless steel liners. Bulk samples of the near surface soil were also collected from the test pit excavations. The modified California sampler was generally driven 18 inches into the material at the bottom of the boring using a 140-pound drop hammer falling 30 inches. In many instances, the sampler was driven less due to the high density of the soil. Thin metal liner tubes containing the sample were sealed to preserve the natural moisture content. All samples were returned to our laboratory for further examination and testing. The boreholes were backfilled with soil cuttings.

The test pits were excavated using a Case 580C Backhoe. The test pits were backfilled with the excavated material and wheel-rolled with the backhoe to minimize surface settlement.

The locations and elevations of all borings were approximated by using an Alta survey topographic map provided to us by Calpine Corporation (Figure 2). A key to logs is presented in Figure A-1. Final logs of the borings and test pits are presented on Figures A-2 through A-19. The descriptions on the boring and test pit logs are based on field logs, sample inspections and results of laboratory tests. The results of laboratory tests are shown at the corresponding sample location on the boring logs and in Appendix C.

Project: Calpine Moreno Power Plant Location: Project Number: 58-00011071.01-SI001	Key to Log of Boring Sheet 1 of 1



COLUMN DESCRIPTIONS

1	**Elevation:**	Elevation (in feet) referenced to Mean Sea Level.
2	**Depth:**	Distance (in feet) below the ground surface.
3	**Sample Type:**	Type of soil sample collected at depth interval depicted; symbols explained above.
4	**Sample Number:**	Sample identification number.
5	**Sampling Resistance:**	Number of blows required to advance driven sampler 1 foot, or distance indicated, using a 140-lb hammer with a 30-inch drop. WR indicates sampler penetrated 18 inches under weight of rods.
6	**Graphic Log:**	Graphic depiction of subsurface material encountered.
7	**Material Description:**	Description of subsurface material encountered, including USCS soil designation.
8	**Water Content:**	Water content of soil sample from laboratory testing, expressed as a percent.
9	**Dry Unit Weight:**	Dry unit weight of soil sample from laboratory testing, expressed in pounds per cubic foot (pcf).
10	**Remarks/Lab Tests:**	Comments or observations regarding drilling/sampling made by driller or URS's field personnel. Laboratory test results not presented in columns to left are recorded in abbreviated format in this column using the following abbreviations:

WA(21) = Wash Analysis (percent passing #200 sieve)
SA(21) = Complete Sieve Analysis (percent passing #200 sieve)
MA(21) = Mechanical Analysis (percent passing #200 sieve)
LL(32) = Liquid Limit (%), PI(15) = Plasticity Index (%), NP = Non Plastic
DS = Direct Shear Test, R = R-Value Test
UC(2.25) = Unconfined Compression Strength (ksf)
R = R-value Test, EI = Expansion Test, LC = Laboratory Compaction Test
CORR = Corrosivity Test (pH, soluble sulfates and chlorides)

Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

Figure A-1

Project: Calpine Moreno Power Plant
Project Location:
Project Number: 58-00011071.01-SI001

Log of Boring B-1

Sheet 1 of 2

Date(s) Drilled	10/30/00	Logged By	A. Harker	Checked By	J. Metzinger
Drilling Method	Mud Rotary	Drill Bit Size/Type	3.5" Tricone	Total Depth Drilled (feet)	49.5
Drill Rig Type	Mobile B-61	Drilling Contractor	F&C Drilling	Hammer Weight/ Drop (lbs/in.)	140/30
Groundwater Depth	None encountered at time of drilling	Sampler Type	ModCal	Approx. Surface Elev. (feet, MSL)	1445.5
Location	See Site Plan			Borehole Backfill	Soil cuttings

Elevation, feet (MSL)	Depth, feet	Type	Number	Sampling Resistance	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS/ LAB TESTS
1445	0					RESIDUAL SOIL Very dense, moist, light brown, fine to coarse SAND (SM), porous			
			1-1	50/3"		ALLUVIUM Very dense, moist, brown, silty to clayey fine to coarse SAND (SM/SC), porous	8	126	WA(48), UC(19.3)
1440	5		1-2	50/3"		Very dense to hard, moist, dark brown, clayey fine to coarse SAND to sandy lean CLAY (SC/CL), porous	14	120	WA(62), UC(11.5)
						Very dense, moist, dark brown, silty fine SAND (SM)			
1435	10		1-3	53/6"			15	104	WA(33), UC(1.7)
						Hard, moist, reddish brown, sandy SILT (ML)			
1430	15		1-4	71			25	92	
1425	20		1-5	50/5"			6	110	
						Very dense, moist, grayish brown to reddish brown, silty fine SAND (SM)			
1420	25		1-6	50/4"		Hard, moist, reddish brown to dark brown, sandy SILT with trace lean clay (ML)	20	106	
1415	30		1-7	50/5"		Very dense, moist, yellow brown, well graded, fine to coarse SAND with silt and fine gravel to silty fine to coarse SAND with fine gravel (SW/SM)	10	116	
						Hard, moist, reddish brown, sandy SILT (ML)			
	35		1-8	70			19	108	

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Figure A-2

12/15/00 1GL10P 07101

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Project: Calpine Moreno Power Plant
Project Location:
Project Number: 58-00011071.01-SI001

Log of Boring B-1

Sheet 2 of 2

Elevation, feet (MSL)	Depth, feet	Type	Number	Sampling Resistance	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS/ LAB TESTS
1410	35								
						Very dense, moist, reddish brown, poorly graded fine to coarse SAND with silt and fine gravel (SP-SM), micaceous			
1405	40		1-9	50/6"		Hard, moist, dark reddish brown, sandy SILT (ML)	22	103	
1400	45		1-10	50/4"			17	112	
						Hard to very dense, moist, reddish brown, sandy SILT to silty fine to coarse SAND with fine gravel (ML/SM)			
1395	50		1-11	80/6"		Bottom of boring at 49.5 feet	14	118	
1390	55								
1385	60								
1380	65								
1375	70								
1370	75								

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Figure A-2 (cont'd)

12/15/00 1GL10P 07101

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Project: Calpine Moreno Power Plant
Project Location:
Project Number: 58-00011071.01-SI001

Log of Boring B-2

Sheet 1 of 1

Date(s) Drilled	10/30/00	Logged By	A. Harker	Checked By	J. Metzinger
Drilling Method	Mud Rotary	Drill Bit Size/Type	3.5" Tricone	Total Depth Drilled (feet)	20.3
Drill Rig Type	Mobile B-61	Drilling Contractor	F&C Drilling	Hammer Weight/ Drop (lbs/in.)	140/30
Groundwater Depth	None encountered at time of drilling	Sampler Type	ModCal	Approx. Surface Elev. (feet, MSL)	1447.0
Location	See Site Plan			Borehole Backfill	Soil cuttings

Elevation, feet (MSL)	Depth, feet	SAMPLES Type	Number	Sampling Resistance	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS/ LAB TESTS
	0					RESIDUAL SOIL Dense to very dense, moist, light brown, silty fine to coarse SAND (SM), porous			
1445			2-1	50/2.5"			11	109	WA(53), UC(13.8)
						ALLUVIUM Hard, moist, dark brown, sandy lean CLAY (CL) with carbonate			
	5		2-2	64/6"		Very dense, moist, reddish brown, clayey to silty fine to medium SAND (SC/SM), porous Becoming dark brown	14	112	WA(13), UC(22.2)
1440						Hard, moist, reddish brown, sandy SILT to silty fine SAND (ML/SM)			
	10		2-3	50/6"			18	107	WA(48), UC(10.2)
1435						Hard, moist, reddish brown, sandy SILT (ML)			
	15		2-4	66		Very dense, moist, reddish brown, silty fine to coarse SAND (SM)	10	108	
1430						Hard, moist, reddish brown, sandy lean CLAY to sandy SILT (CL/ML) with manganese staining			
	20		2-5	50/4"			34	77	
						Bottom of boring at 20.3 feet			
1425									
	25								
1420									
	30								
1415									
	35								

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Figure A-3

12/15/00 1GL10P 07101

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Project: Calpine Moreno Power Plant
Project Location:
Project Number: 58-00011071.01-SI001

Log of Boring B-3

Sheet 1 of 2

Date(s) Drilled	10/30/00	Logged By	A. Harker	Checked By	J. Metzinger
Drilling Method	Mud Rotary	Drill Bit Size/Type	3.5" Tricone	Total Depth Drilled (feet)	49.8
Drill Rig Type	Mobile B-61	Drilling Contractor	F&C Drilling	Hammer Weight/ Drop (lbs/in.)	140/30
Groundwater Depth	None encountered at time of drilling	Sampler Type	ModCal	Approx. Surface Elev. (feet, MSL)	1448.0
Location	See Site Plan			Borehole Backfill	Soil cuttings

Elevation, feet (MSL)	Depth, feet	SAMPLES Type	Number	Sampling Resistance	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS/ LAB TESTS
	0					RESIDUAL SOIL Very dense, moist, light brown, silty fine to coarse SAND (SM), porous			
1445			3-1	50/4"		ALLUVIUM Very dense to hard, moist, reddish brown to brown, clayey fine to coarse SAND to sandy lean CLAY (SC/CL) with fine gravel, porous	13	116	WA(53), UC(11.4)
	5		3-2	71			11	125	WA(43), UC(8.1)
						Hard, moist, brown, sandy lean CLAY (CL)			
1440						Very dense, moist, brown, silty to clayey fine to coarse SAND with fine to coarse gravel (SM/SC)			
	10		3-3	57/6"		Hard, moist, brown, sandy lean CLAY (CL)	18	110	WA(66), UC(10.9)
1435									
	15		3-4	50/4"		Very dense, moist, brown, clayey fine to coarse SAND with fine gravel (SC)	9	130	
1430						Hard, moist, reddish brown, sandy SILT (ML)			
	20		3-5	80			27	95	
1425									
	25		3-6	50/5"			17	112	
1420									
	30		3-7	50/5"			20	107	
1415						Very dense, moist, yellowish brown, silty fine to coarse SAND with trace fine gravel and clay (SM)			
	35		3-8	50/4"			7	115	

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Figure A-4

12/15/00 1GL10P 07101

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Project: Calpine Moreno Power Plant
Project Location:
Project Number: 58-00011071.01-SI001

Log of Boring B-3

Sheet 2 of 2

Elevation, feet (MSL)	Depth, feet	SAMPLES Type	Number	Sampling Resistance	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS/ LAB TESTS
	35								
						Hard, moist, brown, sandy SILT (ML)			
1410									
	40		3-9	50/4.5"			29	96	
1405									
	45		3-10	50/3"			16	116	
1400									
	50		3-11	50/3.5"			19	112	
						Bottom of boring at 49.75 feet			
1395									
	55								
1390									
	60								
1385									
	65								
1380									
	70								
1375									
	75								

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Figure A-4 (cont'd)

12/15/00 1GL10P 07101

Printed: 12/15/00

Project: Calpine Moreno Power Plant
Project Location:
Project Number: 58-00011071.01-SI001

Log of Boring B-4

Sheet 1 of 3

Date(s) Drilled	10/31/00	Logged By	A. Harker	Checked By	J. Metzinger
Drilling Method	Mud Rotary	Drill Bit Size/Type	3.5" Tricone	Total Depth Drilled (feet)	100.0
Drill Rig Type	Mobile B-61	Drilling Contractor	F&C Drilling	Hammer Weight/ Drop (lbs/in.)	140/30
Groundwater Depth	78.5' 24 hours after drilling	Sampler Type	ModCal	Approx. Surface Elev. (feet, MSL)	1444.0
Location	See Site Plan			Borehole Backfill	Soil cuttings

Elevation, feet (MSL)	Depth, feet	SAMPLES Type	Number	Sampling Resistance	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS/ LAB TESTS
	0					RESIDUAL SOIL Dense to very dense, moist, light brown, silty fine to coarse SAND (SM), porous			
			4-1	57		ALLUVIUM Very dense, moist, dark brown to brown, clayey medium to fine SAND (SC), porous	10	116	MA(45), UC(10.2), LL(32), PI(14)
1440									
	5		4-2	50/6"		Hard, moist, brown, sandy lean CLAY (CL)	9	124	MA(54), UC(12.1), LL(32), PI(15)
1435									
	10		4-3	50/4"			19	109	MA(52), UC(14.5), LL(36), PI(15)
1430									
	15		4-4	39		Hard, moist, reddish brown, sandy lean CLAY (CL)	24	101	MA(77), UC(6.8), LL(43), PI(21)
						Very dense, moist, brown, medium to fine silty SAND (SM)			
1425									
	20		4-5	61			11	113	MA(27), UC(1.4), LL(22), PI(NP)
						Very dense, moist, brown, well-graded fine to coarse SAND with silt to silty SAND with fine to coarse gravel (SW/SM)			
1420									
	25		4-6	92			12	105	
						Very dense, moist, reddish brown, silty fine to medium SAND to sandy SILT (SM/ML)			
1415									
	30		4-7	50/5"			10	124	
						Very dense, moist, brown, silty fine to coarse SAND with fine gravel (SM)			
1410									
	35		4-8	53/6"			11	118	

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Figure A-5

12/15/00 1GL10P 07101

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Project: Calpine Moreno Power Plant
Project Location:
Project Number: 58-00011071.01-SI001

Log of Boring B-4

Sheet 2 of 3

Elevation, feet (MSL)	Depth, feet	SAMPLES Type	Number	Sampling Resistance	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS/ LAB TESTS
	35								
1405	40		4-9	50/5"		Hard, moist, yellowish brown, sandy SILT to silty SAND (ML/SM)	9	108	
1400	45		4-10	50/5"		Very dense, moist, grayish brown, silty fine SAND grading to yellowish brown, silty fine to coarse SAND with fine gravel (SM)	18	104	
1395	50		4-11	76		Hard, moist, reddish brown to dark brown, fine sandy SILT (ML)	10	120	
1390	55		4-12	56/6"			16	112	
1385	60		4-13	50/3.5"		Very dense, moist, brown, silty fine to coarse SAND (SM)	12	123	
						Hard, moist, reddish brown, sandy SILT (ML)			
1380	65		4-14	50/4"			13	118	
1375	70		4-15	66/6"			13	112	
1370	75		4-16	50/3.5"			22	107	

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Figure A-5 (cont'd)

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Project: Calpine Moreno Power Plant
Project Location:
Project Number: 58-00011071.01-SI001

Log of Boring B-4

Sheet 3 of 3

Elevation, feet (MSL)	Depth, feet	SAMPLES Type	Number	Sampling Resistance	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS/ LAB TESTS
1365	80		4-17	50/4"			22	108	
1360	85					Very dense, moist, reddish brown, silty to clayey fine to coarse SAND with fine gravel (SM/SC)			
1355	90		4-18	96/6"			17	110	
1350	95								
1345	100		4-19	67/6"		Becomes fine sand	23		
						Bottom of boring at 100 feet			
1340	105								
1335	110								
1330	115								

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Figure A-5 (cont'd)

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Project: Calpine Moreno Power Plant Project Location: Project Number: 58-00011071.01-SI001	Log of Boring B-5 Sheet 1 of 1

Date(s) Drilled	11/1/00	Logged By	A. Harker	Checked By	J. Metzinger
Drilling Method	Mud Rotary	Drill Bit Size/Type	3.5" Tricone	Total Depth Drilled (feet)	19.8
Drill Rig Type	Mobile B-61	Drilling Contractor	F&C Drilling	Hammer Weight/ Drop (lbs/in.)	140/30
Groundwater Depth	None encountered at time of drilling	Sampler Type	ModCal	Approx. Surface Elev. (feet, MSL)	1445.0
Location	See Site Plan			Borehole Backfill	Soil cuttings

Elevation, feet (MSL)	Depth, feet	SAMPLES Type	Number	Sampling Resistance	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS/ LAB TESTS
1445	0					RESIDUAL SOIL Dense to very dense, moist, light brown, silty fine to coarse SAND (SM), porous			
			5-1	50/5"		ALLUVIUM Hard, moist, dark brown, fine to coarse sandy lean CLAY (CL)	11	121	WA(63), UC(13.5)
1440	5		5-2	122/6"		Very dense to hard, moist, brown to reddish brown, clayey fine to coarse SAND to sandy lean CLAY (SC/CL) (moderately cemented)	15		WA(30)
1435	10		5-3	68/6"			10	129	WA(40), UC(8.7)
						Hard, moist, reddish brown, sandy SILT (ML)			
1430	15		5-4	74			15	100	
1425	20		5-5	50/4.5"			17	113	
						Bottom of boring at 19.75 feet			
1420	25								
1415	30								
1410	35								

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Figure A-6

12/15/00 1GL10P 07101

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Project: Calpine Moreno Power Plant Project Location: Project Number: 58-00011071.01-SI001	Log of Boring B-6 Sheet 1 of 1

Date(s) Drilled	11/1/00	Logged By	A. Harker	Checked By	J. Metzinger
Drilling Method	Mud Rotary	Drill Bit Size/Type	3.5" Tricone	Total Depth Drilled (feet)	20.3
Drill Rig Type	Mobile B-61	Drilling Contractor	F&C Drilling	Hammer Weight/ Drop (lbs/in.)	140/30
Groundwater Depth	None encountered at time of drilling	Sampler Type	ModCal	Approx. Surface Elev. (feet, MSL)	1442.0
Location	See Site Plan			Borehole Backfill	Soil cuttings

Elevation, feet (MSL)	Depth, feet	SAMPLES Type	Number	Sampling Resistance	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS/ LAB TESTS
	0					RESIDUAL SOIL Dense to very dense, moist, light brown, silty fine to coarse SAND (SM), porous			
1440			6-1	50/5"		ALLUVIUM Very dense, moist, brown, clayey SAND to sandy lean CLAY (SC/CL), porous	11	129	WA(41), UC(16)
	5		6-2	52/6"		With some fine to coarse gravel	10	130	WA(51), UC(11.5)
1435	10		6-3	43			8	132	WA(29), UC(9.9)
						Dense, moist, brown, clayey fine to coarse SAND (SC)			
1430	15		6-4	51			12	121	
1425	20		6-5	50/4.5"		Hard, moist, brown to reddish brown, sandy SILT (ML)	23	101	
						Bottom of boring at 20.25 feet			
1420	25								
1415	30								
1410	35								

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Figure A-7

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Project: Calpine Moreno Power Plant Project Location: Project Number: 58-00011071.01-SI001	Log of Boring B-7 Sheet 1 of 1

Date(s) Drilled	11/1/00	Logged By	A. Harker	Checked By	J. Metzinger
Drilling Method	Mud Rotary	Drill Bit Size/Type	3.5" Tricone	Total Depth Drilled (feet)	20.5
Drill Rig Type	Mobile B-61	Drilling Contractor	F&C Drilling	Hammer Weight/ Drop (lbs/in.)	140/30
Groundwater Depth	None encountered at time of drilling	Sampler Type	ModCal	Approx. Surface Elev. (feet, MSL)	1441.0
Location	See Site Plan			Borehole Backfill	Soil cuttings

Elevation, feet (MSL)	Depth, feet	SAMPLES Type	Number	Sampling Resistance	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS/ LAB TESTS
1440	0					RESIDUAL SOIL Dense to very dense, moist, fine to coarse SAND (SM), porous			
			7-1	51/6"		ALLUVIUM Very dense, moist, dark brown to reddish brown, clayey fine to coarse SAND (SC), porous	10	119	WA(37), UC(6.0)
1435	5		7-2	50/4"			10	131	WA(37), UC(11.7)
			7-3	64		Grades to brown, sandy lean CLAY (CL)	15	120	WA(63), UC(13.8)
1430	10					Hard, moist, brown, sandy SILT (ML) with pale gray silt veins			
			7-4	39			14	106	
1425	15					Dense, moist, yellowish brown, silty fine SAND (SM)			
			7-5	78			3	115	
1420	20					Becomes gray, poorly graded fine to coarse SAND with silt (SP-SM) Bottom of boring at 20.5 feet			
1415	25								
1410	30								
	35								

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Figure A-8

12/15/00 1GL10P 07101

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Project: Calpine Moreno Power Plant Project Location: Project Number: 58-00011071.01-SI001	Log of Boring B-8 Sheet 1 of 1

Date(s) Drilled	11/1/00	Logged By	A. Harker	Checked By	J. Metzinger
Drilling Method	Mud Rotary	Drill Bit Size/Type	3.5" Tricone	Total Depth Drilled (feet)	19.5
Drill Rig Type	Mobile B-61	Drilling Contractor	F&C Drilling	Hammer Weight/ Drop (lbs/in.)	140/30
Groundwater Depth	None encountered at time of drilling	Sampler Type	ModCal	Approx. Surface Elev. (feet, MSL)	1440.0
Location	See Site Plan			Borehole Backfill	Soil cuttings

Elevation, feet (MSL)	Depth, feet	SAMPLES Type	Number	Sampling Resistance	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS/ LAB TESTS
1440	0					RESIDUAL SOIL Dense to very dense, moist, light brown, silty fine to coarse SAND (SM), porous			
			8-1	50/1.5"		ALLUVIUM Hard to very dense, moist, reddish brown to dark brown, sandy lean CLAY (CL) to clayey SAND (SC) with carbonate, porous	16	112	WA(47), UC(11.8)
1435	5		8-2	52/6"		Very dense, moist, brown, clayey fine to coarse SAND (SM) with fine gravel, porous Very dense, moist, reddish brown, silty to clayey fine SAND with trace fine to coarse gravel (SM/SC)	10	125	WA(40), UC(7.0)
			8-3	86		Hard, moist, reddish brown, sandy lean CLAY to sandy SILT (CL/ML)	22	95	WA(66), UC(6.9)
1430	10					Becomes light brown			
			8-4	50/2.5"		Very dense to hard, moist, brown, silty fine SAND to sandy SILT (SM/ML)	14	115	
1425	15					Very dense, moist, brown, poorly graded SAND with silt to silty fine to coarse SAND (SP/SM) with fine gravel			
			8-5	88/6"			12	114	
1420	20					Bottom of boring at 20.5 feet			
1415	25								
1410	30								
1405	35								

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Figure A-9

12/15/00 1GL10P 07101

Printed: 12/15/00

Project: Calpine Moreno Power Plant **Project Location:** **Project Number:** 58-00011071.01-SI001	**Log of Boring B-9** Sheet 1 of 1

Date(s) Drilled	11/1/00	Logged By	A. Harker	Checked By	J. Metzinger
Drilling Method	Mud Rotary	Drill Bit Size/Type	3.5" Tricone	Total Depth Drilled (feet)	20.3
Drill Rig Type	Mobile B-61	Drilling Contractor	F&C Drilling	Hammer Weight/ Drop (lbs/in.)	140/30
Groundwater Depth	None encountered at time of drilling	Sampler Type	ModCal	Approx. Surface Elev. (feet, MSL)	1443.0
Location	See Site Plan			Borehole Backfill	Soil cuttings

Elevation, feet (MSL)	Depth, feet	SAMPLES Type	Number	Sampling Resistance	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	REMARKS/ LAB TESTS
	0					RESIDUAL SOIL Dense to very dense, moist, light brown, silty fine to coarse SAND (SM)			
1440			9-1	50/5"		ALLUVIUM Very dense, moist, reddish brown, clayey fine to coarse SAND with fine gravel (SC)	4	121	WA(23), UC(4.0)
	5		9-2	87/6"		Very dense, moist, brown, clayey fine to coarse SAND (SC)	10	126	WA(37), UC(12.1)
1435									
	10		9-3	75/6"			11	122	WA(42), UC(7.0)
1430						Hard, moist, reddish brown, fine sandy SILT (ML)			
	15		9-4	73/6"			17	106	
1425									
	20		9-5	50/4"			10	107	
						Bottom of boring at 20.25 feet			
1420	25								
1415	30								
1410	35								

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Figure A-10

12/15/00 1GLTOP 07101

Printed: 12/15/00

DATE OF EXCAVATION	10/25/00	STATION	NA	OFFSET	NA
APPROXIMATE SURFACE ELEVATION (feet, MSL)	1444.5	APPROXIMATE DEPTH (feet)	5.0	APPROXIMATE LENGTH (feet)	10
GENERAL LOCATION	See Site Plan			APPROXIMATE WIDTH (feet)	5
EXCAVATION CONTRACTOR	Benzies Backhoe Rental	EXCAVATION EQUIPMENT	Case 580C		
TYPE OF EXCAVATION	Test Pit	LOGGED BY	A. Harker		

DEPTH, ft	SAMPLES	GRAPHIC LOG	DESCRIPTION	MOISTURE CONTENT, %	DRY DENSITY, pcf	OTHER TESTS
			RESIDUAL SOIL Dense, dry to moist, light brown, silty fine SAND with rootlets (SM), porous			
1	1-1			6	112	*C-1: Sample composited with samples TP-2-1 and TP-3-2 MA(37), LL(24), PI(8), LC, CORR, DS, R(44), EI(0)
2			ALLUVIUM Hard, moist, dark brown, sandy lean CLAY to clayey fine to medium SAND (CL/SC) with roots and trace gravel, porous			
3						
4			Very dense, moist, brown, clayey fine to coarse SAND with fine gravel (SC)			
5	1-2			9	122	
			Bottom of excavation at 5 feet			
6						
7						
8						
9						
10						
11						
12						
13						
14						

Project: Calpine Moreno Power Plant **Project Number:** 58-00011071.01-SI001	**LOG OF TEST PIT TP-1**	Figure A-11 1 of 1

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DATE OF EXCAVATION	10/25/00	STATION	NA	OFFSET	AN
APPROXIMATE SURFACE ELEVATION (feet, MSL)	1446.5	APPROXIMATE DEPTH (feet)	5.0	APPROXIMATE LENGTH (feet)	10
GENERAL LOCATION	See Site Plan			APPROXIMATE WIDTH (feet)	5
EXCAVATION CONTRACTOR	Benzies Backhoe Rental	EXCAVATION EQUIPMENT	Case 580C		
TYPE OF EXCAVATION	Test Pit	LOGGED BY	A. Harker		

DEPTH, ft	SAMPLES	GRAPHIC LOG	DESCRIPTION	MOISTURE CONTENT, %	DRY DENSITY, pcf	OTHER TESTS
			RESIDUAL SOIL Dense, dry to moist, light brown, silty to clayey fine to coarse SAND (SC/SM) with roots, porous			
1	2-1			3	105	*C-1: Sample composited with samples TP-1-1 and TP-3-2 MA(37), LL(24), PI(8), LC, CORR, DS, R(44), EI(0)
2						
			ALLUVIUM Very dense to hard, moist, dark brown to reddish brown, clayey fine to coarse SAND with fine gravel to sandy lean CLAY (SC/CL) with roots, porous			
3						
4	2-2			8		
5				12	120	
6			Bottom of excavation at 5 feet			
7						
8						
9						
10						
11						
12						
13						
14						

Project: Calpine Moreno Power Plant
Project Number: 58-00011071.01-SI001

LOG OF TEST PIT TP-2

Figure A-12
1 of 1

12/15/00 2GPIT 07101

URS

DATE OF EXCAVATION	10/25/00	STATION	NA	OFFSET	NA
APPROXIMATE SURFACE ELEVATION (feet, MSL)	1445.5	APPROXIMATE DEPTH (feet)	5.0	APPROXIMATE LENGTH (feet)	10
GENERAL LOCATION	See Site Plan			APPROXIMATE WIDTH (feet)	5
EXCAVATION CONTRACTOR	Benzies Backhoe Rental	EXCAVATION EQUIPMENT	Case 580C		
TYPE OF EXCAVATION	Test Pit	LOGGED BY	A. Harker		

DEPTH, ft	SAMPLES	GRAPHIC LOG	DESCRIPTION	MOISTURE CONTENT, %	DRY DENSITY, pcf	OTHER TESTS
			RESIDUAL SOIL Dense, dry to moist, light brown, silty fine to coarse SAND with rootlets (SM), porous			
1	3-1		ALLUVIUM Dense to hard, moist, brown, clayey medium to fine SAND to sandy lean CLAY (SC/CL), porous	3	102	*C-1: Sample composited with samples TP-1-1 and TP-2-1 MA(37), LL(24), PI(8), LC, CORR, DS, R(44), EI(0)
2						
3	3-2		With carbonate veins	6		
4						
5				7	117	
6			Bottom of excavation at 5 feet			
7						
8						
9						
10						
11						
12						
13						
14						

Project: Calpine Moreno Power Plant
Project Number: 58-00011071.01-SI001

LOG OF TEST PIT TP-3

Figure A-13
1 of 1

12/15/00 2GPIT 07101

URS

DATE OF EXCAVATION	10/25/00	STATION	NA	OFFSET	NA
APPROXIMATE SURFACE ELEVATION (feet, MSL)	1444.5	APPROXIMATE DEPTH (feet)	5.0	APPROXIMATE LENGTH (feet)	10
GENERAL LOCATION	See Site Plan			APPROXIMATE WIDTH (feet)	5
EXCAVATION CONTRACTOR	Benzies Backhoe Rental	EXCAVATION EQUIPMENT	Case 580C		
TYPE OF EXCAVATION	Test Pit	LOGGED BY	A. Harker		

DEPTH, ft	SAMPLES	GRAPHIC LOG	DESCRIPTION	MOISTURE CONTENT, %	DRY DENSITY, pcf	OTHER TESTS
			RESIDUAL SOIL Dense, dry to moist, light brown, silty fine to coarse SAND (SM) with roots, porous			
1						
2	4-1		ALLUVIUM Hard to very dense, moist, dark brown, sandy lean CLAY to clayey fine SAND with carbonate (CL/SC), porous	6 9	118	*C-2: Sample composited with sample TP-5-2 MA(48), LL(25), PI(10), LC, CORR, DS, R(28), EI(20)
3			Becomes brown to reddish brown with manganese staining			
4	4-2			9		
5				11	115	
			Bottom of excavation at 5 feet			
6						
7						
8						
9						
10						
11						
12						
13						
14						

Project: Calpine Moreno Power Plant
Project Number: 58-00011071.01-SI001

LOG OF TEST PIT TP-4

Figure A-14
1 of 1

12/15/00 2GPIT 07101

URS

DATE OF EXCAVATION	10/25/00	STATION	NA	OFFSET	NA
APPROXIMATE SURFACE ELEVATION (feet, MSL)	1444.0	APPROXIMATE DEPTH (feet)	20.0	APPROXIMATE LENGTH (feet)	10
GENERAL LOCATION				APPROXIMATE WIDTH (feet)	5
EXCAVATION CONTRACTOR	Benzies Backhoe Rental	EXCAVATION EQUIPMENT	Case 580C		
TYPE OF EXCAVATION	Test Pit	LOGGED BY	A. Harker		

DEPTH, ft	SAMPLES	GRAPHIC LOG	DESCRIPTION	MOISTURE CONTENT, %	DRY DENSITY, pcf	OTHER TESTS
			RESIDUAL SOIL Dense, dry to moist, light brown, silty fine to coarse SAND (SM) with roots, porous			
1	5-1					
2	5-2		ALLUVIUM Hard to very dense, moist, dark brown, sandy lean CLAY to clayey fine to coarse SAND (CL/SC), porous	6 11	109	*C-2: Sample composited with sample TP-4-2 MA(48), LL(25), PI(10), LC, CORR, DS, R(28), EI(20)
3			With carbonate veins stained by iron oxide			
4						
5	5-3		Hard, moist, dark brown, sandy lean CLAY to lean CLAY (CL)	11 13	117	
6						
7			Very dense, very moist, dark brown, clayey fine to coarse SAND with fine gravel and abundant biotite (SC)			
8	5-4			7		
9	5-5			15		
10			Hard, moist, brown to dark brown, sandy lean CLAY (CL)			
			Bottom of excavation at 10 feet			
11						
12						
13						
14						

Project: Calpine Moreno Power Plant
Project Number: 58-00011071.01-SI001

LOG OF TEST PIT TP-5

Figure A-15
1 of 1

12/15/00 2GPIT 07101

URS

DATE OF EXCAVATION	10/25/00	STATION	NA	OFFSET	NA
APPROXIMATE SURFACE ELEVATION (feet, MSL)	1443.0	APPROXIMATE DEPTH (feet)	5.0	APPROXIMATE LENGTH (feet)	10
GENERAL LOCATION	See Site Plan			APPROXIMATE WIDTH (feet)	5
EXCAVATION CONTRACTOR	Benzies Backhoe Rental	EXCAVATION EQUIPMENT	Case 580C		
TYPE OF EXCAVATION	Test Pit	LOGGED BY	A. Harker		

DEPTH, ft	SAMPLES	GRAPHIC LOG	DESCRIPTION	MOISTURE CONTENT, %	DRY DENSITY, pcf	OTHER TESTS
			RESIDUAL SOIL Dense, dry to moist, light brown, silty fine to coarse SAND (SM) with roots, porous			
1				5	112	
2	6-1		ALLUVIUM Very dense, moist, dark brown, clayey fine to coarse SAND (SC), porous with minor carbonate	4		
3						
4						
				9	113	
5			Bottom of excavation at 5 feet			
6						
7						
8						
9						
10						
11						
12						
13						
14						

Project: Calpine Moreno Power Plant
Project Number: 58-00011071.01-SI001

LOG OF TEST PIT TP-6

Figure A-16
1 of 1

12/15/00 2GPIT 07101

URS

DATE OF EXCAVATION	10/25/00	STATION	NA	OFFSET	NA
APPROXIMATE SURFACE ELEVATION (feet, MSL)	1442.5	APPROXIMATE DEPTH (feet)	5.0	APPROXIMATE LENGTH (feet)	10
GENERAL LOCATION	See Site Plan			APPROXIMATE WIDTH (feet)	5
EXCAVATION CONTRACTOR	Benzies Backhoe Rental	EXCAVATION EQUIPMENT	Case 580C		
TYPE OF EXCAVATION	Test Pit	LOGGED BY	A. Harker		

DEPTH, ft	SAMPLES	GRAPHIC LOG	DESCRIPTION	MOISTURE CONTENT, %	DRY DENSITY, pcf	OTHER TESTS
			RESIDUAL SOIL Dense, dry to moist, light brown, silty to clayey fine to coarse SAND (SM/SC), porous			
1	7-1			2	108	
2				2		*C-3: Sample composited with samples TP-8-2 and TP-9-2 SA(44), LL(25), PI(8), LC, CORR, DS, R(62), EI(0)
3						
			ALLUVIUM Hard, moist, dark brown, sandy lean CLAY to clayey SAND (CL/SC)			
4	7-2			8		
				13	111	
5			Bottom of excavation at 5 feet			
6						
7						
8						
9						
10						
11						
12						
13						
14						

Project: Calpine Moreno Power Plant
Project Number: 58-00011071.01-SI001

LOG OF TEST PIT TP-7

Figure A-17
1 of 1

12/15/00 2GPIT 07101

URS

DATE OF EXCAVATION	10/25/00	STATION	NA	OFFSET	AN
APPROXIMATE SURFACE ELEVATION (feet, MSL)	1442.0	APPROXIMATE DEPTH (feet)	5.0	APPROXIMATE LENGTH (feet)	10
GENERAL LOCATION	See Site Plan			APPROXIMATE WIDTH (feet)	5
EXCAVATION CONTRACTOR	Benzies Backhoe Rental	EXCAVATION EQUIPMENT	Case 580C		
TYPE OF EXCAVATION	Test Pit	LOGGED BY	A. Harker		

DEPTH, ft	SAMPLES	GRAPHIC LOG	DESCRIPTION	MOISTURE CONTENT, %	DRY DENSITY, pcf	OTHER TESTS
	8-1		RESIDUAL SOIL Dense, dry to moist, light brown, clayey fine to coarse SAND to sandy lean CLAY (SC/CL), porous			
1			ALLUVIUM Hard, moist, dark brown, sandy lean CLAY to clayey SAND (CL/SC), porous	7	113	
2				3		
3						*C-3: Sample composited with samples TP-7-2 and TP-9-2 SA(44), LL(25), PI(8), LC, CORR, DS, R(62), EI(0)
4	8-2			11		
5				9	123	
6			Bottom of excavation 5 feet			
7						
8						
9						
10						
11						
12						
13						
14						

Project: Calpine Moreno Power Plant
Project Number: 58-00011071.01-SI001

LOG OF TEST PIT TP-8

Figure A-18
1 of 1

12/16/00 2GPIT 07101

URS

DATE OF EXCAVATION	10/25/00	STATION	NA	OFFSET	AN
APPROXIMATE SURFACE ELEVATION (feet, MSL)	1441.0	APPROXIMATE DEPTH (feet)	5.0	APPROXIMATE LENGTH (feet)	10
GENERAL LOCATION	See Site Plan			APPROXIMATE WIDTH (feet)	5
EXCAVATION CONTRACTOR	Benzies Backhoe Rental	EXCAVATION EQUIPMENT	Case 580C		
TYPE OF EXCAVATION	Test Pit	LOGGED BY	A. Harker		

DEPTH, ft	SAMPLES	GRAPHIC LOG	DESCRIPTION	MOISTURE CONTENT, %	DRY DENSITY, pcf	OTHER TESTS
	9-1		RESIDUAL SOIL Dense, dry to moist, light brown, silty to clayey fine to coarse SAND to sandy lean CLAY (SM/SC), porous	1		
1			ALLUVIUM Hard to very dense, moist, brown to reddish brown, sandy lean CLAY to clayey SAND (SC/SC), porous	4	111	
2						*C-3: Sample composited with samples TP-7-2 and TP-8-2 SA(44), LL(26), PI(8), LC, CORR, DS, R(62), EI(0)
3						
4	9-2			7		
5				12	110	
6			Bottom of excavation at 5 feet			
7						
8						
9						
10						
11						
12						
13						
14						

Project: Calpine Moreno Power Plant
Project Number: 58-00011071.01-SI001

LOG OF TEST PIT TP-9

Figure A-19
1 of 1

12/15/00 2GPIT 07101

URS

GEOVision, 2000, "Surface Wave (SASW) Measurements Conducted at the Proposed Power Plant Site, Romoland, California," prepared for URS Corporation, dated November 2, 2000.

GEOVision
geophysical services
a division of Blackhawk Geometrics

SURFACE WAVE (SASW) MEASUREMENTS

Conducted at the

Proposed Power Plant Site
Romoland, California

November 2, 2000

SURFACE WAVE (SASW) MEASUREMENTS

Conducted at the

Proposed Power Plant Site
Romoland, California

Prepared for

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Report 01209-01
November 2, 2000

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INTRODUCTION

In-situ seismic measurements using the Spectral Analysis of Surface Waves (SASW) method were performed at the Proposed Power Project Site in Romoland, California on October 28, 2000. The purpose of this investigation was to provide a shear wave velocity profile at the site to a depth of at least 30 meters, to be used for UBC site classification.

This report contains the results of the SASW measurements conducted by Leo Brown and Anthony Martin of GEOVision. Analysis of the surface wave dispersion data to determine the corresponding shear wave velocity profiles was performed by Leo Brown. An overview of the SASW method is given, followed by the procedures used in this investigation. The shear wave velocity profiles obtained from the SASW data are presented in graphic and tabular form. A brief discussion of the results follows.

OVERVIEW OF THE SASW METHOD

Spectral analysis of surface waves (SASW) testing is an in-situ seismic method for determining shear wave velocity (V_S) profiles [Stokoe et al., 1994; Stokoe et al., 1989]. It is non-invasive and non-destructive, with all testing performed on the ground surface at strain levels in the soil in the elastic range (< 0.001%).

The basis of the SASW method is the dispersive characteristic of Rayleigh waves when propagating in a layered medium. The phase velocity, V_R, depends primarily on the material properties (V_S, mass density, and Poisson's ratio or compression wave velocity) over a depth of approximately one wavelength. Waves of different wavelengths, λ, (or frequencies, f) sample different depths. As a result of the variance in the shear stiffness of the layers, waves with different wavelengths travel at different phase velocities; hence, dispersion. A surface wave dispersion curve, or dispersion curve for short, is the variation of V_R with λ or f. SASW testing consists of collecting surface wave phase data in the field, generating the dispersion curve, and then using iterative modeling to back-calculate the shear stiffness profile.

A detailed description of the SASW field procedure is given in Joh [1997]. A vertical dynamic load is used to generate horizontally-propagating Rayleigh waves (Figure 1). The ground motions are monitored by two vertical receivers and recorded by the data acquisition system capable of performing both time and frequency-domain calculations. Theoretical as well as practical considerations, such as attenuation, necessitate the use of several receiver spacings to generate the dispersion curve over the wavelength range required to evaluate the stiffness profile. To minimize phase shifts due to differences in receiver coupling and subsurface variability, the source location is reversed.

After the time-domain motions from the two receivers are converted to frequency-domain records using the Fast Fourier Transform, the cross power spectrum and coherence are calculated. The phase of the cross power spectrum, ϕ_w (f), represents the phase differences between the two receivers as the wavetrain propagates past them. It ranges from $-\pi$ to π in a wrapped form and must be unwrapped through an interactive process called masking. Phase jumps are specified, near-field data (wavelengths longer than three times the distance from the source to first receiver), and low-coherence data are removed. The experimental dispersion curve is calculated from the unwrapped phase angle and the distance between receivers by:

$$V_R = f * d_2/(\Delta\phi/360°),$$

where V_R is Rayleigh wave phase velocity, f is frequency, d_2 is the distance between receivers, and $\Delta\phi$ is the phase difference in degrees.

WinSASW, a program developed at the University of Texas at Austin, is used to reduce and interpret the dispersion curve. Through iterative forward modeling, a V_S profile is found whose theoretical dispersion curve is a close fit to the field data.

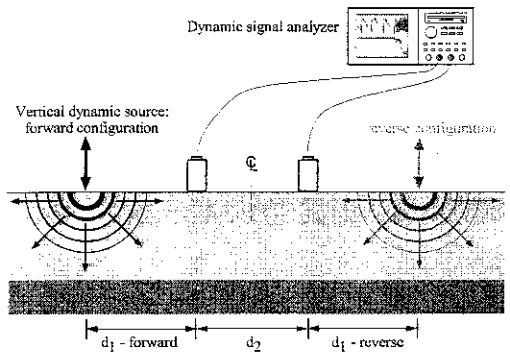

Figure 1 Basic Configuration of SASW Measurements [Modified from Joh, 1997].

The final model profile is assumed to represent actual site conditions. Several options exist for forward modeling: a formulation that takes into account only fundamental-mode Rayleigh wave motion (called the 2-D solution), and those that include all stress waves and incorporate receiver geometry (3-D solution) [Roesset et al., 1991].

PROCEDURES

The SASW array was located at the approximate center of the Romoland site, as shown in Figure 2.

The data were collected with receiver spacings of 2, 4, 8, 12, 16, and 30 m, with a common centerline. This provided overlap of data from different receiver spacings. Generally, the high frequency (short wavelength) surface waves were measured across the short spacings and the low frequency (long wavelength) surface waves were measured with the large receiver spacings.

For receiver spacings up to 16 m, rock hammers, 10-lb, and 20-lb sledgehammers were used as seismic sources. Data from the transient impacts was averaged 10 times to improve signal-to-noise ratio. For the longer receiver spacings, an electromechanical shaker was used to generate low-frequency surface waves (Figure 3).

Surface waves were monitored by two 1-Hz Kinemetrics Ranger Model SS-1 geophones, and recorded by an HP 35670A dynamic signal analyzer. WinSASW was used to average forward- and reverse-direction data, to mask phase data and to generate the dispersion curve. The 2-D model was used for the SASW modeling. This model calculates fundamental-mode Rayleigh wave dispersion and provides satisfactory results at sites with a general increase in V_S with depth, like the Romoland site.

A constant value of mass density, 1.92 g/cc, was used in the profile. Within the normal range encountered in geotechnical engineering, variation in mass density has a negligible effect on dispersion. Compression wave velocity, V_P, was calculated from the assumed value of Poisson's ratio, ν, of 0.33 above the water table, from the relationship:

$$V_P = V_S\,[(2(1-\nu))/(1-2\nu)]^{0.5}.$$

Below the water table, V_P was assumed to be of 1500 m/s. A water table depth of 24 m was incorporated into the velocity profile.

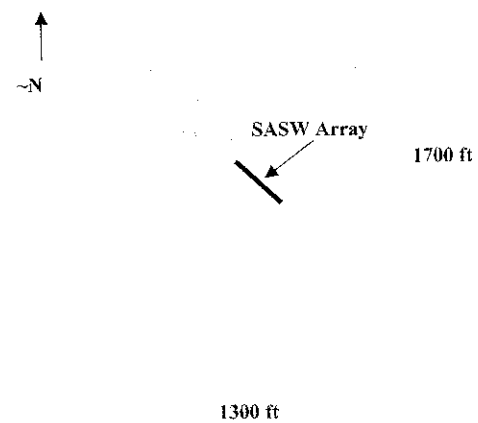

Figure 2 Approximate Location of SASW Testing at the Proposed Power Plant Site in Romoland, CA. The Site is Located at the Northeast Corner of Dawson Rd. and Antelope Rd.

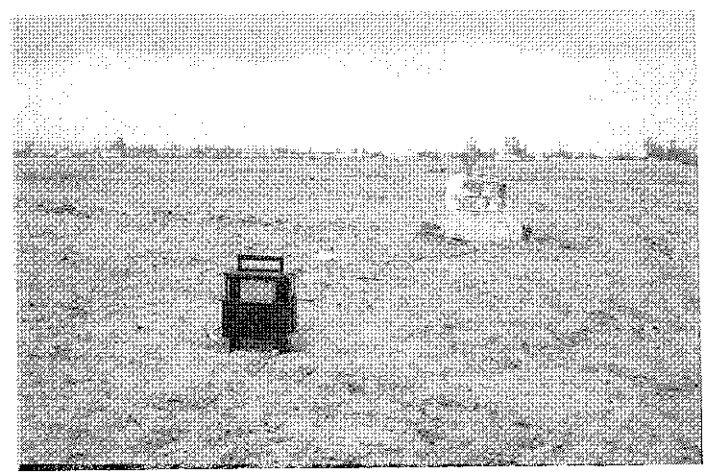

Figure 3 SASW Testing with Electromechanical Shaker as Seismic Source.

RESULTS

The fit of the theoretical dispersion curve to the experimental data is shown in Figure 4. The V_S profile is shown graphically in Figure 5. The resolution decreases gradually with depth, because of loss of sensitivity of the dispersion curve to changes in V_S at greater depth. The V_S and V_P profile used to match the field data is provided in tabular form. The depth to which the profile is valid is 40 m.

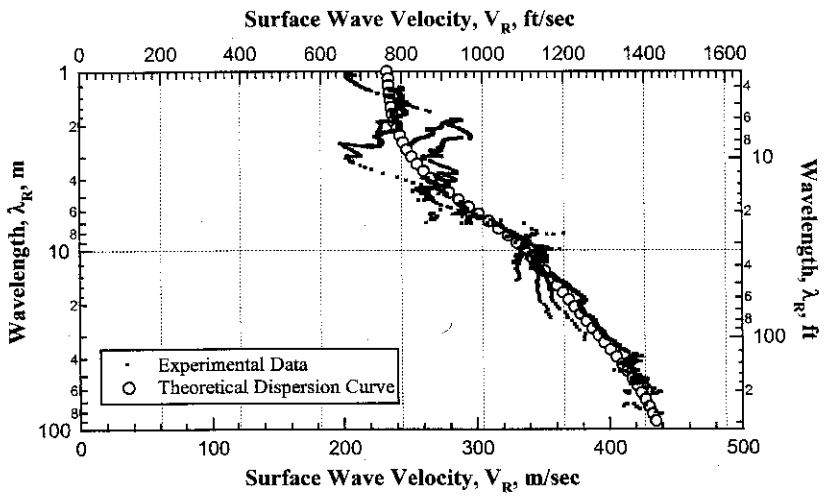

Figure 4 Comparison of Field Experimental Data and Theoretical Dispersion Curve from SASW Testing at the Proposed Power Plant Site in Romoland, CA.

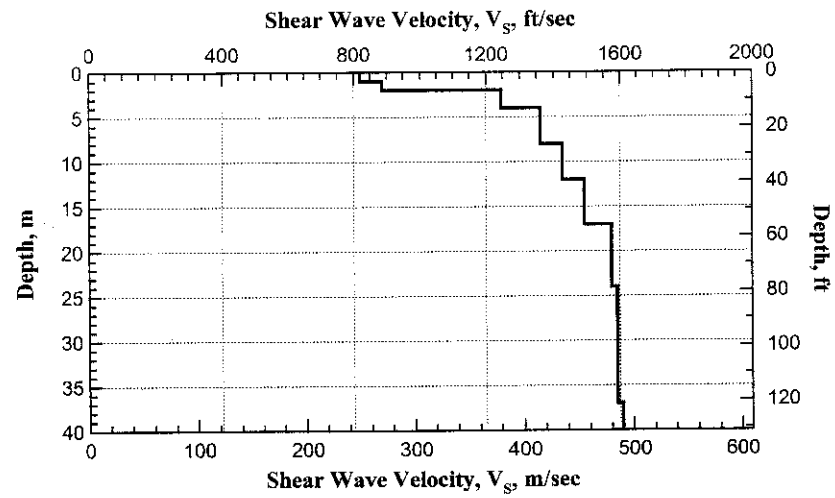

Figure 5 V_S Profile from SASW Testing at the Proposed Power Plant Site in Romoland, CA.

Table 1 V_S Profile Used in the SASW Model for the Proposed Power Plant Site in Romoland, CA.

Depth to Top of Layer		Layer Thickness		S-Wave Velocity		P-Wave Velocity	
m	(ft)	m	(ft)	m/s	(ft/s)	m/s	(ft/s)
0	(0.0)	1	(3.3)	250	(820)	500	(1640)
1	(3.3)	1	(3)	270	(886)	540	(1772)
2	(6.6)	2	(7)	380	(1247)	760	(2493)
4	(13.1)	4	(13)	415	(1362)	830	(2723)
8	(26.2)	4	(13)	435	(1427)	870	(2854)
12	(39.4)	5	(16)	455	(1493)	910	(2985)
17	(55.8)	7	(23)	480	(1575)	960	(3149)
24	(78.7)	13	(43)	485	(1591)	1500	(4921)
37	(121.4)	10000	(32808)	490	(1608)	1500	(4921)

Note: P-wave velocity calculated assuming Poisson's ratio = 0.33 above water table (depth < 24 m). Below water table, P-wave velocity is assumed to be 1500 m/s.

SASW profile valid to 40 m.

DISCUSSION

The surface wave dispersion data from the Romoland site have considerable variability at short wavelengths (Figure 4). There are several possible reasons for this. The velocities of the short surface waves are measured across short distances, so that lateral heterogeneity is reflected in the data. For example, the depth of the loose surface material varied across the array. The dispersion data averaged across longer distances are smoother.

Based on the writer's experience at other sites, the shear wave velocities determined by SASW testing are within 20% of the velocities that would be determined by other seismic methods [Brown, 1998]. Because the Romoland site is fairly uniform and the shear wave velocity generally increases with depth, the SASW results are probably more accurate than this figure. However, thin layers may have an inadequate influence on the dispersion curve to be well resolved.

The theoretical model used to interpret the dispersion assumes horizontally layered, laterally invariant, homogeneous-isotropic material. Although these conditions are seldom strictly met at a site, the results of SASW testing provide a good "global" estimate of the material properties along the array. The results may be more representative of the site than a borehole "point" estimate.

Average shear wave velocity to a depth of 30 m, V30, is 430 m/s. According to the 1997 Uniform Building Code, the site is classified as C, very stiff soil and soft rock (BSSC, 1994).

CONCLUSIONS

Spectral Analysis of Surface Waves (SASW) testing was performed at the proposed power plant site in Romoland, California. The shear wave velocity profile determined by this method is presented in this report as Figure 5 and Table 1. Average shear wave velocity to a depth of 30 m, V30, is 430 m/s.

REFERENCES

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Stokoe, K.H.,II, Rix, G.L. and S. Nazarian, 1989, "In situ seismic testing with surface waves" *Proceedings, Twelfth International Conference on Soil Mechanics and Foundation Engineering, Vol. 1*, Rio de Janeiro, Brazil, pp. 330-334.

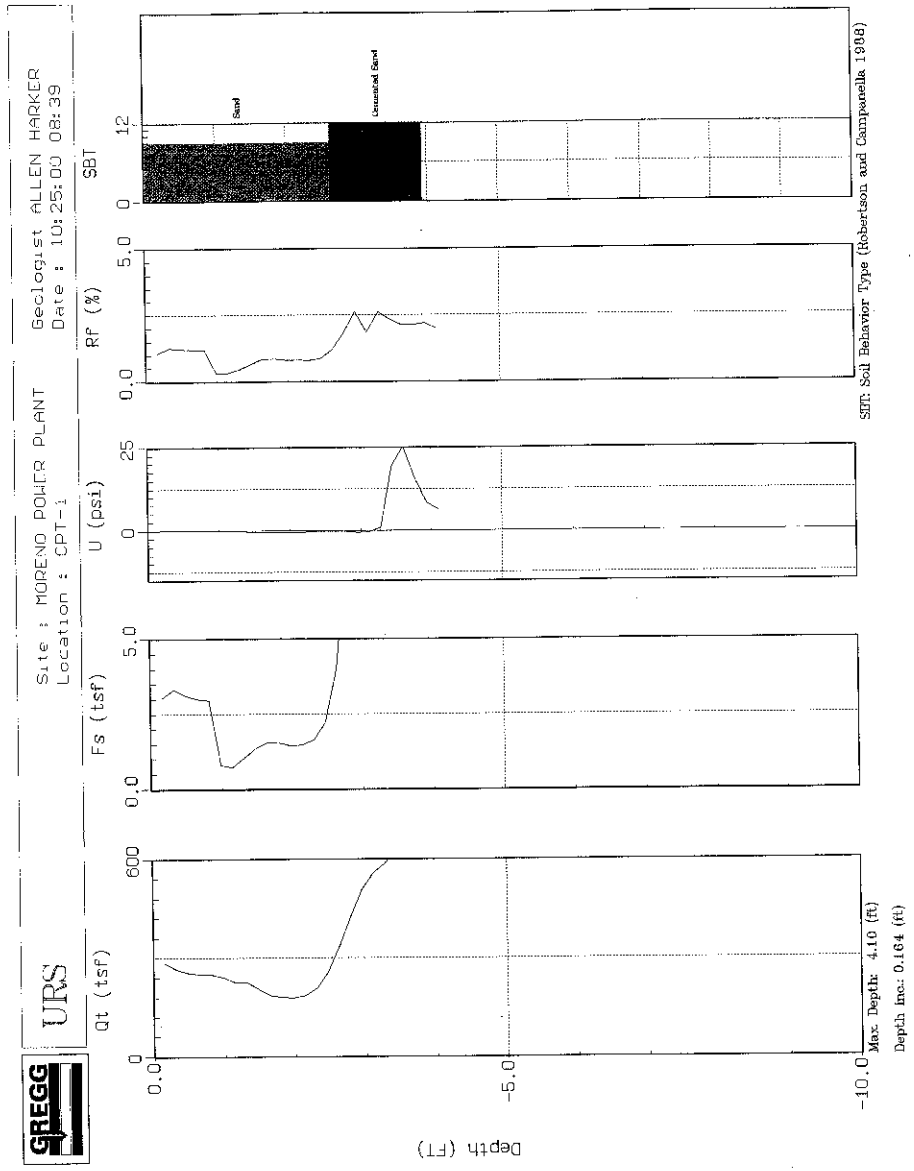

GREGG
URS
Site : MORENO POWER PLANT
Location : CPT-1
Geologist ALLEN HARKER
Date : 10:25:00 08:39
Qt (tsf)
Fs (tsf)
U (psi)
RF (%)
SBT
Sand
Cemented Sand
SBT: Soil Behavior Type (Robertson and Campanella 1988)
Max. Depth: 4.10 (ft)
Depth Inc.: 0.164 (ft)
Depth (FT)

Figure C-1

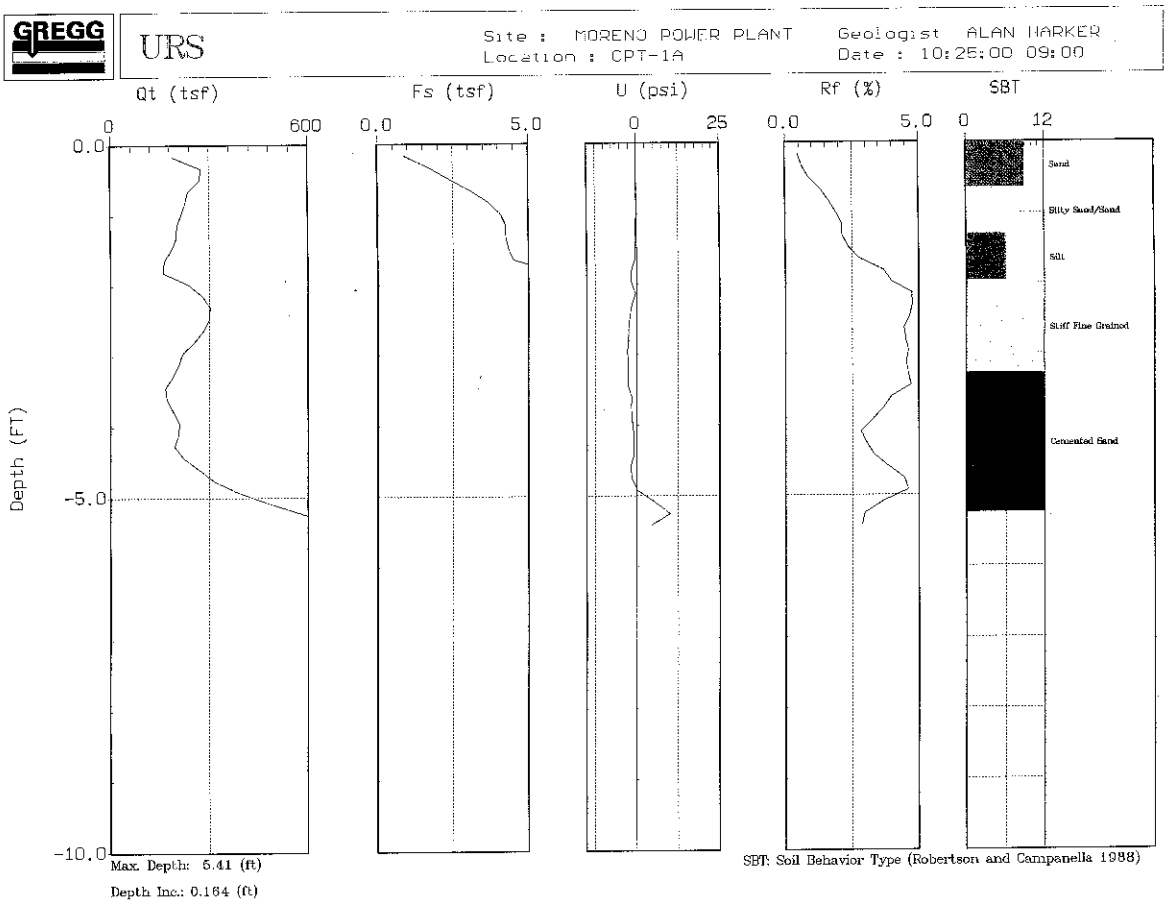


Figure C-2

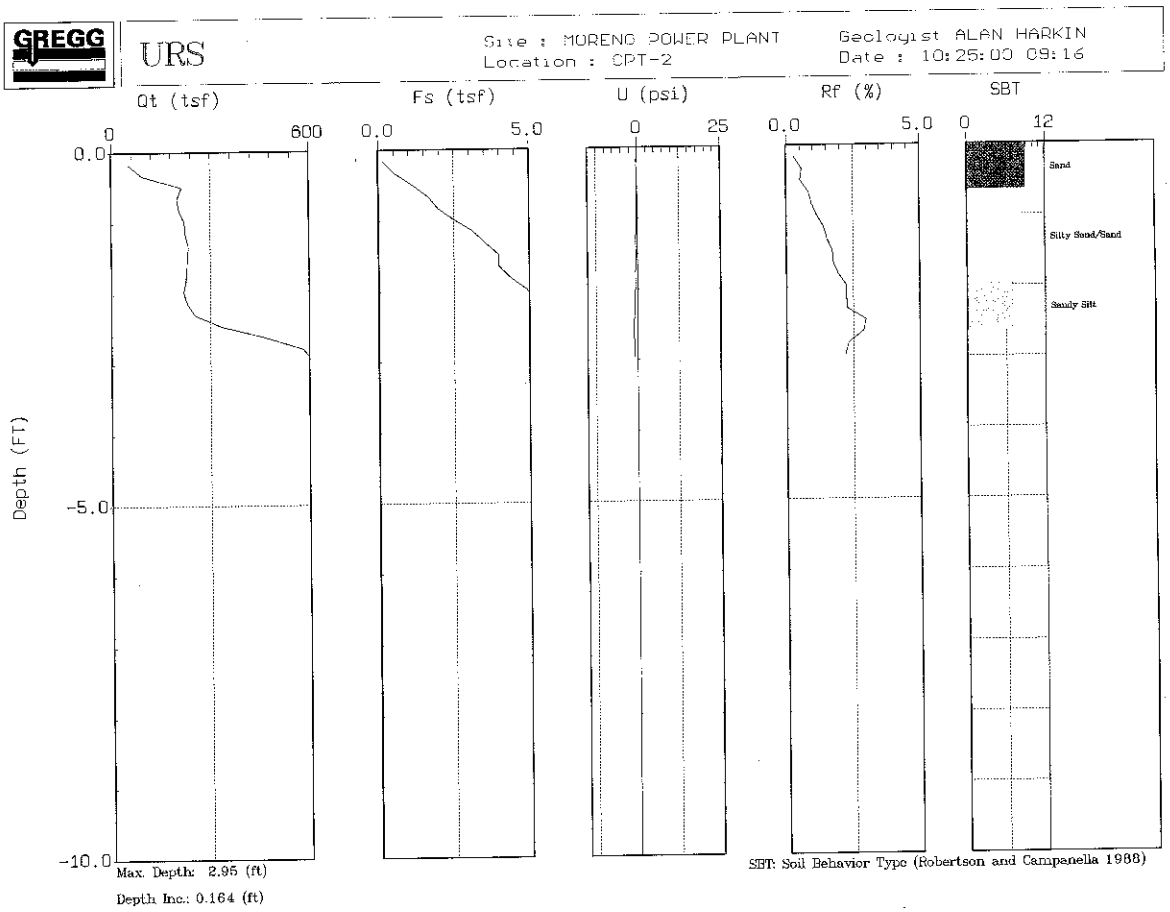


Figure C-3

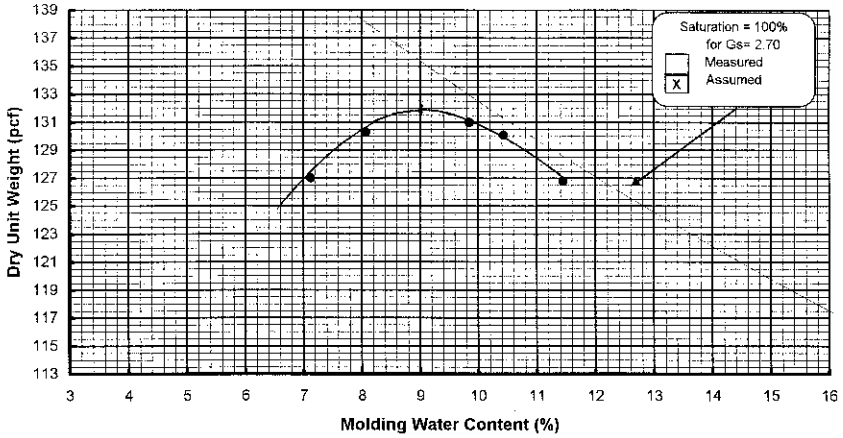
The materials observed in the borings and test pits were visually classified and evaluated with respect to strength, swelling, compressibility, dry density, and moisture content. The classifications were substantiated by performing grain size analyses and Atterberg limits test on representative samples of the soils. The strength of the soils was evaluated by considering the density and moisture content of the samples, the penetration resistance of the sampler, by performing unconfined compression and direct shear tests. The suitability of soils for fill and pavement subgrade was evaluated by performing compaction, R-value and corrosivity tests. The testing was performed in general accordance with ASTM Standards.

The results of the grain size analyses, Atterberg limits, R-Value, expansion index, moisture content, and dry density tests are shown with the penetration resistance of the sampler (if applicable) at the corresponding sample location on the logs, Figures A-2 through A-19. Near surface bulk samples from the test pits were combined to form three representative composite samples, C-1, C-2 and C-3. The results of laboratory testing for the composite samples are shown at the corresponding sample location of each of the samples included in the composite.

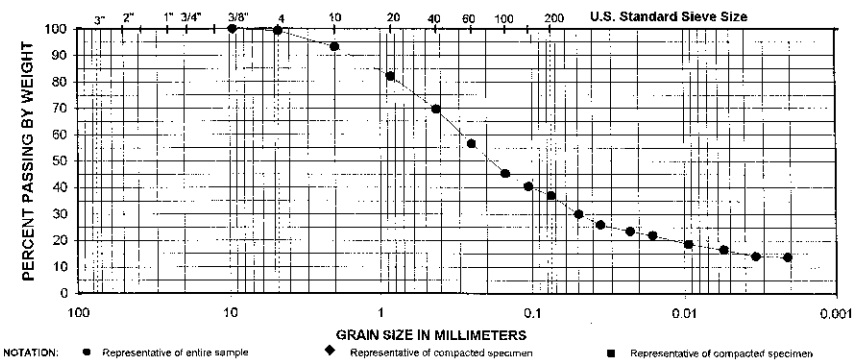
Results of the complete sieve analyses are presented in Figures D-1 through D-4. Results of the compaction test are shown on Figures D-1 through D-3. Results of the direct shear test are shown in Figures D-5 through D-7. Results of the unconfined compression tests are shown in Figures D-8 through D-35. Results of the R-value test are presented in Figures D-36 through D-38. Results of the corrosivity tests are shown on Figures D-39 and D-40.

COMPACTION CURVE

Test Method: ● ASTM D 1557 ■ ASTM D 698 ◆ CA-DWR: S-10 ○ Other Effort
Compaction Procedure: A Specimen Preparation Method: Dry



PARTICLE-SIZE DISTRIBUTION CURVE



NOTATION: ● Representative of entire sample ◆ Representative of compacted specimen ■ Representative of compacted specimen and entire sample

Exploration No.	Sample No.	Depth (ft)	OPT. WC (%)	MAX. DUW (pcf)	LL	PI	Description and/or Classification
Composite C1	1 ~ 4	9.0	131.5	24	8		Brown clayey Sand (SC)

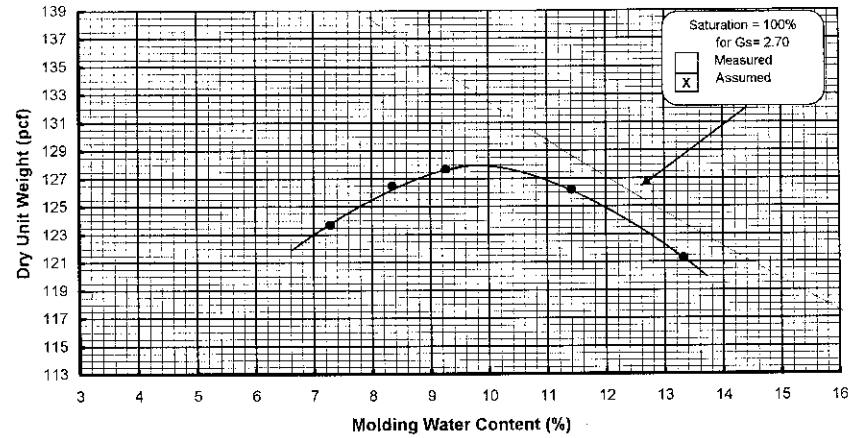
PROJECT NAME: Calpine Moreno Power Plant
PROJECT NUMBER: 5800011071.01

COMPACTION AND INDEX PROPERTY DATA

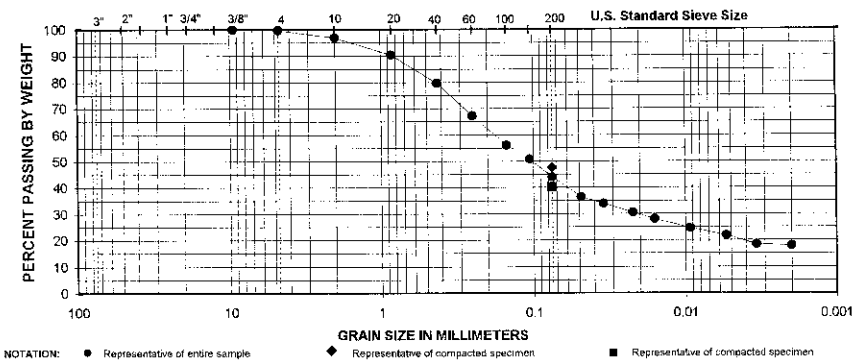
FIGURE No. D-1

COMPACTION CURVE

Test Method: ● ASTM D 1557 ■ ASTM D 698 ◆ CA-DWR: S-10 ○ Other Effort
Compaction Procedure: A Specimen Preparation Method: Dry



PARTICLE-SIZE DISTRIBUTION CURVE



NOTATION: ● Representative of entire sample ◆ Representative of compacted specimen ■ Representative of compacted specimen and entire sample

Exploration No.	Sample No.	Depth (ft)	OPT. WC (%)	MAX. DUW (pcf)	LL	PI	Description and/or Classification
Composite C2	2 ~ 4	10.0	128.0	25	10		Brown clayey Sand (SC)

PROJECT NAME: Calpine Moreno Power Plant
PROJECT NUMBER: 5800011071.01

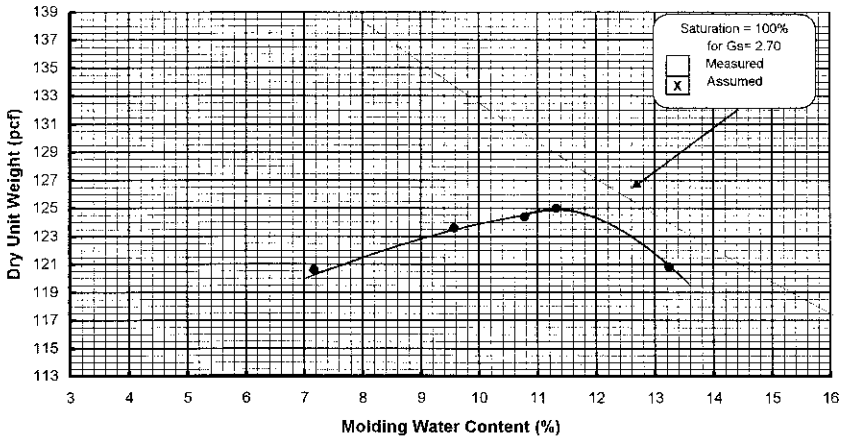
COMPACTION AND INDEX PROPERTY DATA

FIGURE No. D-2

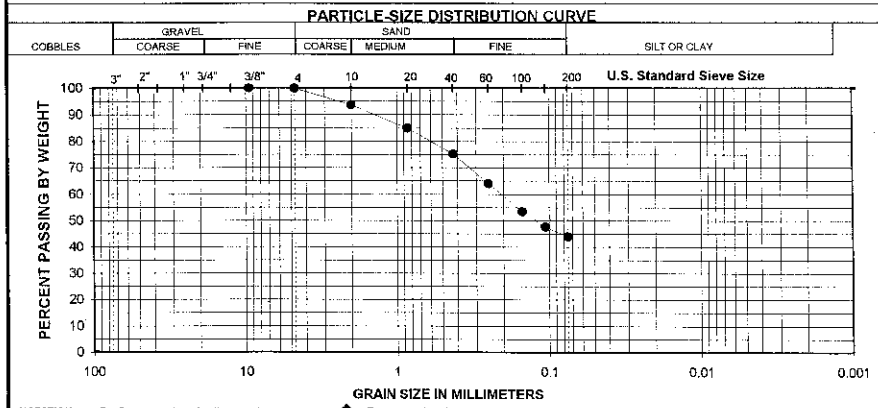
COMPACTION CURVE

Test Method: ● ASTM D 1557 ■ ASTM D 698 ◆ CA-DWR: S-10 ○ Other Effort

Compaction Procedure: A Specimen Preparation Method: Dry



PARTICLE-SIZE DISTRIBUTION CURVE

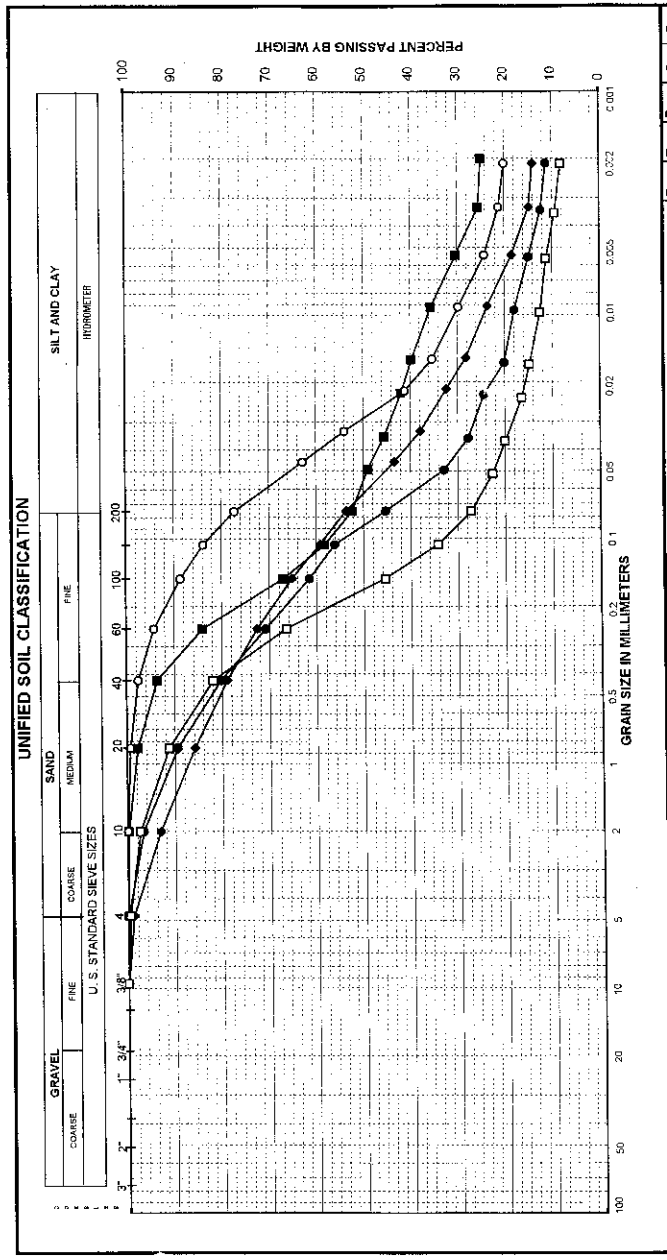


NOTATION: ● Representative of entire sample ◆ Representative of compacted specimen ■ Representative of compacted specimen and entire sample

Exploration No.	Sample No.	Depth (ft)	OPT. WC (%)	MAX. DUW (pcf)	LL	PI	Description and/or Classification
Composite C3	3 ~ 4	11.0	125.0	25	8		Brown clayey Sand (SC)

PROJECT NAME: Calpine Moreno Power Plant PROJECT NUMBER: 5800011071.01	COMPACTION AND INDEX PROPERTY DATA	FIGURE No. D-3

SR-400 (05/00) (SNA) cpcmppc3.xls URS

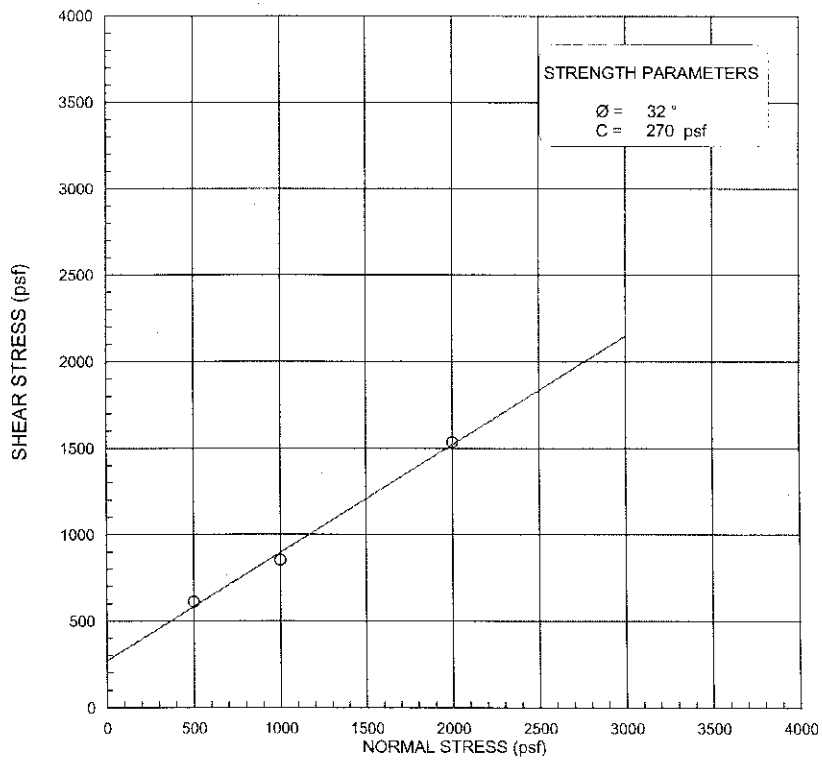


Exploration No.	Sample No.	Depth (ft)	SYMBOL	Wn (%)	LL	PI	% Clay	Description and Classification	D_{60}	D_{30}	D_{10}	C_u	C_c
B-4	1	2.0	●	10.0	32	14	11	Brown clayey Sand (SC)					
B-4	2	5.0	◆	8.9	32	15	14	Brown sandy Clay (CL)					
B-4	3	9.0	■	19.3	36	15	25	Reddish brown sandy Clay (CL)					
B-4	4	14.0	○	24.1	43	21	20	Reddish brown sandy Clay (CL)					
B-4	5	19.0	□	10.5	22	NP	8	Dark brown silty Sand (SM)					

PROJECT NAME: Calpine Moreno Power Plant PROJECT NUMBER: 5800011071.01	PARTICLE-SIZE DISTRIBUTION CURVES	Figure: D-4

URS

(SNA) sieve only (01/2000) sa_cmppa.xls



Maximum Dry Density = 131.5 pcf Optimum Moisture Content = 9.0

BORING NO.	SAMPLE NO.	DEPTH (ft)	Moisture Content (%) / Dry Density (pcf)	NORMAL STRESS (psf)	MAX. SHEAR STRESS (psf)
C-1	TP-1-1	1.0-4.5	11.4 / 118.9	○ 500	612
	TP-2-2		11.4 / 118.8	○ 1000	852
	TP-3-2		11.4 / 118.3	○ 2000	1536

Sample Description: Brown clayey SAND (SC)

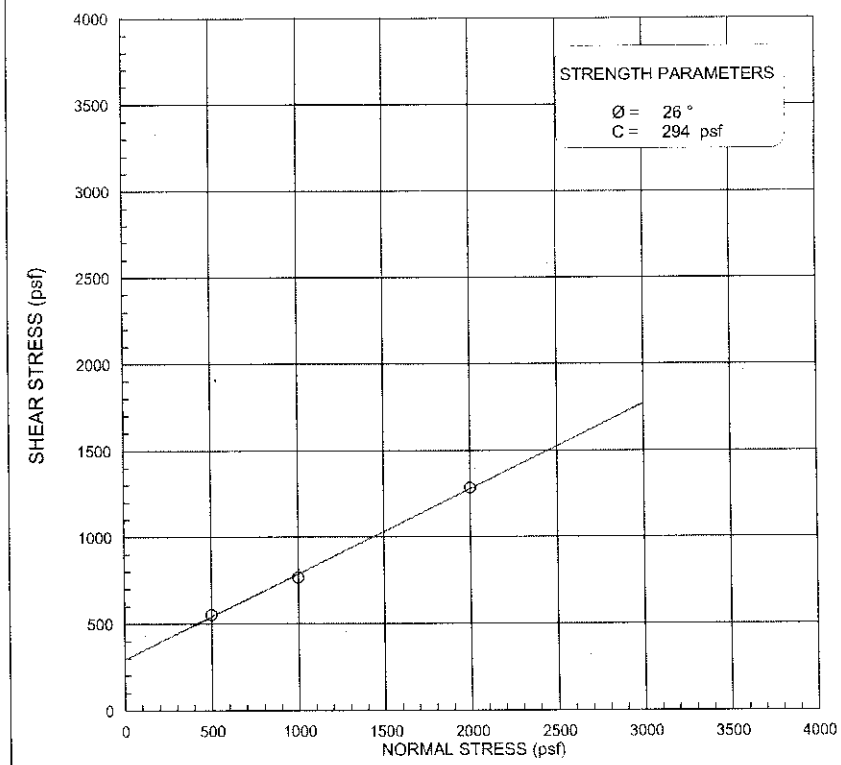
Calpine Moreno Power Plant
58-00011071.01 Task SI001
San Diego, California

DIRECT SHEAR TEST RESULTS

CONSOLIDATED DRAINED
ASTM D 3080

URS

Figure **D-5**



Maximum Dry Density = 128 pcf Optimum Moisture Content = 10.0

BORING NO.	SAMPLE NO.	DEPTH (ft)	Moisture Content (%) / Dry Density (pcf)	NORMAL STRESS (psf)	MAX. SHEAR STRESS (psf)
C-2	TP-4-2	2.0-4.0	11.5 / 115.3	○ 500	552
	TP-5-2		11.5 / 115.5	○ 1000	768
			11.5 / 115.7	○ 2000	1284

Sample Description: Brown clayey SAND (SC)

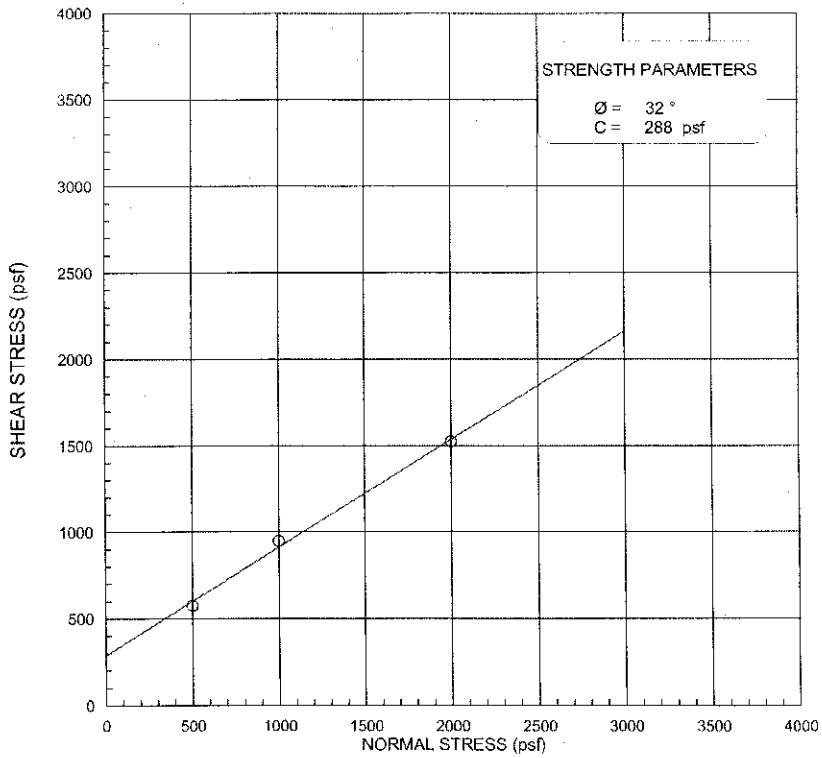
Calpine Moreno Power Plant
58-00011071.01 Task SI001
San Diego, California

DIRECT SHEAR TEST RESULTS

CONSOLIDATED DRAINED
ASTM D 3080

URS

Figure **D-6**



Maximum Dry Density = 125 pcf Optimum Moisture Content = 11.0

BORING NO.	SAMPLE NO.	DEPTH (ft)	Moisture Content (%) / Dry Density (pcf)	NORMAL STRESS (psf)	MAX. SHEAR STRESS (psf)
C-3	TP-7-2	3.5-4.5	11.2 / 113.1	O 500	576
	TP-8-2		11.2 / 113.0	O 1000	948
	TP-9-2		11.2 / 112.9	O 2000	1524

Sample Description: Brown clayey SAND (SC)

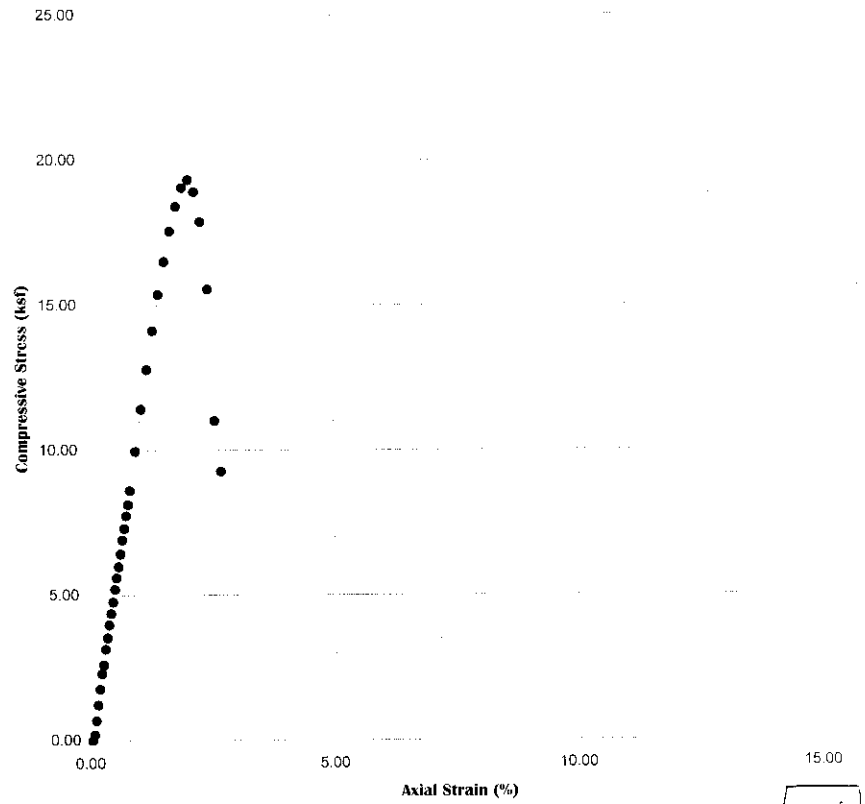
Calpine Moreno Power Plant
58-00011071.01 Task SI001
San Diego, California

DIRECT SHEAR TEST RESULTS

CONSOLIDATED DRAINED
ASTM D 3080

URS

Figure **D-7**



FAILURE SKETCH

Test Number UC000134	Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Degree of Saturation (%)
Initial:	8.3			3.669	1.928	136.3	66.4

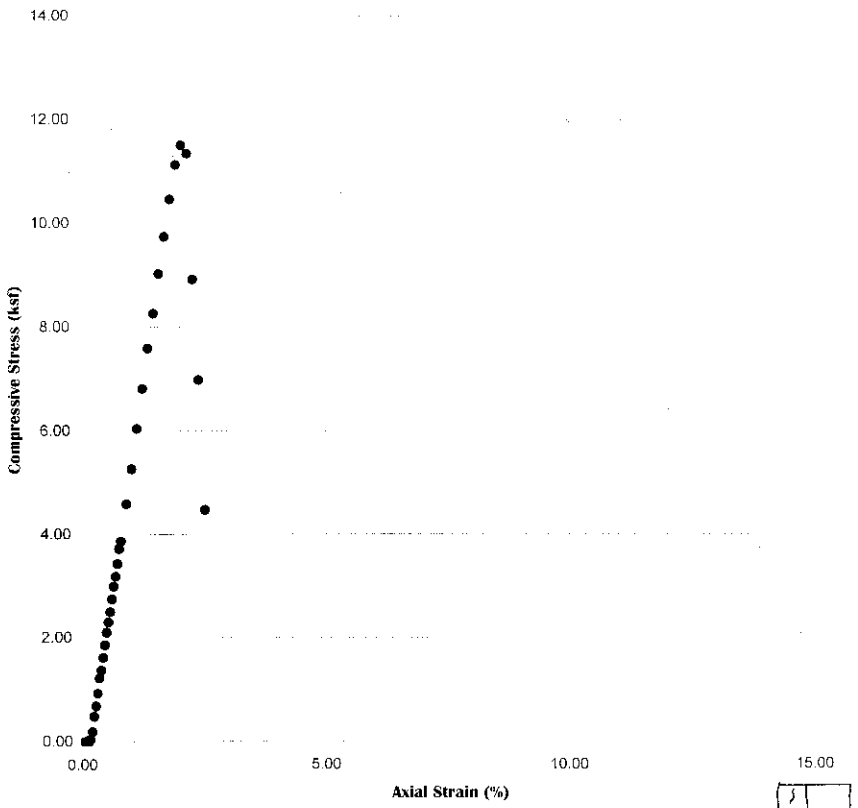
Project Name: Calpine Moreno Power Plant
Project Number: 5800011071.01
Exploration No: B-1 **Sample No.:** 1 **Depth (ft):** 2
Description and/or Classification: Dark brown clayey Sand (SC)

UNCONFINED COMPRESSION TEST

Figure : D-8

SR-206 (4/99) (SNA) uc000134.xls

URS



Test Number UC000135	Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Degree of Saturation (%)
Initial:	13.9			3.895	1.928	136.1	91.4

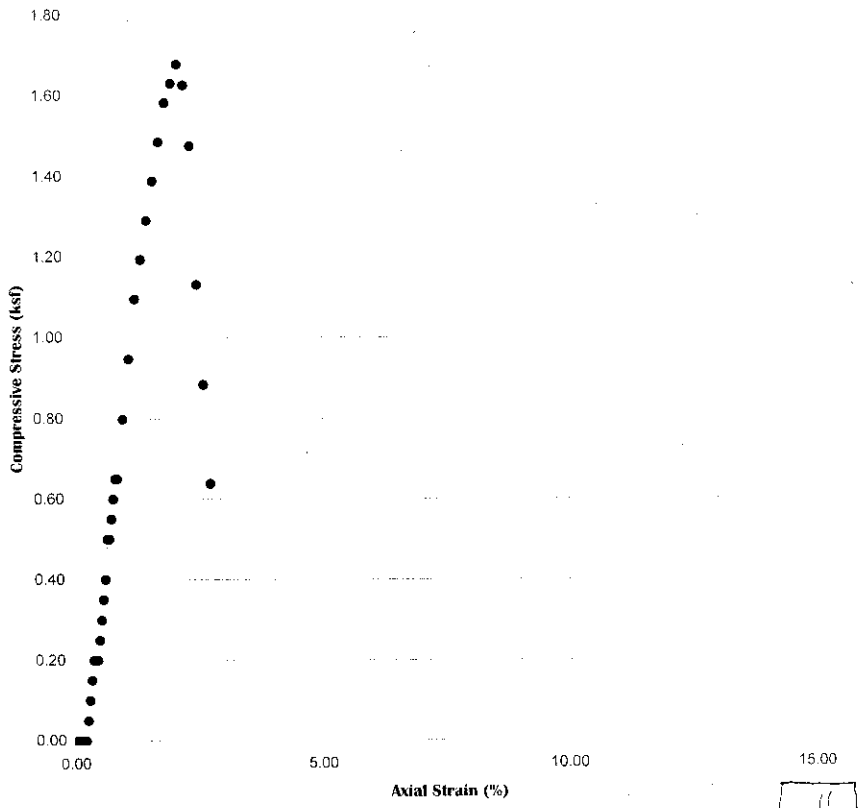
FAILURE SKETCH

Project Name: Calpine Moreno Power Plant
Project Number: 5800011071.01
Exploration No: B-1 Sample No.: 2 Depth (ft): 5
Description and/or Classification: Brown sandy Clay (CL)

UNCONFINED COMPRESSION TEST

Figure : D-9

SR-206 (4/99) (SNA) uc000135.xls URS



Test Number UC000136	Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Degree of Saturation (%)
Initial:	14.7			3.600	1.907	119.3	64.0

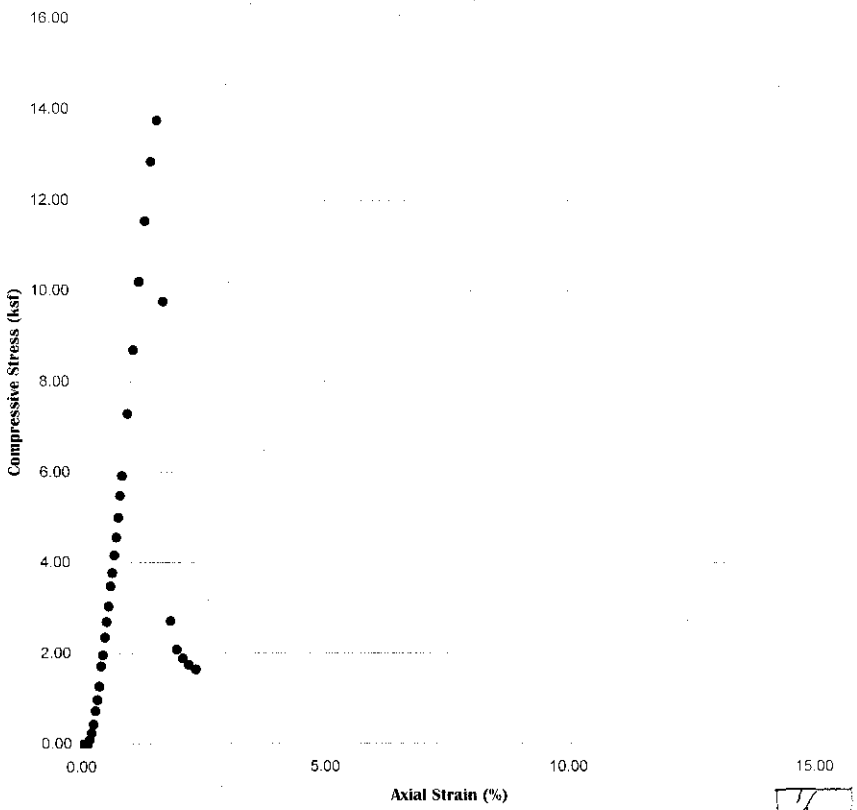
FAILURE SKETCH

Project Name: Calpine Moreno Power Plant
Project Number: 5800011071.01
Exploration No: B-1 Sample No.: 3 Depth (ft): 9
Description and/or Classification: Dark brown silty Sand (SM)

UNCONFINED COMPRESSION TEST

Figure : D-10

SR-206 (4/99) (SNA) uc000136.xls URS



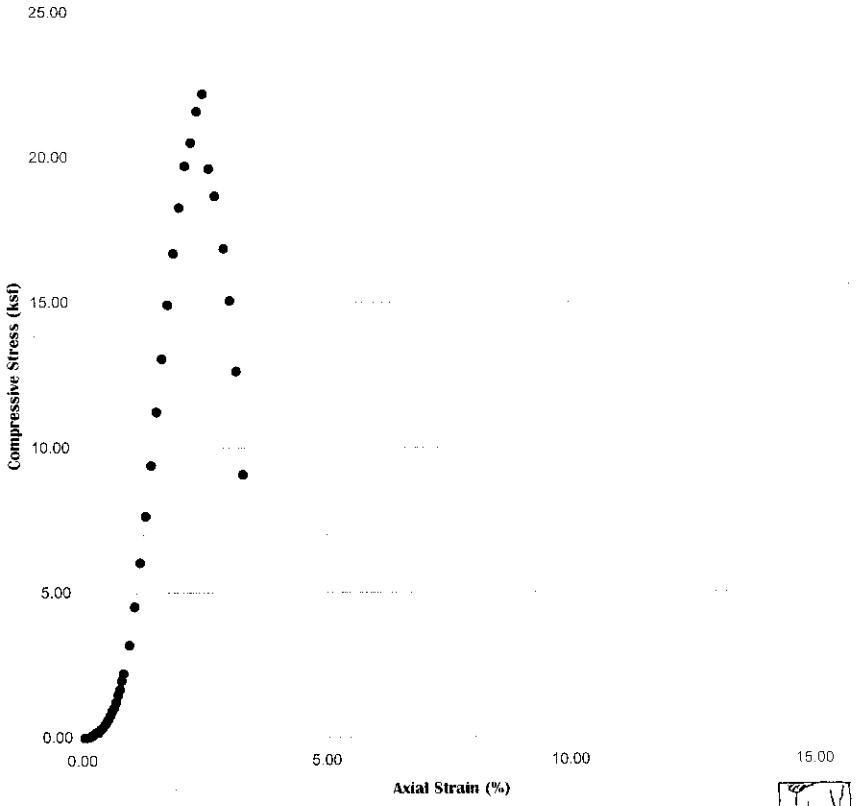
FAILURE SKETCH

Test Number UC000137	Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Degree of Saturation (%)
Initial:	11.4			3.677	1.927	121.1	56.1

Project Name: Calpine Moreno Power Plant
Project Number: 5800011071.01
Exploration No: B-2 Sample No.: 1 Depth (ft): 2
Description and/or Classification: Brown sandy Clay (CL)

UNCONFINED COMPRESSION TEST

Figure : D-11



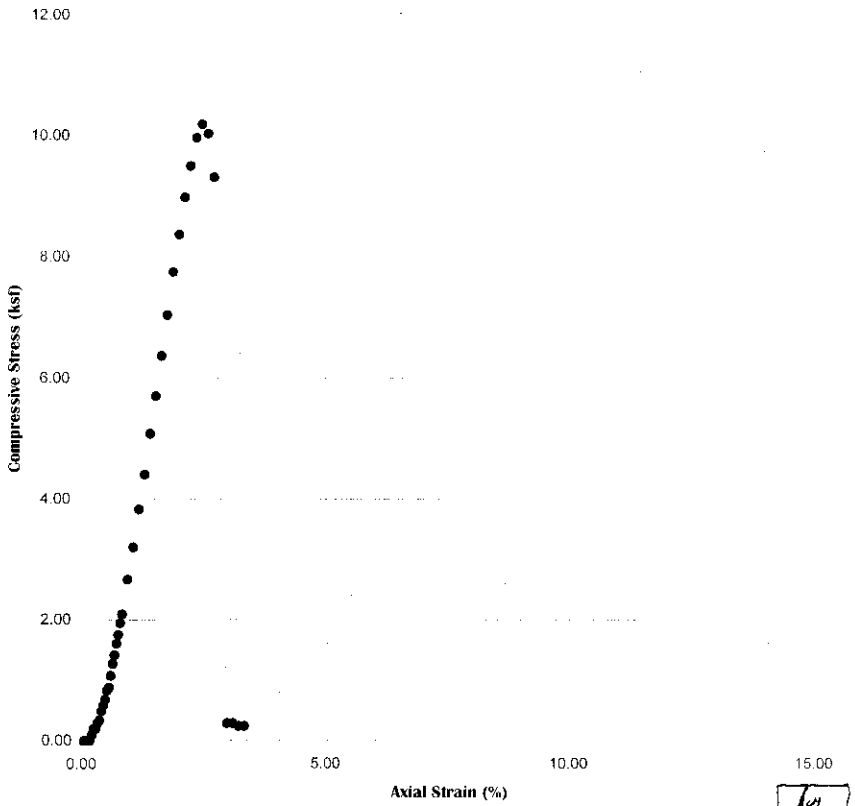
FAILURE SKETCH

Test Number UC000138	Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Degree of Saturation (%)
Initial:	13.8			3.717	1.922	127.8	74.7

Project Name: Calpine Moreno Power Plant
Project Number: 5800011071.01
Exploration No: B-2 Sample No.: 2 Depth (ft): 5
Description and/or Classification: Brown silty Sand (SM)

UNCONFINED COMPRESSION TEST

Figure : D-12



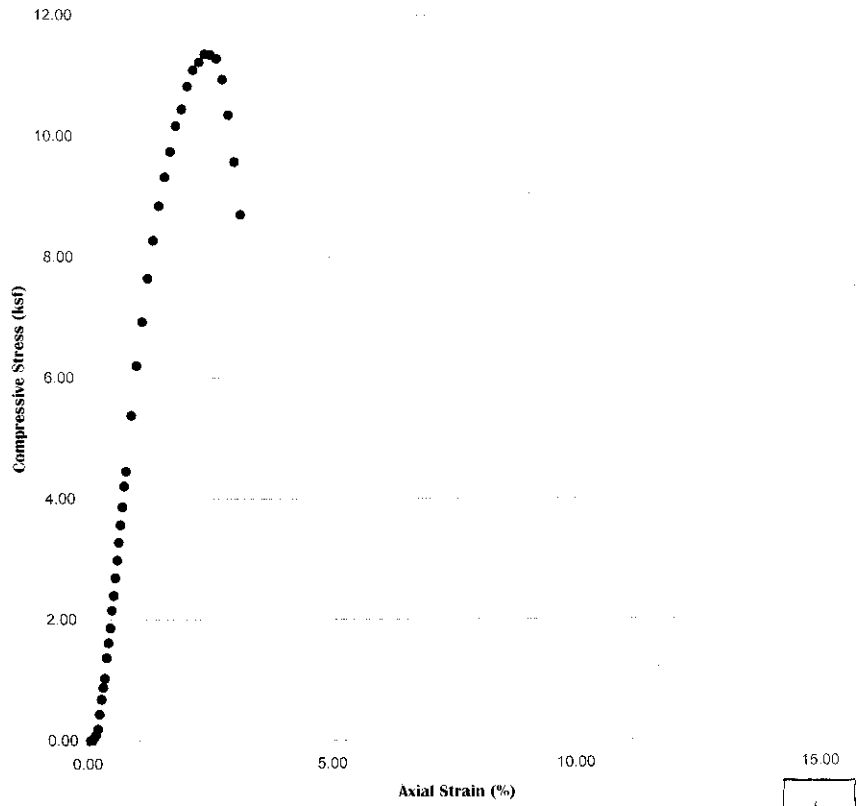
FAILURE SKETCH

Test Number UC000139	Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Degree of Saturation (%)
Initial:	17.6			3.771	1.933	126.2	83.5

Project Name: Calpine Moreno Power Plant
Project Number: 5800011071.01
Exploration No: B-2 Sample No.: 3 Depth (ft): 9
Description and/or Classification: Brown silty Sand (SM)

UNCONFINED COMPRESSION TEST

Figure : D-13



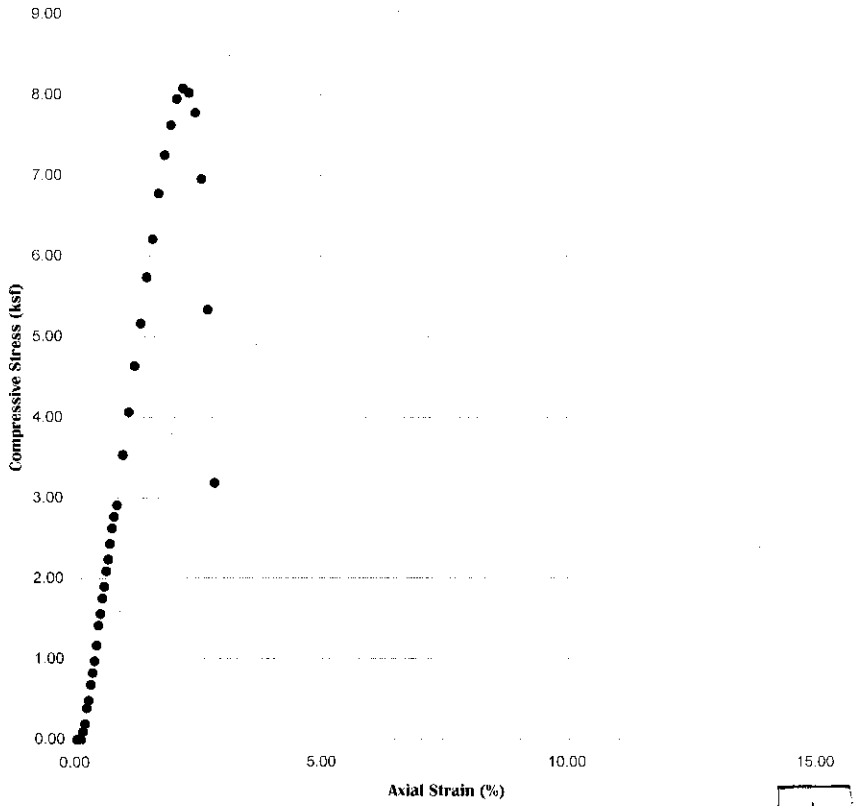
FAILURE SKETCH

Test Number UC000140	Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Degree of Saturation (%)
Initial:	12.9			3.779	1.927	130.9	76.9

Project Name: Calpine Moreno Power Plant
Project Number: 5800011071.01
Exploration No: B-3 Sample No.: 1 Depth (ft): 2
Description and/or Classification: Brown sandy Clay (CL)

UNCONFINED COMPRESSION TEST

Figure : D-14



FAILURE SKETCH

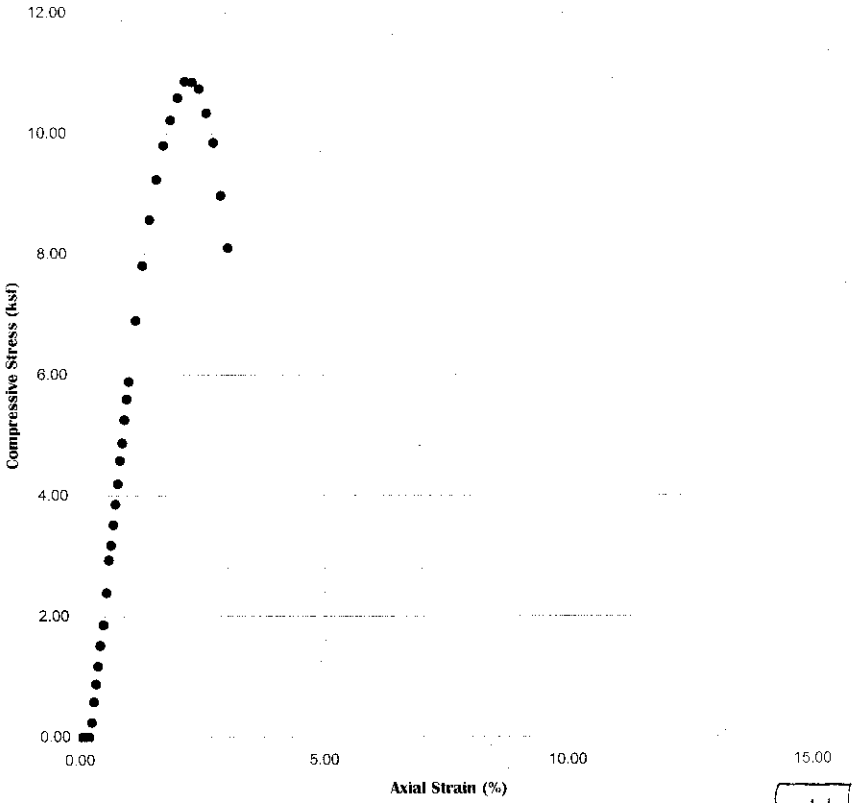
Test Number UC000141	Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Degree of Saturation (%)
Initial:	10.6			3.640	1.936	137.7	81.0

Project Name: Calpine Moreno Power Plant
Project Number: 5800011071.01
Exploration No: B-3 Sample No.: 2 Depth (ft): 5
Description and/or Classification: Brown clayey Sand (SC)

UNCONFINED COMPRESSION TEST

Figure : D-15

SR-206 (4/99) (SNA) uc000141.xls URS



FAILURE SKETCH

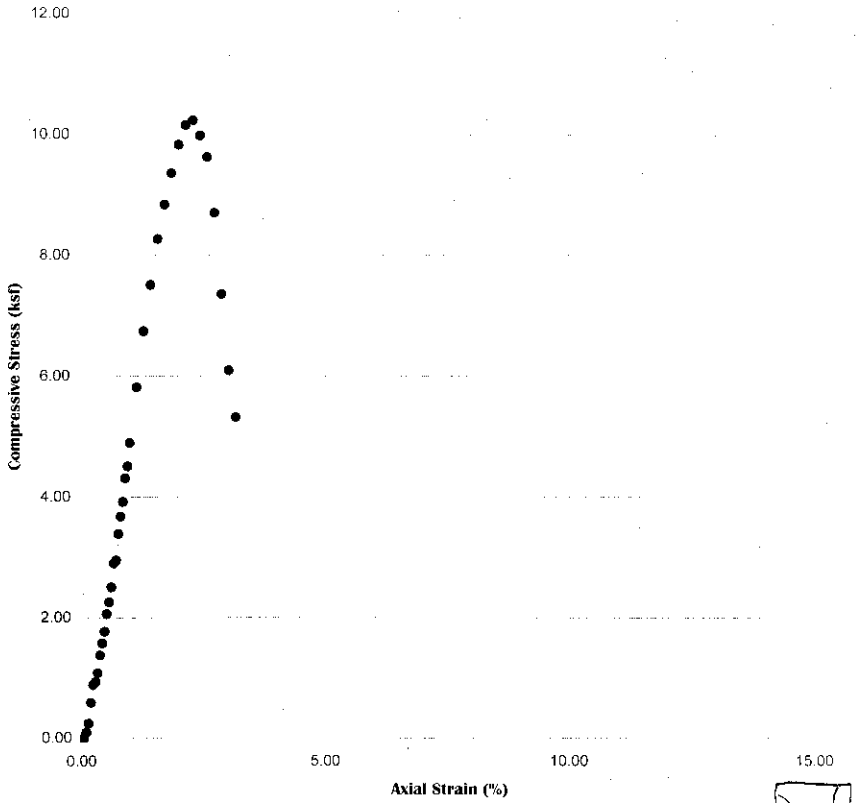
Test Number UC000142	Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Degree of Saturation (%)
Initial:	18.7			3.101	1.931	130.5	94.9

Project Name: Calpine Moreno Power Plant
Project Number: 5800011071.01
Exploration No: B-3 Sample No.: 3 Depth (ft): 9
Description and/or Classification: Brown sandy Clay (CL)

UNCONFINED COMPRESSION TEST

Figure : D-16

SR-206 (4/99) (SNA) uc000142.xls URS



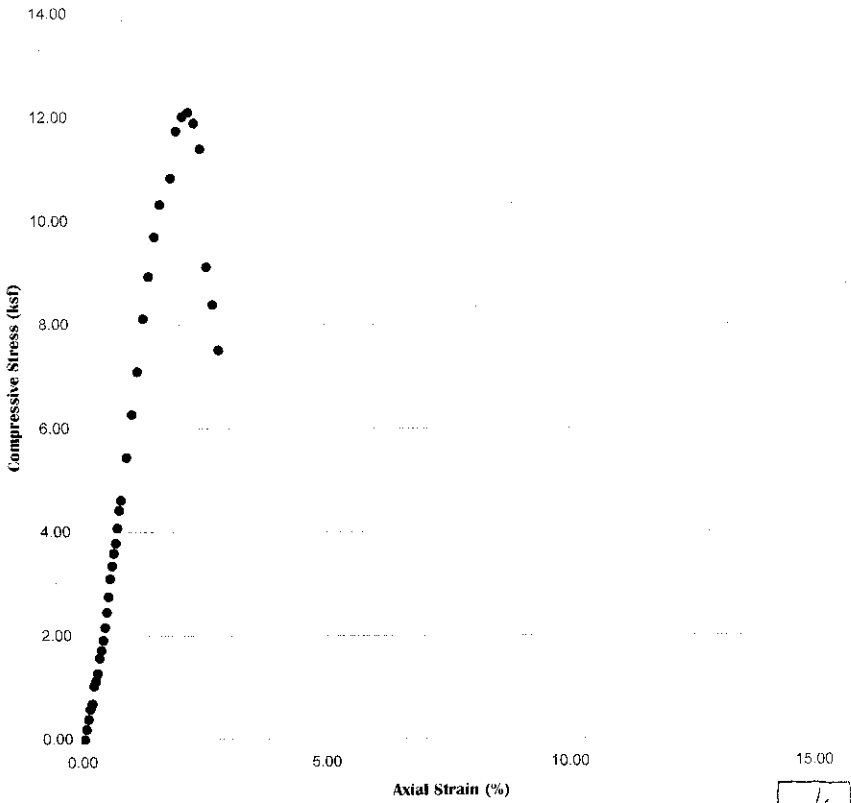
FAILURE SKETCH

Test Number UC000143	Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Degree of Saturation (%)
Initial:	10.0	32	14	3.097	1.926	127.9	59.9

Project Name: Calpine Moreno Power Plant
Project Number: 5800011071.01
Exploration No: B-4 Sample No.: 1 Depth (ft): 2
Description and/or Classification: Brown clayey Sand (SC)

UNCONFINED COMPRESSION TEST

Figure : D-17



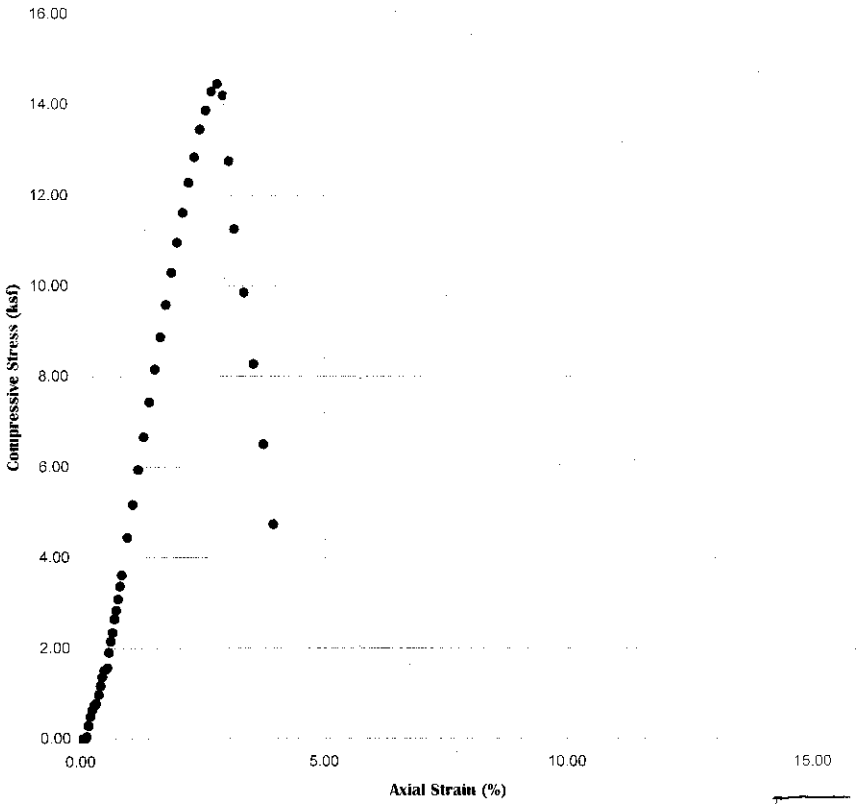
FAILURE SKETCH

Test Number UC000144	Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Degree of Saturation (%)
Initial:	8.9	32	15	3.768	1.924	135.4	67.9

Project Name: Calpine Moreno Power Plant
Project Number: 5800011071.01
Exploration No: B-4 Sample No.: 2 Depth (ft): 5
Description and/or Classification: Brown sandy Clay (CL)

UNCONFINED COMPRESSION TEST

Figure : D-18



FAILURE SKETCH

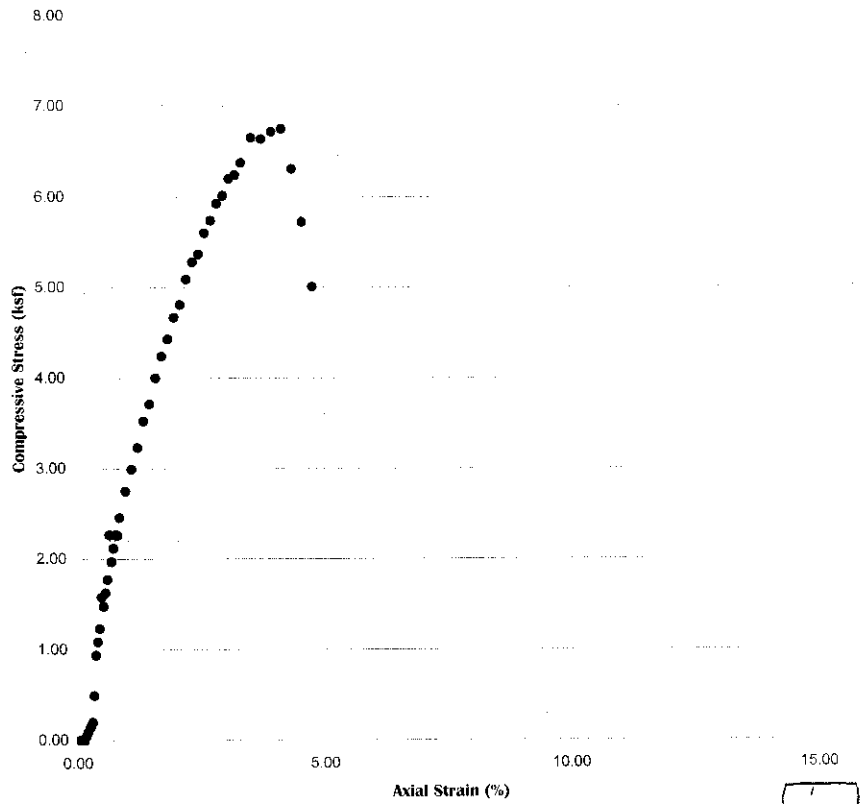
Test Number UC000132	Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Degree of Saturation (%)
Initial:	19.3	36	15	3.843	1.929	129.7	94.9

Project Name: Calpine Moreno Power Plant
Project Number: 5800011071.01
Exploration No: B-4 Sample No.: 3 Depth (ft): 9
Description and/or Classification: Reddish brown sandy Clay (CL)

UNCONFINED COMPRESSION TEST

Figure : D-19

SR-206 (4/99) (SNA) uc000132.xls URS



FAILURE SKETCH

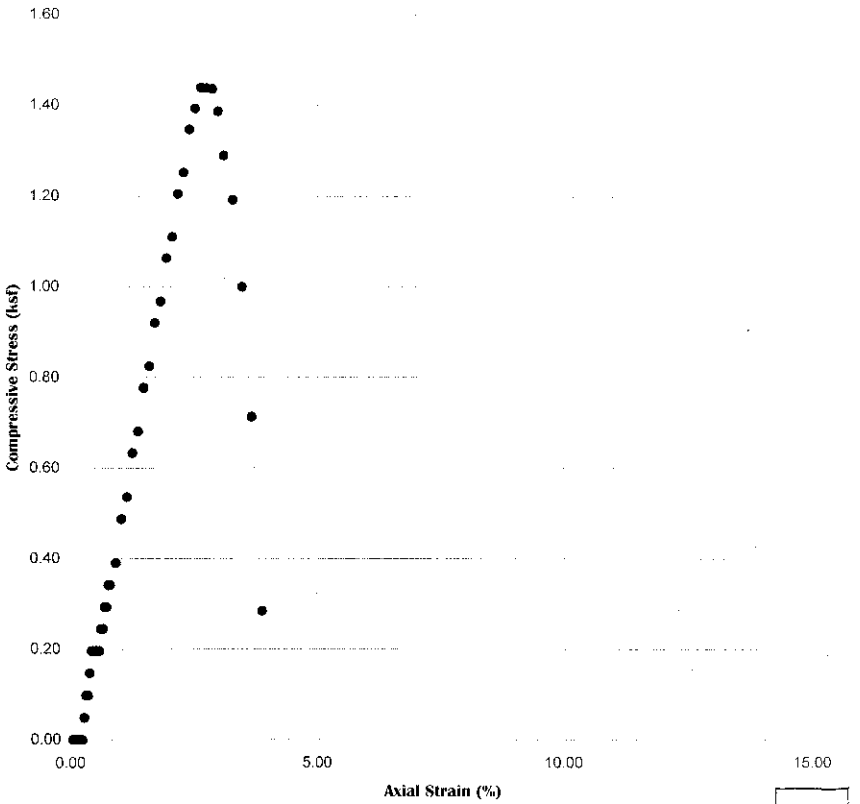
Test Number UC000145	Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Degree of Saturation (%)
Initial:	24.1	43	21	3.610	1.923	125.3	97.5

Project Name: Calpine Moreno Power Plant
Project Number: 5800011071.01
Exploration No: B-4 Sample No.: 4 Depth (ft): 14
Description and/or Classification: Reddish brown sandy Clay (CL)

UNCONFINED COMPRESSION TEST

Figure : D-20

SR-206 (4/99) (SNA) uc000145.xls URS



FAILURE SKETCH

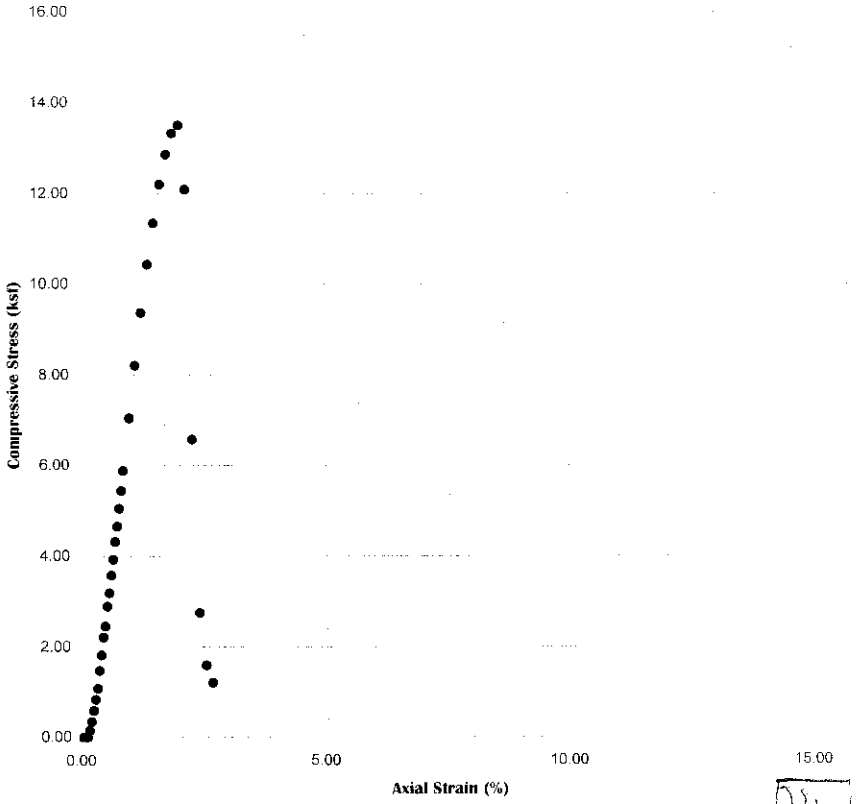
Test Number UC000133	Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Degree of Saturation (%)
Initial:	10.6	22	NP	3.896	1.929	124.9	58.2

Project Name: Calpine Moreno Power Plant
Project Number: 5800011071.01
Exploration No: B-4 Sample No.: 5 Depth (ft): 19
Description and/or Classification: Dark brown silty Sand (SM)

UNCONFINED COMPRESSION TEST

Figure : D-21

SR-206 (4/99) (SNA) uc000133.xls URS



FAILURE SKETCH

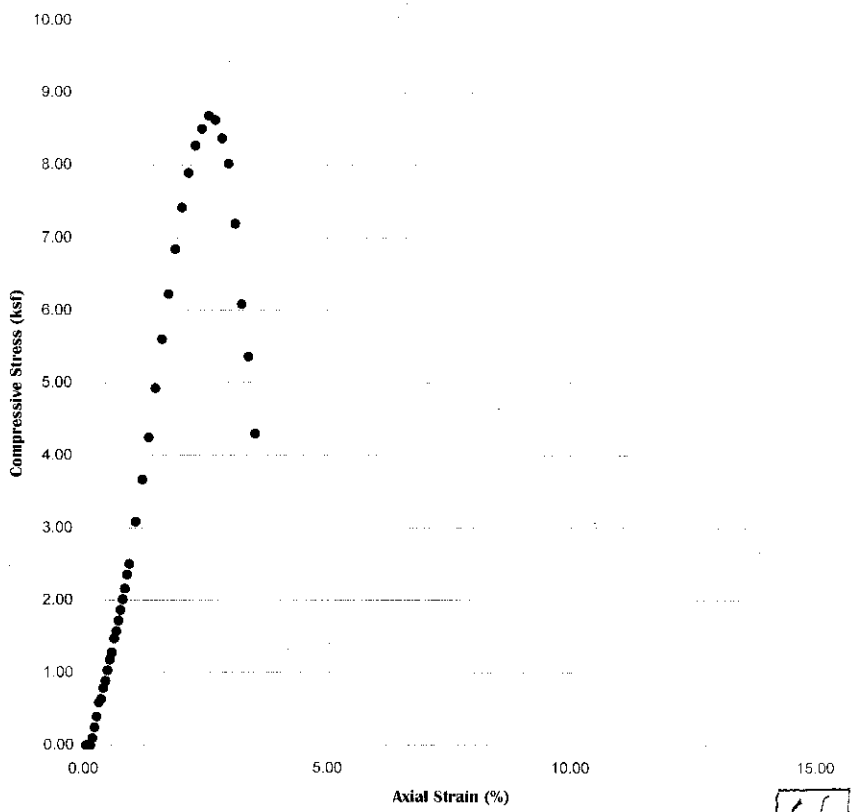
Test Number UC000146	Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Degree of Saturation (%)
Initial:	11.3			3.523	1.926	134.4	77.0

Project Name: Calpine Moreno Power Plant
Project Number: 5800011071.01
Exploration No: B-5 Sample No.: 1 Depth (ft): 3
Description and/or Classification: Dark brown sandy Clay (CL)

UNCONFINED COMPRESSION TEST

Figure : D-22

SR-206 (4/99) (SNA) uc000146.xls URS



Test Number UC000148	Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Degree of Saturation (%)
Initial:	10.0			3.290	1.925	141.4	87.2

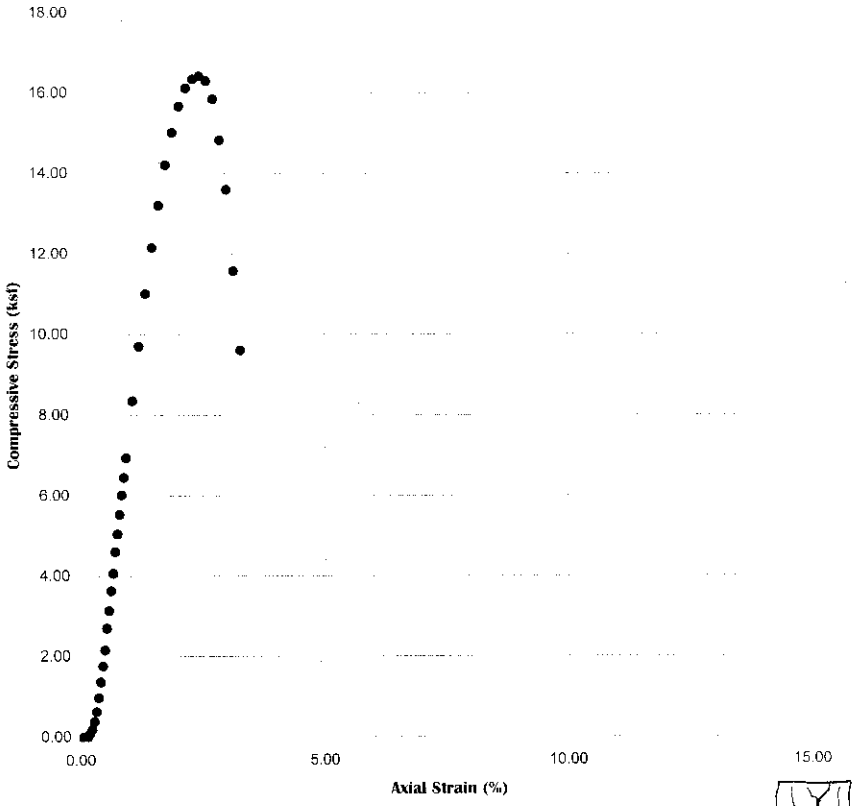
FAILURE SKETCH

Project Name: Calpine Moreno Power Plant
Project Number: 5800011071.01
Exploration No: B-5 Sample No.: 3 Depth (ft): 9
Description and/or Classification: Brown clayey Sand (SC)

UNCONFINED COMPRESSION TEST

Figure : D-23

SR-206 (4/99) (SNA) uc000148.xls URS



Test Number UC000149	Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Degree of Saturation (%)
Initial:	10.9			3.255	1.927	142.8	95.5

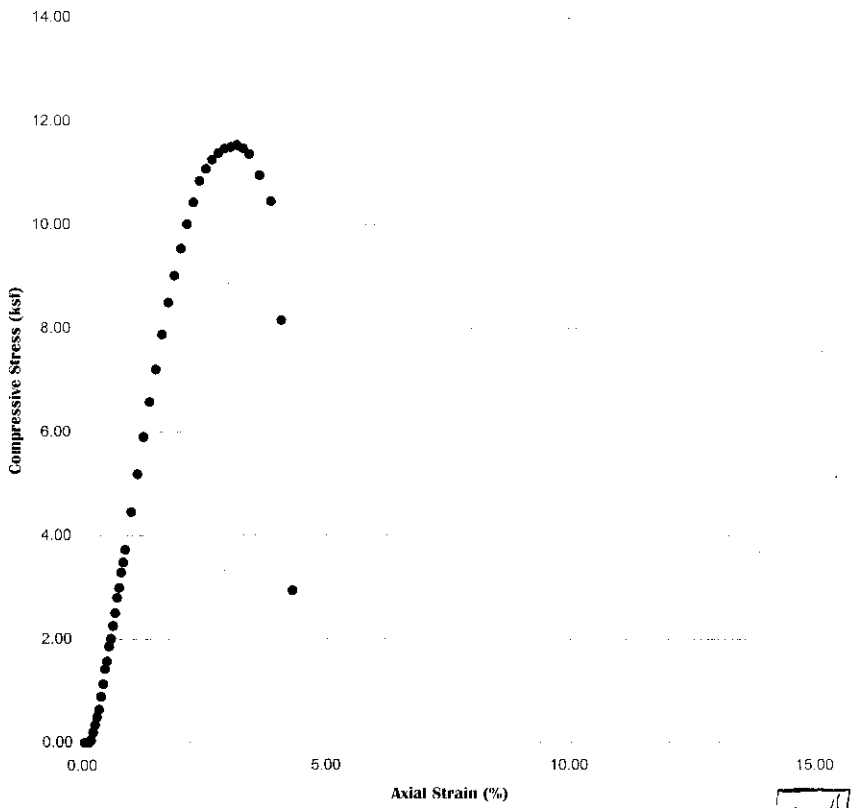
FAILURE SKETCH

Project Name: Calpine Moreno Power Plant
Project Number: 5800011071.01
Exploration No: B-6 Sample No.: 1 Depth (ft): 2
Description and/or Classification: Brown clayey Sand (SC)

UNCONFINED COMPRESSION TEST

Figure : D-24

SR-206 (4/99) (SNA) uc000149.xls URS



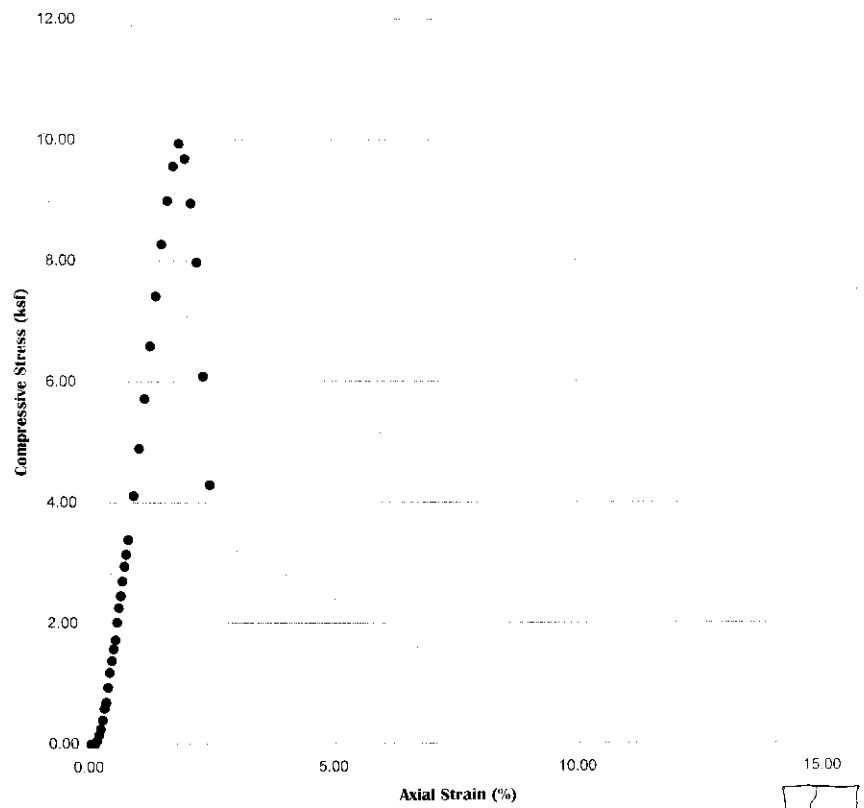
FAILURE SKETCH

Test Number UC000150	Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Degree of Saturation (%)
Initial:	10.1			3.506	1.926	142.9	91.3

Project Name: Calpine Moreno Power Plant
Project Number: 5800011071.01
Exploration No: B-6 Sample No.: 2 Depth (ft): 5
Description and/or Classification: Brown sandy Clay (CL)

UNCONFINED COMPRESSION TEST

Figure : **D-25**



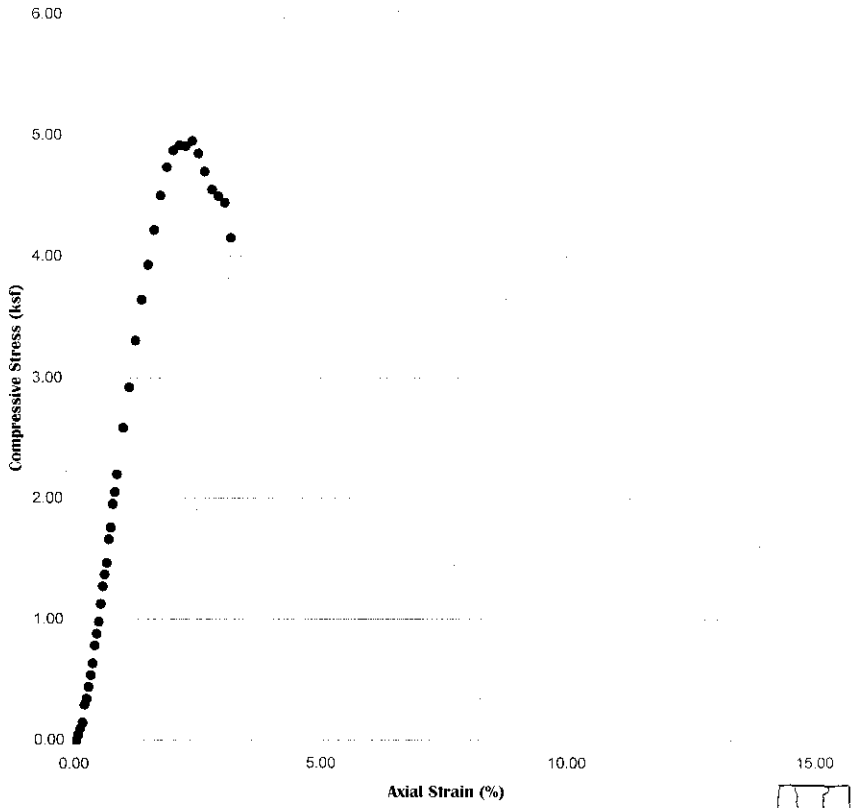
FAILURE SKETCH

Test Number UC000151	Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Degree of Saturation (%)
Initial:	8.2			3.781	1.926	143.1	81.1

Project Name: Calpine Moreno Power Plant
Project Number: 5800011071.01
Exploration No: B-6 Sample No.: 3 Depth (ft): 9
Description and/or Classification: Brown clayey Sand (SC)

UNCONFINED COMPRESSION TEST

Figure : **D-26**



Test Number UC000152	Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Degree of Saturation (%)
Initial:	9.8			3.520	1.929	130.7	63.6

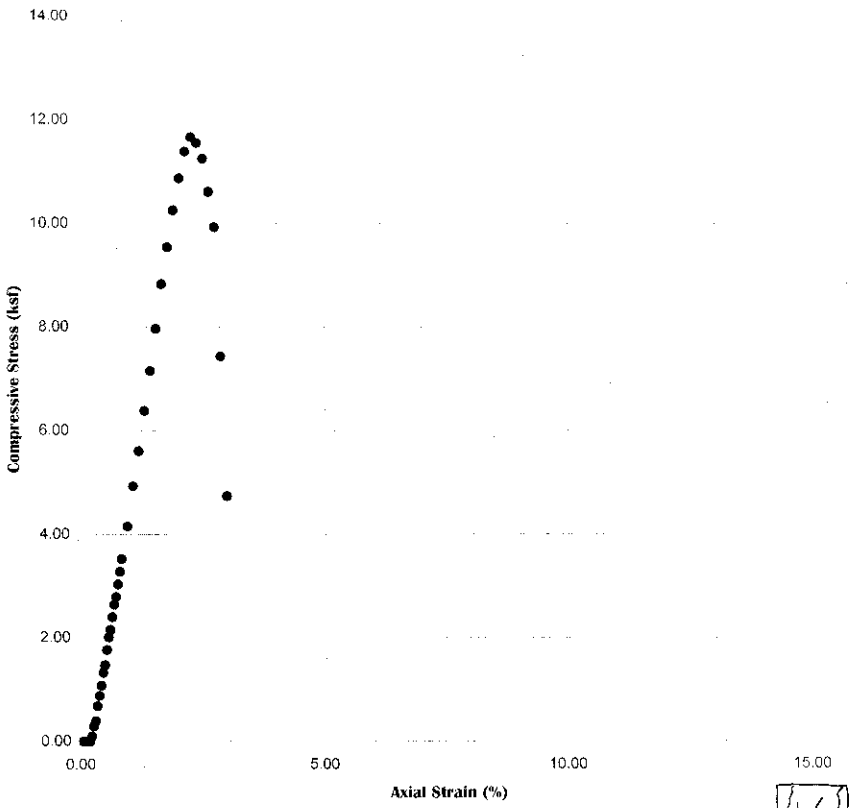
FAILURE SKETCH

Project Name: Calpine Moreno Power Plant
Project Number: 5800011071.01
Exploration No: B-7 Sample No.: 1 Depth (ft): 2
Description and/or Classification: Brown clayey Sand (SC)

UNCONFINED COMPRESSION TEST

Figure : D-27

SR-206 (4/99) (SNA) uc000152.xls URS



Test Number UC000153	Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Degree of Saturation (%)
Initial:	9.5			3.760	1.928	143.3	89.3

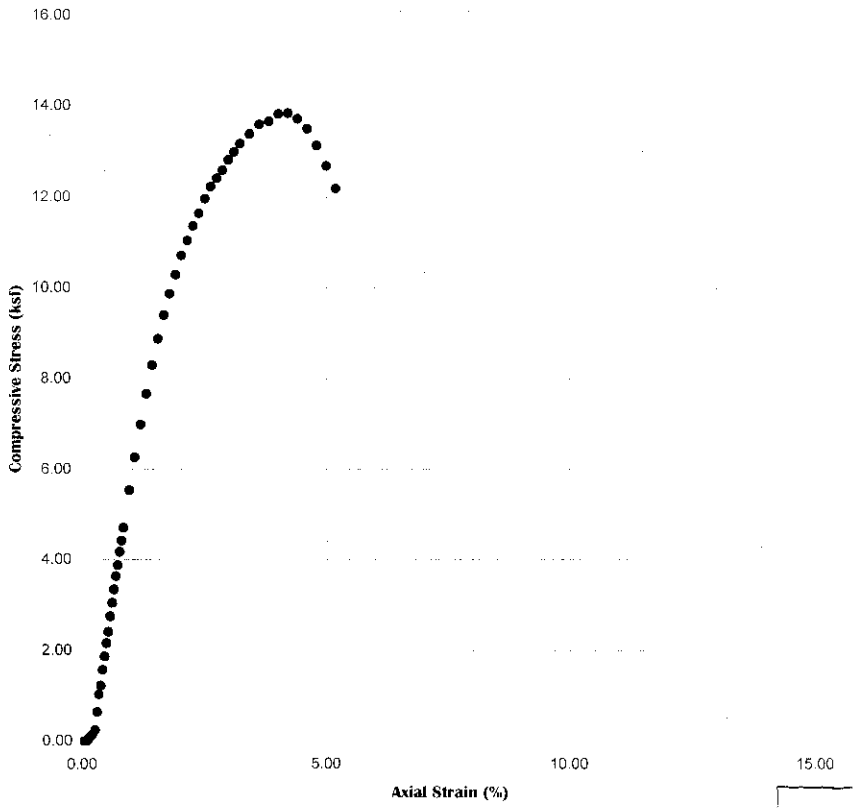
FAILURE SKETCH

Project Name: Calpine Moreno Power Plant
Project Number: 5800011071.01
Exploration No: B-7 Sample No.: 2 Depth (ft): 5
Description and/or Classification: Brown clayey Sand (SC)

UNCONFINED COMPRESSION TEST

Figure : D-28

SR-206 (4/99) (SNA) uc000153.xls URS



Test Number UC000154	Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Degree of Saturation (%)
Initial:	14.9			3.758	1.925	138.1	100.0

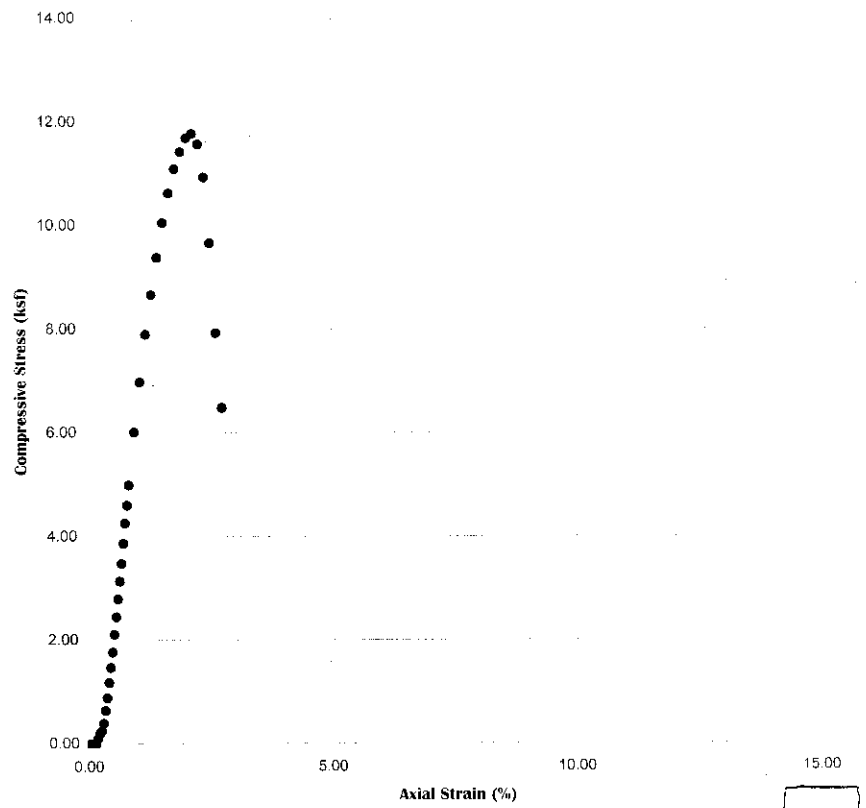
FAILURE SKETCH

Project Name: Calpine Moreno Power Plant
Project Number: 5800011071.01
Exploration No: B-7 Sample No.: 3 Depth (ft): 9
Description and/or Classification: Brown sandy Clay (CL)

UNCONFINED COMPRESSION TEST

Figure : D-29

SR-206 (4/99) (SNA) uc000154.xls URS



Test Number UC000155	Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Degree of Saturation (%)
Initial:	15.9			3.767	1.928	129.5	84.6

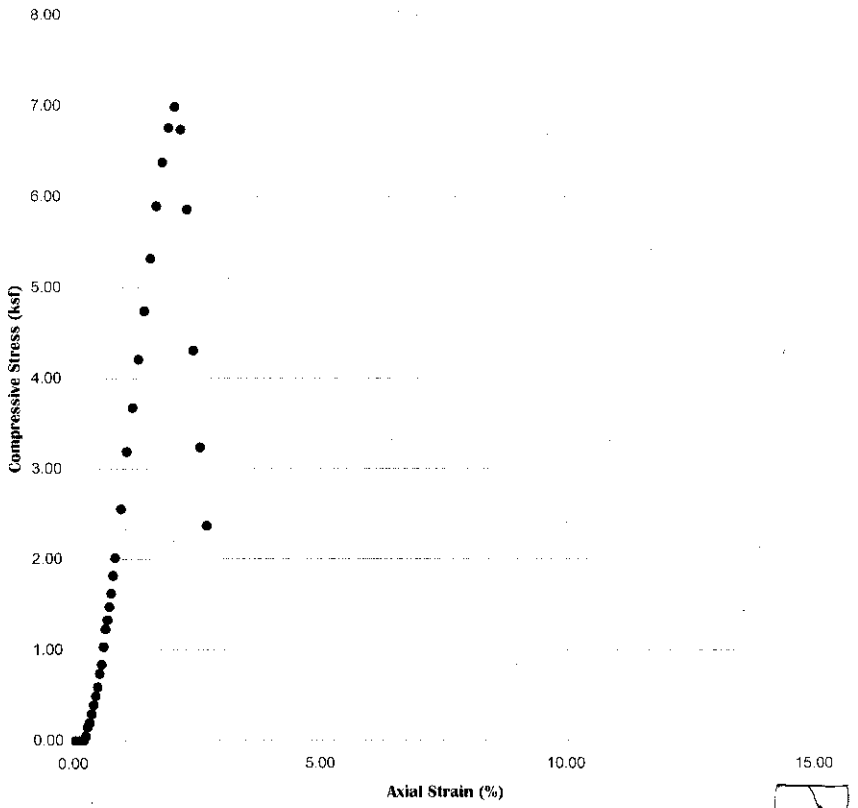
FAILURE SKETCH

Project Name: Calpine Moreno Power Plant
Project Number: 5800011071.01
Exploration No: B-8 Sample No.: 1 Depth (ft): 2
Description and/or Classification: Grayish brown clayey Sand (SC)

UNCONFINED COMPRESSION TEST

Figure : D-30

SR-206 (4/99) (SNA) uc000155.xls URS



Test Number UC000156	Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Degree of Saturation (%)
Initial:	9.5			3.638	1.923	136.6	73.1

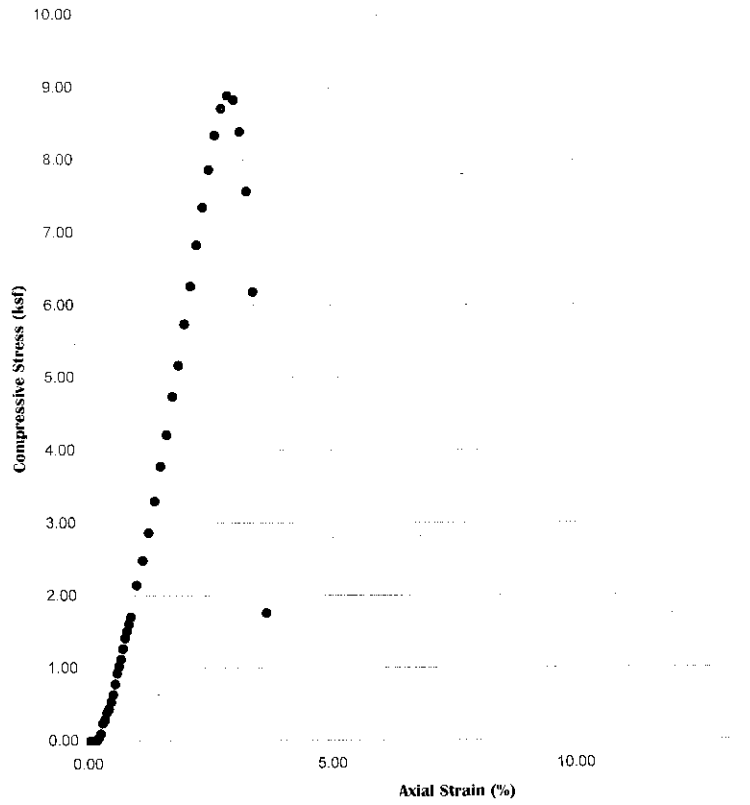
FAILURE SKETCH

Project Name: Calpine Moreno Power Plant
Project Number: 5800011071.01
Exploration No: B-8 Sample No.: 2 Depth (ft): 5
Description and/or Classification: Reddish brown clayey Sand (SC)

UNCONFINED COMPRESSION TEST

Figure : D-31

SR-206 (4/99) (SNA) uc000156.xls URS



Test Number UC000157	Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Degree of Saturation (%)
Initial:	21.8			3.512	1.930	115.9	76.5

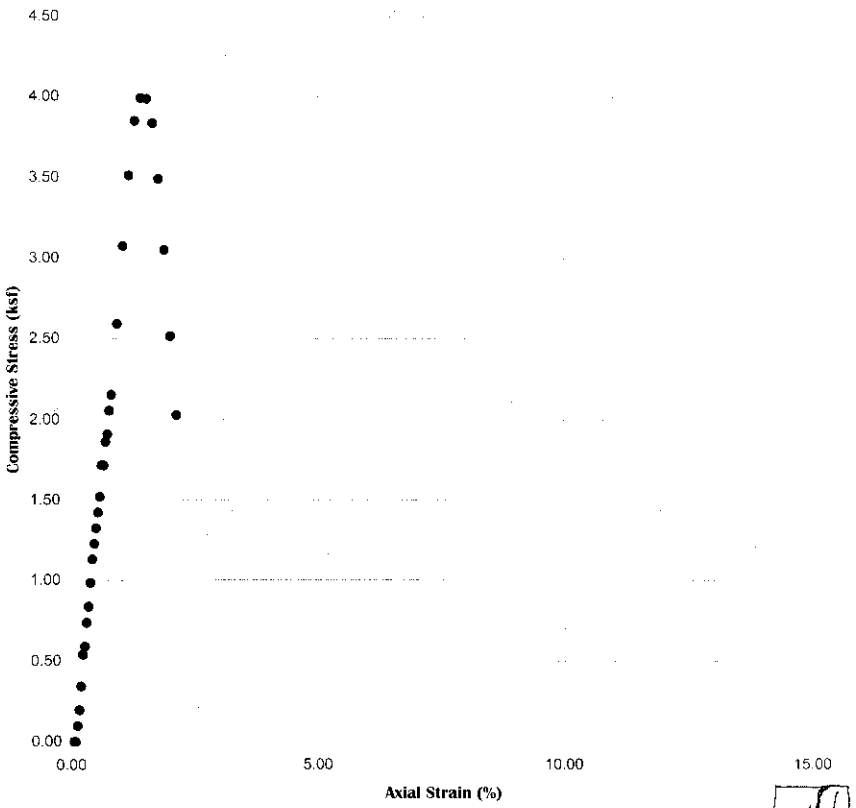
FAILURE SKETCH

Project Name: Calpine Moreno Power Plant
Project Number: 5800011071.01
Exploration No: B-8 Sample No.: 3 Depth (ft): 9
Description and/or Classification: Light brown sandy Silt (ML)

UNCONFINED COMPRESSION TEST

Figure : D-32

SR-206 (4/99) (SNA) uc000157.xls URS



Test Number UC000158	Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Degree of Saturation (%)
Initial:	3.6			3.757	1.927	125.6	25.1

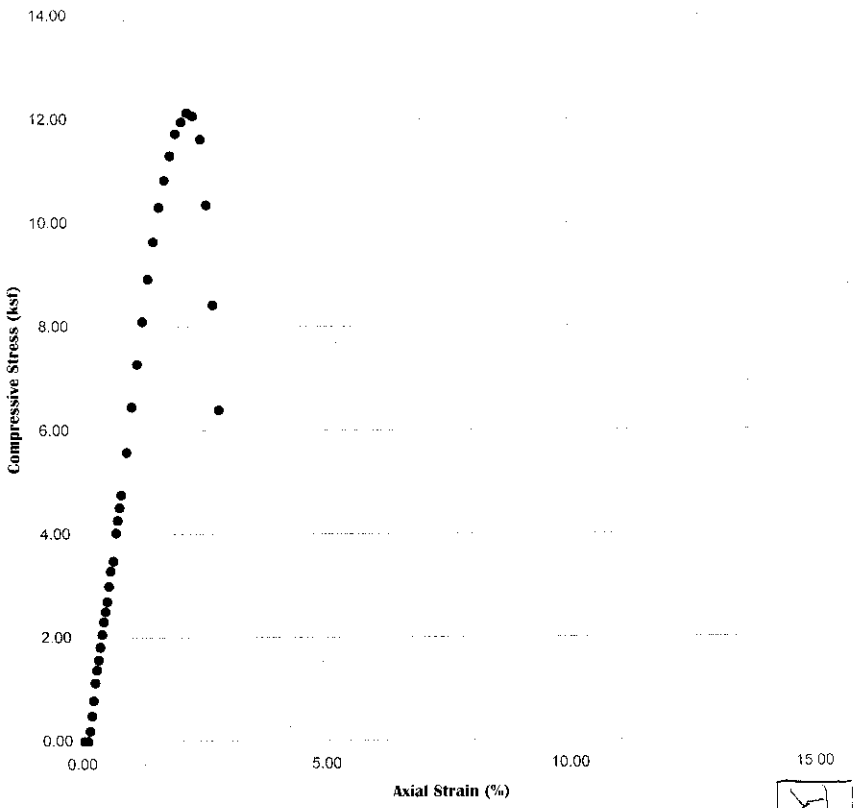
FAILURE SKETCH

Project Name: Calpine Moreno Power Plant
Project Number: 5800011071.01
Exploration No: B-9 Sample No.: 1 Depth (ft): 2
Description and/or Classification: Dark brown clayey Sand (SC)

UNCONFINED COMPRESSION TEST

Figure : D-33

SR-206 (4/99) (SNA) uc000158.xls URS



Test Number UC000159	Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Degree of Saturation (%)
Initial:	9.7			3.890	1.926	137.9	77.0

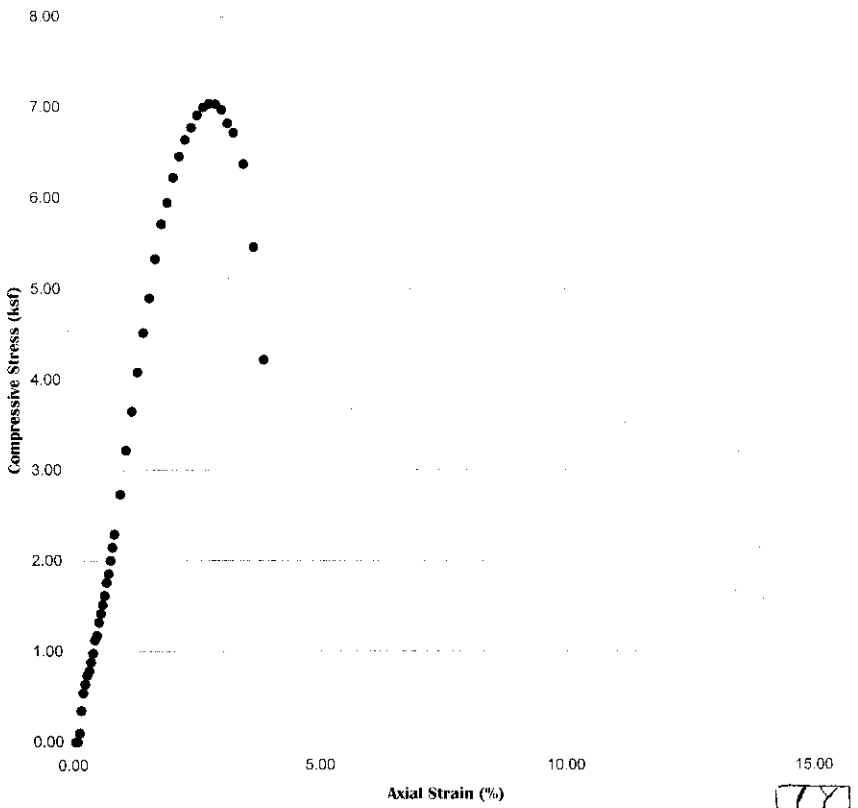
FAILURE SKETCH

Project Name: Calpine Moreno Power Plant
Project Number: 5800011071.01
Exploration No: B-9 Sample No.: 2 Depth (ft): 5
Description and/or Classification: Dark brown clayey Sand (SC)

UNCONFINED COMPRESSION TEST

Figure : D-34

SR-206 (4/99) (SNA) uc000159.xls URS



FAILURE SKETCH

Test Number UC000160	Water Content (%)	LL	PI	Length (in)	Diameter (in)	Wet Unit Weight (pcf)	Degree of Saturation (%)
Initial:	11.4			3.676	1.929	136.2	81.4

Project Name: Calpine Moreno Power Plant
Project Number: 5800011071.01
Exploration No: B-9 Sample No.: 3 Depth (ft): 9
Description and/or Classification: Brown clayey Sand (SC)

UNCONFINED COMPRESSION TEST

Figure : D-35

SR-208 (4/99) (SNA) uc000160.xls

URS

R - VALUE DATA SHEET

58-00011071.01/SIOC
TP-3-2 @ 1'-5'

PROJECT NUMBER 27496 BORING NUMBER: C-1:TP-1-1,TP-2-2

SAMPLE DESCRIPTION: Brown Sandy Silt

Item	SPECIMEN a	b	c
Mold Number	10	11	12
Water added, grams	100	78	67
Initial Test Water, %	14.4	12.5	11.5
Compact Gage Pressure,psi	65	165	230
Exudation Pressure, psi	101	250	373
Height Sample, Inches	2.64	2.56	2.45
Gross Weight Mold, grams	3303	3254	3247
Tare Weight Mold, grams	2123	2101	2117
Sample Wet Weight, grams	1180	1153	1130
Expansion, Inches x 10exp-4	0	7	10
Stability 2,000 lbs (160psi)	42 / 97	28 / 64	22 / 53
Turns Displacement	5.98	5.65	5.22
R-Value Uncorrected	21	40	49
R-Value Corrected	23	41	49
Dry Density, pcf	118.3	121.3	125.3
DESIGN CALCULATION DATA			
Traffic Index Assumed:	4.0	4.0	4.0
G.E. by Stability	0.79	0.60	0.52
G. E. by Expansion	0.00	0.23	0.33

Equilibrium R-Value 44 by EXUDATION

Examined & Checked: 11 /20/ 00

REMARKS: Gf = 1.25
0.0% Retained
on the 3/4" Sieve.

REGISTERED PROFESSIONAL ENGINEER STEVEN R. MARVIN 30659 12/31/00 CIVIL STATE OF CALIFORNIA

Steven R. Marvin, RCE 30659

The data above is based upon processing and testing samples as received from the field. Test procedures in accordance with latest revisions to Department of Transportation, State of California, Materials & Research Test Method No. 301.

Figure D-36

LaBelle • Marvin

R - VALUE DATA SHEET

58-00011071.01/SI0C
@ 2'-4.5'

PROJECT NUMBER 27496 BORING NUMBER: C-2:TP-4-2,TP-5-2

SAMPLE DESCRIPTION: Brown Sandy Clay

Item	SPECIMEN a	b	c
Mold Number	7	8	9
Water added, grams	90	70	59
Initial Test Water, %	15.2	13.4	12.4
Compact Gage Pressure,psi	50	110	165
Exudation Pressure, psi	207	303	525
Height Sample, Inches	2.43	2.43	2.43
Gross Weight Mold, grams	3206	3211	3225
Tare Weight Mold, grams	2125	2116	2113
Sample Wet Weight, grams	1081	1095	1112
Expansion, Inches x 10exp-4	8	24	37
Stability 2,000 lbs (160psi)	46 / 112	36 / 84	27 / 67
Turns Displacement	5.54	4.87	4.47
R-Value Uncorrected	16	32	44
R-Value Corrected	15	31	42
Dry Density, pcf	117.0	120.4	123.3
	DESIGN	CALCULATION	DATA
Traffic Index Assumed:	4.0	4.0	4.0
G.E. by Stability	0.87	0.71	0.59
G. E. by Expansion	0.27	0.80	1.23

Equilibrium R-Value 28 by EXPANSION

Examined & Checked: 11 /20/ 00

REMARKS: Gf = 1.25
0.0% Retained
on the 3/4" Sieve.

Steven R. Marvin, RCE 30659

The data above is based upon processing and testing samples as received from the field. Test procedures in accordance with latest revisions to Department of Transportation, State of California, Materials & Research Test Method No. 301.

Figure: D-37

LaBelle • Marvin

R - VALUE DATA SHEET

58-00011071.01/SI0C
TP-9-2,@ 3.5'-4.5'

PROJECT NUMBER 27496 BORING NUMBER: C-3:TP-7-2,TP-8-2

SAMPLE DESCRIPTION: Brown Sandy Silt

Item	SPECIMEN a	b	c
Mold Number	4	5	6
Water added, grams	100	80	73
Initial Test Water, %	14.7	13.0	12.4
Compact Gage Pressure,psi	175	275	350
Exudation Pressure, psi	185	470	794
Height Sample, Inches	2.47	2.43	2.41
Gross Weight Mold, grams	3206	3197	3213
Tare Weight Mold, grams	2120	2117	2122
Sample Wet Weight, grams	1086	1080	1091
Expansion, Inches x 10exp-4	9	19	38
Stability 2,000 lbs (160psi)	17 / 35	15 / 30	13 / 26
Turns Displacement	6.24	5.27	4.80
R-Value Uncorrected	59	67	73
R-Value Corrected	59	66	72
Dry Density, pcf	116.1	119.2	122.1
	DESIGN	CALCULATION	DATA
Traffic Index Assumed:	4.0	4.0	4.0
G.E. by Stability	0.42	0.35	0.29
G. E. by Expansion	0.30	0.63	1.27

Equilibrium R-Value 62 by EXUDATION

Examined & Checked: 11 /20/ 00

REMARKS: Gf = 1.25
0.0% Retained
on the 3/4" Sieve.

Steven R. Marvin, RCE 30659

The data above is based upon processing and testing samples as received from the field. Test procedures in accordance with latest revisions to Department of Transportation, State of California, Materials & Research Test Method No. 301.

Figure: D-38

LaBelle • Marvin

M. J. Schiff & Associates, Inc.
Consulting Corrosion Engineers - Since 1959
1308 Monte Vista Avenue, Suite 6
Upland, CA 91786-8224
Phone: 909/931-1360

Table 1 - Laboratory Tests on Soil Samples

Calpine Moreno Power Plant
Your #5800011071.01/SI001, MJS&A #00-0743LAB
15-Nov-00

Sample ID			TP-1,2,3 @ 3-5' SC	TP-4,5 @ 2-4' SC	TP-7,8,9 @ 3.5-4.5' SC	B-4-3 @9' CL	B-4-5 @19' SC
Resistivity		**Units**					
as-received		ohm-cm	63,000	8,500	4,500	1,600	4,200
saturated		ohm-cm	2,000	1,500	1,500	870	2,400
pH			7.6	7.6	7.7	7.4	7.5
Electrical Conductivity		mS/cm	0.07	0.09	0.10	0.11	0.05
Chemical Analyses							
Cations							
calcium	Ca^{2+}	mg/kg	24	16	20	24	ND
magnesium	Mg^{2+}	mg/kg	ND	ND	ND	10	ND
sodium	Na^{1+}	mg/kg	52	65	76	68	53
Anions							
carbonate	CO_3^{2-}	mg/kg	ND	ND	ND	ND	ND
bicarbonate	HCO_3^{1-}	mg/kg	104	92	116	61	40
chloride	Cl^{1-}	mg/kg	14	21	14	50	25
sulfate	SO_4^{2-}	mg/kg	65	74	96	122	45
Other Tests							
ammonium	NH_4^{1+}	mg/kg	na	na	na	na	na
nitrate	NO_3^{1-}	mg/kg	na	na	na	na	na
sulfide	S^{2-}	qual	na	na	na	na	na
Redox		mv	na	na	na	na	na

Electrical conductivity in millisiemens/cm and chemical analysis were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

Figure D-39

M. J. Schiff & Associates, Inc.
Consulting Corrosion Engineers - Since 1959
1308 Monte Vista Avenue, Suite 6
Upland, CA 91786-8224
Phone 909/931.1360

Table 1 - Laboratory Tests on Soil Samples

Calpine Moreno Power Plant
Your #5800011071.01/SI001, MJS&A #00-0743LAB
15-Nov-00

Sample ID			B-4-7 @ 29' SC	B-4-9 @ 39' SC	B-4-11 @ 49' SC
Resistivity		**Units**			
as-received		ohm-cm	2,400	3,900	3,900
saturated		ohm-cm	1,900	2,400	2,200
pH			7.7	7.7	7.8
Electrical Conductivity		mS/cm	0.07	0.04	0.07
Chemical Analyses					
Cations					
calcium	Ca^{2+}	mg/kg	ND	ND	ND
magnesium	Mg^{2+}	mg/kg	ND	ND	ND
sodium	Na^{1+}	mg/kg	79	46	92
Anions					
carbonate	CO_3^{2-}	mg/kg	ND	ND	ND
bicarbonate	HCO_3^{1-}	mg/kg	43	40	49
chloride	Cl^{1-}	mg/kg	21	25	46
sulfate	SO_4^{2-}	mg/kg	103	31	91
Other Tests					
ammonium	NH_4^{1+}	mg/kg	na	na	na
nitrate	NO_3^{1-}	mg/kg	na	na	na
sulfide	S^{2-}	qual	na	na	na
Redox		mv	na	na	na

Electrical conductivity in millisiemens/cm and chemical analysis were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.
Redox = oxidation-reduction potential in millivolts
ND = not detected
na = not analyzed

Figure D-40

APPENDIX H

PHASE I
ENVIRONMENTAL SITE ASSESSMENT

CALPINE CORPORATION
6700 Koll Center Parkway, Suite 200
Pleasanton, California 94566

PHASE I ENVIRONMENTAL SITE ASSESSMENT

Inland Empire Energy Center
26226 Antelope Road
Romoland, California

FOSTER WHEELER ENVIRONMENTAL CORPORATION

1940 E. Deere Avenue
Santa Ana, California 92705

MAY 14, 2001

APPENDIX H PHASE I ENVIRONMENTAL SITE ASSESSMENT
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EXECUTIVE SUMMARY

Foster Wheeler Environmental Corporation conducted a Phase I Environmental Site Assessment of the property located at 26226 Antelope Road in Romoland, California. The purpose of this Phase I ESA was to identify, to the extent feasible pursuant to the processes prescribed herein, recognized environmental conditions, if any, associated with the site. This was accomplished by reviewing reasonably ascertainable records and conducting a site and area reconnaissance.

A recognized environmental condition, as defined by the American Society for Testing and Materials (ASTM) Standard Practice E 1527-00, is the presence or likely presence of hazardous substances or petroleum products on a property under conditions that, without employing sampling, testing, or intrusive techniques, appear to indicate an existing release, a past release, or a material threat of a release into the property's structures or into the ground, groundwater, or surface water.

The following summary is based upon the site and vicinity reconnaissance, a historical review, and a review of federal, state, and local public records:

- The property consists of one 45.8-acre parcel located northwest of the intersection of Antelope and McLaughlin Roads, in Romoland, California.
- The site is currently used for agriculture. High-powered electrical lines, telephone lines, and a drainage ditch run parallel to the southern property boundary. Concrete debris from an old irrigation system and some old tires are in the center of the east side of the site.
- Review of the site history indicates that the site has been vacant or used for agriculture since prior to 1953.
- Evidence of past or present hazardous substance use, storage or disposal was not observed on the property during the site reconnaissance.
- An asphalt-gravel plant is north of the site. Piles of asphalt and gravel and old conveyors and other equipment used at the gravel plant are east of the site. Matthews Road and the AT & SF Railroad are northeast of the site. Residential and vacant properties are south of the site, across McLaughlin Road. Construction equipment is stored on a portion of the property west of the site, across Antelope Road. The remainder of the western adjoining property is vacant.
- Environmental Data Resources, Inc., (EDR) was retained to perform an environmental database search for locations identified as hazardous substance and/or hazardous waste facilities near the subject property. The site was not identified on any of databases searched and the search did not identify facilities within the search distances specified in the ASTM; Standard Practice for Environmental Site Assessments: Phase I Site Assessment Process: ASTM Designation E1527-00.

Foster Wheeler Environmental Corporation does not recommend additional assessment of the site at this time.

1.0 INTRODUCTION

This report presents the results of a Phase I Environmental Site Assessment (ESA) of the property located at 26226 Antelope Road in Romoland, California. This report was prepared by Foster Wheeler Environmental Corporation (Foster Wheeler Environmental) for the sole use of Calpine Corporation (Calpine) pursuant to the express limitations provided in Sections 1.2 and 5.2. The project was approved by Gregory A. Lamberg of Calpine on April 5, 2001. The format of this report is generally consistent with the recommended format in "Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process," issued by the American Society for Testing and Materials (ASTM Standard E1527-00).

1.1 PURPOSE

The purpose of this Phase I ESA was to identify recognized environmental conditions in connection with the property. As defined in the ASTM Standard Practice E1527-00, "recognized environmental conditions" are defined as "the presence or likely presence of hazardous substances or petroleum products on a property under conditions that, without employing sampling, testing, or intrusive techniques, appear to indicate an existing release, a past release, or a material threat of a release into the property's structures or into the ground, groundwater, or surface water of the property."

1.2 LIMITING CONDITIONS AND METHODOLOGY USED

This assessment was performed by Kristen Williamson RG, REA of Foster Wheeler Environmental (see appendix D for resume). The scope of services for this project was limited to the following tasks:

- Task 1 - Review of Available Records and Documents;
- Task 2 - Site and Area Reconnaissance; and
- Task 3 – Data Analysis and Report Preparation.

This Phase I ESA did not include wetlands evaluation, testing for or surveying of asbestos, radon, lead in potable water, or lead paint. Also, this assessment did not include any soil or groundwater sampling.

2.0 SITE DESCRIPTION

The information in this section was obtained from the site and area reconnaissance and a records review.

2.1 SITE LOCATION AND LEGAL DESCRIPTION

The property consists of a 45.8-acre parcel northwest of the intersection of Antelope and McLaughlin Roads, as shown on United States Geological Survey Maps (USGS) 7.5 Minute Quadrangle, Romoland, California. The site location is shown on Figure 1, Site Location Map. The site is identified by the Riverside County Assessor's office as Parcel No. 331-180-008.

2.2 SITE AND VICINITY CHARACTERISTICS

The site is irregularly-shaped and fairly level. Antelope Road runs along the west side of the property and McLaughlin Road runs along the south side of the property. Both Antelope and McLaughlin are graded dirt roads. Matthews Road and the AT&SF Railroad are northeast of the property. The site is in a mixed-use area. Properties in the general site area are a mix of commercial, residential, and vacant property.

2.3 SITE IMPROVEMENTS

High-powered electrical lines, telephone lines, and a drainage ditch run parallel to the southern property boundary. The remainder of the property is cultivated.

2.4 ENVIRONMENTAL LIENS

No reported National Priority List (NPL) liens associated with the property were identified in the Environmental Site Assessment Report prepared by Environmental Data Resources, Inc. (EDR). A copy of the EDR Report is provided in Appendix B.

2.5 CURRENT USES OF THE PROPERTY

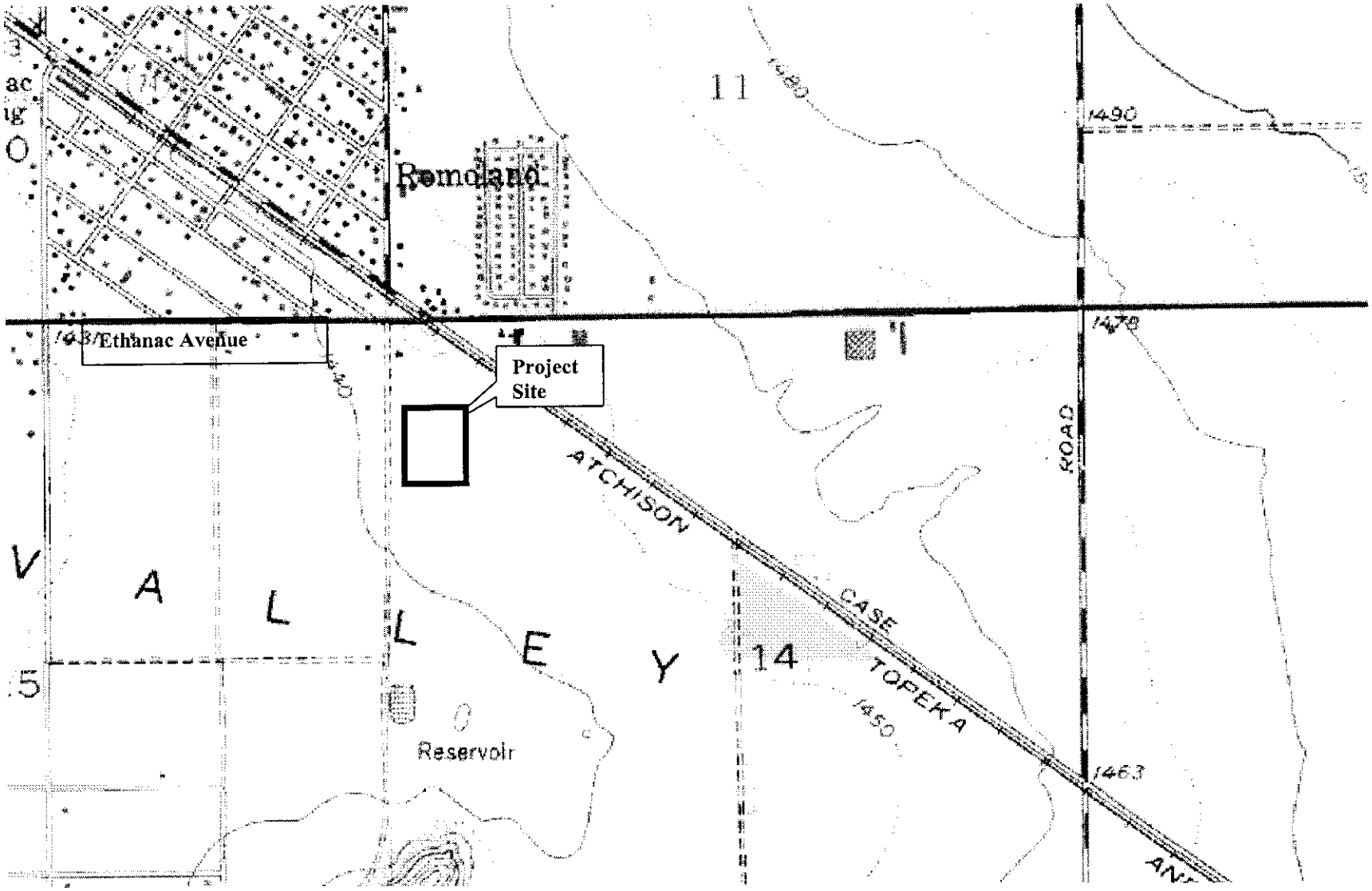
The property is currently used for agriculture.

2.6 PAST USES OF THE PROPERTY

A review of the site history indicates that the property has been vacant or used for agriculture since prior to 1953.

2.7 CURRENT AND PAST USES OF ADJOINING PROPERTY

An asphalt-gravel plant is north of the site. Piles of asphalt and gravel and old conveyors and other equipment used at the gravel plant are east of the site. Matthews Road and the AT&SF Railroad are northeast of the site. Residential and vacant properties are south of the site, across McLaughlin Road. Construction equipment is stored on a portion of the property west of the site, across Antelope Road. The remainder of the western adjoining property is vacant.



Inland Empire Energy Center
Inland Empire Energy Center, LLC

Figure 1
Site Location

A review of aerial photographs indicates that the adjoining properties north, west, and east of the site were vacant from 1953 through 1994. The residential property south of the site was developed some time between 1967 and 1989. The railroad northeast of the site has been developed prior to 1953.

3.0 RECORDS AND DATA REVIEW

3.1 REGULATORY AGENCY DATABASE SEARCH

This section of the report is a compilation of federal, state, and local environmental databases. The information contained in these reports is current as of the date the agency database was last updated. However, due to the dynamic nature of environmental laws and data reporting, this information will change over time.

A search of available environmental records was performed by EDR, and a report was issued to Foster Wheeler Environmental on April 20, 2001. The lists searched and the search distances are specified by ASTM standards. The EDR report contains additional lists beyond those specified in ASTM, which are discussed below only if environmental concerns were noted. The EDR report summarizes the origin and purpose of each list, specifies the distance searched from the site, and identifies the date the list was last updated. Other than specifying the project location, Foster Wheeler Environmental did not participate in the research or compilation of the records report. A copy of this report is provided in Appendix B. Databases reviewed for the subject property and the ASTM Standard E1527-97 search radius around the subject properties included:

- CERCLIS - Comprehensive Environmental Response, Compensation, and Liability Information System. CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies, and private persons pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priority List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.
- CERCLIS-NFRAP – CERCLIS No Further Action Planned. The CERCLIS-NFRAP identifies facilities which have been removed from the CERCLIS list because no further action is planned.
- ERNS - Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.
- NPL - National Priority List. The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program.
- Delisted NPL – Delisted National Priority List. The Delisted NPL identifies facilities deleted from the NPL where no further response is appropriate.

- RCRIS - Resource Conservation and Recovery Information System. RCRIS includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA).
- CORRACTS - Corrective Action Report. CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.
- LUST - Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents.
- AWP – Annual Workplan. The AWP identifies known hazardous substances sites targeted for cleanup.
- Cal-Sites – The Cal-Sites database identifies facilities with potential or confirmed hazardous substance releases.
- CHMIRS – California Hazardous Material Incident Report System. The CHMIRS report contains information on reported hazardous material incidents (accidental releases or spills).
- SWF/LF - Solid Waste Facilities/Landfill Sites. SWF/LF type records typically contain an inventory of solid waste disposal facilities or landfills in a particular state.
- UST - Registered Underground Storage Tanks. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA) and must be registered with the state department responsible for administering the UST program.

The site was not identified on the databases searched and EDR did not identify any facilities within the ASTM-specified search radius. The EDR report includes a list of orphan sites. The orphan summary identifies sites that have incomplete address information and could not be plotted. Based on a review of the orphan sites and comparison with local street maps, none of the orphan sites appear to be within one mile of the subject property.

3.2 PHYSICAL SETTING SOURCES

The US Department of the Interior, Geological Survey (USGS) Topographic Map (7.5-minute series) for the Romoland Quadrangle was obtained to provide information on the site location and its surroundings. The site is located in the Perris Valley. The San Jacinto River is about three miles northwest of the site and the Lakeview Mountains are about three miles to the northeast. The site is located at an elevation of about 1,445 feet above mean sea level.

In a preliminary geotechnical investigation of the site, groundwater was encountered at a depth of 78.5 feet (URS, 2000). This corresponds to an elevation of +1364 feet above mean sea level. Based on well data provided by the Eastern Municipal Water District, the direction of regional groundwater flow in the general vicinity of the project area is from east to west (URS, 2000).

3.3 HISTORICAL USE INFORMATION SOURCES

3.3.1 Aerial Photographs

Aerial photographs showing the site were requested from EDR's Aerial Photography Print Service. EDR provided photographs covering the site for the years 1953, 1967, 1989, and 1994. A review of the aerial photographs indicates that the site has been vacant or used for agriculture since 1953.

4.0 INFORMATION FROM SITE RECONNAISSANCE AND INTERVIEWS

On May 3, 2001, Ms. Kristen Williamson of Foster Wheeler Environmental visited the site to obtain information with regard to the likelihood of identifying recognized environmental conditions, if any, associated with the property. Ms. Williamson conducted the site reconnaissance unaccompanied and did not interview persons familiar with the site because a site contact was not provided.

Copies of select photographs taken during the site reconnaissance are provided in Appendix A. The results of the site reconnaissance are provided in Section 2.0 and the following sections. Foster Wheeler Environmental did not have access to the interior of the residential buildings on the site during the site visit.

4.1 HAZARDOUS AND NON-HAZARDOUS SUBSTANCES IN CONNECTION WITH IDENTIFIED USES

Hazardous and non-hazardous substances were not identified during the site reconnaissance.

4.2 HAZARDOUS AND NON-HAZARDOUS SUBSTANCES AND UNIDENTIFIED CONTAINERS

Unidentified containers were not identified during the site reconnaissance.

4.3 STORAGE TANKS

Evidence of aboveground or underground storage tanks was not observed during the site reconnaissance.

4.4 INDICATIONS OF POLYCHLORINATED BIPHENYLS (PCBs)

Electrical transformers and other equipment likely to contain PCBs were not observed during the site reconnaissance.

4.5 INDICATIONS OF SOLID WASTE

Several old tires and concrete debris were observed in the center of the east side of the property. According to Mr. Aaron Knox of Harley, Knox & Associates, Inc., who has been in contact with the property owner, the concrete debris is from an old irrigation system used at the site about 30 years ago. Evidence of landfilling or other solid waste disposal was not observed during the site reconnaissance.

4.6 OTHER CONDITIONS OF CONCERN

Other conditions of concern were not identified during the site reconnaissance.

5.0 FINDINGS AND CONCLUSIONS

Foster Wheeler Environmental conducted a Phase I ESA of the property located at 26226 Antelope Road in Romoland, California. The purpose of this Phase I ESA was to identify, to the extent feasible pursuant to the processes described herein, recognized environmental conditions, if any, associated with the property. Our findings are summarized as follows:

- The property consists of one 45.8-acre parcel located northwest of the intersection of Antelope and McLaughlin Roads, in Romoland, California. Figure 1 shows the site location.
- The site is currently used for agriculture. High-powered electrical lines, telephone lines, and a drainage ditch run parallel to the southern property boundary. Concrete debris from an old irrigation system and some old tires are in the center of the east side of the site.
- Review of the site history indicates that the site has been vacant or used for agriculture since prior to 1953.
- Evidence of past or present hazardous substance use, storage or disposal was not observed on the property during the site reconnaissance.
- An asphalt-gravel plant is north of the site. Piles of asphalt and gravel and old conveyors and other equipment used at the gravel plant are east of the site. Matthews Road and the AT & SF Railroad are northeast of the site. Residential and vacant properties are south of the site, across McLaughlin Road. Construction equipment is stored on a portion of the property west of the site, across Antelope Road. The remainder of the western adjoining property is vacant.
- EDR was retained to perform an environmental database search for locations identified as hazardous substance and/or hazardous waste facilities near the subject property. The site was not identified on any of databases searched and the search did not identify facilities within the search distances specified in the ASTM; Standard Practice for Environmental Site Assessments: Phase I Site Assessment Process: ASTM Designation E1527-00.

Foster Wheeler Environmental does not recommend additional assessment of the site at this time.

5.1 LIMITATIONS AND EXCEPTIONS OF ASSESSMENT

This report is prepared for the sole use of Calpine pursuant to our proposal dated February 6, 2001. The scope of work and the findings should not be considered suitable for other potential users and any use by other parties shall be at their sole risk.

This report is based on review of limited data, as described herein, in accordance with generally accepted professional practices, applicable to work of similar nature and complexity of similar localities, at the time the services were performed. No warranty, express or implied, is made. The scope of this report is limited in nature and intended to provide a preliminary evaluation of the current obvious environmental conditions at the site at the time of the report and does not constitute definitive or in-depth review of all the potential environmental impairments and situations. Foster Wheeler Environmental assumes no responsibility for conditions of which it is unaware and/or as to which there was no opportunity or request for review.

It is important to recognize that even the most comprehensive scope of services may not detect all the environmental liabilities at a particular site. Therefore, nothing herein shall be construed as a representation, warranty or certification that the site is either fully characterized or is free of environmental impairments and/or contamination.

In order to conduct the investigation for this report, Foster Wheeler Environmental relied upon the readily available information, as discussed in the report and, unless explicitly included in our scope, included no verification of the accuracy or completeness of documentation or data or possible withholding of information by any of the interviewees, agencies, or other parties. (Please also refer to the EDR Disclaimer, Appendix B.)

6.0 REFERENCES

EDR-Radius Map with GeoCheck Report, NWC McLaughlin Road/Antelope Road, Perris, California, prepared by Environmental Data Resources, Inc., April 20, 2001

EDR-Aerial Photograph Report, NWC McLaughlin Road/Antelope Road, Perris, California, prepared by Environmental Data Resources, Inc., April 26, 2001

URS. 2000. Preliminary Geotechnical Investigation – Calpine Moreno Power Plant, Riverside County, California.

US Geological Survey (USGS). 1976. Romoland Quadrangle, California, 7.5-minute series (topographic): USGS, scale 1:24,000, 1 sheet.

Mr. Aaron Knox, Harley, Knox & Associates, Inc., Personal Communication with Dwight Mudry, May 10, 2001.

7.0 SIGNATURE OF ENVIRONMENTAL PROFESSIONALS

Preparation of this Report was conducted by the following Foster Wheeler Environmental personnel:

Kristen Williamson, RG, REA
Environmental Geologist

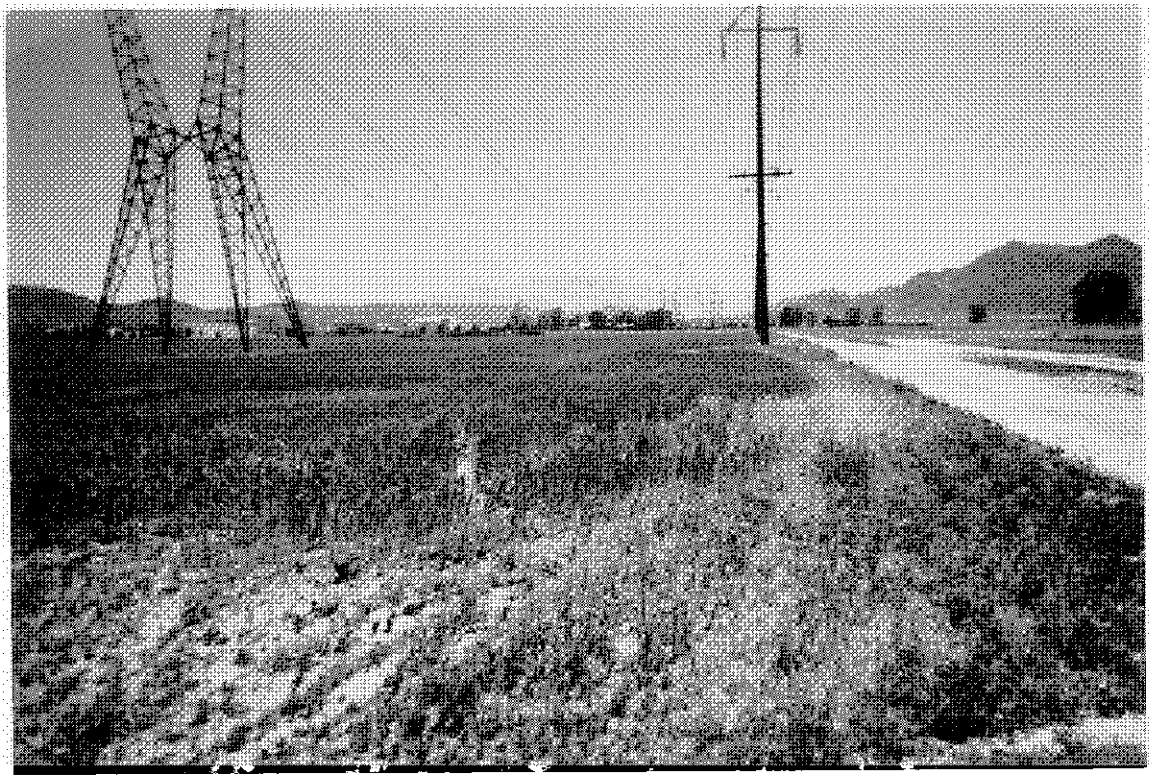
Review of the Report was performed by the following Foster Wheeler Environmental personnel:

Dwight Mudry, Ph.D.
Consulting Scientist

APPENDIX A

SITE RECONNAISSANCE PHOTOGRAPHS

View of Site from Southern Boundary, Looking North



View of Southern Boundary of Site, Looking East

APPENDIX B

ENVIRONMENTAL DATA RESOURCES, INC. REPORT

The EDR Radius Map
with GeoCheck®

NWC McLaughlin Rd/Antelope Rd
NWC McLaughlin Rd/Antelope Rd
Perris, CA 92585

Inquiry Number: 622543.3s

April 20, 2001

Environmental Data Resources, Inc.

The Source For Environmental Risk Management Data

3530 Post Road
Southport, Connecticut 06490

Nationwide Customer Service

Telephone: 1-800-352-0050
Fax: 1-800-231-6802
Internet: www.edrnet.com

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Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

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EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc. (EDR). The report meets the government records search requirements of ASTM Standard Practice for Environmental Site Assessments, E 1527-00. Search distances are per ASTM standard or custom distances requested by the user.

TARGET PROPERTY INFORMATION

ADDRESS

NWC MCLAUGHLIN RD/ANTELOPE RD
PERRIS, CA 92585

COORDINATES

Latitude (North):	33.737110 - 33' 44' 13.6"
Longitude (West):	117.170260 - 117' 10' 12.9"
Universal Tranverse Mercator:	Zone 11
UTM X (Meters):	484228.2
UTM Y (Meters):	3732827.2

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property:	2433117-F2 ROMOLAND, CA
Source:	USGS 7.5 min quad index

TARGET PROPERTY SEARCH RESULTS

The target property was not listed in any of the databases searched by EDR.

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the ASTM E 1527-00 search radius around the target property for the following databases:

FEDERAL ASTM STANDARD

NPL	National Priority List
Proposed NPL	Proposed National Priority List Sites
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CERC-NFRAP	CERCLIS No Further Remedial Action Planned
CORRACTS	Corrective Action Report
RCRIS-TSD	Resource Conservation and Recovery Information System
RCRIS-LQG	Resource Conservation and Recovery Information System
RCRIS-SQG	Resource Conservation and Recovery Information System
ERNS	Emergency Response Notification System

STATE ASTM STANDARD

AWP	Annual Workplan Sites
Cal-Sites	Calsites Database
CHMIRS	California Hazardous Material Incident Report System
Cortese	"Cortese" Hazardous Waste & Substances Sites List

EXECUTIVE SUMMARY

Notify 65	Proposition 65 Records
Toxic Pits	Toxic Pits Cleanup Act Sites
SWF/LF	Solid Waste Information System
WMUDS/SWAT	Waste Management Unit Database
LUST	Leaking Underground Storage Tank Information System
UST	Hazardous Substance Storage Container Database
CA BOND EXP. PLAN	Bond Expenditure Plan
CA FID UST	Facility Inventory Database

FEDERAL ASTM SUPPLEMENTAL

CONSENT	Superfund (CERCLA) Consent Decrees
ROD	Records Of Decision
Delisted NPL	National Priority List Deletions
FINDS	Facility Index System/Facility Identification Initiative Program Summary Report
HMIRS	Hazardous Materials Information Reporting System
MLTS	Material Licensing Tracking System
MINES	Mines Master Index File
NPL Liens	Federal Superfund Liens
PADS	PCB Activity Database System
RAATS	RCRA Administrative Action Tracking System
TRIS	Toxic Chemical Release Inventory System
TSCA	Toxic Substances Control Act
FTTS	FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)

STATE OR LOCAL ASTM SUPPLEMENTAL

AST	Aboveground Petroleum Storage Tank Facilities
CA WDS	Waste Discharge System
CA SLIC	Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
HAZNET	Hazardous Waste Information System

EDR PROPRIETARY DATABASES

Coal Gas	Former Manufactured Gas (Coal Gas) Sites

SURROUNDING SITES: SEARCH RESULTS

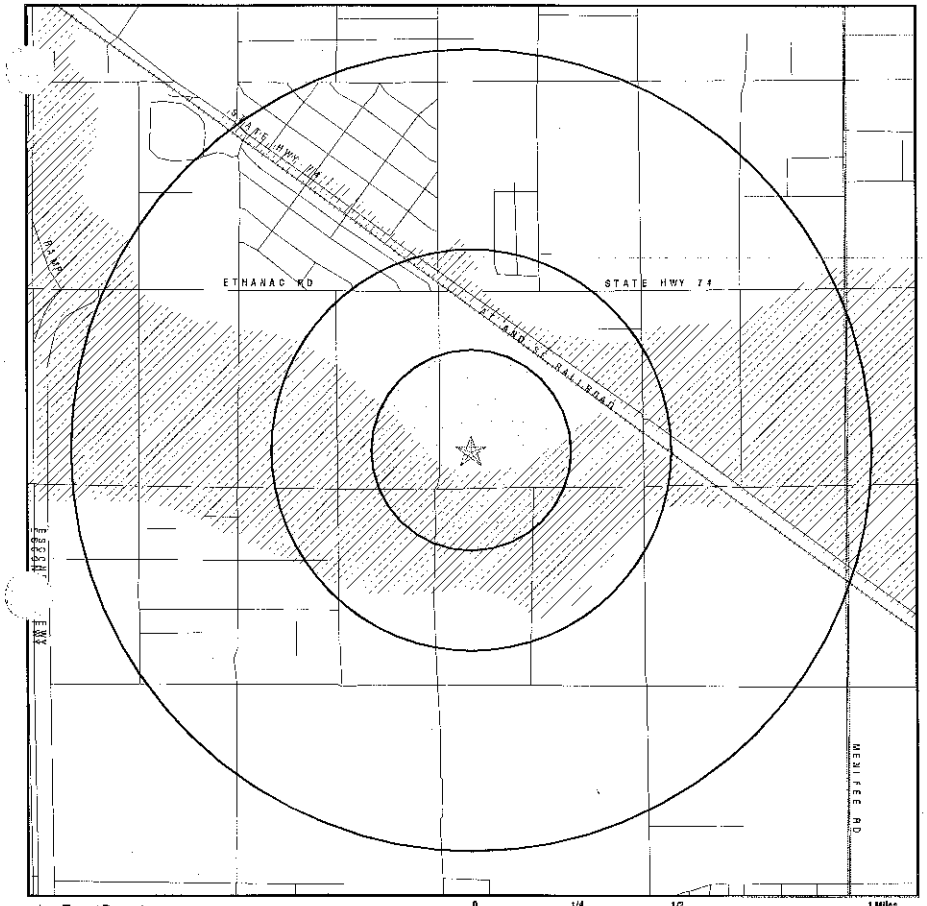
Surrounding sites were not identified.

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped:

Site Name	Database(s)
S.T.R. TIRE RECYCLING	SWF/LF
ALVIN C SMITH WTS	SWF/LF
ECOLOGY FARMS	SWF/LF
HOMELAND	SWF/LF
CALTRANS	LUST
CAL TRANS	LUST
NICANOR ARCE	HAZNET
ALUMAX BUILDING PRODUCTS	HAZNET

OVERVIEW MAP - 622543.3s - Foster Wheeler

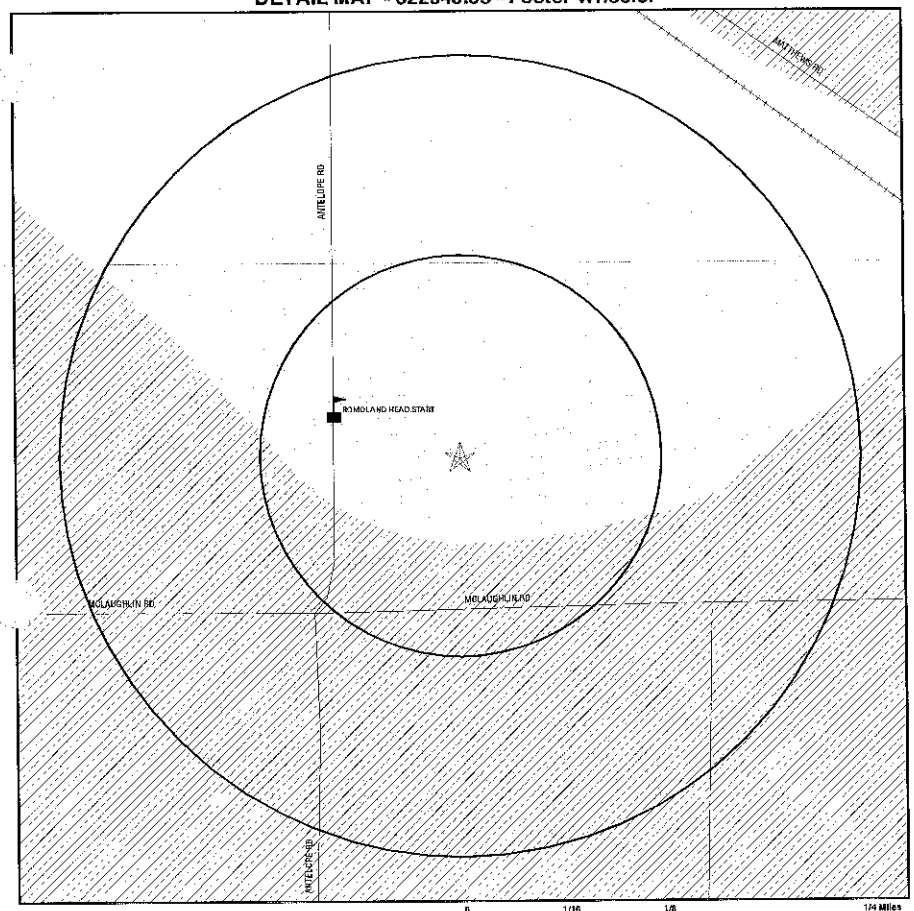


0 1/4 1/2 1 Miles

- ★ Target Property
- ▲ Sites at elevations higher than or equal to the target property
- ◆ Sites at elevations lower than the target property
- Coal Gasification Sites (if requested)
- National Priority List Sites
- Landfill Sites
- Power transmission lines
- Oil & Gas pipelines
- 100-year flood zone
- 500-year flood zone
- Areas of Concern

TARGET PROPERTY:	NWC McLaughlin Rd/Antelope Rd	CUSTOMER:	Foster Wheeler
ADDRESS:	NWC McLaughlin Rd/Antelope Rd	CONTACT:	Kristen Williamson
CITY/STATE/ZIP:	Perris CA 92585	INQUIRY #:	622543.3s
LAT/LONG:	33.7371 / 117.1703	DATE:	April 20, 2001 4:46 pm

DETAIL MAP - 622543.3s - Foster Wheeler



0 1/16 1/8 1/4 Miles

- ★ Target Property
- ▲ Sites at elevations higher than or equal to the target property
- ◆ Sites at elevations lower than the target property
- Coal Gasification Sites (if requested)
- Sensitive Receptors
- National Priority List Sites
- Landfill Sites
- Power transmission lines
- Oil & Gas pipelines
- 100-year flood zone
- 500-year flood zone
- Areas of Concern

TARGET PROPERTY:	NWC McLaughlin Rd/Antelope Rd	CUSTOMER:	Foster Wheeler
ADDRESS:	NWC McLaughlin Rd/Antelope Rd	CONTACT:	Kristen Williamson
CITY/STATE/ZIP:	Perris CA 92585	INQUIRY #:	622543.3s
LAT/LONG:	33.7371 / 117.1703	DATE:	April 20, 2001 4:46 pm

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
FEDERAL ASTM STANDARD								
NPL		1.000	0	0	0	0	NR	0
Proposed NPL		1.000	0	0	0	0	NR	0
CERCLIS		0.500	0	0	0	NR	NR	0
CERC-NFRAP		0.250	0	0	NR	NR	NR	0
CORRACTS		1.000	0	0	0	0	NR	0
RCRIS-TSD		0.500	0	0	0	NR	NR	0
RCRIS Lg. Quan. Gen.		0.250	0	0	NR	NR	NR	0
RCRIS Sm. Quan. Gen.		0.250	0	0	NR	NR	NR	0
ERNS		TP	NR	NR	NR	NR	NR	0
STATE ASTM STANDARD								
AWP		1.000	0	0	0	0	NR	0
Cal-Sites		1.000	0	0	0	0	NR	0
CHMIRS		1.000	0	0	0	0	NR	0
Cortese		1.000	0	0	0	0	NR	0
Notify 65		1.000	0	0	0	0	NR	0
Toxic Pits		1.000	0	0	0	0	NR	0
State Landfill		0.500	0	0	0	NR	NR	0
WMUDS/SWAT		0.500	0	0	0	NR	NR	0
LUST		0.500	0	0	0	NR	NR	0
UST		0.250	0	0	NR	NR	NR	0
CA Bond Exp. Plan		1.000	0	0	0	0	NR	0
CA FID UST		0.250	0	0	NR	NR	NR	0
FEDERAL ASTM SUPPLEMENTAL								
CONSENT		1.000	0	0	0	0	NR	0
ROD		1.000	0	0	0	0	NR	0
Delisted NPL		1.000	0	0	0	0	NR	0
FINDS		TP	NR	NR	NR	NR	NR	0
HMIRS		TP	NR	NR	NR	NR	NR	0
MLTS		TP	NR	NR	NR	NR	NR	0
MINES		0.250	0	0	NR	NR	NR	0
NPL Liens		TP	NR	NR	NR	NR	NR	0
PADS		TP	NR	NR	NR	NR	NR	0
RAATS		TP	NR	NR	NR	NR	NR	0
TRIS		TP	NR	NR	NR	NR	NR	0
TSCA		TP	NR	NR	NR	NR	NR	0
FTTS		TP	NR	NR	NR	NR	NR	0
STATE OR LOCAL ASTM SUPPLEMENTAL								
AST		TP	NR	NR	NR	NR	NR	0
CA WDS		TP	NR	NR	NR	NR	NR	0
CA SLIC		0.500	0	0	0	NR	NR	0

MAP FINDINGS SUMMARY

Database	Target Property	Search Distance (Miles)	< 1/8	1/8 - 1/4	1/4 - 1/2	1/2 - 1	> 1	Total Plotted
HAZNET		0.250	0	0	NR	NR	NR	0
EDR PROPRIETARY DATABASES								
Coal Gas		1.000	0	0	0	0	NR	0

AQUIFLOW - see EDR Physical Setting Source Addendum

TP = Target Property

NR = Not Requested at this Search Distance

* Sites may be listed in more than one database

MAP FINDINGS

Map ID Direction Distance Distance (ft.) Elevation	Site	Database(s)	EDR ID Number EPA ID Number

Coal Gas Site Search: No site was found in a search of Real Property Scan's ENVIROHAZ database.

NO SITES FOUND

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)	Facility ID
PERRIS	S103945842	S.T.R. TIRE RECYCLING	23836 HIGHWAY 74		SWF/LF	33-TI-0993
PERRIS	S104654453	ALVIN C SMITH WTS	ON APN 322-020-003 IN BACK OF HEADLY RD		SWF/LF	33-TI-1266
PERRIS	S103568033	ECOLOGY FARMS	GOETZ ROAD AT ETHANAC ROAD		SWF/LF	33-AA-0253
PERRIS	S103340380	HOMELAND	320 S PERRIS BLVD, S7 T5S R2W		SWF/LF	33-CR-0007
ROMOLAND	S103652342	NICANOR ARCE	31631 HWY 74	92585	HAZNET	CLU060008192
ROMOLAND	S103696019	CALTRANS	27764 HIGHWAY 74	92585	LUST	083301251T
ROMOLAND	S103820786	CAL TRANS	HIGHWAY 74	92585	LUST	89341
ROMOLAND	S103949673	ALUMAX BUILDING PRODUCTS	28821 E HWY 74	92585	HAZNET	CAL912405299

To maintain currency of the following federal and state databases, EDR contacts the appropriate governmental agency on a monthly or quarterly basis, as required.

Elapsed ASTM days: Provides confirmation that this EDR report meets or exceeds the 90-day updating requirement of the ASTM standard.

FEDERAL ASTM STANDARD RECORDS

NPL: National Priority List
Source: EPA
Telephone: N/A
National Priorities List (Superfund). The NPL is a subset of CERCLIS and identifies over 1,200 sites for priority cleanup under the Superfund Program. NPL sites may encompass relatively large areas. As such, EDR provides polygon coverage for over 1,000 NPL site boundaries produced by EPA's Environmental Photographic Interpretation Center (EPIC).

Date of Government Version: 01/23/01
Date Made Active at EDR: 02/16/01
Database Release Frequency: Semi-Annually
Date of Data Arrival at EDR: 02/05/01
Elapsed ASTM days: 11
Date of Last EDR Contact: 02/05/01

Proposed NPL: Proposed National Priority List Sites
Source: EPA
Telephone: N/A

Date of Government Version: 01/23/01
Date Made Active at EDR: 02/16/01
Database Release Frequency: Semi-Annually
Date of Data Arrival at EDR: 02/05/01
Elapsed ASTM days: 11
Date of Last EDR Contact: 02/05/01

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System
Source: EPA
Telephone: 703-413-0223
CERCLIS contains data on potentially hazardous waste sites that have been reported to the USEPA by states, municipalities, private companies and private persons, pursuant to Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). CERCLIS contains sites which are either proposed to or on the National Priorities List (NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL.

Date of Government Version: 12/28/00
Date Made Active at EDR: 02/28/01
Database Release Frequency: Quarterly
Date of Data Arrival at EDR: 12/29/00
Elapsed ASTM days: 61
Date of Last EDR Contact: 03/26/01

CERCLIS-NFRAP: CERCLIS No Further Remedial Action Planned
Source: EPA
Telephone: 703-413-0223
As of February 1995, CERCLIS sites designated "No Further Remedial Action Planned" (NFRAP) have been removed from CERCLIS. NFRAP sites may be sites where, following an initial investigation, no contamination was found, contamination was removed quickly without the need for the site to be placed on the NPL, or the contamination was not serious enough to require Federal Superfund action or NPL consideration. EPA has removed approximately 25,000 NFRAP sites to lift the unintended barriers to the redevelopment of these properties and has archived them as historical records so EPA does not needlessly repeat the investigations in the future. This policy change is part of the EPA's Brownfields Redevelopment Program to help cities, states, private investors and affected citizens to promote economic redevelopment of unproductive urban sites.

Date of Government Version: 12/28/00
Date Made Active at EDR: 02/28/01
Database Release Frequency: Quarterly
Date of Data Arrival at EDR: 12/29/00
Elapsed ASTM days: 61
Date of Last EDR Contact: 03/26/01

CORRACTS: Corrective Action Report
Source: EPA
Telephone: 800-424-9346
CORRACTS identifies hazardous waste handlers with RCRA corrective action activity.

Date of Government Version: 04/20/00
Date Made Active at EDR: 08/01/00
Database Release Frequency: Semi-Annually
Date of Data Arrival at EDR: 06/12/00
Elapsed ASTM days: 50
Date of Last EDR Contact: 03/14/01

RCRIS: Resource Conservation and Recovery Information System
Source: EPA/NTIS
Telephone: 800-424-9346
Resource Conservation and Recovery Information System. RCRIS includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA).

Date of Government Version: 06/21/00
Date Made Active at EDR: 07/31/00
Database Release Frequency: Semi-Annually
Date of Data Arrival at EDR: 07/10/00
Elapsed ASTM days: 21
Date of Last EDR Contact: 01/30/01

ERNS: Emergency Response Notification System
Source: EPA/NTIS
Telephone: 202-260-2342
Emergency Response Notification System. ERNS records and stores information on reported releases of oil and hazardous substances.

Date of Government Version: 08/08/00
Date Made Active at EDR: 09/06/00
Database Release Frequency: Quarterly
Date of Data Arrival at EDR: 08/11/00
Elapsed ASTM days: 26
Date of Last EDR Contact: 02/02/01

FEDERAL ASTM SUPPLEMENTAL RECORDS

BRS: Biennial Reporting System
Source: EPA/NTIS
Telephone: 800-424-9346
The Biennial Reporting System is a national system administered by the EPA that collects data on the generation and management of hazardous waste. BRS captures detailed data from two groups: Large Quantity Generators (LQG) and Treatment, Storage, and Disposal Facilities.

Date of Government Version: 12/31/97
Database Release Frequency: Biennially
Date of Last EDR Contact: 03/19/01
Date of Next Scheduled EDR Contact: 06/18/01

CONSENT: Superfund (CERCLA) Consent Decrees
Source: EPA Regional Offices
Telephone: Varies
Major legal settlements that establish responsibility and standards for cleanup at NPL (Superfund) sites. Released periodically by United States District Courts after settlement by parties to litigation matters.

Date of Government Version: N/A
Database Release Frequency: Varies
Date of Last EDR Contact: N/A
Date of Next Scheduled EDR Contact: N/A

ROD: Records Of Decision
Source: NTIS
Telephone: 703-416-0223
Record of Decision. ROD documents mandate a permanent remedy at an NPL (Superfund) site containing technical and health information to aid in the cleanup.

Date of Government Version: 09/30/99
Database Release Frequency: Annually
Date of Last EDR Contact: 04/10/01
Date of Next Scheduled EDR Contact: 07/09/01

DELISTED NPL: National Priority List Deletions
Source: EPA
Telephone: N/A
The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) establishes the criteria that the EPA uses to delete sites from the NPL. In accordance with 40 CFR 300.425.(e), sites may be deleted from the NPL where no further response is appropriate.

Date of Government Version: 01/23/01
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 02/05/01
Date of Next Scheduled EDR Contact: 05/07/01

FINDS: Facility Index System/Facility Identification Initiative Program Summary Report
Source: EPA
Telephone: N/A
Facility Index System. FINDS contains both facility information and 'pointers' to other sources that contain more detail. EDR includes the following FINDS databases in this report: PCS (Permit Compliance System), AIRS (Aerometric Information Retrieval System), DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes), FURS (Federal Underground Injection Control), C-DOCKET (Criminal Docket System used to track criminal enforcement actions for all environmental statutes), FFIS (Federal Facilities Information System), STATE (State Environmental Laws and Statutes), and PADS (PCB Activity Data System).

Date of Government Version: 07/07/00
Database Release Frequency: Quarterly
Date of Last EDR Contact: 04/09/01
Date of Next Scheduled EDR Contact: 07/09/01

HMIRS: Hazardous Materials Information Reporting System
Source: U.S. Department of Transportation
Telephone: 202-366-4526
Hazardous Materials Incident Report System. HMIRS contains hazardous material spill incidents reported to DOT.

Date of Government Version: 05/31/00
Database Release Frequency: Annually
Date of Last EDR Contact: 01/23/01
Date of Next Scheduled EDR Contact: 04/23/01

MLTS: Material Licensing Tracking System
Source: Nuclear Regulatory Commission
Telephone: 301-415-7169
MLTS is maintained by the Nuclear Regulatory Commission and contains a list of approximately 8,100 sites which possess or use radioactive materials and which are subject to NRC licensing requirements. To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 01/30/01
Database Release Frequency: Quarterly
Date of Last EDR Contact: 04/09/01
Date of Next Scheduled EDR Contact: 07/09/01

MINES: Mines Master Index File
Source: Department of Labor, Mine Safety and Health Administration
Telephone: 303-231-5959

Date of Government Version: 08/01/98
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 04/02/01
Date of Next Scheduled EDR Contact: 07/02/01

NPL LIENS: Federal Superfund Liens
Source: EPA
Telephone: 205-564-4267
Federal Superfund Liens. Under the authority granted the USEPA by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner receives notification of potential liability. USEPA compiles a listing of filed notices of Superfund Liens.

Date of Government Version: 10/15/91
Database Release Frequency: No Update Planned
Date of Last EDR Contact: 02/20/01
Date of Next Scheduled EDR Contact: 05/21/01

PADS: PCB Activity Database System
Source: EPA
Telephone: 202-260-3936
PCB Activity Database. PADS Identifies generators, transporters, commercial storers and/or brokers and disposers of PCB's who are required to notify the EPA of such activities.

Date of Government Version: 01/01/00
Database Release Frequency: Annually
Date of Last EDR Contact: 02/12/01
Date of Next Scheduled EDR Contact: 05/14/01

RAATS: RCRA Administrative Action Tracking System
Source: EPA
Telephone: 202-564-4104
RCRA Administration Action Tracking System. RAATS contains records based on enforcement actions issued under RCRA pertaining to major violators and includes administrative and civil actions brought by the EPA. For administration actions after September 30, 1995, data entry in the RAATS database was discontinued. EPA will retain a copy of the database for historical records. It was necessary to terminate RAATS because a decrease in agency resources made it impossible to continue to update the information contained in the database.

Date of Government Version: 04/17/95
Database Release Frequency: No Update Planned
Date of Last EDR Contact: 03/13/01
Date of Next Scheduled EDR Contact: 06/11/01

TRIS: Toxic Chemical Release Inventory System
Source: EPA
Telephone: 202-260-1531
Toxic Release Inventory System. TRIS identifies facilities which release toxic chemicals to the air, water and land in reportable quantities under SARA Title III Section 313.

Date of Government Version: 12/31/97
Database Release Frequency: Annually
Date of Last EDR Contact: 03/26/01
Date of Next Scheduled EDR Contact: 06/25/01

TSCA: Toxic Substances Control Act
Source: EPA
Telephone: 202-260-1444
Toxic Substances Control Act. TSCA identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site.

Date of Government Version: 12/31/98
Database Release Frequency: Every 4 Years
Date of Last EDR Contact: 03/30/01
Date of Next Scheduled EDR Contact: 06/12/01

FTTS: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
Source: EPA/Office of Prevention, Pesticides and Toxic Substances
Telephone: 202-564-2501
FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act). To maintain currency, EDR contacts the Agency on a quarterly basis.

Date of Government Version: 08/30/00
Database Release Frequency: Quarterly
Date of Last EDR Contact: 03/26/01
Date of Next Scheduled EDR Contact: 06/25/01

FTTS INSP: FIFRA/ TSCA Tracking System - FIFRA (Federal Insecticide, Fungicide, & Rodenticide Act)/TSCA (Toxic Substances Control Act)
Source: EPA
Telephone: 202-564-2501

Date of Government Version: 08/10/00
Database Release Frequency: Quarterly
Date of Last EDR Contact: 03/26/01
Date of Next Scheduled EDR Contact: 06/25/01

STATE OF CALIFORNIA ASTM STANDARD RECORDS

CAL-SITES (AWP): Annual Workplan Sites
Source: California Environmental Protection Agency
Telephone: 916-323-3400
Known Hazardous Waste Sites. California DTSC's Annual Workplan (AWP), formerly BEP, identifies known hazardous substance sites targeted for cleanup.

Date of Government Version: 11/08/00
Date Made Active at EDR: 03/02/01
Database Release Frequency: Annually
Date of Data Arrival at EDR: 01/31/01
Elapsed ASTM days: 30
Date of Last EDR Contact: 01/30/01

CAL-SITES (ASPIS): Calsites Database
Source: Department of Toxic Substance Control
Telephone: 916-323-3400
The Calsites database contains potential or confirmed hazardous substance release properties. In 1996, California EPA reevaluated and significantly reduced the number of sites in the Calsites database.

Date of Government Version: 10/01/00
Date Made Active at EDR: 11/22/00
Database Release Frequency: Quarterly
Date of Data Arrival at EDR: 10/30/00
Elapsed ASTM days: 23
Date of Last EDR Contact: 04/09/01

CHMIRS: California Hazardous Material Incident Report System
Source: Office of Emergency Services
Telephone: 916-464-3283
California Hazardous Material Incident Reporting System. CHMIRS contains information on reported hazardous material incidents (accidental releases or spills).

Date of Government Version: 12/31/94
Date Made Active at EDR: 04/24/95
Database Release Frequency: No Update Planned
Date of Data Arrival at EDR: 03/13/95
Elapsed ASTM days: 42
Date of Last EDR Contact: 02/26/01

CORTESE: "Cortese" Hazardous Waste & Substances Sites List
Source: CAL EPA/Office of Emergency Information
Telephone: 916-327-1848
The sites for the list are designated by the State Water Resource Control Board (LUST), the Integrated Waste Board (SWF/LS), and the Department of Toxic Substances Control (Cal-Sites).

Date of Government Version: 04/01/98
Date Made Active at EDR: 09/23/98
Database Release Frequency: Varies
Date of Data Arrival at EDR: 08/26/98
Elapsed ASTM days: 28
Date of Last EDR Contact: 01/30/01

NOTIFY 65: Proposition 65 Records
Source: State Water Resources Control Board
Telephone: 916-657-0696
Proposition 65 Notification Records. NOTIFY 65 contains facility notifications about any release which could impact drinking water and thereby expose the public to a potential health risk.

Date of Government Version: 10/21/93
Date Made Active at EDR: 11/19/93
Database Release Frequency: No Update Planned
Date of Data Arrival at EDR: 11/01/93
Elapsed ASTM days: 18
Date of Last EDR Contact: 01/26/01

TOXIC PITS: Toxic Pits Cleanup Act Sites
Source: State Water Resources Control Board
Telephone: 916-227-4364
Toxic PITS Cleanup Act Sites. TOXIC PITS identifies sites suspected of containing hazardous substances where cleanup has not yet been completed.

Date of Government Version: 07/01/95
Date Made Active at EDR: 09/26/95
Database Release Frequency: No Update Planned
Date of Data Arrival at EDR: 08/30/95
Elapsed ASTM days: 27
Date of Last EDR Contact: 02/06/01

SWF/LF (SWIS): Solid Waste Information System
Source: Integrated Waste Management Board
Telephone: 916-341-6320
Active, Closed and Inactive Landfills. SWF/LF records typically contain an inve ntory of solid waste disposal facilities or landfills. These may be active or i nactive facilities or open dumps that failed to meet RCRA Section 4004 criteria for solid waste landfills or disposal sites.

Date of Government Version: 01/10/01
Date Made Active at EDR: 03/29/01
Database Release Frequency: Quarterly
Date of Data Arrival at EDR: 03/01/01
Elapsed ASTM days: 28
Date of Last EDR Contact: 03/19/01

WMUDS/SWAT: Waste Management Unit Database
Source: State Water Resources Control Board
Telephone: 916-227-4448
Waste Management Unit Database System. WMUDS is used by the State Water Resources Control Board staff and the Regional Water Quality Control Boards for program tracking and inventory of waste management units. WMUDS is composed of the following databases: Facility Information, Scheduled Inspections Information, Waste Management Unit Information, SWAT Program Information, SWAT Report Summary Information, SWAT Report Summary Data, Chapter 15 (formerly Subchapter 15) Information, Chapter 15 Monitoring Parameters, TPCA Program Information, RCRA Program Information, Closure Information, and Interested Parties Information.

Date of Government Version: 04/01/00
Date Made Active at EDR: 05/10/00
Database Release Frequency: Quarterly
Date of Data Arrival at EDR: 04/10/00
Elapsed ASTM days: 30
Date of Last EDR Contact: 03/16/01

LUST: Leaking Underground Storage Tank Information System
Source: State Water Resources Control Board
Telephone: 916-445-6532
Leaking Underground Storage Tank Incident Reports. LUST records contain an inventory of reported leaking underground storage tank incidents. Not all states maintain these records, and the information stored varies by state.

Date of Government Version: 01/10/01
Date Made Active at EDR: 02/12/01
Database Release Frequency: Quarterly
Date of Data Arrival at EDR: 01/11/01
Elapsed ASTM days: 32
Date of Last EDR Contact: 04/12/01

CA UST:

UST: Hazardous Substance Storage Container Database
Source: State Water Resources Control Board
Telephone: 916-227-4408
The Hazardous Substance Storage Container Database is a historical listing of UST sites. Refer to local/county source for current data.

Date of Government Version: 10/15/90
Date Made Active at EDR: 02/12/91
Database Release Frequency: No Update Planned
Date of Data Arrival at EDR: 01/25/91
Elapsed ASTM days: 18
Date of Last EDR Contact: 04/05/01

CA BOND EXP. PLAN: Bond Expenditure Plan
Source: Department of Health Services
Telephone: 916-255-2118
Department of Health Services developed a site-specific expenditure plan as the basis for an appropriation of Hazardous Substance Cleanup Bond Act funds. It is not updated.

Date of Government Version: 01/01/89
Date Made Active at EDR: 08/02/94
Database Release Frequency: No Update Planned
Date of Data Arrival at EDR: 07/27/94
Elapsed ASTM days: 6
Date of Last EDR Contact: 05/31/94

CA FID UST: Facility Inventory Database
Source: California Environmental Protection Agency
Telephone: 916-445-6532
The Facility Inventory Database (FID) contains a historical listing of active and inactive underground storage tank locations from the State Water Resource Control Board. Refer to local/county source for current data.

Date of Government Version: 10/31/94
Date Made Active at EDR: 09/29/95
Database Release Frequency: No Update Planned
Date of Data Arrival at EDR: 09/05/95
Elapsed ASTM days: 24
Date of Last EDR Contact: 12/28/98

STATE OF CALIFORNIA ASTM SUPPLEMENTAL RECORDS

AST: Aboveground Petroleum Storage Tank Facilities
Source: State Water Resources Control Board
Telephone: 916-227-4382
Registered Aboveground Storage Tanks.

Date of Government Version: 03/01/01
Database Release Frequency: Quarterly
Date of Last EDR Contact: 02/05/01
Date of Next Scheduled EDR Contact: 05/07/01

CA WDS: Waste Discharge System
Source: State Water Resources Control Board
Telephone: 916-657-1571
Sites which have been issued waste discharge requirements.

Date of Government Version: 02/14/01
Database Release Frequency: Quarterly
Date of Last EDR Contact: 03/26/01
Date of Next Scheduled EDR Contact: 06/25/01

HAZNET: Hazardous Waste Information System
Source: California Environmental Protection Agency
Telephone: 916-255-1136
Facility and Manifest Data. The data is extracted from the copies of hazardous waste manifests received each year by the DTSC. The annual volume of manifests is typically 700,000 - 1,000,000 annually, representing approximately 350,000 - 500,000 shipments. Data are from the manifests submitted without correction, and therefore many contain some invalid values for data elements such as generator ID, TSD ID, waste category, and disposal method.

Date of Government Version: 12/31/99
Database Release Frequency: Annually
Date of Last EDR Contact: 02/14/01
Date of Next Scheduled EDR Contact: 05/14/01

LOCAL RECORDS

ALAMEDA COUNTY:

Local Oversight Program Listing of UGT Cleanup Sites
Source: Alameda County Environmental Health Services
Telephone: 510-567-6700

Date of Government Version: 08/01/00
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 01/30/01
Date of Next Scheduled EDR Contact: 04/30/01

Underground Tanks
Source: Alameda County Environmental Health Services
Telephone: 510-567-6700

Date of Government Version: 12/01/00
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 01/30/00
Date of Next Scheduled EDR Contact: 04/30/01

CONTRA COSTA COUNTY:

Site List
Source: Contra Costa Health Services Department
Telephone: 925-646-2286
List includes sites from the underground tank, hazardous waste generator and business plan/2185 programs.

Date of Government Version: 09/01/00
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 03/05/01
Date of Next Scheduled EDR Contact: 06/04/01

FRESNO COUNTY:

CUPA Resources List
Source: Dept. of Community Health
Telephone: 559-445-3271
Certified Unified Program Agency. CUPA's are responsible for implementing a unified hazardous materials and hazardous waste management regulatory program. The agency provides oversight of businesses that deal with hazardous materials, operate underground storage tanks or aboveground storage tanks.

Date of Government Version: 01/22/01
Database Release Frequency: N/A
Date of Last EDR Contact: 01/22/01
Date of Next Scheduled EDR Contact: 05/14/01

KERN COUNTY:

Underground Storage Tank Sites & Tanks Listing
Source: Kern County Environment Health Services Department
Telephone: 661-862-8700
Kern County Sites and Tanks Listing.

Date of Government Version: 01/23/01
Database Release Frequency: Quarterly
Date of Last EDR Contact: 03/05/01
Date of Next Scheduled EDR Contact: 06/04/01

LOS ANGELES COUNTY:

List of Solid Waste Facilities
Source: La County Department of Public Works
Telephone: 818-458-5185

Date of Government Version: 09/16/98
Database Release Frequency: Varies
Date of Last EDR Contact: 03/19/01
Date of Next Scheduled EDR Contact: 06/18/01

City of El Segundo Underground Storage Tank
Source: City of El Segundo Fire Department
Telephone: 310-607-2239

Date of Government Version: 02/01/01
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 02/19/01
Date of Next Scheduled EDR Contact: 05/21/01

City of Long Beach Underground Storage Tank
Source: City of Long Beach Fire Department
Telephone: 562-570-2543

Date of Government Version: 10/01/99
Database Release Frequency: Annually
Date of Last EDR Contact: 02/27/01
Date of Next Scheduled EDR Contact: 05/28/01

City of Torrance Underground Storage Tank
Source: City of Torrance Fire Department
Telephone: 310-618-2973

Date of Government Version: 02/01/01
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 02/19/01
Date of Next Scheduled EDR Contact: 05/21/01

City of Los Angeles Landfills
Source: Engineering & Construction Division
Telephone: 213-473-7869

Date of Government Version: 08/31/99
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 03/19/01
Date of Next Scheduled EDR Contact: 06/18/01

Street Number List
Source: Department of Public Works
Telephone: 626-458-3517
Industrial Waste and Underground Storage Tank Sites.

Date of Government Version: 11/30/00
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 02/19/01
Date of Next Scheduled EDR Contact: 05/21/01

Site Mitigation List
Source: Community Health Services
Telephone: 323-890-7806
Industrial sites that have had some sort of spill or complaint.

Date of Government Version: 06/02/00 — Date of Last EDR Contact: 02/19/01
Database Release Frequency: Annually — Date of Next Scheduled EDR Contact: 05/21/01

San Gabriel Valley Areas of Concern
Source: EPA Region 9
Telephone: 415-744-2407
San Gabriel Valley areas where VOC contamination is at or above the MCL as designated by region 9 EPA office.

Date of Government Version: 12/31/98 — Date of Last EDR Contact: 06/29/99
Database Release Frequency: N/A — Date of Next Scheduled EDR Contact: N/A

MARIN COUNTY:

Underground Storage Tank Sites
Source: Public Works Department Waste Management
Telephone: 415-499-6647
Currently permitted USTs in Marin County.

Date of Government Version: 08/08/00 — Date of Last EDR Contact: 02/05/01
Database Release Frequency: Semi-Annually — Date of Next Scheduled EDR Contact: 05/07/01

NAPA COUNTY:

Sites With Reported Contamination
Source: Napa County Department of Environmental Management
Telephone: 707-253-4269

Date of Government Version: 10/23/00 — Date of Last EDR Contact: 04/02/01
Database Release Frequency: Semi-Annually — Date of Next Scheduled EDR Contact: 07/02/01

Closed and Operating Underground Storage Tank Sites
Source: Napa County Department of Environmental Management
Telephone: 707-253-4269

Date of Government Version: 08/30/00 — Date of Last EDR Contact: 04/02/01
Database Release Frequency: Annually — Date of Next Scheduled EDR Contact: 07/02/01

ORANGE COUNTY:

List of Underground Storage Tank Cleanups
Source: Health Care Agency
Telephone: 714-834-3446
Orange County Underground Storage Tank Cleanups (LUST).

Date of Government Version: 11/29/00 — Date of Last EDR Contact: 03/13/01
Database Release Frequency: Quarterly — Date of Next Scheduled EDR Contact: 06/11/01

List of Underground Storage Tank Facilities
Source: Health Care Agency
Telephone: 714-834-3446
Orange County Underground Storage Tank Facilities (UST).

Date of Government Version: 11/29/00 — Date of Last EDR Contact: 03/13/01
Database Release Frequency: Quarterly — Date of Next Scheduled EDR Contact: 06/11/01

List of Industrial Site Cleanups
Source: Health Care Agency
Telephone: 714-834-3446
Petroleum and non-petroleum spills.

Date of Government Version: 06/23/00 — Date of Last EDR Contact: 03/13/01
Database Release Frequency: Annually — Date of Next Scheduled EDR Contact: 06/11/01

PLACER COUNTY:

Master List of Facilities
Source: Placer County Health and Human Services
Telephone: 530-889-7335
List includes aboveground tanks, underground tanks and cleanup sites.

Date of Government Version: 01/18/01 — Date of Last EDR Contact: 03/26/01
Database Release Frequency: Semi-Annually — Date of Next Scheduled EDR Contact: 06/25/01

RIVERSIDE COUNTY:

Listing of Underground Tank Cleanup Sites
Source: Department of Public Health
Telephone: 909-358-5055
Riverside County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 01/24/01 — Date of Last EDR Contact: 01/23/01
Database Release Frequency: Quarterly — Date of Next Scheduled EDR Contact: 04/23/01

Underground Storage Tank Tank List
Source: Health Services Agency
Telephone: 909-358-5055

Date of Government Version: 12/05/00 — Date of Last EDR Contact: 01/23/01
Database Release Frequency: Quarterly — Date of Next Scheduled EDR Contact: 04/23/01

SACRAMENTO COUNTY:

CS - Contaminated Sites
Source: Sacramento County Environmental Management
Telephone: 916-875-8450

Date of Government Version: 02/06/01 — Date of Last EDR Contact: 02/06/01
Database Release Frequency: Quarterly — Date of Next Scheduled EDR Contact: 05/07/01

ML - Regulatory Compliance Master List
Source: Sacramento County Environmental Management
Telephone: 916-875-8450
Any business that has hazardous materials on site - hazardous material storage sites, underground storage tanks, waste generators.

Date of Government Version: 02/06/01 — Date of Last EDR Contact: 02/06/01
Database Release Frequency: Quarterly — Date of Next Scheduled EDR Contact: 05/07/01

SAN BERNARDINO COUNTY:

Hazardous Material Permits
Source: San Bernardino County Fire Department Hazardous Materials Division
Telephone: 909-387-3041
This listing includes underground storage tanks, medical waste handlers/generators, hazardous materials handlers, hazardous waste generators, and waste oil generators/handlers.

Date of Government Version: 10/02/00
Database Release Frequency: Quarterly
Date of Last EDR Contact: 03/13/01
Date of Next Scheduled EDR Contact: 06/11/01

SAN DIEGO COUNTY:

Solid Waste Facilities
Source: Department of Health Services
Telephone: 619-338-2209
San Diego County Solid Waste Facilities.

Date of Government Version: 07/01/98
Database Release Frequency: Annually
Date of Last EDR Contact: 02/27/01
Date of Next Scheduled EDR Contact: 05/28/01

Hazardous Materials Management Division Database
Source: Hazardous Materials Management Division
Telephone: 619-338-2268
The database includes: HE58 - This report contains the business name, site address, business phone number, establishment 'H' permit number, type of permit, and the business status. HE17 - In addition to providing the same information provided in the HE58 listing, HE17 provides inspection dates, violations received by the establishment, hazardous waste generated, the quantity, method of storage, treatment/disposal of waste and the hauler, and information on underground storage tanks. Unauthorized Release List - Includes a summary of environmental contamination cases in San Diego County (underground tank cases, non-tank cases, groundwater contamination, and soil contamination are included.)

Date of Government Version: 01/07/01
Database Release Frequency: Quarterly
Date of Last EDR Contact: 04/09/01
Date of Next Scheduled EDR Contact: 07/09/01

SAN FRANCISCO COUNTY:

Local Oversite Facilities
Source: Department Of Public Health San Francisco County
Telephone: 415-252-3920

Date of Government Version: 01/02/01
Database Release Frequency: Quarterly
Date of Last EDR Contact: 03/13/01
Date of Next Scheduled EDR Contact: 06/11/01

Underground Storage Tank Information
Source: Department of Public Health
Telephone: 415-252-3920

Date of Government Version: 12/01/00
Database Release Frequency: Quarterly
Date of Last EDR Contact: 03/13/01
Date of Next Scheduled EDR Contact: 06/11/01

SAN MATEO COUNTY:

Fuel Leak List
Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921

Date of Government Version: 10/05/00
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 01/30/01
Date of Next Scheduled EDR Contact: 04/30/01

Business Inventory
Source: San Mateo County Environmental Health Services Division
Telephone: 650-363-1921
List includes Hazardous Materials Business Plan, hazardous waste generators, and underground storage tanks.

Date of Government Version: 06/24/99
Database Release Frequency: Annually
Date of Last EDR Contact: 04/17/01
Date of Next Scheduled EDR Contact: 07/16/01

SANTA CLARA COUNTY:

Fuel Leak Site Activity Report
Source: Santa Clara Valley Water District
Telephone: 408-927-0710

Date of Government Version: 12/31/00
Database Release Frequency: Semi-Annually
Date of Last EDR Contact: 04/02/01
Date of Next Scheduled EDR Contact: 07/02/01

Hazaroud Material Facilities
Source: City of San Jose Fire Department
Telephone: 408-277-4659

Date of Government Version: 09/28/00
Database Release Frequency: Quarterly
Date of Last EDR Contact: 03/13/01
Date of Next Scheduled EDR Contact: 06/11/01

SOLANO COUNTY:

Leaking Undergroung Storage Tanks
Source: Solano County Department of Environmental Management
Telephone: 707-421-6770

Date of Government Version: 02/06/01
Database Release Frequency: Quarterly
Date of Last EDR Contact: 03/19/01
Date of Next Scheduled EDR Contact: 06/18/01

Underground Storage Tanks
Source: Solano County Department of Environmental Management
Telephone: 707-421-6770

Date of Government Version: 09/01/00
Database Release Frequency: Quarterly
Date of Last EDR Contact: 03/19/01
Date of Next Scheduled EDR Contact: 06/18/01

SONOMA COUNTY:

Leaking Underground Storage Tank Sites
Source: Department of Health Services
Telephone: 707-525-6565

Date of Government Version: 12/01/00
Database Release Frequency: Quarterly
Date of Last EDR Contact: 01/30/01
Date of Next Scheduled EDR Contact: 04/30/01

SUTTER COUNTY:

Underground Storage Tanks
Source: Sutter County Department of Agriculture
Telephone: 530-822-7500

Date of Government Version: 01/02/01 — Date of Last EDR Contact: 04/09/01
Database Release Frequency: Semi-Annually — Date of Next Scheduled EDR Contact: 07/09/01

VENTURA COUNTY:

Inventory of Illegal Abandoned and Inactive Sites
Source: Environmental Health Division
Telephone: 805-654-2813
Ventura County Inventory of Closed, Illegal Abandoned, and Inactive Sites.

Date of Government Version: 06/01/99 — Date of Last EDR Contact: 03/01/01
Database Release Frequency: Annually — Date of Next Scheduled EDR Contact: 05/28/01

Listing of Underground Tank Cleanup Sites
Source: Environmental Health Division
Telephone: 805-654-2813
Ventura County Underground Storage Tank Cleanup Sites (LUST).

Date of Government Version: 07/26/00 — Date of Last EDR Contact: 03/19/01
Database Release Frequency: Quarterly — Date of Next Scheduled EDR Contact: 06/18/01

Underground Tank Closed Sites List
Source: Environmental Health Division
Telephone: 805-654-2813
Ventura County Operating Underground Storage Tank Sites (UST)/Underground Tank Closed Sites List.

Date of Government Version: 11/22/00 — Date of Last EDR Contact: 04/16/01
Database Release Frequency: Quarterly — Date of Next Scheduled EDR Contact: 07/16/01

Business Plan, Hazardous Waste Producers, and Operating Underground Tanks
Source: Ventura County Environmental Health Division
Telephone: 805-654-2813
The BWT list indicates by site address whether the Environmental Health Division has Business Plan (B), Waste Producer (W), and/or Underground Tank (T) information.

Date of Government Version: 11/22/00 — Date of Last EDR Contact: 03/19/01
Database Release Frequency: Quarterly — Date of Next Scheduled EDR Contact: 06/18/01

YOLO COUNTY:

Underground Storage Tank Comprehensive Facility Report
Source: Yolo County Department of Health
Telephone: 530-666-8646

Date of Government Version: 01/23/01 — Date of Last EDR Contact: 01/23/01
Database Release Frequency: Annually — Date of Next Scheduled EDR Contact: 04/23/01

California Regional Water Quality Control Board (RWQCB) LUST Records

LUST REG 1: Active Toxic Site Investigation
Source: California Regional Water Quality Control Board North Coast (1)
Telephone: 707-576-2220

Date of Government Version: 02/01/01 — Date of Last EDR Contact: 02/28/01
Database Release Frequency: Quarterly — Date of Next Scheduled EDR Contact: 05/28/01

LUST REG 2: Fuel Leak List
Source: California Regional Water Quality Control Board San Francisco Bay Region (2)
Telephone: 510-286-0457

Date of Government Version: 12/01/00 — Date of Last EDR Contact: 04/16/01
Database Release Frequency: Quarterly — Date of Next Scheduled EDR Contact: 07/16/01

LUST REG 3: Leaking Underground Storage Tank Database
Source: California Regional Water Quality Control Board Central Coast Region (3)
Telephone: 805-549-3147

Date of Government Version: 02/20/01 — Date of Last EDR Contact: 02/19/01
Database Release Frequency: Quarterly — Date of Next Scheduled EDR Contact: 05/21/01

LUST REG 4: Underground Storage Tank Leak List
Source: California Regional Water Quality Control Board Los Angeles Region (4)
Telephone: 213-266-6600

Date of Government Version: 11/01/00 — Date of Last EDR Contact: 04/02/01
Database Release Frequency: Quarterly — Date of Next Scheduled EDR Contact: 07/02/01

LUST REG 5: Leaking Underground Storage Tank Database
Source: California Regional Water Quality Control Board Central Valley Region (5)
Telephone: 916-255-3125

Date of Government Version: 01/02/01 — Date of Last EDR Contact: 04/09/01
Database Release Frequency: Quarterly — Date of Next Scheduled EDR Contact: 07/09/01

LUST REG 6L: Leaking Underground Storage Tank Case Listing
Source: California Regional Water Quality Control Board Lahontan Region (6)
Telephone: 916-542-5424

Date of Government Version: 01/02/01 — Date of Last EDR Contact: 04/09/01
Database Release Frequency: Quarterly — Date of Next Scheduled EDR Contact: 07/09/01

LUST REG 6V: Leaking Underground Storage Tank Case Listing
Source: California Regional Water Quality Control Board Victorville Branch Office (6)
Telephone: 760-346-7491

Date of Government Version: 01/02/01 — Date of Last EDR Contact: 04/09/01
Database Release Frequency: Quarterly — Date of Next Scheduled EDR Contact: 07/09/01

LUST REG 7: Leaking Underground Storage Tank Case Listing
Source: California Regional Water Quality Control Board Colorado River Basin Region (7)
Telephone: 760-346-7491

Date of Government Version: 01/24/01 — Date of Last EDR Contact: 04/02/01
Database Release Frequency: Semi-Annually — Date of Next Scheduled EDR Contact: 07/02/01

LUST REG 8: Leaking Underground Storage Tanks
Source: California Regional Water Quality Control Board Santa Ana Region (8)
Telephone: 909-782-4498

Date of Government Version: 11/22/00 — Date of Last EDR Contact: 02/15/01
Database Release Frequency: Semi-Annually — Date of Next Scheduled EDR Contact: 05/14/01

LUST REG 9: Leaking Underground Storage Tank Report
Source: California Regional Water Quality Control Board San Diego Region (9)
Telephone: 619-467-2952

Date of Government Version: 12/05/00 — Date of Last EDR Contact: 01/22/01
Database Release Frequency: Quarterly — Date of Next Scheduled EDR Contact: 04/23/01

California Regional Water Quality Control Board (RWQCB) SLIC Records

SLIC REG 1: Active Toxic Site Investigations
Source: California Regional Water Quality Control Board, North Coast Region (1)
Telephone: 707-576-2220

Date of Government Version: 02/01/01
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 02/28/01
Date of Next Scheduled EDR Contact: 05/28/01

SLIC REG 2: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
Source: Regional Water Quality Control Board San Francisco Bay Region (2)
Telephone: 510-286-0457
Any contaminated site that impacts groundwater or has the potential to impact groundwater.

Date of Government Version: 12/01/00
Database Release Frequency: Quarterly

Date of Last EDR Contact: 04/16/01
Date of Next Scheduled EDR Contact: 07/16/01

SLIC REG 3: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
Source: California Regional Water Quality Control Board Central Coast Region (3)
Telephone: 805-549-3147
Any contaminated site that impacts groundwater or has the potential to impact groundwater.

Date of Government Version: 02/20/01
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 02/19/01
Date of Next Scheduled EDR Contact: 05/21/01

SLIC REG 4: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
Source: Region Water Quality Control Board Los Angeles Region (4)
Telephone: 213-576-6600
Any contaminated site that impacts groundwater or has the potential to impact groundwater.

Date of Government Version: 02/01/01
Database Release Frequency: Quarterly

Date of Last EDR Contact: 01/30/01
Date of Next Scheduled EDR Contact: 04/30/01

SLIC REG 5: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
Source: Regional Water Quality Control Board Central Valley Region (5)
Telephone: 916-855-3075
Unregulated sites that impact groundwater or have the potential to impact groundwater.

Date of Government Version: 12/30/00
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 04/11/01
Date of Next Scheduled EDR Contact: 07/09/01

SLIC REG 6V: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
Source: Regional Water Quality Control Board, Victorville Branch
Telephone: 619-241-6583

Date of Government Version: 10/01/00
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 04/09/01
Date of Next Scheduled EDR Contact: 07/09/01

SLIC REG 8: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
Source: California Region Water Quality Control Board Santa Ana Region (8)
Telephone: 909-782-3298

Date of Government Version: 06/01/00
Database Release Frequency: Semi-Annually

Date of Last EDR Contact: 04/11/01
Date of Next Scheduled EDR Contact: 07/09/01

SLIC REG 9: Spills, Leaks, Investigation & Cleanup Cost Recovery Listing
Source: California Regional Water Quality Control Board San Diego Region (9)
Telephone: 858-467-2980

Date of Government Version: 06/01/00
Database Release Frequency: Annually

Date of Last EDR Contact: 03/05/01
Date of Next Scheduled EDR Contact: 06/04/01

EDR PROPRIETARY DATABASES

Former Manufactured Gas (Coal Gas) Sites: The existence and location of Coal Gas sites is provided exclusively to EDR by Real Property Scan, Inc. ©Copyright 1993 Real Property Scan, Inc. For a technical description of the types of hazards which may be found at such sites, contact your EDR customer service representative.

Disclaimer Provided by Real Property Scan, Inc.

The information contained in this report has predominantly been obtained from publicly available sources produced by entities other than Real Property Scan. While reasonable steps have been taken to insure the accuracy of this report, Real Property Scan does not guarantee the accuracy of this report. Any liability on the part of Real Property Scan is strictly limited to a refund of the amount paid. No claim is made for the actual existence of toxins at any site. This report does not constitute a legal opinion.

HISTORICAL AND OTHER DATABASE(S)

Depending on the geographic area covered by this report, the data provided in these specialty databases may or may not be complete. For example, the existence of wetlands information data in a specific report does not mean that all wetlands in the area covered by the report are included. Moreover, the absence of any reported wetlands information does not necessarily mean that wetlands do not exist in the area covered by the report.

Oil/Gas Pipelines/Electrical Transmission Lines: This data was obtained by EDR from the USGS in 1994. It is referred to by USGS as GeoData Digital Line Graphs from 1:100,000-Scale Maps. It was extracted from the transportation category including some oil, but primarily gas pipelines and electrical transmission lines.

Sensitive Receptors: There are individuals deemed sensitive receptors due to their fragile immune systems and special sensitivity to environmental discharges. These sensitive receptors typically include the elderly, the sick, and children. While the location of all sensitive receptors cannot be determined, EDR indicates those buildings and facilities - schools, daycares, hospitals, medical centers, and nursing homes - where individuals who are sensitive receptors are likely to be located.

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 1999 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 1999 from the U.S. Fish and Wildlife Service.

GEOCHECK®- PHYSICAL SETTING SOURCE ADDENDUM

TARGET PROPERTY ADDRESS

NWC MCLAUGHLIN RD/ANTELOPE RD
NWC MCLAUGHLIN RD/ANTELOPE RD
PERRIS, CA 92585

TARGET PROPERTY COORDINATES

Latitude (North):	33.737110 - 33' 44' 13.6"
Longitude (West):	117.170258 - 117' 10' 12.9"
Universal Tranverse Mercator:	Zone 11
UTM X (Meters):	484228.2
UTM Y (Meters):	3732827.2

EDR's GeoCheck Physical Setting Source Addendum has been developed to assist the environmental professional with the collection of physical setting source information in accordance with ASTM 1527-00, Section 7.2.3. Section 7.2.3 requires that a current USGS 7.5 Minute Topographic Map (or equivalent, such as the USGS Digital Elevation Model) be reviewed. It also requires that one or more additional physical setting sources be sought when (1) conditions have been identified in which hazardous substances or petroleum products are likely to migrate to or from the property, and (2) more information than is provided in the current USGS 7.5 Minute Topographic Map (or equivalent) is generally obtained, pursuant to local good commercial or customary practice, to assess the impact of migration of recognized environmental conditions in connection with the property. Such additional physical setting sources generally include information about the topographic, hydrologic, hydrogeologic, and geologic characteristics of a site, and wells in the area.

Assessment of the impact of contaminant migration generally has two principle investigative components:

1. Groundwater flow direction, and
2. Groundwater flow velocity.

Groundwater flow direction may be impacted by surface topography, hydrology, hydrogeology, characteristics of the soil, and nearby wells. Groundwater flow velocity is generally impacted by the nature of the geologic strata. EDR's GeoCheck Physical Setting Source Addendum is provided to assist the environmental professional in forming an opinion about the impact of potential contaminant migration.

GEOCHECK®- PHYSICAL SETTING SOURCE SUMMARY

GROUNDWATER FLOW DIRECTION INFORMATION

Groundwater flow direction for a particular site is best determined by a qualified environmental professional using site-specific well data. If such data is not reasonably ascertainable, it may be necessary to rely on other sources of information, such as surface topographic information, hydrologic information, hydrogeologic data collected on nearby properties, and regional groundwater flow information (from deep aquifers).

TOPOGRAPHIC INFORMATION

Surface topography may be indicative of the direction of surficial groundwater flow. This information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

USGS TOPOGRAPHIC MAP ASSOCIATED WITH THIS SITE

Target Property: 2433117-F2 ROMOLAND, CA
Source: USGS 7.5 min quad index

GENERAL TOPOGRAPHIC GRADIENT AT TARGET PROPERTY

Target Property: General WNW

Source: General Topographic Gradient has been determined from the USGS 1 Degree Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified.

HYDROLOGIC INFORMATION

Surface water can act as a hydrologic barrier to groundwater flow. Such hydrologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Refer to the Physical Setting Source Map following this summary for hydrologic information (major waterways and bodies of water).

FEMA FLOOD ZONE

Target Property County	FEMA Q3 Flood Data Electronic Coverage
RIVERSIDE, CA	YES - refer to the Overview Map and Detail Map

Flood Plain Panel at Target Property:	0602452085B / CBPP
Additional Panels in search area:	0602451450C / CBPP
	0602580015D / CBPP

NATIONAL WETLAND INVENTORY

NWI Quad at Target Property	NWI Electronic Coverage
ROMOLAND	NO

HYDROGEOLOGIC INFORMATION

Hydrogeologic information obtained by installation of wells on a specific site can often be an indicator of groundwater flow direction in the immediate area. Such hydrogeologic information can be used to assist the environmental professional in forming an opinion about the impact of nearby contaminated properties or, should contamination exist on the target property, what downgradient sites might be impacted.

Site-Specific Hydrogeological Data*:
Search Radius: 2.0 miles
Status: Not found

AQUIFLOW®

Search Radius: 2.000 Miles.

EDR has developed the AQUIFLOW Information System to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted by environmental professionals to regulatory authorities at select sites and has extracted the date of the report, groundwater flow direction as determined hydrogeologically, and the depth to water table.

MAP ID	LOCATION FROM TP	GENERAL DIRECTION GROUNDWATER FLOW
1	1 - 2 Miles SW	NE

For additional site information, refer to Physical Setting Source Map Findings.

GROUNDWATER FLOW VELOCITY INFORMATION

Groundwater flow velocity information for a particular site is best determined by a qualified environmental professional using site specific geologic and soil strata data. If such data are not reasonably ascertainable, it may be necessary to rely on other sources of information, including geologic age identification, rock stratigraphic unit and soil characteristics data collected on nearby properties and regional soil information. In general, contaminant plumes move more quickly through sandy-gravelly types of soils than silty-clayey types of soils.

GEOLOGIC INFORMATION IN GENERAL AREA OF TARGET PROPERTY

Geologic information can be used by the environmental professional in forming an opinion about the relative speed at which contaminant migration may be occurring.

GEOLOGIC AGE IDENTIFICATION

Geologic Code: Kg
Era: Mesozoic
System: Cretaceous
Series: Cretaceous granitic rocks

ROCK STRATIGRAPHIC UNIT

Category: Plutonic and Intrusive Rocks

Geologic Age and Rock Stratigraphic Unit Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - a digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

DOMINANT SOIL COMPOSITION IN GENERAL AREA OF TARGET PROPERTY

The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the National Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps. The following information is based on Soil Conservation Service STATSGO data.

* ©1998 Site-specific hydrogeological data gathered by CERCLIS Alerts, Inc., Bainbridge Island, WA. All rights reserved. All of the information and opinions presented are those of the cited EPA report(s), which were completed under a Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) investigation.

Soil Component Name: MONSERATE

Soil Surface Texture: sandy loam

Hydrologic Group: Class C - Slow infiltration rates. Soils with layers impeding downward movement of water, or soils with moderately fine or fine textures.

Soil Drainage Class: Well drained. Soils have intermediate water holding capacity. Depth to water table is more than 6 feet.

Hydric Status: Soil does not meet the requirements for a hydric soil.

Corrosion Potential - Uncoated Steel: MODERATE

Depth to Bedrock Min: > 60 inches

Depth to Bedrock Max: > 60 inches

Soil Layer Information

	Boundary			Classification			
Layer	Upper	Lower	Soil Texture Class	AASHTO Group	Unified Soil	Permeability Rate (in/hr)	Soil Reaction (pH)
1	0 inches	10 inches	sandy loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Silty Soils.	COURSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 2.00 Min: 0.60	Max: 7.30 Min: 6.10
2	10 inches	28 inches	sandy clay loam	Silt-Clay Materials (more than 35 pct. passing No. 200), Clayey Soils.	COURSE-GRAINED SOILS, Sands, Sands with fines, Clayey sand.	Max: 0.60 Min: 0.20	Max: 7.30 Min: 6.10
3	28 inches	45 inches	indurated	Not reported	Not reported	Max: 0.00 Min: 0.00	Max: 0.00 Min: 0.00
4	45 inches	57 inches	cemented	Not reported	Not reported	Max: 0.00 Min: 0.00	Max: 0.00 Min: 0.00
5	57 inches	70 inches	loamy coarse sand	Granular materials (35 pct. or less passing No. 200), Stone Fragments, Gravel and Sand.	COURSE-GRAINED SOILS, Sands, Sands with fines, Silty Sand.	Max: 2.00 Min: 0.60	Max: 8.40 Min: 6.60

OTHER SOIL TYPES IN AREA

Based on Soil Conservation Service STATSGO data, the following additional subordinant soil types may appear within the general area of target property.

Soil Surface Textures: loam
fine sandy loam
coarse sandy loam

Surficial Soil Types: loam

	fine sandy loam coarse sandy loam
Shallow Soil Types:	indurated sandy loam fine sandy loam
Deeper Soil Types:	stratified coarse sandy loam gravelly - fine sandy loam

ADDITIONAL ENVIRONMENTAL RECORD SOURCES

According to ASTM E 1527-00, Section 7.2.2, "one or more additional state or local sources of environmental records may be checked, in the discretion of the environmental professional, to enhance and supplement federal and state sources... Factors to consider in determining which local or additional state records, if any, should be checked include (1) whether they are reasonably ascertainable, (2) whether they are sufficiently useful, accurate, and complete in light of the objective of the records review (see 7.1.1), and (3) whether they are obtained, pursuant to local, good commercial or customary practice." One of the record sources listed in Section 7.2.2 is water well information. Water well information can be used to assist the environmental professional in assessing sources that may impact groundwater flow direction, and in forming an opinion about the impact of contaminant migration on nearby drinking water wells.

WELL SEARCH DISTANCE INFORMATION

DATABASE	SEARCH DISTANCE (miles)
Federal USGS	1.000
Federal FRDS PWS	Nearest PWS within 1 mile
State Database	1.000

FEDERAL USGS WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

FEDERAL FRDS PUBLIC WATER SUPPLY SYSTEM INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No PWS System Found		

Note: PWS System location is not always the same as well location.

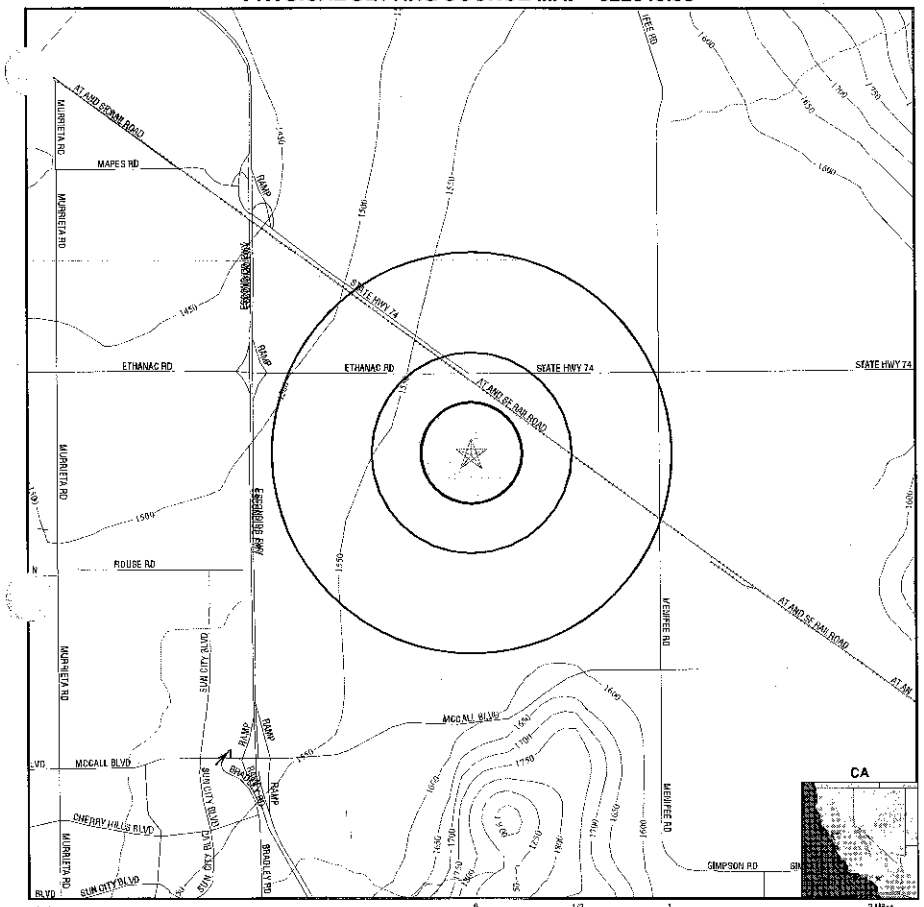
STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP

STATE DATABASE WELL INFORMATION

MAP ID	WELL ID	LOCATION FROM TP
No Wells Found		

PHYSICAL SETTING SOURCE MAP - 622543.3s



- Major Roads
- Contour Lines
- Earthquake Fault Lines
- Water Wells
- Public Water Supply Wells
- Groundwater Flow Direction
- Indeterminate Groundwater Flow at Location
- Groundwater Flow Varies at Location
- Cluster of Multiple Icons
- Earthquake epicenter, Richter 5 or greater
- Closest Hydrogeological Data
- Oil, gas or related wells

TARGET PROPERTY:	NWC McLaughlin Rd/Antelope Rd	CUSTOMER:	Foster Wheeler
ADDRESS:	NWC McLaughlin Rd/Antelope Rd	CONTACT:	Kristen Williamson
CITY/STATE/ZIP:	Perris CA 92585	INQUIRY #:	622543.3s
LAT/LONG:	33.7371 / 117.1703	DATE:	April 20, 2001 4:46 pm

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS

Map ID / Direction / Distance / Elevation			Database	EDR ID Number
1 SW 1 - 2 Miles Lower	Site ID: Groundwater Flow: Shallow Water Depth: Deep Water Depth: Average Water Depth: Date:	083302233T NE Not Reported Not Reported 35.31 07/06/1998	AQUIFLOW	52038

GEOCHECK® - PHYSICAL SETTING SOURCE MAP FINDINGS
RADON

AREA RADON INFORMATION

Federal EPA Radon Zone for RIVERSIDE County: 2

Note: Zone 1 indoor average level > 4 pCi/L.
: Zone 2 indoor average level >= 2 pCi/L and <= 4 pCi/L.
: Zone 3 indoor average level < 2 pCi/L.

RIVERSIDE COUNTY, CA

Number of sites tested: 12

Area	Average Activity	% <4 pCi/L	% 4-20 pCi/L	% >20 pCi/L
Living Area - 1st Floor	0.117 pCi/L	100%	0%	0%
Living Area - 2nd Floor	0.450 pCi/L	100%	0%	0%
Basement	1.700 pCi/L	100%	0%	0%

PHYSICAL SETTING SOURCE RECORDS SEARCHED

HYDROLOGIC INFORMATION

Flood Zone Data: This data, available in select counties across the country, was obtained by EDR in 1999 from the Federal Emergency Management Agency (FEMA). Data depicts 100-year and 500-year flood zones as defined by FEMA.

NWI: National Wetlands Inventory. This data, available in select counties across the country, was obtained by EDR in 1999 from the U.S. Fish and Wildlife Service.

HYDROGEOLOGIC INFORMATION

AQUIFLOW[R] Information System
Source: EDR proprietary database of groundwater flow information
EDR has developed the AQUIFLOW Information System (AIS) to provide data on the general direction of groundwater flow at specific points. EDR has reviewed reports submitted to regulatory authorities at select sites and has extracted the date of the report, hydrogeologically determined groundwater flow direction and depth to water table information.

GEOLOGIC INFORMATION

Geologic Age and Rock Stratigraphic Unit
Source: P.G. Schruben, R.E. Arndt and W.J. Bawiec, Geology of the Conterminous U.S. at 1:2,500,000 Scale - A digital representation of the 1974 P.B. King and H.M. Beikman Map, USGS Digital Data Series DDS - 11 (1994).

STATSGO: State Soil Geographic Database
The U.S. Department of Agriculture's (USDA) Soil Conservation Service (SCS) leads the national Cooperative Soil Survey (NCSS) and is responsible for collecting, storing, maintaining and distributing soil survey information for privately owned lands in the United States. A soil map in a soil survey is a representation of soil patterns in a landscape. Soil maps for STATSGO are compiled by generalizing more detailed (SSURGO) soil survey maps.

ADDITIONAL ENVIRONMENTAL RECORD SOURCES

FEDERAL WATER WELLS

PWS: Public Water Systems
Source: EPA/Office of Drinking Water
Telephone: 202-260-2805
Public Water System data from the Federal Reporting Data System. A PWS is any water system which provides water to at least 25 people for at least 60 days annually. PWSs provide water from wells, rivers and other sources.

PWS ENF: Public Water Systems Violation and Enforcement Data
Source: EPA/Office of Drinking Water
Telephone: 202-260-2805
Violation and Enforcement data for Public Water Systems from the Safe Drinking Water Information System (SDWIS) after August 1995. Prior to August 1995, the data came from the Federal Reporting Data System (FRDS).

USGS Water Wells: In November 1971 the United States Geological Survey (USGS) implemented a national water resource information tracking system. This database contains descriptive information on sites where the USGS collects or has collected data on surface water and/or groundwater. The groundwater data includes information on more than 900,000 wells, springs, and other sources of groundwater.

PHYSICAL SETTING SOURCE RECORDS SEARCHED

STATE RECORDS

California Drinking Water Quality Database
Source: Department of Health Services
Telephone: 916-324-2319
The database includes all drinking water compliance and special studies monitoring for the state of California since 1984. It consists of over 3,200,000 individual analyses along with well and water system information.

California Oil and Gas Well Locations for District 2 and 6
Source: Department of Conservation
Telephone: 916-323-1779

RADON

Area Radon Information: The National Radon Database has been developed by the U.S. Environmental Protection Agency (USEPA) and is a compilation of the EPA/State Residential Radon Survey and the National Residential Radon Survey. The study covers the years 1986 - 1992. Where necessary data has been supplemented by information collected at private sources such as universities and research institutions.

EPA Radon Zones: Sections 307 & 309 of IRAA directed EPA to list and identify areas of U.S. with the potential for elevated indoor radon levels.

OTHER

Epicenters: World earthquake epicenters, Richter 5 or greater
Source: Department of Commerce, National Oceanic and Atmospheric Administration

California Earthquake Fault Lines: The fault lines displayed on EDR's Topographic map are digitized quaternary fault lines, prepared in 1975 by the United State Geological Survey. Additional information (also from 1975) regarding activity at specific fault lines comes from California's Preliminary Fault Activity Map prepared by the California Division of Mines and Geology.

ORPHAN SUMMARY

City	EDR ID	Site Name	Site Address	Zip	Database(s)	Facility ID
PERRIS	S103945842	S.T.R. TIRE RECYCLING	23836 HIGHWAY 74		SWF/LF	33-TI-0933
PERRIS	S104654453	ALVIN C SMITH WTS	ON APN 322-020-003 IN BACK OF HEADLY RD		SWF/LF	33-TI-1265
PERRIS	S103588033	ECOLOGY FARMS	GOETZ ROAD AT ETHANAC ROAD		SWF/LF	33-AA-0263
PERRIS	S103443380	HOMELAND	320 S PERRIS BLVD, S7 T6S R2W		SWF/LF	33-CR-0007
ROMOLAND	S103652342	NICANOR ARCE	31831 HWY 74	92380	HAZNET	CLU060008192
ROMOLAND	S103695019	CALTRANS	2764 HIGHWAY 74	92380	LUST	083301251T
ROMOLAND	S103820786	CAL TRANS	HIGHWAY 74	92380	LUST	89341
ROMOLAND	S103949673	ALUMAX BUILDING PRODUCTS	28921 E HWY 74	92585	HAZNET	CAL912405289

Site	Database(s)	EDR ID Number / EPA ID Number

S.T.R. TIRE RECYCLING
23836 HIGHWAY 74
PERRIS, CA

SWF/LF S103945842
N/A

LF:

Facility ID:	33-TI-0993
Operator:	S.T.R. Tire Recycling
Operator Addr:	PO Box 1639 Kent, WA 98031
Operator Phone:	(253) 373-9188
Owner:	Delgado, George
Owner Address:	23836 Highway 74 Perris, CA 92570
Ower Telephone:	(909) 943-5711
Activity:	Minor Waste Tire Facility
Operator's Status:	Active
Regulation Status:	Unpermitted
Region:	STATE
Lat/Long:	33.78333 / -117.23333
Waste Accepted:	Tires
Surrounding Land:	Not reported
Report of Facility Info Date:	Not reported
Report of Facility Info Amendment:	Not reported
Permitted Throughput with Units:	Not reported
Permitted Throughput with Units:	Not reported
Permitted Throughput with Units:	Not reported
Actual Throughput with Units:	4000 Tires
Actual Capacity with Units:	Not reported
Permited Capacity with Units:	Not reported
Remaining Capacity with Units:	4000
Permitted Total Acreage:	Not reported
Actual Total Acreage:	Not reported
Permitted Disposal Acreage:	Not reported
Actual Disposal Acreage:	Not reported
Inspection Frequency:	Not reported

ALVIN C SMITH WTS
ON APN 322-020-003 IN BACK OF HEADLY RD
PERRIS, CA

SWF/LF S104654453
N/A

LF:

Facility ID:	33-TI-1265
Operator:	Not reported
Operator Addr:	Not reported
Operator Phone:	Not reported
Owner:	SMITH, ALVIC C AND JESSIE B
Owner Address:	21540 MACK STREET PERRIS, CA 92570
Ower Telephone:	(909) 657-4166
Activity:	Minor Waste Tire Facility
Operator's Status:	Inactive
Regulation Status:	Unpermitted
Region:	STATE
Lat/Long:	33.81480 / -117.30855
Waste Accepted:	Not reported
Surrounding Land:	Not reported
Report of Facility Info Date:	Not reported
Report of Facility Info Amendment:	Not reported
Permitted Throughput with Units:	Not reported
Permitted Throughput with Units:	Not reported

Site	Database(s)	EDR ID Number / EPA ID Number

ALVIN C SMITH WTS (Continued) S104654453

Permitted Throughput with Units:	Not reported
Actual Throughput with Units:	Not reported
Actual Capacity with Units:	Not reported
Permited Capacity with Units:	Not reported
Remaining Capacity with Units:	Not reported
Permitted Total Acreage:	Not reported
Actual Total Acreage:	Not reported
Permitted Disposal Acreage:	Not reported
Actual Disposal Acreage:	Not reported
Inspection Frequency:	Not reported

ECOLOGY FARMS
GOETZ ROAD AT ETHANAC ROAD
PERRIS, CA

SWF/LF S103588033
N/A

LF:

Facility ID:	33-AA-0283
Operator:	Ecology Farms Management, Inc.
Operator Addr:	27636 Ynez Road, L7-197 Temecula, CA 92591
Operator Phone:	(909) 676-5277
Owner:	Not reported
Owner Address:	Not reported
Ower Telephone:	Not reported
Activity:	Chipping and Grinding Activity
Operator's Status:	Active
Regulation Status:	Excluded
Region:	STATE
Lat/Long:	33.78333 / -117.23333
Waste Accepted:	Not reported
Surrounding Land:	Not reported
Report of Facility Info Date:	Not reported
Report of Facility Info Amendment:	Not reported
Permitted Throughput with Units:	Not reported
Permitted Throughput with Units:	Not reported
Permitted Throughput with Units:	Not reported
Actual Throughput with Units:	Not reported
Actual Capacity with Units:	Not reported
Permited Capacity with Units:	Not reported
Remaining Capacity with Units:	Not reported
Permitted Total Acreage:	Not reported
Actual Total Acreage:	Not reported
Permitted Disposal Acreage:	Not reported
Actual Disposal Acreage:	Not reported
Inspection Frequency:	Not reported

HOMELAND
320 S PERRIS BLVD. S7 T5S R2W
PERRIS, CA

SWF/LF S103340380
N/A

LF:

Facility ID:	33-CR-0007
Operator:	WASTE MANAGEMENT
Operator Addr:	1955 MARKET STREET RIVERSIDE, CA 92501
Operator Phone:	(909) 275-1370
Owner:	ASHLEY, JOHN
Owner Address:	320 S PERRIS BLVD

HOMELAND (Continued) S103340380

PERRIS, CA 92370
Ower Telephone: Not reported
Activity: Solid Waste Disposal Site
Operator's Status: Closed
Regulation Status: Pre-regulations
Region: STATE
Lat/Long: 33.75360 / -117.11868
Waste Accepted: Not reported
Surrounding Land: Not reported
Report of Facility Info Date: Not reported
Report of Facility Info Amendment: Not reported
Permitted Throughput with Units: Not reported
Permitted Throughput with Units: Not reported
Permitted Throughput with Units: Not reported
Actual Throughput with Units: Not reported
Actual Capacity with Units: Not reported
Permited Capacity with Units: Not reported
Remaining Capacity with Units: Not reported
Permitted Total Acreage: Not reported
Actual Total Acreage: Not reported
Permitted Disposal Acreage: Not reported
Actual Disposal Acreage: Not reported
Inspection Frequency: Not reported

NICANOR ARCE HAZNET **S103652342**
31831 HWY 74 **N/A**
ROMOLAND, CA 92380

HAZNET:
Gepaid: CLU960008192 Tepaid: AZD049318009
Contact: Not reported Telephone: (000) 000-0000
Gen County: Riverside Tsd County: 99
Tons: 0.075
Category: Other inorganic solid waste
Disposal Method: Transfer Station
Mailing Address: DTSC CLU/ERU
SACRAMENTO, CA 95812 - 0806
County Not reported

Gepaid: CLU960008192 Tepaid: AZD049318009
Contact: Not reported Telephone: (000) 000-0000
Gen County: Riverside Tsd County: 99
Tons: 0.0225
Category: Oxygenated solvents (acetone, butanol, ethyl acetate, etc.)
Disposal Method: Transfer Station
Mailing Address: DTSC CLU/ERU
SACRAMENTO, CA 95812 - 0806
County Not reported

Gepaid: CLU960008192 Tepaid: AZD049318009
Contact: Not reported Telephone: (000) 000-0000
Gen County: Riverside Tsd County: 99
Tons: 0.1
Category: Off-specification, aged, or surplus organics
Disposal Method: Transfer Station
Mailing Address: DTSC CLU/ERU
SACRAMENTO, CA 95812 - 0806
County Not reported

NICANOR ARCE (Continued) S103652342

Gepaid: CLU960008192 Tepaid: AZD049318009
Contact: Not reported Telephone: (000) 000-0000
Gen County: Riverside Tsd County: 99
Tons: 0.0225
Category: Liquids with pH <UN-> 2
Disposal Method: Transfer Station
Mailing Address: DTSC CLU/ERU
SACRAMENTO, CA 95812 - 0806
County Not reported

CALTRANS **LUST** **S103696019**
2764 HIGHWAY 74 **N/A**
ROMOLAND, CA 92380

State LUST:
Cross Street: I-215
Qty Leaked: 0.00000
Case Number 083301251T
Reg Board: Santa Ana Region
Chemical: Not reported
Lead Agency: Local Agency
Local Agency : 33000
Case Type: Soil only
Status: Signed off, remedial action completed or deemed unnecessary
County: Not reported
Review Date: 10/18/94 Confirm Leak: Not reported
Workplan: Not reported Prelim Assess: 07/27/89
Pollution Char: Not reported Remed Plan: Not reported
Remed Action: Not reported Monitoring: Not reported
Close Date: 05/31/94
Release Date: 05/31/89
Cleanup Fund Id : Not reported
Discover Date : 04/19/89
Enforcement Dt : / /
Enf Type: None taken
Enter Date : 09/06/89
Funding: Federal Funds
Staff Initials: Not reported
How Discovered: Other Means
How Stopped: Close Tank
Interim : Yes
Lat/Lon : Not reported
Leak Cause: Unknown
Leak Source: Tank
Local Case # : 89341
Beneficial: Not reported
Staff : NOM
MTBE Date : / /
MTBE Tested : Not reported
Max MTBE GW : 0.00000
GW Qualifies : Not reported
Max MTBE Soil : 0.00000
Soil Qualifies : Not reported
Hydr Basin #: Not reported
Operator : Not reported
Oversight Prgm : LOP
Priority : Not reported
Review Date : 10/18/94

Site	Database(s)	EDR ID Number / EPA ID Number
CALTRANS (Continued)		S103696019

Stop Date : 04/19/89
Street Number : 2764
Work Suspended :Not reported
Responsible PartyCALTRANS
Summary: Not reported

LUST Region 8:

Facility ID:	083301251T	Region:	8
Substance:	8006619	Cross Street:	I-215
Date Closed:	04/19/1989		
Case Type:	Spill		
Regional Board:	08		
Local Case Num:	89341		
Facility Status:	Signed off, remedial action completed or deemed unnecessary		
Staff:	NOM		
Lead Agency:	Local Agency		
Local Agency:	Riverside County Dept of Env. Health		
Qty Leaked:	Not reported		
County:	Riverside		
Review Date:	10/18/1994	Confirm Leak:	Not reported
Workplan:	Not reported	Prelim Assess:	7/27/89
Pollution Char:	Not reported	Remed Plan:	Not reported
Remed Action:	Not reported	Monitoring:	Not reported
Close Date:	5/31/94		

Cleanup Fund Id : Not reported
Discover Date : 04/19/1989
Enforcement Dt : Not reported
Enf Type: None taken
Enter Date : 09/06/1989
Funding: Federal Funds
Staff Initials: Not reported
How Discovered: Other Means
How Stopped: Close Tank
Interim : Yes
Lat/Lon : Not reported
Leak Cause: Unknown
Leak Source: Tank
Beneficial: Not reported
MTBE Date : Not reported
MTBE Tested : NT
Max MTBE GW : 0
GW Qualifies : Not reported
Max MTBE Soil : Not reported
Soil Qualifies : Not reported
Hydr Basin #: Not reported
Operator : Not reported
Oversight Prgm : LOP
Priority : Not reported
Street Number : 2764
Work Suspended :Not reported
Responsible PartyCALTRANS
Summary: Not reported

Site	Database(s)	EDR ID Number / EPA ID Number
CAL TRANS **HIGHWAY 74** **ROMOLAND, CA 92380**	**LUST**	**S103820786** **N/A**

LUST Region RV:

Facility ID:	89341
Region :	RIVERSIDE
Status:	Signed off, remedial action completed or deemed unnecessary
Site Closed:	Yes
Case Type:	Soil only

ALUMAX BUILDING PRODUCTS **28921 E HWY 74** **ROMOLAND, CA 92585**	**HAZNET**	**S103949673** **N/A**

HAZNET:

Gepaid:	CAL912405299	Tepaid:	CAT080022148
Contact:	ALUMAX BUILDING PRODUCTS	Telephone:	(714) 928-1000
Gen County:	Riverside	Tsd County:	San Bernardino
Tons:	0.02		
Category:	Off-specification, aged, or surplus organics		
Disposal Method:	Transfer Station		
Mailing Address:	1495 COLUMBIA AVE RIVERSIDE, CA 92507		
County	Not reported		

Gepaid:	CAL912405299	Tepaid:	CAT080022148
Contact:	ALUMAX BUILDING PRODUCTS	Telephone:	(714) 928-1000
Gen County:	Riverside	Tsd County:	San Bernardino
Tons:	0.0458		
Category:	Laboratory waste chemicals		
Disposal Method:	Not reported		
Mailing Address:	1495 COLUMBIA AVE RIVERSIDE, CA 92507		
County	Not reported		

Gepaid:	CAL912405299	Tepaid:	CAT080022148
Contact:	ALUMAX BUILDING PRODUCTS	Telephone:	(714) 928-1000
Gen County:	Riverside	Tsd County:	San Bernardino
Tons:	0.0458		
Category:	Laboratory waste chemicals		
Disposal Method:	Transfer Station		
Mailing Address:	1495 COLUMBIA AVE RIVERSIDE, CA 92507		
County	Not reported		

Gepaid:	CAL912405299	Tepaid:	CAT080022148
Contact:	ALUMAX BUILDING PRODUCTS	Telephone:	(714) 928-1000
Gen County:	Riverside	Tsd County:	San Bernardino
Tons:	0.35		
Category:			
Disposal Method:	Not reported		
Mailing Address:	1495 COLUMBIA AVE RIVERSIDE, CA 92507		
County	Not reported		

DETAILED ORPHAN LISTING

Site	Database(s)	EDR ID Number EPA ID Number
ALUMAX BUILDING PRODUCTS (Continued)		S103949673

Gepaid:	CAL912405298	Tepaid:	CAT080022148
Contact:	ALUMAX BUILDING PRODUCTS	Telephone:	(714) 928-1000
Gen County:	Riverside	Tsd County:	San Bernardino
Tons:	0.1751		
Category:			
Disposal Method:	Transfer Station		
Mailing Address:	1495 COLUMBIA AVE RIVERSIDE, CA 92507		
County	Not reported		

The CA HAZNET database contains 1 additional record for this site.
Please contact your EDR Account Executive for more information.

APPENDIX C

HISTORIC AERIAL PHOTOGRAPHS

The EDR-Aerial Photography Print Service

NWC McLaughlin Rd/Antelope Rd
NWC McLaughlin Rd/Antelope Rd
Perris, CA 92570

April 26, 2001

Inquiry Number: 622543-5

Environmental Data Resources, Inc.
an edr company

The Source For Environmental Risk Management Data

3530 Post Road
Southport, Connecticut 06490

Nationwide Customer Service

Telephone: 1-800-352-0050
Fax: 1-800-231-6802

Environmental Data Resources, Inc.
Aerial Photography Print Service

Environmental Data Resources, Inc.'s (EDR) Aerial Photography Print Service is a screening tool designed to assist professionals in evaluating potential liability on a target property resulting from past activities. ASTM E 1527-00, Section 7.3 on Historical Use Information, identifies the prior use requirements for a Phase I environmental site assessment. The ASTM standard requires a review of *reasonably ascertainable standard historical sources. Reasonably ascertainable means information that is publicly available, obtainable from a source with reasonable time and cost constraints, and practically reviewable.*

To meet the prior use requirements of ASTM E 1527-00, Section 7.3.2, the following *standard historical sources* may be used: aerial photographs, fire insurance maps, property tax files, land title records (although these cannot be the sole historical source consulted), topographic maps, city directories, building department records, or zoning/land use records. ASTM E 1527-00 requires *"All obvious uses of the property shall be identified from the present, back to the property's obvious first developed use, or back to 1940, whichever is earlier. This task requires reviewing only as many of the standard historical sources as are necessary, and that are reasonably ascertainable and likely to be useful."* (ASTM E 1527-00, Section 7.3.2, page 11.

Aerial Photographs
Aerial photographs are a valuable historical resource for documenting past land use and can be particularly helpful when other historical sources (such as city directories or fire insurance maps) are not reasonably ascertainable. The EDR Aerial Photograph Print Service includes a search of aerial photograph collections flown by public and private agencies for the state of California. EDR's professional field-based researchers provide digitally reproduced historical aerial photographs at approximately ten year intervals.

Please call EDR Nationwide Customer Service at
1-800-352-0050 (8a.m-8pm EST)
with questions or comments about your report.
Thank you for your business!

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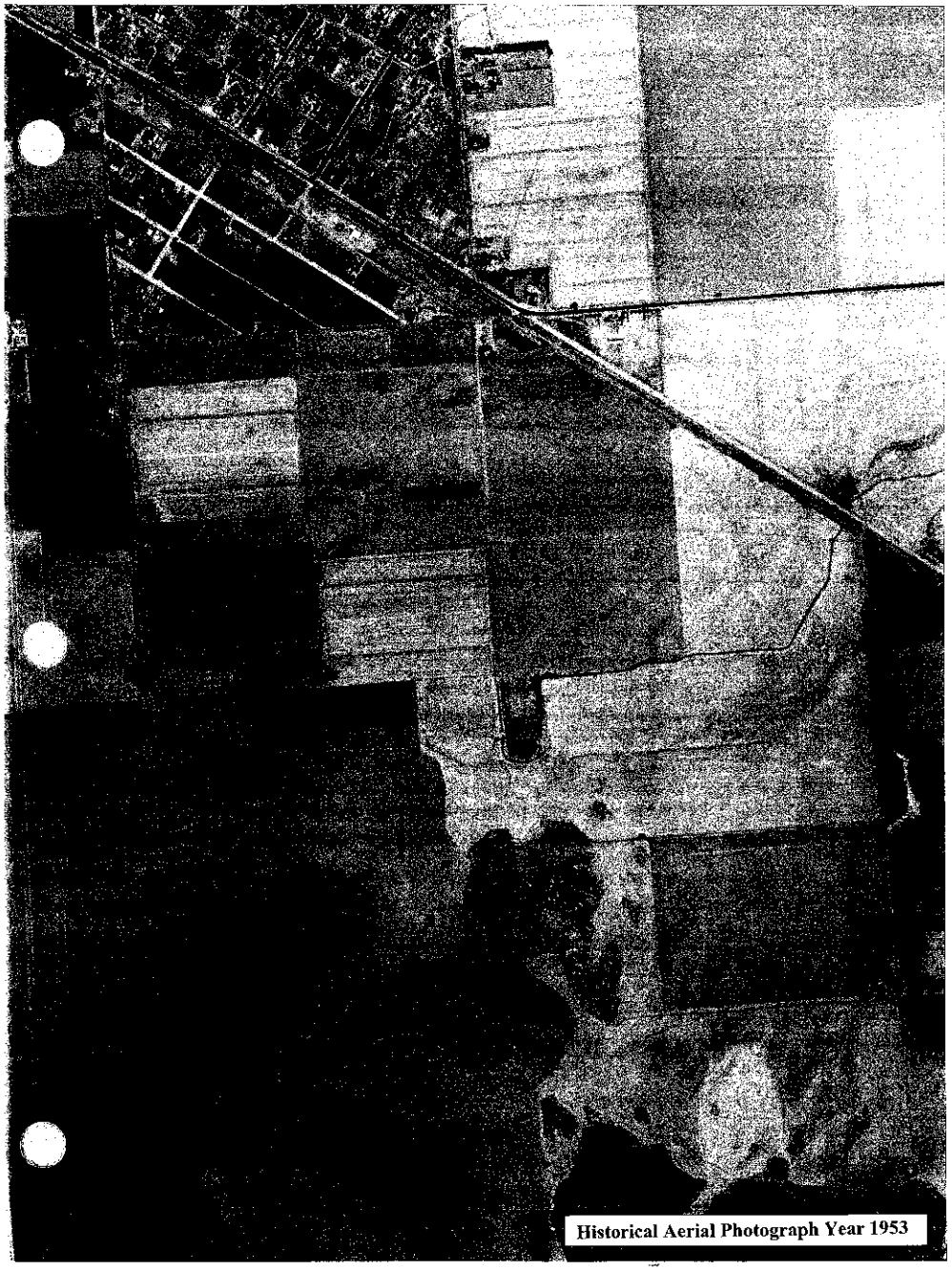
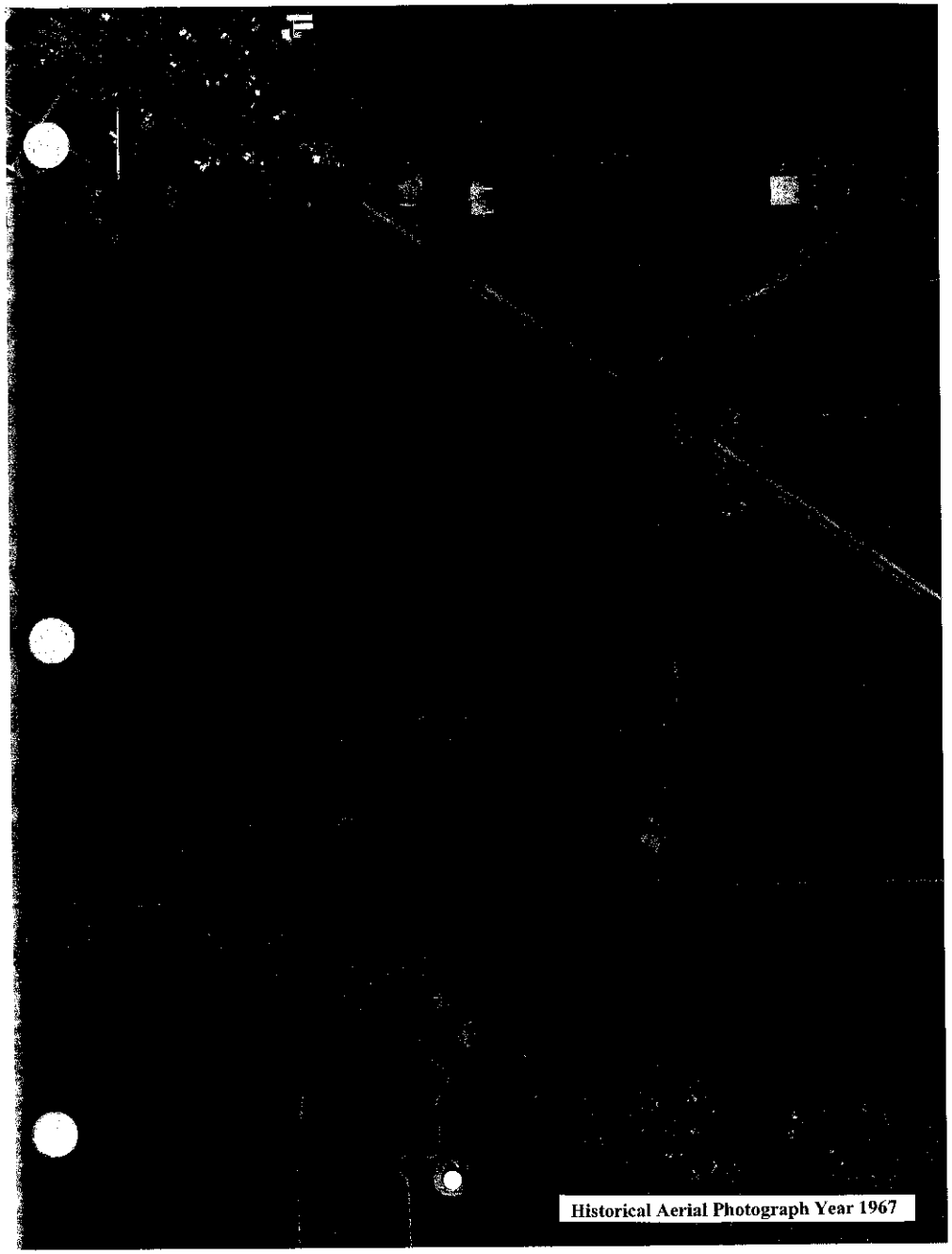
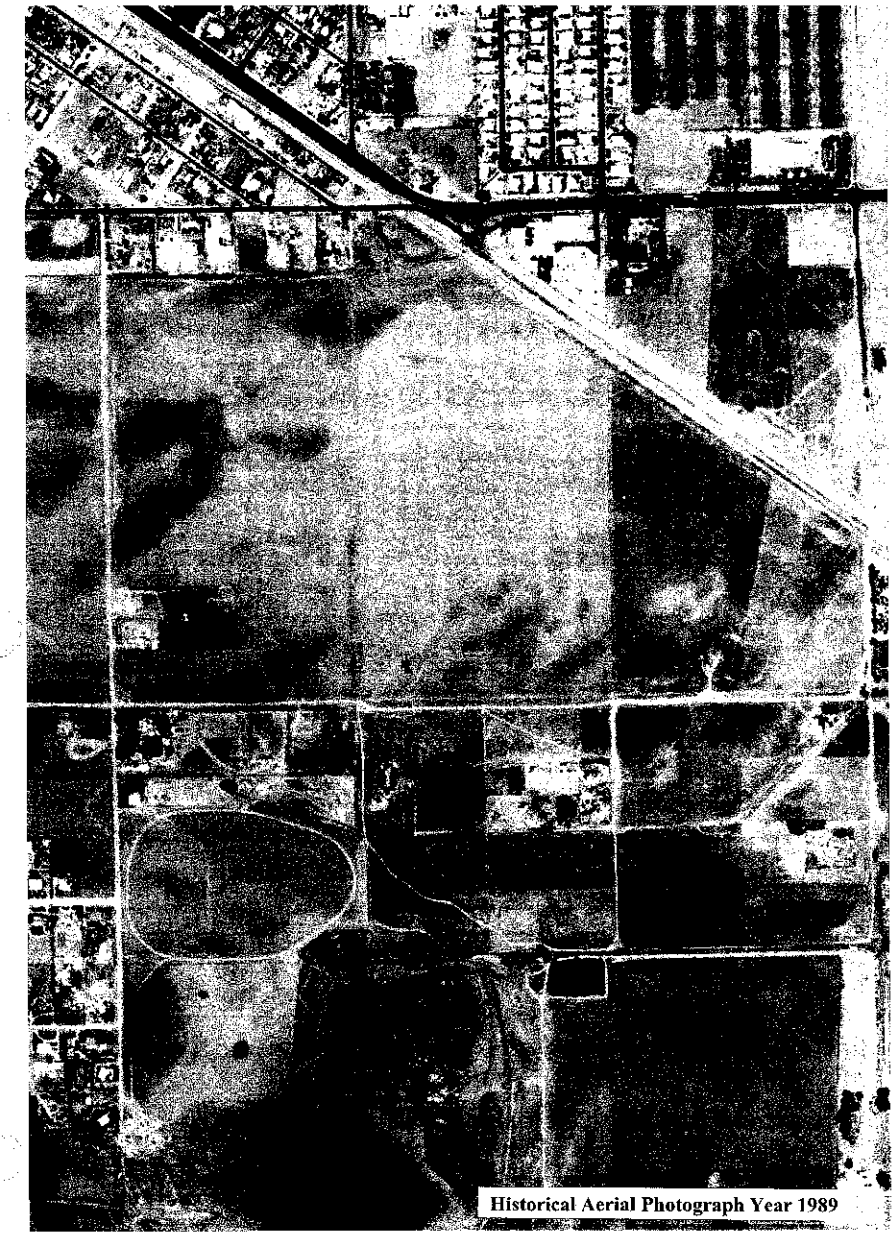


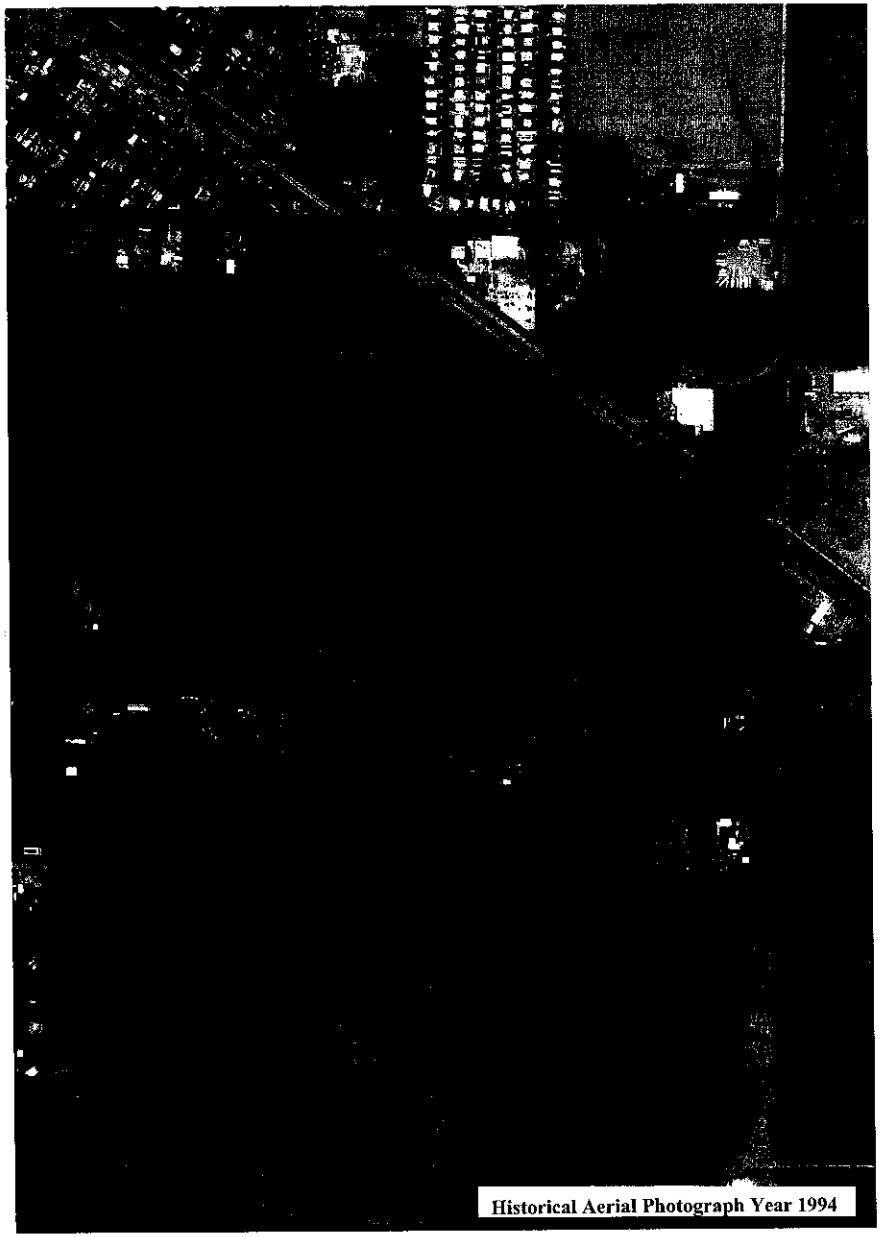
Historical Aerial Photograph Year 1953



Historical Aerial Photograph Year 1967



Historical Aerial Photograph Year 1989



Historical Aerial Photograph Year 1994

APPENDIX D

RESUMES

Kristen K. Williamson, RG, REA

Senior Geoscientist

EXPERIENCE SUMMARY

Eight years experience in the assessment, characterization, and remediation of soil and groundwater contamination at sites throughout Southern California. Directed numerous site investigations, feasibility studies, and remedial actions for chemical and oil industry clients. Worked with clients, consultants, regulatory agencies, and contractors to establish practical, cost-effective cleanup objectives.

REGISTRATIONS/CERTIFICATIONS

Registered Geologist - CA, No. 6144
Registered Environmental Assessor - CA, No. 06451

EDUCATION

BS / Geology / University of California, Los Angeles / 1987

DISCIPLINE(S)

Geology

LOCATION

Company: Foster Wheeler Environmental Corporation; 7/17/96 - Present
Years w/Other Firms: 8

REPRESENTATIVE PROJECT EXPERIENCE

Site Characterization/Site Assessments - Served as project manager and/or principal investigator for the characterization of soil and groundwater contaminated by petroleum hydrocarbons, chlorinated solvents, PCBs, and various metals. Assessments included soil boring and monitoring well installation, soil and groundwater sampling, and soil vapor sampling and surveys. Experience includes extensive evaluation of large and small industrial facilities, underground storage tank (UST) sites, bulk terminals, pipelines, and refineries.

UST Assessment and Closure - Managed environmental projects for major oil companies and independent owners and operators. These projects included soil and groundwater assessment and characterization, permitting, regulatory compliance, agency and client interaction, groundwater monitoring, site acquisition assessment, tank removal supervision, remedial action planning and feasibility study, and attainment of site closure using both remediation and risk assessment. Also worked with the UST Reimbursement Fund to ensure client reimbursement for assessment and remedial activities.

Agency Negotiation and Compliance - Interfaced and negotiated with regulatory agencies for practical scopes of work resulting in reduced project cost without compromising data acquisition. Also obtained required permits and negotiated cleanup levels for subsequent site closure. Agency experience includes RWQCB, DOHS, DTSC, CALEPA as well as local environmental programs. Familiar with local, state, and federal regulations.

Remediation - Evaluated site conditions for various remedial options based on technical and practical conditions at the site. Technologies included vapor extraction, bioremediation,

chemical stabilization, air sparging, and pump and treat systems. Prepared and evaluated remedial Action Plans. Managed large-scale soil remediation projects which included contaminated soil excavation, on or off site treatment or disposal, and verification sampling. Projects included treatment or disposal of a wide range of contaminants including petroleum hydrocarbons, chlorinated solvents, PCBs, pesticides and metals.

Technical Support for Legal Counsel - Provided technical support to legal counsel for cases requiring environmental geology and hydrogeology expertise for regulatory compliance or responsible party litigation where contaminated groundwater impacted adjacent properties, as well as in Superfund areas.

Phase I Environmental Site Assessments - Conducted and/or managed dozens of Phase I Environmental Assessments ranging from individual sites to multi-site portfolios. Assessments consisted of site and area surveys, public records search, review of databases and lists of hazardous waste sites, review of regional and site specific geology and hydrogeology, and aerial photograph interpretation.

EXPERIENCE SUMMARY

Dr. Mudry has 28 years of direct experience in environmental sciences including: field surveys; field data analysis; impact assessment; and, management of multidisciplinary environmental, earth sciences, and engineering teams for resource development and environmental and hazardous waste projects.

Responsible for conducting and managing multidisciplinary environmental studies associated with: major industrial and resource development projects; coal, biomass, and gas fired power plants; coal mine development and mining operations; hydroelectric facilities; co-generation facilities; and, road, pipeline, and transmission lines. Provides senior technical support in the areas of power plant siting and impact assessment, biology, and aquatic ecology. Project experience includes preparation of Environmental Assessments, Initial Studies, Environmental Impact Reports and Impact Statements under CEQA, NEPA, and World Bank guidelines. Experience includes projects in Canada, Nepal, and Pakistan, as well as California and other parts of the US.

EDUCATION

PhD / Biology / University of Calgary / 1972
MA / Biology / California State University at Long Beach / 1969
BS / Zoology / California State University at Long Beach / 1967

TRAINING

OSHA Hazardous Waste Operations (HAZWOPER)

REPRESENTATIVE PROJECT EXPERIENCE

New Cure, Inc., Oil Superfund Site, Monterey Park, California - Deliverables Manager for coordination, production, and quality control of all documents prepared for submission to the US EPA. The Operating Industries, Inc., (OII) Landfill is a 190-acre closed industrial/municipal landfill and Superfund site. The project work includes engineering and construction of cover systems, gas management systems, and surface water management systems for closure of the landfill. Responsible for preparing schedules, developing report outlines, coordinating preparation of deliverables by technical leads, final editing, report production, and presentations to the EPA. Documents prepared and submitted to the EPA include: Work Plan, Quality Assurance/Quality Control Plan, Safety, Health and Emergency Response Plan, and Preliminary Design Report.

Infrastructure Capital Group, LLC, Liberty Power Project, Pakistan - Conducted field investigations, directed local subcontractors, and prepared a draft Environmental and Social Soundness Assessment for a proposed 450 MW gas fired power plant to be located in northern Sindh Province of Pakistan. In addition to the power plant itself, the project also included construction of approximately 110 km of natural gas pipeline, a 7 km transmission line, a site access road, and a residential colony housing approximately 300 staff and support personnel. The draft report documents the affected environment, identifies potential adverse impacts, and proposes appropriate mitigation measures using the guidelines of the Government of Pakistan and the World Bank. Principal areas of environmental concern included pipeline construction through desert and agricultural lands, planned river crossings through sensitive riparian and aquatic habitats, air and water quality impacts, traffic impacts during construction, displacement

of on-site residents due to project construction, and socio-economic impacts related to the operation of the facility.

Los Angeles Harbor Department, Environmental Impact Report - Project Manager and principal author of an Initial Study, Draft and Final Environmental Impact Report (EIR), and Mitigation Monitoring Plan for renewal of Hugo Neu-Proler's lease at Berths 210-211 in the Port of Los Angeles. This facility processes and ships over one million tons per year of scrap metal to Pacific Rim countries. Special studies conducted in support of the EIR included traffic impact assessment, air quality monitoring, health risk assessment, and noise monitoring. Prepared responses to comments from the public and agencies on the Draft EIR and prepared a Final EIR.

Eastern Transportation Corridor, Orange County, California - Acting Mitigation Manager responsible for coordinating and directing multidisciplinary staff monitoring all construction activities for a toll road in Orange County. The 23-mile toll road includes four major intersections, approximately 50 bridges or other structures, and 29 sensitive stream crossings. The project location includes foothill and mountain terrain with chaparral and coastal sage scrub habitat as well as agricultural lands. Monitoring includes: verification that project plans for protection of biological, archaeological, paleontological, and other resources have been implemented; evaluation of the effectiveness of sedimentation and erosion protection measures; continuous monitoring of impacts to sensitive species such as the California gnatcatcher and the cactus wren; implementation of mitigation programs for replacement of coastal sage scrub and wetlands; and, monitoring of clearing, grading, and other construction activities.

Jet Propulsion Laboratory, Environmental Risk Assessment - Responsible for coordination and preparation of a screening ecological risk assessment which is being prepared following guidelines of the California Department of Toxic Substances Control. The risk assessment is being conducted in support of the Remedial Investigations (RI) for groundwater, soil, and soil vapor contamination at the Jet Propulsion Laboratory (JPL) in Pasadena, California. The risk assessment will help to determine the potential ecological receptors, the potential contaminants of concern, and the potentially completed exposure pathways. The assessment will qualitatively evaluate the potential threat to non-human receptors posed by potential contaminants and site-specific activities.

Caltico Oil Corporation, Conditional Use Permit Application - Responsible for preparation of a Conditional Use Permit Application submitted to the City of Santa Clarita for development of the Confusion Hill oil field. The project consisted of 62 oil production wells and 28 steam and water injection wells and modification of existing oil and steam distribution pipeline systems. Approximately 50 old tanks and other equipment will be dismantled and removed. Special studies included biological surveys, archaeological surveys, noise assessment, and investigation of land use issues. An evaluation of potential impacts was completed using a CEQA Initial Study format.

Miscellaneous Projects

Responsible for management of staff involved in the following projects: Potrero Canyon Environmental Impact Report (EIR); Review of eight power plants under the California Energy Commission Siting Program; Preparation of incineration feasibility study for Basin F remediation at the Rocky Mountain Arsenal; Berths 212-215 Remediation Plan and EIR for Port of Los Angeles; Hazardous waste site investigations at sites in Downey, Los Angeles, Indio, Fresno,

Vernon and Westminster, California, as well as others; Investigation under the Defense Environmental Restoration Account on behalf of the US Corps of Engineers; and, Preparation of air quality and environmental documents for projects such as UNOCAL Cogeneration Project, Genstar Coyote Canyon Landfill Gas Power Plant, O'Brien Energy Corporation projects (several), and Delano Biomass Power Plant.

APPENDIX I

INTERCONNECTION STUDY

CALIFORNIA ISO

California Independent
System Operator

CC: Jim McLucas
Alan Roth
Greg Lindsey
File

March 2, 2001

Weston L. Williams
Manager, Grid Contracts/Tariff Negotiation/Development
Southern California Edison
P.O. Box 800
2244 Walnut Grove Ave.
Rosemead, CA 91770

Dear Mr. Williams:

The California ISO (Cal-ISO) has reviewed the Moreno Valley Generation Project System Impact Study (SIS), dated January 19, 2001. This study was conducted as requested by Calpine Corporation (Calpine) for the electrical connection of the proposed 679 MW power plant project (Valley Project) to SCE's existing Valley 500 kV substation, which is a part of the ISO-controlled grid. Southern California Edison Company (SCE) performed this SIS pursuant to the ISO Tariff. The expected in-service date for the Valley Project is June 2004.

The purpose of this SIS is to assess the reliability impacts due to the connection of the Valley Project on SCE's existing transmission and substation facilities, and to determine if the proposed 679 MW generation addition requires system modifications or reinforcements.

A summary of the study assumptions and conclusions is included below along with the Cal-ISO comments.

Study Assumptions and Methodology

SCE modeled a 679 MW plant connected to the existing Valley 500 kV substation. The SCE transmission system was analyzed under the following system conditions:

- 2004 Heavy Summer base case with high Southern California load levels (21,715 MW) and very high internal SCE eastern area generation (15,555MW).
- 2004 Light Spring base case with low Southern California load levels (14,208 MW) and very high internal SCE eastern area generation (8,165 MW).

The base cases included all the generation and transmission projects that are ahead of the Valley Project in SCE's system impact study queue. This included SDG&E's proposed Valley-Rainbow 500 kV line.

All relevant contingencies were analyzed under the above scenarios to assess potential reliability impacts related to the combined operation of the Valley Project and the existing and proposed generation.

Load Flow Results

- Normal Conditions:

The SIS concludes that the addition of the Valley Project does not cause any thermal overload problems on the transmission system during normal conditions (i.e. with all facilities in service).

- Contingency Analysis:

The SIS shows that the addition of the Valley Project does not create any N-1 or N-2 overload problems. Tables 2-1 and 2-2 of the SIS show that the addition of the Valley Project relieves some of the pre-project existing emergency overloads.

Post-Transient Voltage Study

The SIS shows that the Valley Project does not create any post transient voltage deviation problems.

Transient Stability Study

The transient stability studies indicated that the Valley Project does not have any adverse impact on system stability.

Short Circuit Duty Study

The SIS shows that the addition of the Valley Project increases the three-phase short circuit duties at 47 substations, which are listed in Tables 5 and 6 of the SIS. However, the SIS did not indicate if these increased short circuit duties would remain below the circuit breaker ratings. The Cal-ISO requires comparing the short circuit duties due to the Valley Project with the circuit breaker ratings at the mentioned 47 substations, as part of a Facilities Study, to determine if the proposed project causes any criteria violation.

Study Recommendations

- In its October 26, 2000 meeting, the Cal-ISO Board of Governors directed the Cal-ISO staff to request solicitation of alternative proposals to compete with the Valley-Rainbow 500 kV transmission line. The outcomes of this competitive solicitation may affect either the specifics of the Valley-Rainbow project, its feasibility compared to other alternatives, or its in service date. Therefore, the Cal-ISO recommends that SCE conduct sensitivity studies, as part of a Facilities Study, to identify the impact of the Valley Generation Project on the Cal-ISO controlled grid, without including the proposed Valley-Rainbow 500 kV transmission line in the base case.

- Based on these results, the Cal-ISO grants preliminary approval to connect the Valley Project to the grid. Final approval will be granted upon the satisfactory completion of the Facilities Study.

Next Steps

With the System Impact Study completed, the next step in the connection request process is to perform a Facilities Study. The Facilities Study will be also prepared by SCE, and sent to the Cal-ISO for review upon completion.

If you have any questions about the Cal-ISO review of this study, please call me at (916) 351- 4464 (jmiller@caiso.com) or Mohamed Awad at (916) 351-2153 (mawad@caiso.com).

Sincerely,

Jeffrey Miller
Regional Transmission Manager

CC: Kellan Fluckiger (ISO)
Armando Perez (ISO)
Tony Velarde (SCE)
Pat Mayfield (SCE)
Dana Cabbell (SCE)
Ralph Hollenbacher (Calpine)
Grid Planning (ISO)

SOUTHERN CALIFORNIA
EDISON®
'ISON INTERNATIONAL® Company

Weston L. Williams
Manager, Grid Contract/Tariff
Negotiation/Development

January 19, 2001

Mr. Ralph Hollenbacher
Project Manager
Calpine Corporation
Western Region Office
6700 Koll Center Parkway, Suite 200
Pleasanton, California 94566

Re: Moreno Valley Interconnection System Impact Study Results

Dear Mr. Hollenbacher:

Attached is a System Impact Study (Study) related to your Transmission Owners (TO) Tariff request for interconnection of 669 MW of additional capacity into SCE's Valley 500 kV switchyard. The Study results indicate that transmission capacity on the SCE transmission system is adequate to accommodate the proposed generation.

The short circuit duty study identified a number of circuit breakers that may be over stressed due to the increased duty. Breaker replacement or other means may be required to mitigate the identified problem due to increased short circuit duties. A Facilities Study is necessary to determine the specific facilities, equipment modifications or additions that may be required as a result of this proposed generation increase and interconnection.

The Study results do not reflect any review or analysis by any third party. However, pursuant to Sections 10.5 of the TO Tariff, a copy of this Study will be sent to the California Independent System Operator. If you elect to proceed with the interconnection process, copies will also be sent to the Western Systems Coordinating Council and any transmission owner potentially impacted by the requested service. Review by these entities may necessitate modification to the Study. The cost of any Study revisions or mitigation requirements would be the responsibility of Calpine.

By February 9, 2001, we will send to you for execution, a study agreement for SCE to perform, at Calpine's expense, the Facilities Study. The Facilities Study would also include an estimate of the amount that Calpine would be allocated, if any, for its share of the costs of interconnection facilities, equipment additions or upgrades.

P. O. Box 800
2244 Walnut Grove Ave.
Rosemead, CA 91770
626-302-9615
Fax 626-302-1152
williawl@sce.com

If you have any questions, please don't hesitate to call me at the number listed on the bottom of the previous page, or have your staff contact Mr. Lawren Minor of SCE at (626) 302-8734.

Sincerely,

Weston L. Williams

Attachment

c: Mr. Armando Perez (CAISO) w/Attachment

APPENDIX J

BIOLOGICAL RESOURCES REFERENCE DOCUMENTS

J-1 Protocol for Biological Surveys
J-2: Biological Resource Surveyors Qualifications and Resumes
J-3: California Natural Diversity Data Base (CNDDB) Printouts
J-4: USFWS Special-Status Species Report Dated May 25, 2001
J-5: California Natural Community Field Survey Forms
J-6: Biological Resources Map (Scale 1:6,000)

J-1: Protocol for Biological Surveys

Inland Empire Energy Center
PROTOCOL FOR BIOLOGICAL SURVEYS

Prepared by:

FOSTER WHEELER ENVIRONMENTAL CORPORATION
1940 E. Deere Avenue, Suite 200
Santa Ana, CA 92705

April, 2001

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1.0 INTRODUCTION

This document provides introductory material on the Inland Empire Energy Center (IEEC or Energy Center) and describes proposed biology surveys to be conducted in April-June 2001.

The project components used as a basis for the biological surveys are:

- **Energy Center Site and Laydown Area.** The Energy Center site and laydown area are on a 45.8 acre parcel of agricultural lands.
- **Two Alternative Natural Gas Pipelines:**
  - Alternative A Menifee Road natural gas pipeline, approximately 0.9 miles in length. This alternative gas pipeline route also includes a compressor station on a 2.6 acre site within a 6.6 acre parcel on Rouse Road near Menifee Road. A re-pressure gas line corridor (0.1 mile in length) connects the gas compressor site to a nearby San Diego Gas and Electric (SDG&E) gas transmission line that is located at Menifee Road.
  - Alternative B Moreno Valley natural gas pipeline, approximately 14.8 miles in length.
- **Electrical Transmission Line.** Electrical interconnection will require adding a 500 kV transmission line across the southern end of the project site. The new transmission will be approximately 0.9 miles in length. Two Southern California Edison lines presently occupy the transmission line route. The survey area will include both of the existing lines, with a buffer area extending out from the outer edge of both of the existing lines.
- **Non-Reclaimable Wastewater Pipeline.** A non-reclaimable wastewater pipeline will connect the Energy Center site to a wastewater disposal facility approximately 4.7 miles from the site. The route is along agricultural fields on an unpaved road for approximately 2.0 miles and within a paved road for approximately 2.7 miles.

2.0 SENSITIVE SPECIES OF THE PROJECT AREA

The proposed facilities will be located within the current and historic ranges of several listed and special status plant and wildlife species. The United States Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (CDFG) will be consulted to ensure compliance with the Federal Endangered Species Act and the California Endangered Species Act.

Biological resource issues that may become critical in terms of the siting and licensing of the project include impacts to federal and state listed endangered, threatened, and other special status species. Additionally, the location and boundaries of all well-defined bed and bank and wetland resources within the proposed construction corridor may become critical issues because they are subject to jurisdiction by the CDFG under code 1603, U.S. Army Corps of

Engineers (Corps) under Section 404 (b)(1) of the Clean Water Act, and Section 10 of the Rivers and Harbors Act of 189.

The Energy Center site is within an area that provides habitat for a number of special-status species that could require mitigation if they were to be found on or adjacent to the site, or within or adjacent to the linear corridors. Fortunately, the Energy Center site is cultivated and lacks undisturbed natural habitat; the linear routes have greater potential for presence of special status species.

2.1 Special-status Species

Special status species are those with regulatory protection under the federal Endangered Species Act, the Migratory Bird Treaty Act, the California Endangered Species Act, or any other local policies or ordinances protecting biological resources. A search of the California Natural Diversity Database (CNDDB/RareFind) indicates the project area coincides with habitat for several special-status plant and wildlife species. Table 1 is a list of special-status species known to occur in Riverside County; those underlined have been reported on the U.S. Geological Survey (USGS) quad sheets for the project area (USGS 7.5-minute topographic quadrangles: Perris, Romoland, Lakeview, Sunnymeade, and El Casco). Table 1 represents a tentative list of species to be considered during field surveys. This list will be verified through informal consultation with USFWS and CDFG.

2.2 Site Observations

The Energy Center site, and proposed compressor station are cultivated agricultural lands without undisturbed natural habitat. The eastern boundary of the Energy Center has the remnants of low dikes and an irrigation system (excavated uplands for water conveyance). The Alternative B Moreno Valley natural gas pipeline route passes through agricultural, rural residential, grassland and some natural areas, including the CDFG's San Jacinto Wildlife Area. Contributors to the maintenance of this area include Ducks Unlimited, Southern California Ducks, San Bernardino Valley Audubon, Quail Unlimited, Pheasants Forever, and Friends of the Northern San Jacinto Valley. The San Jacinto Wildlife Area lies along the San Jacinto River just east of the Bernasconi Hills and Perris Reservoir and north of the community of Lakeview.

Table 2 provides a summary of observations along the Alternative B natural gas pipeline route. The CNDDB records, and reconnaissance level field investigations indicate that the greatest potential for encountering special status plants or animals is along the Alternative B natural gas pipeline route from approximately MP 4 – 14.

Table 1. Special Status Species Identified in CNDDB or by Local Resource Specialists for the Perris, Romoland, Lakeview, Sunnymeade, and El Casco Quadrangles

Common Name	Scientific Name	Federal/ State/CNPS*
Plants		
Smooth Tarplant	*Hemizonia pungens laevis*	SC/--/1B
Coulter's Goldfields	*Lasthenia glabrata coulteri*	SC/--/1B
Wright's Trichocoronis	*Trichocoronis wrightii var wrightii*	--/--/2
Payson's Jewel-Flower	*Caulanthus simulans*	SC/--/4
San Jacinto valley crownscale	*Atriplex coronata var notatior*	E/--/1B
South Coast Saltscale	*Atriplex pacifica*	SC/--/1B
Parish's Brittlescale	*Atriplex parishii*	SC/--/1B
Parry's Spineflower	*Chorizanthe parryi var parryi*	SC/--/3
Long-Spined Spineflower	*Choeizanthe polygonoides var longispina*	SC/--/1B
Slender-Horned Spineflower*	*Dodecahema leptoceras*	E/E/--
Spreading Navarretia*	*Navarretia fossalis*	T/--/1B
Munz's Onion	*Allium munzii*	E/T/--
Little Mousetail	*Myosurus minimus ssp apus*	T/--/1B
Salt Spring Checkerbloom	*Sidalaces neomexicana*	--/--/2
California Orcutt Grass*	*Orcuttia californica*	E/--/--
San Jacinto Valley Spineflower*	*Atriplex coronota var. notatior*	E/--/--
Thread-Leaved Brodaea*	*Brodiaea filifolia*	T/E/--
Reptiles, Amphibians		
California Tiger Salamander	*Ambystoma californiense(1)*	--/SC/--
Arroyo Southwestern Toad*	*Bufo microscaphus californicus*	E/SC/--
Western Spadefoot Toad*	*Scaphiopus hammondi*	--/SC/--
Southwestern Pond Turtle	*Clemmys marmorata pallida*	--/SC/--
San Diego Horned Lizard	*Phrynosoma coronatum blainvillei*	--/SC/--
Orange Throated Whiptail	*Cnemidophorus hyperythrus*	--/SC/--
Invertebrates		
Qunio checkerspot butterfly*	*Euphydryas editha quino*	--/E/--
Birds		
Golden Eagle*	*Aquila chrysaetos*	--/SC/--
Bald Eagle*	*Haliaeetus leucocephalus*	E/T/--
Coopers Hawk	*Accipiter cooperii*	--/SC/--
Burrowing Owl*	*Athene cunicularia*	--/SC/--
Long-Eared Owl	*Asio otus*	--/SC/--
Tricolored Blackbird	*Agelaius tricolor*	SC/SC/--
Coastal California Gnatcatcher*	*Polioptila californica*	T/SC/--
Southwestern Willow Flycatcher*	*Empidonax traillii extimus*	E/--/--
Least Bell's Vireo*	*Vireo bellii pusillus*	E/E/--
So. Calif Rufous-crowned Sparrow	*Aimophila ruficeps*	--/SC/--
Mammals		
San Diego Black-Tailed Jackrabbit	*Lepus californicus bennettii*	--/SC/--
Northwestern San Diego Pocket Mouse	*Chaetodipus fallax fallax*	SC/SC/--
Los Angeles Pocket Mouse	*Perognathus longimembris brevinasus*	SC/SC/--
San Bernardino Kangaroo Rat*	*Dipodomys merriami parvus*	E/--/--
Stephens' Kangaroo Rat*	*Dipodomys stephensi*	E/T/--

T = Threatened, SC = species of concern, 1A = presumed extinct in California, 1B = rare or endangered in California, CNPS = California Native Plant Society.
*identified by local resource specialist
Notes: (1) Record of California Tiger Salamander believed to be misidentification (personnel communication with CDFG).

Table 2. Site Observations Along the Alternative B Moreno Valley Natural Gas Pipeline Route from South to North, by Section

Township/ Range	Section	Observations
T5S, R3W	14	Energy Center Site: cultivated agriculture; potential burrowing owl habitat along eastern property line; potential vernal pool under transmission line, SE of property
	2	Rural residential; potential burrowing owl habitat
T4S, R3W	35	Cultivated agriculture; rural residential
	26	Eucalyptus trees; cultivated agriculture; nearby ponds; potential burrowing owl habitat
	24	Cultivated agriculture; saline soils with valley saltbush scrub
	13	Cultivated agriculture; saline soils with valley saltbush scrub; crossing of San Jacinto River dikes and riparian habitat; potential burrowing owl habitat
	12	Cultivated agriculture; saline soils with valley saltbush scrub
T4S, R2W	6	Cultivated agriculture; saline soils with valley saltbush scrub
T3S, R2W	31	San Jacinto Wildlife Area; coastal sage scrub; riparian habitat; saline soils with valley saltbush scrub
	30	Coastal sage scrub
	19	Coastal sage scrub; cultivated agriculture

2.3 Wetlands

There does not appear to be any potential for wetlands on the Energy site. No areas were identified that were inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. However, possible vernal pools / seasonal wetlands are present along some of the linear facilities.

The Alternative B Moreno Valley natural gas pipeline route crosses the San Jacinto River several miles north of the Energy Center site and riparian habitat is present at that location. Crossing the San Jacinto River would probably require horizontal directional drilling, thus avoiding impacts to waters of the United States and associated wetlands near the river. There are some constructed ponds near the Alternative A Menifee Road natural gas pipeline route, but all can be avoided. A jurisdictional delineation is planned to determine the extent of jurisdictional features and potential project impacts.

2.4 Other Sensitive Habitats/Associated Species

The Western Riverside Vernal Pool Report (CDFG, 1998) has GIS based maps of vernal pool locations that identify a number of potential vernal pool sites along the Alternative B Moreno Valley natural gas pipeline route. Fairy shrimp may occur in ephemeral pools, ditches, and other seasonally pounded areas.

2.5 Optimum Survey Periods

Figure 1 illustrates appropriate survey windows for all of the key species of concern that have been recorded in the project area. Based on the survey periods for these species, surveys in April through July should be appropriate for most species.

3.0 METHODS

3.1 Approach

The biological surveys will be completed during April through July 2001. The biological survey work will be completed in four phases:

- Natural community mapping
- Sensitive species ("transect") surveys
- Final map preparation
- Preparation of a biological report

3.2 Natural Communities Mapping

Prior to initiating field investigations of the proposed Energy Center site, alternative compressor station, and linear corridor facilities, biologists will develop preliminary natural communities maps that will be based on aerial imagery of the project area. The preliminary communities maps will be verified during field investigations of the project sites and changes will be recorded for final map production. It is anticipated that base maps for the project will be digital versions of 7.5 minute U.S. Geological Survey quadrangles and aerial imagery.

To comply with CEC data adequacy requirements, natural communities will be mapped for a distance of one mile from the edge of the Energy Center site. Along both natural gas pipeline alternatives, non-reclaimable wastewater pipeline, and electrical transmission line routes natural communities will be mapped for a distance of 1,000 feet on each side of the centerline of the route.

3.3 SENSITIVE SPECIES SURVEYS

A team of biologists will conduct a 100% pedestrian field survey of the entire proposed project impact zone (ground disturbance areas associated with the Energy Center site, alternative compressor station, transmission line, and linear pipeline facilities) and adjacent areas. General habitat data and vegetation community characteristics will be recorded. All botanical species observed will be listed from each community type observed within the project area (The botanical species names will be recorded according to *The Jepson Manual Higher Plants of California).* All wildlife species observed will be recorded including habitat description, behavior, and evidence of presence (direct observation, vocalization, sign, etc). Qualified federal 10(a)(1)(A) recovery permitted biologist will assess the necessity to conduct

Figure 1. Appropriate Survey Windows

focused surveys for specific threatened and endangered species based on the habitat present within the proposed project impact zone and adjacent areas within 1,000 feet. The locations of sensitive species found during all field surveys will be mapped with GPS receivers. These data will then be available to overlay on maps and plans of the project facilities to facilitate project planning, impact analysis, and development of avoidance measures.

3.3.1 Botanical Surveys

Surveys for sensitive botanical resources, and noxious weeds (California Exotic Pest Council (CalEPC) Invasive Plant Lists – Red Alert List, and A List) will be conducted as part of the proposed transect surveys.

- **Botanical Transect Surveys:** The location of the proposed facility and a 500-foot buffer zone around the proposed facility will be surveyed by walking meandering transects spaced at 50-foot intervals to cover 100% of the project site. Areas that support sensitive plant species, or noxious weeds will be recorded on maps of the project site for impact evaluation. Plants will be identified to a taxonomic level sufficient to determine if the species observed are classified as an invasive non-native, or sensitive plant species. Botanists will evaluate those areas where species are not located during field evaluations for their suitability to support sensitive botanical resources.

  Surveys of the proposed pipelines and transmission lines will extend 500-feet on either side of the centerline of the proposed natural gas pipelines (Alternatives A and B), transmission line, and wastewater pipeline right-of-way. Transmission line and pipeline routes will be surveyed for sensitive botanical resources, and noxious weeds by walking meandering transects. The transects will be spaced at 50-foot intervals to provide 100% coverage of the area within 500 feet of the centerline, except for recently cultivated agricultural lands and rural residential lands. Plants will be identified to a taxonomic level sufficient to determine if the species observed are classified as an invasive non-native, or sensitive plant species These transects will concentrate on identifying locations of sensitive species, suitable habitat for sensitive species, areas where special surveys will need to be conducted, and the occurrences of non-sensitive species. Areas that support sensitive species or their habitats will be recorded on maps of the project site for impact evaluation.

- **Spot Checks:** The general location of many sensitive plant species populations is available from the CNDDB, and the San Jacinto Wildlife Area. Prior to initiating plant surveys, known sensitive plant populations in the local project area will be observed, and local variation in flowering phenology will be noted before surveys commence. Spot checks of these sensitive plant populations will facilitate determining the current status of the populations, confirm blooming periods, and assist in determining whether the construction or operation of the proposed project facilities will impact these populations.

3.3.2 Waters of the U.S. and Wetlands Surveys

Biologists will review the preliminary natural communities maps developed for the project and conduct field investigations to determine whether any wetlands, waters, or jurisdictional

bed and bank features will likely be affected by the proposed project. Any jurisdictional wetland or water feature observed within the project vicinity will be recorded on maps of the Energy Center site and a determination made whether project construction or operation could affect these resources.

Wetlands within the study area will be delineated according to guidelines established by the Army Corps of Engineers (ACOE) Wetlands Delineation Manual 987. CDFG code 1603 jurisdictional features will be identified in the field by the presence of ephemeral or perennial natural flow in a well-defined bed, channel, river, stream, lake, or bank with an ordinary high water mark (OHWM). Waters of the U.S. will be identified in the field by the presence of a well-defined bed and bank and OHWM. Potential jurisdictional waters of the U.S. have to demonstrate:

- potential resource value for wildlife species (potential to provide some food for wildlife, potential nesting or roosting habitat, serve as a wildlife migration or dispersal corridor, contain habitat that is distinct from the adjacent uplands, etc.); and,
- display some connection to a natural drainage feature / pattern (i.e. upstream and downstream vegetation, provide natural flood control, etc).

3.3.3 Amphibians and Reptiles

The San Jacinto River area is most likely to have habitat within the proposed project area suitable to support populations of western spadefoot toad. The San Jacinto River could also potentially contain habitat for the arroyo southwestern toad. Where suitable habitats are identified, the following survey methods will be used to determine if these target species are present.

- **Habitat Assessment and Survey:** If appropriate habitat is encountered during biological surveys of the project area, properly permitted biologists will conduct western spadefoot toad / arroyo southwestern toad surveys consisting of day and evening visits to the study area to evaluate habitat and presence/absence.
- **Transect Survey:** Transect surveys at 50-foot intervals within the 500 ft buffer zones on each side of the center line of proposed linear facilities will be conducted as described above for Botanical Surveys. During the transect survey event all reptile and amphibian species encountered will be included in the biological survey report.

3.3.4 Bird Surveys

During all field investigations, incidental observations of birds within the project area will be recorded. Two specific survey techniques will be used to determine the presence of sensitive avian species within the project area.

- **Transect Survey:** Transect surveys of 500-ft buffer zones will be conducted as described above for Botanical Surveys. The project is located within the historic range of burrowing owl, bald eagle, golden eagle, southwestern willow flycatcher, least Bell's vireo, and coastal California gnatcatcher. Qualified biologist will assess

the necessity to conduct focused surveys for specific threatened and endangered species based on the habitat present within the proposed project impact zone and adjacent areas within 1,000 feet.

- During the transect survey artificial canals, and drains excavated in uplands for water conveyance will be recorded because they have a high potential for burrowing owl occupation. Coastal sage scrub plant communities, potential raptor nesting areas, and riparian habitats will be recorded and assessed for sensitive birds. During the transect survey event, all avian species encountered will be included in the biological survey report.
- **Burrowing Owl Nesting Season Survey:** If potential burrows are discovered during transect surveys in accordance with the survey protocol established by the CA Burrowing Owl Consortium 1993, four site visits will take place between April 15 and July 15. Survey data collected will include direct observation (including behavior characteristics), sign (tracks, scat, burrow, etc.), or vocalization (CA Burrowing Owl Consortium 1993). Both natural and artificial burrows will be identified.

Coastal California Gnatcatcher Survey Methods

Focused surveys for the California gnatcatcher will be conducted by a qualified permitted biologist at suitable habitats on the project linear routes, and within 1,000 feet of the project area in appropriate habitat.

The surveys will be conducted following the current protocol of the USFWS, *Coastal California Gnatcatcher (Polioptila californica californica) 1997 Presence/Absence Survey Protocol*. The surveys will consist of 6-visits to the proposed alignment area at approximately weekly intervals. Six visits for the survey are required for areas not enrolled within the Natural Community Conservation Planning Program.

3.3.5 Invertebrates

Qualified federal 10(a)(1)(A) recovery permitted biologist will assess the necessity to conduct focused surveys for quino checkerspot butterfly based on the habitat present within the proposed project impact zone and adjacent areas within 1,000 feet. Additionally, Fairy shrimp may occur in ephemeral pools, ditches, and other seasonally pounded areas. In the vicinity of the project area these types of habitats are located mainly along the middle and northern portion of the gas pipeline route. These habitat types will be identified as part of the transect surveys of the 500 ft buffer zones for the project linear components.

A qualified federal 10(a)(1)(A) recovery permitted biologist will conduct a focused survey for vernal pools and special status branchiopods, in accordance with the USFWS protocol (USFWS, 1996). The protocol, identifies a complete survey as:

- two full wet season surveys done within a 5-year period; or
- two consecutive seasons of one full wet season survey and one dry season survey (or one dry season survey and one full wet season survey)

For our project schedule, one dry season and one full wet season (confirmation) survey is the appropriate sample regime. During the transect survey event invertebrate species (terrestrial and aquatic) observed will be included in the biological survey report

3.3.6 Mammals

As noted in Table 1, several species of mammals are known from the project area. The following survey techniques will be used to determine the presence of sensitive mammalian species within the project area.

- **Transect Survey:** Transect surveys at 50-foot intervals on the Energy Center site and within a 500-ft buffer zone for the site and on each side of the center line of linear facilities will be conducted as described above for Botanical Surveys. All known and potential kangaroo rat burrows or sign observed in the survey area will be accurately mapped. During the transect survey event all mammalian species encountered will be included in the biological survey report

- **Stephen's Kangaroo Rat and San Bernardino Kangaroo Rat:** Presence/absence surveys for Stephens / San Bernardino kangaroo rat will be conducted in accordance with the specific terms and conditions of the valid 10(a)(1)(A) Federal Recovery Permit held by the primary investigator.

4.0 MAPPING AND BIOLOGY SURVEY REPORT

Black-and-white base maps at a scale of 1:24,000 (digitized from USGS 7.5-minute series) will be used to display project components and vegetation communities. The sensitive species survey results will be mapped at a scale of 1:6,000.

A biological survey report will be prepared for inclusion as an appendix to the AFC. The report will include the following:

- Description of field survey methods and results
- Description of field survey conditions (weather, dates of survey, etc.)
- Tables and maps illustrating survey results
- CNDDB date sheets (print outs)
- Completed CNDDB species occurrence report forms
- Species Accounts

J-2: Biological Resource Surveyors Qualifications and Resumes

Leonard M. Malo

Scientist - Biologist/Ecologist

LOCATION

Company: Foster Wheeler Environmental Corporation; 01/06/00 - Present
Years w/Other Firms: 4
Present Location: Santa Ana, CA
Daytime Phone: 949-756-7556, 805-312-4073

EXPERIENCE SUMMARY

Mr. Malo has five years experience in interdisciplinary projects centered in biological resource assessment and identification, environmental compliance and permitting, and soil and groundwater investigations and remediation. He has prepared biological reports and assessments to document compliance with NEPA, CEQA, FERC, and federal and state Endangered Species Acts. Mr. Malo has initiated formal consultation with the USFWS pursuant to Section 7 and Section 10 of the Endangered Species Act of 1973, as amended. He has developed survey protocols, field survey schedules, and mitigation packages in accordance with local and federal agency standards. He has also coordinated and conducted threatened and endangered species surveys, wetland delineation's, and other waters determinations based on CDFG code 1603, Section 404 (b)(1) of the Clean Water Act, and Section 10 of the Rivers and Harbors Act. Mr. Malo is also experienced in technical report preparation for soil and groundwater investigations, underground storage tank (UST) installation and removal, environmental permitting, and heavy equipment operation.

REGISTRATIONS/CERTIFICATIONS

State Water Resources Control Board Underground Storage Tank Removal - March 1999
Certified Arborist, International Society of Arboriculture - No. WC-4007 - April 1998
Certified Biologist, San Diego County Department of Planning and Land Use – February 2001

TRAINING

40-Hour HAZWOPER – December 2000
40-Hour OSHA Hazardous Waste and Safety Training – December 2000
8-Hour OSHA Hazardous Waste Health and Safety Supervisor Training - December 2000
Wetland delineation training utilizing the US Army Corps of Engineers 1987 Manual, May Consulting – July 1998
USFWS Least Bells Vireo, Southwestern Willow Flycatcher, Yellow-billed Cuckoo Working Group Meeting – March 2001
Western Yellow Billed Cuckoo Training on the Lower Colorado River - Mary Diane Halterman May 2001
Southern Sierra Research Station Southwestern Willow Flycatcher Workshop Kern River Preserve – May 2001

EDUCATION

BS / Ecology / University of California, Berkeley / 1997
Minor / Forestry and Resource Management / University of California, Berkeley / 1996

REPRESENTATIVE PROJECT EXPERIENCE

***Midway Power, LLC.; Florida Power and Light Project, Northern California; Biological Task Manager / Biologist;* 10/00 - Present** – Conducted a biological reconnaissance survey and prepared a biological report. Characterized the site and evaluated whether endangered, threatened, or special status species or their habitats occur or potentially occur at the Midway site. Determined potential impacts to wetland habitat, riparian habitat, locally designated natural communities, and biological resources protected by local policies or ordinances.

Coordination and preparation of biological reports and assessments to document compliance with CEQA, federal and state Endangered Species Acts, and biological resources protected by local policies or ordinances for an Application for Certification (AFC) to be presented to the California Energy Commission. Developed field survey protocols, field survey schedules, and mitigation packages in accordance with local and federal agency standards. Coordinated threatened and endangered species surveys for wildlife and plants including Mountain Plover, Burrowing Owl, San Joaquin Kit Fox, Red-legged Frog, Giant Garter Snake, Swainson's Hawk, Tri-colored blackbird, and California Horned Lark. Coordinated wetland delineation's, and other waters determinations based on CDFG code 1603, Section 404 (b)(1) of the Clean Water Act, and Section 10 of the Rivers and Harbors Act.

***Installation Restoration (IR) Sites 1 and 2, Innovative Technology* RAC, *Long Beach Naval Complex, Long Beach, California; Biologist;* 9/00 -** Conducted a biological reconnaissance survey and prepared a biological report. Characterized the site and evaluated whether endangered, threatened, or special status species or their habitats occur or potentially occur at the Long Beach Navy Mole site. Determined potential impacts to avian species, riparian habitat, locally designated natural communities, and biological resources protected by local policies or ordinances.

***360networks, inc.; Fiber Optic Project, Southern California; Biologist;* 9/00 -** Conducted a biological reconnaissance survey and prepared a biological report. Characterized the site and evaluated whether endangered, threatened, or special status species or their habitats occur or potentially occur at the Guatay site. Determined potential impacts to wetland habitat, riparian habitat, locally designated natural communities, and biological resources protected by local policies or ordinances.

Pacific Gas and Electric; North Baja Natural Gas Pipeline, Southern California and Western Arizona; Biological Task Manager / Project Biologist; 5/00 – Present – Prepared biological reports and assessments to document compliance with NEPA, CEQA, FERC, and federal and state Endangered Species Acts. Developed field survey protocols, field survey schedules, and mitigation packages in accordance with local and federal agency standards. Coordinated and conducted threatened and endangered species surveys for rare plants, Desert Tortoise, Couch's Spadefoot Toad, Flat-tailed Horned Lizard, Yuma Clapper Rail, Black Rail, Mountain Plover, Burrowing Owl, Western Yellow-billed Cuckoo, and Southwestern Willow Flycatcher. Coordinated and conducted wetland delineation's, and other waters determinations

based on CDFG code 1603, Section 404 (b)(1) of the Clean Water Act, and Section 10 of the Rivers and Harbors Act.

***AT&T/PF.Net; Fiber Optic Project, Southern California; Biological Task Manager / Project Biologist;* 02/00 – Present** – Prepared biological reports and assessments to document compliance with NEPA, CEQA, and federal and state Endangered Species Acts. Responsible for developing field survey protocols, field survey schedules, and mitigation packages in accordance with local and federal agency standards. Coordinated and conducted threatened and endangered species surveys for rare plants, Desert Tortoise, Southwestern Arroyo Toad, Flat-tailed Horned Lizard, Couch's Spadefoot Toad, Mountain Plover, Burrowing Owl, California Gnatcatcher, Least Bell's Vireo, and Southwestern Willow Flycatcher. Coordinated and conducted wetland delineation's, and other waters determinations based on CDFG code 1603, Section 404 (b)(1) of the Clean Water Act, and Section 10 of the Rivers and Harbors Act.

Environmental trainer, responsible for instructing, implementing, and maintaining compliance with various biological mitigation measures outlined in numerous project approvals and permits.

***Calpine Corporation; Inland Empire Energy Center (IEEC) Riverside County, Southern California; Biological Task Manager / Project Biologist;* 03/00 – Present** – Coordination and preparation of biological reports and assessments to document compliance with CEQA, federal and state Endangered Species Acts, and biological resources protected by local policies or ordinances for an Application for Certification (AFC) to be presented to the California Energy Commission. Developed field survey protocols, field survey schedules, and mitigation packages in accordance with local and federal agency standards. Coordinated and conducted threatened and endangered species surveys for wildlife and plants including Coastal California Gnatcatcher, Burrowing Owl, Stephens' kangaroo rat, and Southwestern Arroyo Toad. Coordinated wetland delineation's, and other waters determinations based on CDFG code 1603, Section 404 (b)(1) of the Clean Water Act, and Section 10 of the Rivers and Harbors Act.

***360networks, inc.; Fiber Optic Project, Northern California; Biologist;* 1/00 – 2/00** – Conducted field reconnaissance level biological surveys and mapping verification for fiber optic conduit installation. Responsible for delineating exclusion zones for sensitive biological resources.

PRIOR EXPERIENCE

Augeas Corporation
Half Moon Bay CA
6/98 – 1/00
Environmental Scientist / Director for Underground Storage Tank Cleanup Fund (USTCF) Department. Conducted wetland delineation, soil and groundwater investigations, environmental compliance and permitting, emergency response containment, and remediation projects in the real estate, petroleum hydrocarbon, and dry cleaning industries.

Various clients; Underground Storage Tank Cleanup Fund; Director; 6/98-1/00 – Served as liaison with the USTCF in Sacramento. Reviewed and evaluated all documentation submitted to the State Water Resource Control Board USTCF.

Served as Project Manager. Prepared proposals and technical reports for soil and groundwater investigations, wetland delineation, biological assessment, underground storage tank (UST) installation and removal, permitting, heavy equipment operation, and subcontractor crews. Provided field oversight and assistance. Wrote wetland delineation reports, reports on subsurface investigations of soil and groundwater, remedial work plans, quarterly groundwater monitoring reports, hazardous materials business plans, spill prevention containment and countermeasures plans, city and county permits, and formal local responsible agency (LRA) correspondence.

Compiled and manipulated analytical data to create tables/charts and characterized soil and groundwater contamination plumes. Responsible for machine operation (backhoe, track-mounted dozer, front-end loader, and bobcat type equipment). Collected soil and groundwater samples for State certified analytical laboratories and LRA officials.

Meister Environmental & Arboricultural Consulting
Santa Cruz, CA;
4/98 – 1/00
Served as Environmental Consultant and Project Manager. Conducted biological assessment and resource identification. Responsible for tree evaluations and landscape scale resource management plans (addressing valuation of tree aesthetics, wildlife habitat, Eco-tourism potential, plant nutrition, endemic vs. exotic plant selection and succession, and hazard abatement). Provided assistance with specimen installation, establishment and long-term pruning prescriptions for re-vegetation and mitigation plans, erosion control plans, and quarterly vegetation monitoring plans. Provided arboricultural consulting addressing cabling, bracing, lightning protection, diagnosis and treatment of pests, disease, and problems associated with soil and water.

Prepared USTCF reimbursement requests and applications for private homeowners and independent gas stations. Collected soil and groundwater samples for State certified analytical laboratories and LRA officials.

Western Environmental Consultants, Inc.
Santa Cruz, CA
05/97 – 06/98
As a utility forester, served as environmental consultant to Pacific Gas and Electric Company (PG&E). Coordinated and supervised line clearance operations to ensure compliance with the California Public Resources Code and California Public Utility Commission. Updated computer tree inventory programs, prepared staff reports and tree inventory records. Worked closely with PG&E corporate and consumer clients. Performed audits of outside contractors' adherence to prescribed work orders.

Jones & Stokes Associates
Sacramento, CA;
01/96 – 05/97

As an environmental technician, worked on interdisciplinary projects centered on natural resource management and protection. Participated in wetland delineation and assessment, and threatened and endangered species surveys. Compiled and manipulated data to create resource database, species inventory lists on plants and wildlife, tables and charts (botanical, invertebrate and wetland databases). Assisted with preparation of environmental impact reports, environmental impact statements, mitigation and monitoring plans, and wetland delineation reports.

Interpreted aerial photographs (identified vernal pool signatures, possible jurisdictional wetlands, drainage, possible water of the United States, etc.). Prepared maps depicting physical size, hydrology and vegetation of vernal pool habitats, major topographic features, acreage of habitats, and oak tree location.

Performed wildlife surveys, using baited smoke plates and trail marker camera stations to determine species composition, and presence/absence of special status mammals.

Conducted plant surveys concerning species composition and inventory work for trees, presence/ absence of wetland plants, and quarterly monitoring.

Conducted kit fox surveys in Contra Costa County, including den surveys for two-week periods, and excavation of potential den sites. Calculated radial telemetry data (48-hour monitoring surveys under conditions of extensive disturbance).

Performed laboratory field activities specifically related to invertebrates, including identification and survey of special status fairy shrimp in both adult and cyst stages, freshwater and terrestrial invertebrate species, California valley elderberry longhorn beetle, and delta green ground beetle.

DISCIPLINE (S) (Y = Primary Indicator; N = Secondary Indicator)

Biologist	Y
Ecologist	N

Robert F. Anderson
Associate Biologist

EXPERIENCE SUMMARY

Mr. Anderson is a biologist with more than 20 years of experience conducting field surveys, field data analysis, restoration planning and mitigation monitoring. Recent project experience includes mitigation monitoring for restoration of coastal sage scrub habitat and wetlands habitat.

EDUCATION

MS / Integrated Pest Management / California State University / Riverside, CA
BA / Biology / California State Polytechnic University / Pomona, CA

LICENSES, OTHER TRAINING

Agricultural Pest Control Advisors License / State of California / Department of Pesticide Regulation

Certified Applicator License / State of California / Department of Pesticide Regulation

Completion of a class on identification of Fairy Shrimp by Denton Belk, Ph.D.

Completion of a class and workshop on the identification of the Quino Checkerspot. Conducted at the United States Department of Fish and Game / Carlsbad, CA

PROFESSIONAL MEMBERSHIPS

Society for Ecological Restoration (SER)
California Exotic Plant Pest Council (CalEPPC)
Southern California Botanists

Company: Foster Wheeler Environmental Corporation; Years with Foster Wheeler: 1; Years with Other: 20
Present Location: Santa Ana, CA
Daytime Phone: 949-756-7500

REPRESENTATIVE PROJECT EXPERIENCE

Eastern Transportation Corridor (Toll Road); Restoration Ecologist – Responsible for restoration of the following sites:

- Siphon Reservoir Restoration Site in Santa Ana mountain foothills. Mitigation for impacts to Coastal Sage Scrub habitat along the Eastern Transportation Corridor (ETC). The site is 100 acres of former citrus orchard restored to native coastal sage scrub. Animal species utilizing the site (both actual and potential) include mountain lion, bobcat, deer, coyote, California gnat catcher, Coastal cactus wren, rattlesnakes and other vertebrate and invertebrate species. Plant species include California sagebrush, California buckwheat, California encelia, blue elderberry and other coastal sage scrub plant species.
- Limestone Restoration Site – 50 acres of river habitat. Mitigation for impacts to upland and riparian habitats along the ETC including oak woodland, sycamore-elderberry woodland, willow woodland, floodplain sage scrub and coastal sage scrub. Actual and

potential animal usage of the site includes all the same species listed for siphon. Plant species including the siphon species but also include coast live oak, sycamore, elderberry and other upland and riparian species.

P&D Consultants, Inc., Orange, CA; Restoration Ecologist – Design and installation of a Coastal Safe Scrub restoration project. This project is current and includes an experimental plot portion that will fulfill in part the requirements of Master of Arts degree in Biology.

Agricultural Biologist; Fresno, CA – Independent Pest Management Consultant specializing in trees and vines.

H. Naraghi Farms, Modesto, CA; Agricultural Biologist – Integrated Pest-Management Specialist responsible for chemical rules and regulations. Foreman of chemical crews and chemical worker safety.

Union Chemical Co., Dos Palos, CA; Agricultural Biologist – Integrated Pest-Management Specialist and Agricultural Pest Control Advisor

RESEARCH ACTIVITY

- Original investigations comparing several methods and combinations of techniques used in the restoration of the Coastal Sage Scrub community.
- Assisted with the pollinator study for *Eriastrum densifolium ssp. sanctorum* an endangered plant species. Study is part of the management plan for the species. Research conducted by Dr. Eugene Jones and Dr. Jack Burk, at California State University, Fullerton, CA.
- Original investigations to assess the importance of behavior as a mechanism of reproductive isolation in various species in the genus *Lytta* Meloidae, Coleopetra. Masters Thesis work in the laboratory of Dr. John Pinto, University of California, Riverside.
- Assisted with the study of systematics in various insect taxa in the laboratory of Dr. John Pinto, University of California, Riverside.
- Assisted in the development of the California IPM program for cotton. Program was a joint effort of the University of California at Riverside, Davis and Berkley. Met the internship requirement for Master of Science degree in Integrated Pest Management.

TEACHING POSITIONS

- Lab Instructor, California State University, Fullerton, CA. Principles of Zoology
- Graduate Assistant, California State University, Fullerton, CA. Field Botany
- Teaching Assistant, University of California, Riverside, CA. Entomology for non-majors

Bob Anderson

Resume update

360 Network – Northern California Fiber-optic Construction and Installation
- Environmental Inspector and Biological Resource Specialist

  Responsibilities included oversight of the construction and installation of a 330-mile fiber-optic system from Sacramento to the Oregon Border. Environmental and biological protocols focused on compliance with mitigation measures as mandated by the California Public Utilities Commission. Duties included recognition, delineation and/or remediation of all water crossings, noxious weeds, hazardous spills and biological resources encountered during construction.

North Baja Pipeline – Southern California Natural Gas Pipeline Installation
- Biological Resource Specialist

  Responsibilities included leading a team of biologists assigned to the identification and delineation of biological resources along the ROW of a proposed natural gas pipeline to be built between Blythe and Yuma in the Colorado Desert.

NexGen – Southern California Fiber-optic Construction and Installation
- Biological Resource Specialist

  Responsibilities included the identification and delineation of noxious weed populations along the desert portion of the proposed ROW for a fiber-optic installation project in Southern California.

Rio Linda project –
- Biological Resource Specialist

  Responsibilities covered the identification and mapping of species of special concern including habitat that may be impacted during the construction of a Northern California power plant. Concerns of this project included Swainson Hawks, other raptors, raptor nests, Giant Garter Snakes (GGS) and GGS habitat.

Midway project –
- Biological Resource Specialist

  Member of a team of biologists assigned to the identification and delineation of biological resources on the footprint of a proposed natural gas power plant to be built in Northern California including required resource ROWs associated with the plant.

JENNIFER M. SCHEFFEL

Assistant Biologist/Ecologist

EXPERIENCE SUMMARY

Although Ms. Scheffel has no previous professional experience, throughout her undergraduate and graduate work, she has worked extensively on field biology projects.

Currently, she works in the Santa Ana, CA office where her responsibilities have included basic biological research, botanical surveys, and mapping. The majority of her work has been on the PG&E North Baja Pipeline project and her duties on this project have included gathering data, QA/QC, map analysis, botanical and habitat assessment surveys, mapping (using ArcView GIS software) of all collected survey data, and writing survey reports. Ms. Scheffel is currently the project biologist on the FPL Midway Power Plant Project with responsibilities including basic biological research, consultation with CDFG and USFWS, survey coordination, conducting surveys, writing reports, and mapping.

EDUCATION

M.S. (Master of Science), Applied Geography, New Mexico State University, Las Cruces, NM, 2001
B.S. (Bachelor of Science), Biology, Southwest Texas State University, San Marcos, TX, 1998

TRAINING

CPR and CPR for the Professional Rescuer, July 1998
Life Saving, July 1998
First Aid / Red Cross Certification, July 1998

FOSTER WHEELER ENVIRONMENTAL CORPORATION EXPERIENCE

Project Biologist, May 2001 - Present
FPL-Midway Power Plant Project, Alameda County, CA
Duties include basic biological research, consultation with CDFG and USFWS, survey coordination, conducting surveys, writing reports, and mapping.

Assistant Biologist, January 2001 -Present
PG&E North Baja Pipeline Project, Blythe, CA to Baja California
Assist in the gathering of data, QA/QC, map analysis, assisting in preparation of Section 404 and Section 10 reports, conducting botanical surveys, writing survey reports, and mapping of all survey data using ArcView GIS software.

PROFESSIONAL AFFILIATIONS

American Association of Geographers, Biogeography, 2000

DISCIPLINE CODES

Ecologists: 007, Primary
Surveyors: 023, Secondary
Biologists: 138, Secondary

SKILL SET

BIOLOGICAL SCIENCES
Biological Field Studies
Biological Modeling

Field Biology
Field Sampling
GIS Applications for Plant and Mammal Populations
Habitat Based Assessments
Habitat Based Mapping
Landscape Ecology
Mapping
Soils
Statistical Analysis
Terrestrial and Wetland Ecological Investigations
Threatened and Endangered Species Assessments
Threatened and Endangered Species Surveys
Vegetation Assessments
Vegetation Characterization
Wildlife and Habitat Inventory
Wildlife Ecology

SOCIAL SCIENCE
Cartography

TECHNICAL EXPERTISE

ArcView GIS
Systat Statistical Software

LANGUAGE SKILLS

English *Knowledge Level:* Primary

PROFESSIONAL REFERENCES

Dwight Mudry, Project Manager/Senior Biologist, FWENC, 949-756-7533
Jim Nickerson, Project Manager, FWENC, 949-756-7517
Penny Eckert, Independent Contractor, FWENC, 949-756-7547
Lenny Malo, Biologist, FWENC, 949-756-7556

RELATED COMPANY INFORMATION

Office Location: Santa Ana
FWENC Hire Date: 1/8/01
Years with Other Firms: 0
Daytime Telephone: 949-756-7527
E-mail Address: jscheffel@fwenc.com

Mina de Leest

2200 Cheyenne Way #108
Fullerton, CA 92833
(714) 521-4897
adeleest@hotmail.com

EDUCATION

California State University Fullerton
Fullerton, California
Bachelor of Science in Biology – December 2000

Relevant Coursework

Plant Taxonomy	Survey of Land Plants	Field Botany
Botany	Ecology	Zoology

EXPERIENCE

Oak Canyon Nature Center, Anaheim, California
Naturalist, October 2000 – Present
Conduct natural history and environmental theme tours at the Nature Center; prepare and present natural history, environmental and energy conservation programs for schools, libraries and community groups; care for the Nature Center's live animals; assist with the operation of Oak Canyon Nature Center.

California State University Fullerton, Fullerton, California
Field Assistant, June 2000 – Present
Conducted field studies; assisted in researching toward understanding and preserving the plant *Eriastrum densifolium ssp. Sanctorum* (Eds) (Polemoniaceae).

Irvine Ranch Water District, Irvine, California
Biologist, June 2000 – October 2000 (temping through Lab Support)
Perform various bacteriological and biological analyses related to the monitoring of water and wastewater treatment; perform bacteriological quality assurance testing, such as the completed coliform test; perform quality assurance and quality control as required; set up potable samples and potable distribution system; set up and read recycled water distribution system; set up and read customer service request samples; send out water quality notifications for high HPCs; prepare all media for potable and reclaimed water; set up quality controls for all media and read pH

SKILLS

Environmental

Skill Name	Skill Level	Last Used	Experience
Identify various vegetation	Intermediate	Currently Used	1 year
Key out plants from the Jepson Manual	Intermediate	Currently Used	1 year
Prepare written and oral Reports	Intermediate	Currently Used	3 years

Computers
Excel, Word, PowerPoint, and web page design
Statistics: ANOVA

J-3: California Natural Diversity Data Base (CNDDB) Printouts

Perris

SCAPHIOPUS HAMMONDII
WESTERN SPADEFOOT — Element Code: AAABF01030

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G3?	CDFG Status: SC
State: None	State: S3?	

Habitat Associations
General: OCCURS PRIMARILY IN GRASSLAND HABITATS, BUT CAN BE FOUND IN VALLEY-FOOTHILL HARDWOOD WOODLANDS.
Micro: VERNAL POOLS ARE ESSENTIAL FOR BREEDING AND EGG-LAYING.

Occurrence No. 5 — Map Index: 20474
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1991 (OBS)
Dates Last Seen — Element: 1991-06-01 — Site: 1991-06-01

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: JUST EAST OF THE SAN JACINTO RIVER, APPROXIMATELY 150 FEET NORTH OF THE END OF 11TH STREET, 1 MI NORTH OF NUEVO.

Lat/Long: 33°49'28" / 117°08'48" — Township: 04S
UTM: Zone-11 N3742521 E486435 — Range: 03W
Mapping Precision: SPECIFIC — Section: 13 Qtr N
Symbol Type: POINT — Meridian: S
Radius: 80 meters — Elevation: 1420 ft

Comments
Distribution: TOADS INHABIT A SERIES OF SHALLOW, MAN-MADE PONDS.
Ecological: HABITAT SURROUNDING PONDS CONSISTS OF ALKALINE SINK SCRUB, VEGETATED BY SUAEDA TORREYA, SPERGULARIA MARINA, FRANKENIA GRANDIFOLIA, RUMEX CRISPUS, HORDEUM DEPRESSUM, POLYGONUM AVICIULARE, LASTHENIA CALIFORNICA, AMARANTHUS ALBUS, AND OTHERS.
Threat: CURRENTLY OPEN SPACE USED FOR SHEEP GRAZING. PROPOSED FLOOD CONTROL PROJECT COULD AFFECT THIS SITE.
General: APPROXIMATELY 700 "TOADLETS" (JUVENILES) OBSERVED. POTENTIAL FAIRY SHRIMP HABITAT. AREA SURROUNDING THIS SITE RECENTLY ZONED FOR RESIDENTIAL DEVELOPMENT.
Owner/Manager: UNKNOWN

Source Codes
BRA91F02

ATHENE CUNICULARIA (BURROW SITES)
BURROWING OWL — Element Code: ABNSB10010

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T2	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: FOUND IN OPEN, DRY ANNUAL OR PERENIAL GRASSLANDS, DESERTS & SCRUBLANDS CHARACTERIZED BY LOW-GROWING VEGETATION.
Micro: SUBTERRANEAN NESTER, DEPENDENT UPON BURROWING MAMMALS, MOST NOTABLY, THE CALIFORNIA GROUND SQUIRREL.

Occurrence No. 65 — Map Index: 03755
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: SPEAKS, J. 1983 (PERS)
Dates Last Seen — Element: 1980-XX-XX — Site: 1980-XX-XX

Quad Summary: PERRIS (3311772/085C)*, SUNNYMEAD (3311782/085B)
County Summary: RIVERSIDE
SNA Summary:

Location: LAKE PERRIS STATE RECREATION AREA, BETWEEN DAM AND PARKING LOT.

Lat/Long: 33°52'09" / 117°11'05" — Township: 03S
UTM: Zone-11 N3747465 E482908 — Range: 03W
Mapping Precision: NON-SPECIFIC — Section: 34 Qtr XX
Symbol Type: POINT — Meridian: S
Radius: 1 mile — Elevation: 1650 ft

Comments
Distribution:
Ecological:
Threat:
General: COLONY OF MANY OWLS OBSERVED IN 1980 BY J. SPEAKS.
Owner/Manager: DPR-LAKE PERRIS SRA

Source Codes
JOH88U01, SPE83U02

ATHENE CUNICULARIA (BURROW SITES) (cont.)
BURROWING OWL — Element Code: ABNSB10010

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T2	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: FOUND IN OPEN, DRY ANNUAL OR PERENIAL GRASSLANDS, DESERTS & SCRUBLANDS CHARACTERIZED BY LOW-GROWING VEGETATION.
Micro: SUBTERRANEAN NESTER, DEPENDENT UPON BURROWING MAMMALS, MOST NOTABLY, THE CALIFORNIA GROUND SQUIRREL.

Occurrence No. 99 — Map Index: 17249
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: LA RUE, E. 1989 (OBS)
Dates Last Seen — Element: 1989-10-07 — Site: 1989-10-07

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: 0.5 NE OF ROMOLAND, ADJACENT TO MAPES ROAD AND TRADEWIND DRIVE.

Lat/Long: 33°45'34" / 117°09'51" — Township: 05S
UTM: Zone-11 N3735309 E484803 — Range: 03W
Mapping Precision: NON-SPECIFIC — Section: 02 Qtr SW
Symbol Type: POINT — Meridian: S
Radius: 1/5 mile — Elevation: 1475 ft

Comments
Distribution: TWO BURROWS AND TWO OWLS LOCATED, BOTH NEAR LOW ROCK OUTCROPS.
Ecological: BURROWS SURROUNDED BY LAND HISTORICALLY PLANTED IN POTATOES; PRESENTLY, VEGETATION CONSISTS OF DISTURBED ANNUALS INCLUDING BRASSICA GENICULATA, AMSINCKIA INTERMEDIA, SALSOLA IBERICA, BROMUS RUBENS, BROMUS DIANDRUS, CHENOPODIUM ALBUS, ETC.
Threat: MAIN THREAT IS DEVELOPMENT PLANNED FOR THE SITE.
General: IT IS UNKNOWN IF THE OWLS ARE ACTUALLY BREEDING AT THIS HEAVILY-DISTURBED SITE.
Owner/Manager: PVT

Source Codes
LAR89F01

ATHENE CUNICULARIA (BURROW SITES) (cont.)
BURROWING OWL — Element Code: ABNSB10010

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T2	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: FOUND IN OPEN, DRY ANNUAL OR PERENIAL GRASSLANDS, DESERTS & SCRUBLANDS CHARACTERIZED BY LOW-GROWING VEGETATION.
Micro: SUBTERRANEAN NESTER, DEPENDENT UPON BURROWING MAMMALS, MOST NOTABLY, THE CALIFORNIA GROUND SQUIRREL.

Occurrence No. 247 — Map Index: 36172
Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: MCGAUGH, C. 1997 (OBS)
Dates Last Seen — Element: 1997-05-XX; Site: 1997-05-XX

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: EAST SIDE OF PERRIS VALLEY DRAIN, 0.4 MILE NE OF POINT WHERE I-15E CROSSES THE DRAIN, 1 MILE EAST OF PERRIS.

Lat/Long: 33°45'38" / 117°11'42" — Township: 04S
UTM: Zone-11 N3737285 E481956 — Range: 03W
Mapping Precision: SPECIFIC — Section: 33 Qtr SE
Symbol Type: POINT — Meridian: S
Radius: 80 meters — Elevation: 1410 ft

Comments
Distribution: ONE OF FOUR BURROW SITES LOCATED WITHIN A 2-MILE STRETCH.
Ecological: HABITAT SURROUNDING THE BURROW SITE CONSISTS OF AGRICULTURE, FALLOW FIELDS, AND THE RUDERAL FLOODPLAIN OF THE SAN JACINTO RIVER.
Threat: THREATENED BY THE PENDING EXCAVATION OF THE PERRIS VALLEY DRAIN (MITIGATION: PASSIVE RELOCATION).
General: 2 BURROWS BEING USED BY 2 ADULTS AND AT LEAST 1 JUVENILE DURING 19-27 MAY 1997 SURVEY.
Owner/Manager: RIV COUNTY FLOOD CONTROL

Source Codes
MCG97F01

ATHENE CUNICULARIA (BURROW SITES) (cont.)
BURROWING OWL — Element Code: ABNSB10010

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T2	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: FOUND IN OPEN, DRY ANNUAL OR PERENIAL GRASSLANDS, DESERTS & SCRUBLANDS CHARACTERIZED BY LOW-GROWING VEGETATION.
Micro: SUBTERRANEAN NESTER, DEPENDENT UPON BURROWING MAMMALS, MOST NOTABLY, THE CALIFORNIA GROUND SQUIRREL.

Occurrence No. 248 — Map Index: 36173
Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: MCGAUGH, C. 1997 (OBS)
Dates Last Seen — Element: 1997-05-XX; Site: 1997-05-XX

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: WEST SIDE OF PERRIS VALLEY DRAIN, 0.5 MILE ENE OF THE INTERSECTION OF WILSON AVENUE& SAN JACINTO AVENUE, EAST OF PERRIS.

Lat/Long: 33°47'21" / 117°12'17" — Township: 04S
UTM: Zone-11 N3738597 E481056 — Range: 03W
Mapping Precision: SPECIFIC — Section: 28 Qtr SW
Symbol Type: POINT — Meridian: S
Radius: 80 meters — Elevation: 1410 ft

Comments
Distribution: ONE OF FOUR BURROW SITES LOCATED ALONG A 2-MILE STRETCH OF THE DRAIN.
Ecological: HABITAT SURROUNDING THE BURROW SITES INCLUDES AGRICULTURE, FALLOW FIELDS, AND THE RUDERAL FLOODPLAIN FLOODPLAIN OF THE SAN JACINTO RIVER.
Threat: THREATENED BY THE PENDING EXCAVATION OF THE PERRIS VALLEY DRAIN (MITIGATION: PASSIVE RELOCATION).
General: TWO ADULTS OBSERVED AT THE BURROW SITE DURING A 19-27 MAY 1997 SURVEY.
Owner/Manager: RIV COUNTY FLOOD CONTROL

Source Codes
MCG97F01

ATHENE CUNICULARIA (BURROW SITES) (cont.)
BURROWING OWL — Element Code: ABNSB10010

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T2	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: FOUND IN OPEN, DRY ANNUAL OR PERENIAL GRASSLANDS, DESERTS & SCRUBLANDS CHARACTERIZED BY LOW-GROWING VEGETATION.
Micro: SUBTERRANEAN NESTER, DEPENDENT UPON BURROWING MAMMALS, MOST NOTABLY, THE CALIFORNIA GROUND SQUIRREL.

Occurrence No. 249 — Map Index: 36174
Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: MCGAUGH, C. 1997 (OBS)
Dates Last Seen — Element: 1997-05-XX; Site: 1997-05-XX

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: WEST SIDE OF PERRIS VALLEY DRAIN, 0.3 MILE ENE OF THE INTERSECTION OF WILSON AVENUE AND NUEVO ROAD, NE OF PERRIS

Lat/Long: 33°48'08" / 117°12'23" — Township: 04S
UTM: Zone-11 N3740064 E480907 — Range: 03W
Mapping Precision: SPECIFIC — Section: 21 Qtr SW
Symbol Type: POLYGON — Meridian: S
Area: 10.0 ac — Elevation: 1410 ft

Comments
Distribution: THESE TWO BURROWS ARE THE NORTHMOST OF FOUR BURROW SITES LOCATED ALONG A 2-MILE STRETCH OF THE DRAIN.
Ecological: HABITAT SURROUNDING THE BURROW SITE CONSISTS OF AGRICULTURE, FALLOW FIELDS, AND THE RUDERAL FLOODPLAIN OF THE SAN JACINTO RIVER.
Threat: THREATENED BY THE PENDING EXCAVATION OF THE PERRIS VALLEY DRAIN (PROPOSED MITIGATION: PASSIVE RELOCATION).
General: TWO ADULT AND AT LEAST ONE YOUNG OBSERVED AT ONE BURROW AND TWO ADULTS AND AT LEAST FOUR YOUNG AT THE SECOND BURROW.
Owner/Manager: RIV COUNTY FLOOD CONTROL

Source Codes
MCG97F01

DIPODOMYS STEPHENSI
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 3 — Map Index: 03895
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Stable
Main Source: PRICE, M. 1991 (OBS)
Dates Last Seen — Element: 1991-10-XX; Site: 1991-10-XX

Quad Summary: SUNNYMEAD (3311782/085B)*, LAKEVIEW (3311771/085D), PERRIS (3311772/085C), EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: SURROUNDING PERRIS LAKE; MOST OF THE HABITAT IS LOCATED NORTH AND EAST OF THE LAKE.

Lat/Long: 33°52'15" / 117°10'18" — Township: 03S
UTM: Zone-11 N3747661 E484129 — Range: 03W
Mapping Precision: NON-SPECIFIC — Section: 24 Qtr XX
Symbol Type: POLYGON — Meridian: S
Area: 8,057.7 ac — Elevation: 1750 ft

Comments
Distribution: PATCHY DISTRIBUTION THROUGHOUT AREA. OBSERVATIONS SINCE 1972 INDICATE TRACE TO MEDIUM ABUNDANCES. THERE IS MUCH DISTRIBUTION DETAIL ON THE SOURCE MAPS. THE EXTREME SE PORTION HAS AN OBSERVATION WHICH RECORDS PRESENCE OF 239 INDIVIDUALS.
Ecological: PREVIOUSLY-CULTIVATED ANNUAL GRASSLAND BASIN SURROUNDED BY RIVERSIDIAN SAGE SCRUB. SOIL: CIENEBA, EXETER, GORGONIO, GREENFIELD, HANFORD, MONSERATE, PACHAPPA, PLACENTIA, RAMONA, VISTA. SLOPE: 0-15%.
Threat: DEVELOPMENT AND AGIRCULTURE ARE THREATS. THE SAN JACINTO PORTION (SE) HAS THE THREAT OF IMMINENT DEVELOPMENT.
General: A LARGE PORTION OF THIS SITE IS THE LAKE PERRIS SRA AND SAN JACINTO WILDLIFE AREA. WEST PORTIONS UNDER STUDY FOR HABITAT ENHANCEMENT. FUTURE STATE PARK PRACTICES NEED TO ADDRESS PROPER MANAGEMENT FOR SKR HABITAT. 13 SOURCE DOCUMENTS.
Owner/Manager: DPR, DFG, PVT

Source Codes
BEH90F02, MCC89F04, PRI91F02, FRI89F07, PRI89F03, PRI91F03, MCC91F03, FRI89F09, BEH90F01, OFA88F51, PRI89F08, MCC90F08, THO73R01, LSA91R02

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 30 — Map Index: 03634
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: STEPHENS, F. 1923 (MUS)
Dates Last Seen — Element: 1923-09-23 — Site: 1923-09-23

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: PERRIS.

Lat/Long: / — Township:
UTM: — Range:
Mapping Precision: — Section: — Qtr
Symbol Type: — Meridian:
Radius: — Elevation:

Comments
Distribution:
Ecological:
Threat:
General: MVZ #33562.
Owner/Manager: UNKNOWN

Source Codes
MVZ81S01

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 48 — Map Index: 03936
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Extirpated
Trend: Unknown
Main Source: O'FARRELL, M. ET AL 1988 (OBS)
Dates Last Seen — Element: 1980-03-07 — Site: 1988-09-18

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: ABOUT 5.0 MI E OF PERRIS.

Lat/Long: 33°46'25" / 117°07'47" — Township: 04S
UTM: Zone-11 N3736869 E487989 — Range: 02W
Mapping Precision: NON-SPECIFIC — Section: 31 Qtr SW
Symbol Type: POINT — Meridian: S
Radius: 1/5 mile — Elevation: 2200 ft

Comments
Distribution: 16 TRAPPED IN 1980. REPORTED EXTIRPATED BY DEVELOPMENT IN 1988.
Ecological: TYPICAL COASTAL SAGE SCRUB HABITAT.
Threat: DEVELOPMENT
General:
Owner/Manager: UNKNOWN

Source Codes
OFA88F78, PEA80R01

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 70 — Map Index: 20358
Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: PRICE, M. 1991 (OBS)
Dates Last Seen — Element: 1991-10-XX — Site: 1991-10-XX

Quad Summary: STEELE PEAK (3311773/086D)*, PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary: Perris

Location: DIRECTLY NORTH OF PERRIS; THIS IS A MAJOR PORTION OF THE MOTTE RIMROCK RESERVE.

Lat/Long: 33°48'43" / 117°15'45" — Township: 04S
UTM: Zone-11 N3741141 E475709 — Range: 04W
Mapping Precision: NON-SPECIFIC — Section: 23 Qtr XX
Symbol Type: POLYGON — Meridian: S
Area: 1,589.7 ac — Elevation: 1850 ft

Comments
Distribution: FROM TRACE TO HIGH ABUNDANCE THROUGHOUT PROPERTY; PRICE (1991) REPORTED SIGHTING 254 INDIVIDUALS.
Ecological: ANNUAL GRASSLANDS AND RIVERSIDIAN SAGE SCRUB. SOIL: CIENEBA, HANFORD, VISTA. SLOPE: 0-15%.
Threat: THE PORTION OF THE SITE OFF THE RESERVE IS THREATENED BY DEVELOPMENT, AGRICULTURE, ORV ACTIVITY, AND DUMPING.
General: THERE ARE ELEVEN FIELD SURVEY FORMS FOR THIS OCCURRENCE WITH SUBSTANTIAL ADDITIONAL INFORMATION. THE SW PORTION OF THE SITE IS NOT PART OF THE MOTTE RIMROCK RESERVE.
Owner/Manager: UCLWRS-MOTTE RIMROCK RES, PVT

Source Codes
MCC89F03, BEL89F11, RIV95R01, PRI91F01, BEL89F12, OFA88F33, PRI89F01, MCC90F02, MON89F06, BAX91F01, MCC91F01, MON90F18

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 81 — Map Index: 20560
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: MONTGOMERY S. 1989 (OBS)
Dates Last Seen — Element: 1989-03-04 — Site: 1989-03-04

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: ONE MI NORTH OF NUEVO ROAD JUNCTION WITH PICO AVENUE; ONE MI NW OF NUEVO.

Lat/Long: 33°49'00" / 117°09'44" — Township: 04S
UTM: Zone-11 N3741641 E484992 — Range: 03W
Mapping Precision: NON-SPECIFIC — Section: 14 Qtr XX
Symbol Type: POINT — Meridian: S
Radius: 3/5 mile — Elevation: 1500 ft

Comments
Distribution:
Ecological: MOSTLY LEVEL TO GENTLY SLOPING TERRAIN WITH A SMALL ROCKY HILLSIDE ALONG SW PART OF SITE. MOST OF SITE SUBJECT TO DISCING. SOME HERBACEOUS COVER AND NON-NATIVE GRASSES; SOME DEGRADED RIPARIAN WOODLAND. SOIL: SANDY LOAMS AND SILTY CLAYS.
Threat: MAIN THREAT IS FROM DISCING; SOME ORV USE.
General: TWO ADULTS OBSERVED.
Owner/Manager: PVT

Source Codes
MON89F05

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 141 — Map Index: 20987
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: MONTGOMERY, S. 1989 (OBS)
Dates Last Seen — Element: 1989-08-24 — Site: 1989-08-24

Quad Summary: ROMOLAND (3311762/068B)*, LAKE ELSINORE (3311763/069A), PERRIS (3311772/085C), STERLE PEAK (3311773/086D)
County Summary: RIVERSIDE
SNA Summary:

Location: 3.5 MILES E OF ROMOLAND.

Lat/Long: 33°44'57" / 117°14'43" — Township: 05S
UTM: Zone-11 N3734168 E477288 — Range: 04W
Mapping Precision: NON-SPECIFIC — Section: 12 Qtr XX
Symbol Type: POINT — Meridian: S
Radius: 2/5 mile — Elevation: 1500 ft

Comments
Distribution: 6 INDIVIDUALS FOUND. K-RATS OCCUR THROUGHOUT THE PROPERTY.
Ecological: FLAT TO GENTLY ROLLING HILLS WITH NON-NATIVE GRASSLANDS AND SAGE SCRUB. SOME EUCALYPTUS GROVES. SOILS ARE LOAMY.
Threat: INTENSE ORV USE AND DUMPING. NORTHERN PORTION OF THE SITE DISKED IN 1987.
General:
Owner/Manager: PVT

Source Codes
MON89F24

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 189 — Map Index: 21200
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: O'FARRELL, M. & C. UPTAIN 1988 (OBS)
Dates Last Seen — Element: 1988-09-18 — Site: 1988-09-18

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: 0.3 MILES SE OF ORANGE AVE. JCT. WITH FOOTHILL AVE. ABOUT 3 MILES NE OF PERRIS AND ABOUT 2 MILES S OF PERRIS RESERVOIR.

Lat/Long: 33°48'49" / 117°10'40" — Township: 04S
UTM: Zone-11 N3741324 E483549 — Range: 03W
Mapping Precision: NON-SPECIFIC — Section: 22 Qtr XX
Symbol Type: POINT — Meridian: S
Radius: 4/5 mile — Elevation: 1580 ft

Comments
Distribution: 20 ACRES OF TRACE DISTRIBUTION IN SMALL DISJUNCT PATCHES.
Ecological: NON-NATIVE GRASSLAND AT BASE OF ROCKY SLOPES COVERED BY RIVERSIDIAN SAGE SCRUB. SLOPE: 0-20%. SOIL: HANFORD, VISTA.
Threat: GRAZING, BURNING, AND URBAN DEVELOPMENT.
General:
Owner/Manager: UNKNOWN

Source Codes
OFA88F77

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 190 — Map Index: 21201
Occ Rank: Poor
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: O'FARRELL, M. ET AL 1988 (OBS)
Dates Last Seen — Element: 1988-09-18 — Site: 1988-09-18

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: 1.3 MILES NE OF MAPES ROAD JCT WITH MENIFEE ROAD; 5 MILES E OF PERRIS.

Lat/Long: 33°46'06" / 117°08'04" — Township: 05S
UTM: Zone-11 N3736287 E487562 — Range: 02W
Mapping Precision: NON-SPECIFIC — Section: 06 Qtr NW
Symbol Type: POLYGON — Meridian: S
Area: 6.4 ac — Elevation: 1850 ft

Comments
Distribution: ABOUT 10 ACRES OF TRACE ABUNDANCE.
Ecological: NON-NATIVE GRASSLAND AT BASE OF ROCKY STEEP SLOPES COVERED BY RIVERSIDIAN SAGE SCRUB. SLOPE: 0-10%. SOIL: CIENEBA, HANFORD.
Threat: RURAL HOUSING DEVELOPMENT, POWER LINE RIGHT-OF-WAY.
General:
Owner/Manager: UNKNOWN

Source Codes
OFA88F79

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 191 — Map Index: 21199
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Extirpated
Trend: Unknown
Main Source: O'FARRELL, M. ET AL 1988 (OBS)
Dates Last Seen — Element: 1988-09-18 — Site: 1988-09-18

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: 0.5 MILES NW OF MAPES ROAD JCT. WITH BRIGGS ROAD; 5 MILES ESE OF PERRIS.

Lat/Long: 33°45'46" / 117°08'35" — Township: 05S
UTM: Zone-11 N3735669 E486752 — Range: 03W
Mapping Precision: NON-SPECIFIC — Section: 01 Qtr SE
Symbol Type: POINT — Meridian: S
Radius: 1/5 mile — Elevation: 1610 ft

Comments
Distribution: EXTIRPATED
Ecological: NON-NATVIE GRASSLAND WITH SCATTERED RIVERSIDIAN SAGE SCRUB.
Threat: DEVELOPMENT AND AGRICULTURE.
General: REPORTED HERE BY LEPRE IN 1963.
Owner/Manager: UNKNOWN

Source Codes
OFA88F80

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status: Federal: Endangered; State: Threatened
NDDB Element Ranks: Global: G2; State: S2
Other Lists: CDFG Status:

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 192 — Map Index: 21198
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: RIGGAN, R. 1990 (OBS)
Dates Last Seen — Element: 1990-07-09; Site: 1990-07-09

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: 0.8 MILES WSW OF MAPES ROAD JCT WITH GOETZ ROAD; 1.5 MILES SOUTH OF PERRIS.

Lat/Long: 33°45'13" / 117°14'15"
UTM: Zone-11 N3734675 E477991
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile
Township: 05S
Range: 03W
Section: 07 Qtr NW
Meridian: S
Elevation: 1440 ft

Comments
Distribution:
Ecological: SITE FORMERLY IN RIVERSIDIAN SAGE SCRUB BUT NOW HEAVILY DISTURBED AND MOST SHRUBS EXTIRPATED. SPARSE COVER OF ANNUAL GRASSES AND FORBS.
Threat: SOME TRASH DUMPING.
General:
Owner/Manager: UNKNOWN

Source Codes
RIG90F05

CLEMMYS MARMORATA PALLIDA
SOUTHWESTERN POND TURTLE — Element Code: ARAAD02032

Status: Federal: None; State: None
NDDB Element Ranks: Global: G4T2T3; State: S2
Other Lists: CDFG Status: SC

Habitat Associations
General: INHABITS PERMANENT OR NEARLY PERMANENT BODIES OF WATER IN MANY HABITAT TYPES; BELOW 6000 FT ELEV.
Micro: REQUIRE BASKING SITES SUCH AS PARTIALLY SUBMERGED LOGS, VEGETATION MATS, OR OPEN MUD BANKS. NEED SUITABLE NESTING SITES.

* SENSITIVE *
Occurrence No. 49 — Map Index: 03634
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Possibly Extirpated
Trend: Unknown
Main Source: HOLLAND, D. 1988 (PERS)
Dates Last Seen — Element: XXXX-XX-XX; Site: 1987-XX-XX

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: *SENSITIVE* Location information suppressed.

* SENSITIVE * Lat/Long: /
UTM:
Mapping Precision:
Symbol Type:
Radius:
Township:
Range:
Section: Qtr
Meridian:
Elevation:

Comments
Distribution: Please contact the California Natural Diversity Database, California Department of Fish and Game, for more information: (916) 324-3812.
Ecological:
Threat:
General:
Owner/Manager:

Source Codes
BRA90U02, BRA88R01, HOL88U02

PHRYNOSOMA CORONATUM BLAINVILLEI
SAN DIEGO HORNED LIZARD — Element Code: ARACF12021

Status: Federal: None; State: None
NDDB Element Ranks: Global: G4T3T4; State: S2S3
Other Lists: CDFG Status: SC

Habitat Associations
General: INHABITS COASTAL SAGE SCRUB AND CHAPARRAL IN ARID AND SEMI-ARID CLIMATE CONDIT
Micro: PREFERS FRIABLE, ROCKY, OR SHALLOW SANDY SOILS.

Occurrence No. 8 — Map Index: 03634
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: GLASER, R. 1970 (LIT)
Dates Last Seen — Element: 197X-XX-XX; Site: 197X-XX-XX

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: PERRIS.

Lat/Long: /
UTM:
Mapping Precision:
Symbol Type:
Radius:
Township:
Range:
Section: Qtr
Meridian:
Elevation:

Comments
Distribution:
Ecological:
Threat:
General: FROM MCGURTY 1980 REPT TO CDFG.
Owner/Manager: UNKNOWN

Source Codes
MCG80R01, GLA70B01

PHRYNOSOMA CORONATUM BLAINVILLEI (cont.)
SAN DIEGO HORNED LIZARD — Element Code: ARACF12021

Status: Federal: None; State: None
NDDB Element Ranks: Global: G4T3T4; State: S2S3
Other Lists: CDFG Status: SC

Habitat Associations
General: INHABITS COASTAL SAGE SCRUB AND CHAPARRAL IN ARID AND SEMI-ARID CLIMATE CONDIT
Micro: PREFERS FRIABLE, ROCKY, OR SHALLOW SANDY SOILS.

Occurrence No. 248 — Map Index: 03533
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Decreasing
Main Source: MILROY, L. 1992 (OBS)
Dates Last Seen — Element: 1970-XX-XX; Site: 1992-04-12

Quad Summary: STEELE PEAK (3311773/086D)*, PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: VAL VERDE, 5 MILES NNW OF PERRIS.

Lat/Long: 33°50'47" / 117°15'17"
UTM: Zone-11 N3744967 E476435
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1 mile
Township: 04S
Range: 04W
Section: 01 Qtr SW
Meridian: S
Elevation: 1500 ft

Comments
Distribution: COLLECTED NORTH OF CAJALCO JUNCTION BY GLASER.
Ecological:
Threat: AREA IS UNDER CONSTRUCTION FOR COMMERCIAL USE AND HIGHWAY CONSTRUCTION, ELIMINATING IT AS A LIZARD SITE.
General: SDNHM 23702; COLLECTION DATE UNKNOWN. COLLECTION MADE IN 1970.
Owner/Manager: UNKNOWN

Source Codes
BRO86U05, MIL92F11

CNEMIDOPHORUS HYPERYTHRUS
ORANGE-THROATED WHIPTAIL — Element Code: ARACJ02060

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: INHABITS LOW-ELEVATION COASTAL SCRUB, CHAPARRAL, AND VALLEY-FOOTHILL HARDWOOD HABITATS.
Micro: PREFERS WASHES & OTHER SANDY AREAS WITH PATCHES OF BRUSH & ROCKS. PERENNIAL PLANTS NECESSARY FOR ITS MAJOR FOOD-TERMITES

Occurrence No. 125 — Map Index: 17867
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: LA RUE, E. 1989 (OBS)

Dates Last Seen
Element: 1989-09-22
Site: 1989-09-22

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: ABOUT 2.5 MILES SOUTH OF PERRIS RESERVOIR AND 2.5 MILES NORTHEAST OF PERRIS.

Lat/Long: 33°48'09" / 117°10'46"
UTM: Zone-11 N3740089 E483380
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 2/5 mile

Township: 04S
Range: 03W
Section: 22 Qtr S
Meridian: S
Elevation: 1500 ft

Comments
Distribution:
Ecological: HABITAT IS SPARSE COASTAL SAGE SCRUB, INTERRUPTED BY ROCKY OUTCROPS, ON A SE-FACING SLOPE.
Threat: PROPOSED DEVELOPMENT, CURRENTLY GRAZED BY SHEEP.
General: ONE ADULT OBSERVED.
Owner/Manager: PVT

Source Codes
LAR89F05

CNEMIDOPHORUS HYPERYTHRUS (cont.)
ORANGE-THROATED WHIPTAIL — Element Code: ARACJ02060

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: INHABITS LOW-ELEVATION COASTAL SCRUB, CHAPARRAL, AND VALLEY-FOOTHILL HARDWOOD HABITATS.
Micro: PREFERS WASHES & OTHER SANDY AREAS WITH PATCHES OF BRUSH & ROCKS. PERENNIAL PLANTS NECESSARY FOR ITS MAJOR FOOD-TERMITES

Occurrence No. 126 — Map Index: 17868
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: LA RUE, E. 1989 (OBS)

Dates Last Seen
Element: 1989-06-11
Site: 1989-06-11

Quad Summary: PERRIS (3311772/085C)*, LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: IN LAKEVIEW MOUNTAINS, ABOUT 3 MILES NORTHEAST OF ROMOLAND.

Lat/Long: 33°46'47" / 117°07'48"
UTM: Zone-11 N3737559 E487972
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 3/5 mile

Township: 04S
Range: 02W
Section: 31 Qtr XX
Meridian: S
Elevation: 2000 ft

Comments
Distribution: 2 ADULTS OBSERVED IN SPARSE BURNED CHAPARRAL ON BANKS OF SEASONAL DRAINAGES (NO WATER PRESENT).
Ecological: AREA HAD BEEN BURNED WITHIN THE LAST YEAR. COMMON PLANTS INCLUDE ADENOSTOMA FASCICULATA, ERIOGONIUM FASCICULATUM, RHUS OVATA. SPARSE VEGETATION ON SIDES OF DRY DRAINAGES WITH GRANITE ROCK OUTCROPS.
Threat: PLANNED DEVELOPMENT.
General:
Owner/Manager: PVT

Source Codes
LAR89F09

CNEMIDOPHORUS HYPERYTHRUS (cont.)
ORANGE-THROATED WHIPTAIL — Element Code: ARACJ02060

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: INHABITS LOW-ELEVATION COASTAL SCRUB, CHAPARRAL, AND VALLEY-FOOTHILL HARDWOOD HABITATS.
Micro: PREFERS WASHES & OTHER SANDY AREAS WITH PATCHES OF BRUSH & ROCKS. PERENNIAL PLANTS NECESSARY FOR ITS MAJOR FOOD-TERMITES

Occurrence No. 259 — Map Index: 03755
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: LEATHERMAN B. & D. STRONG 1989 (OBS)

Dates Last Seen
Element: 1989-08-03
Site: 1989-08-03

Quad Summary: PERRIS (3311772/085C)*, SUNNYMEAD (3311782/085B)
County Summary: RIVERSIDE
SNA Summary:

Location: 20 METERS WEST OF CAMP NATURE THEATRE, LOT 17, LAKE PERRIS STATE RECREATIONAL AREA.

Lat/Long: 33°52'09" / 117°11'05"
UTM: Zone-11 N3747465 E482908
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1 mile

Township: 03S
Range: 03W
Section: 34 Qtr XX
Meridian: S
Elevation: 1650 ft

Comments
Distribution:
Ecological: VEGETATION TYPE CLASSIFIED AS GRASSLAND , 80% GRASS COVER. PERENNIALS PRESENT, IN ORDER OF DOMINANCE: SALVIA OPIANA & ADENOSTOMA FASCICULATUM.
Threat: BUILDINGS
General: 1 OBSERVED, 1989.
Owner/Manager: DPR-LAKE PERRIS SRA

Source Codes
LEA89F11

CNEMIDOPHORUS HYPERYTHRUS (cont.)
ORANGE-THROATED WHIPTAIL — Element Code: ARACJ02060

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: INHABITS LOW-ELEVATION COASTAL SCRUB, CHAPARRAL, AND VALLEY-FOOTHILL HARDWOOD HABITATS.
Micro: PREFERS WASHES & OTHER SANDY AREAS WITH PATCHES OF BRUSH & ROCKS. PERENNIAL PLANTS NECESSARY FOR ITS MAJOR FOOD-TERMITES

Occurrence No. 260 — Map Index: 40133
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: LEATHERMAN B. & D. STRONG 1989 (OBS)

Dates Last Seen
Element: 1989-08-03
Site: 1989-08-03

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: 300 METERS NORTH OF BIG ROCK, BERNASCONI BEACH, LAKE PERRIS STATE RECREATION AREA.

Lat/Long: 33°50'29" / 117°10'11"
UTM: Zone-11 N3744397 E484272
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 2/5 mile

Township: 04S
Range: 03W
Section: 11 Qtr XX
Meridian: S
Elevation: 1600 ft

Comments
Distribution: LIZARDS OBSERVED OFF PAVED ROAD FOR CYCLISTS, ETC.
Ecological: DENSE, THICK FOLIAGE, MOSTLY SALVIA OPIANA AND BRASSICA SP; ALSO MARRUBIUM SP.
Threat: ROADS
General: 2 LIZARDS OBSERVED, 1989.
Owner/Manager: DPR-LAKE PERRIS SRA

Source Codes
LEA89F12

CENTROMADIA PUNGENS SSP LAEVIS
SMOOTH TARPLANT — Element Code: PDAST4R0R4

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-3

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND, CHENOPOD SCRUB, MEADOWS, PLAYAS, RIPARIAN WOODLAND.
Micro: ALKALI MEADOW, ALKALI SCRUB; ALSO IN DISTURBED PLACES. 0-480M.

Occurrence No. 9 — Map Index: 28237
Occ Rank: Poor
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1990 (OBS)
Dates Last Seen — Element: 1990-07-20 — Site: 1990-07-20

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: NORTH SIDE OF RAMONA EXPRESSWAY, 0.5 MILE WEST OF LAKEVIEW.

Lat/Long: 33°50'18" / 117°07'33"
UTM: Zone-11 N3744048 E488347
Mapping Precision: SPECIFIC
Symbol Type: POINT
Radius: 80 meters
Township: 04S
Range: 02W
Section: 07 Qtr NE
Meridian: S
Elevation: 1430 ft

Comments
Distribution: ALONG SIDE OF ROAD ABOUT MIDWAY BETWEEN LAKEVIEW AND SAN JACINTO RIVER.
Ecological: RUDERAL ROADSIDE SETTING WITH ATRIPLEX ARGENTEA, SALSOLA IBERICA, AVENA FATUA, A. BARBATA, AMBROSIA ACANTHICARPA, BROMUS DIANDRUS, B. RUBENS, SCHISMUS BARBATA, CRESSA TRUXILLENSIS, AND CYNODON DACTYLON.
Threat: ACTIVELY DISTURBED BY ROADSIDE MAINTENANCE.
General: 2500 PLANTS OBSERVED IN 1990.
Owner/Manager: UNKNOWN

Source Codes
BRA90F33, ERC90R05, BAC54S04

CENTROMADIA PUNGENS SSP LAEVIS (cont.)
SMOOTH TARPLANT — Element Code: PDAST4R0R4

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-3

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND, CHENOPOD SCRUB, MEADOWS, PLAYAS, RIPARIAN WOODLAND.
Micro: ALKALI MEADOW, ALKALI SCRUB; ALSO IN DISTURBED PLACES. 0-480M.

Occurrence No. 10 — Map Index: 28236
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1990 (OBS)
Dates Last Seen — Element: 1990-07-20 — Site: 1990-07-20

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: SOUTHEAST OF THE RAMONA EXPRESSWAY AT THE SAN JACINTO RIVER, ABOUT 1 MILE WEST OF LAKEVIEW.

Lat/Long: 33°50'18" / 117°08'01"
UTM: Zone-11 N3744060 E487636
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 8.9 ac
Township: 04S
Range: 02W
Section: 07 Qtr SW
Meridian: S
Elevation: 1420 ft

Comments
Distribution: SITE MAPPED ABOUT 500 FEET EAST OF RIVER LEVEE AND 600 FEET SOUTH OF THE EXPRESSWAY.
Ecological: VALLEY SINK SCRUB. ASSOCIATED WITH SUAEDA TORREYANA, SALICORNIA SUBTERMINALIS, ATRIPLEX ARGENTEA, CRESSA TRUXILLENSIS, BASSIA, LEPIDIUM DICTYOTUM, DISTICHLIS SPICATA, FRANKENIA GRANDIFOLIA, AND THE RARE ATRIPLEX CORONATA NOTATIOR.
Threat: AGRICULTURE AND DEVELOPMENT.
General: 100 PLANTS OBSERVED IN 1990. BRAMLET SUGGESTS INCLUDING THIS SITE WITHIN PROPOSED MULTI-SPECIES HCP BEING DEVELOPED FOR THIS REGION.
Owner/Manager: UNKNOWN

Source Codes
SAN87U01, SAN80S12, MIT90S01, BRA90U05, BRA90F31

CENTROMADIA PUNGENS SSP LAEVIS (cont.)
SMOOTH TARPLANT — Element Code: PDAST4R0R4

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-3

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND, CHENOPOD SCRUB, MEADOWS, PLAYAS, RIPARIAN WOODLAND.
Micro: ALKALI MEADOW, ALKALI SCRUB; ALSO IN DISTURBED PLACES. 0-480M.

Occurrence No. 11 — Map Index: 28232
Occ Rank: Poor
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: WHITE, S. 1990 (OBS)
Dates Last Seen — Element: 1990-09-05 — Site: 1990-09-05

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: PERRIS VALLEY STORM DRAIN, ABOUT 0.25 MILE NORTH OF SAN JACINTO AVE, NORTHEAST OF PERRIS.

Lat/Long: 33°47'24" / 117°12'11"
UTM: Zone-11 N3738688 E481190
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Area: 24.7 ac
Township: 04S
Range: 03W
Section: 28 Qtr SW
Meridian: S
Elevation: 1410 ft

Comments
Distribution: ON LEVEE EAST OF CHANNEL WITHIN THE CENTER OF THE SW 1/4 OF SECTION 28.
Ecological: GROWING IN DISTURBED HABITAT.
Threat: SITE IS CURRENTLY IN AGRICULTURE, PLANNED FOR DEVELOPMENT.
General: 1 PLANT OBSERVED IN 1990. WHITE SUGGESTS SITE SHOULD SHOULD BE RETAINED AS OPENSPACE/GREENBELT ALONG THE CHANNEL.
Owner/Manager: PVT

Source Codes
WHI90F14

CENTROMADIA PUNGENS SSP LAEVIS (cont.)
SMOOTH TARPLANT — Element Code: PDAST4R0R4

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-3

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND, CHENOPOD SCRUB, MEADOWS, PLAYAS, RIPARIAN WOODLAND.
Micro: ALKALI MEADOW, ALKALI SCRUB; ALSO IN DISTURBED PLACES. 0-480M.

Occurrence No. 12 — Map Index: 28234
Occ Rank: Poor
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1990 (OBS)
Dates Last Seen — Element: 1990-07-20 — Site: 1990-07-20

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: SOUTH OF THE SAN JACINTO RIVER AT CONFLUENCE WITH PERRIS VALLEY STORM DRAIN, ABOUT 1 MILE EAST OF PERRIS.

Lat/Long: 33°46'28" / 117°11'49"
UTM: Zone-11 N3736975 E481773
Mapping Precision: SPECIFIC
Symbol Type: POINT
Radius: 80 meters
Township: 04S
Range: 03W
Section: 33 Qtr SE
Meridian: S
Elevation: 1420 ft

Comments
Distribution: SITE IS MAPPED ABOUT 0.25 MILE NORTH OF ELLIS AVE AT THE 15 FREEWAY.
Ecological: RUDERAL HABITAT DOMINATED BY SALSOLA IBERICA AND ATRIPLEX SERENANA. ASSOCIATED WITH HEMIZONIA KELLOGGII, ATRIPLEX ARGENTEA, BROMUS DIANDRUS, HELIANTHUS ANNUUS, BRASSICA GENICULATA, SORGHUM HALIPENSIS, LACTUCA SERRIOLA, CENTAUREA, ET AL.
Threat: CURRENTLY UNDER AGRICULTURE, THIS SITE (OR NEARBY AREAS) PROPOSED FOR DEVELOPMENT.
General: 15 PLANTS OBSERVED IN 1990.
Owner/Manager: UNKNOWN

Source Codes
BRA90F32, HOO68S08

CENTROMADIA PUNGENS SSP LAEVIS (cont.)
SMOOTH TARPLANT — Element Code: PDAST4R0R4

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-3

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND, CHENOPOD SCRUB, MEADOWS, PLAYAS, RIPARIAN WOODLAND.
Micro: ALKALI MEADOW, ALKALI SCRUB; ALSO IN DISTURBED PLACES. 0-480M.

Occurrence No. 13 — Map Index: 28235
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1990 (OBS)
Dates Last Seen — Element: 1990-07-25 — Site: 1990-07-25

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: ABOUT 0.25 MILE NORTHWEST OF ELLIS ROAD AT SHERMAN ROAD, ABOUT 2.5 MILES EAST OF PERRIS.

Lat/Long: 33°46'25" / 117°10'56"
UTM: Zone-11 N3736913 E483116
Mapping Precision: SPECIFIC
Symbol Type: POINT
Radius: 80 meters
Township: 04S
Range: 03W
Section: 34 Qtr SW
Meridian: S
Elevation: 1420 ft

Comments
Distribution:
Ecological: VALLEY SINK SCRUB WITH OPEN SALT PANS. ASSOCIATED WITH SUAEDA TORREYANA, DISTICHLIS SPICATA, BASSIA HYSSOPIFOLIA, BRASSICA GENICULATA, ATRIPLEX ARGENTEA, SALSOLA IBERICA, GEDTUCA MEGALURA, HAPLOPAPPUS VENETUS, AND MARRUBIUM VULGARE.
Threat: PRESENTLY SITE IS OPEN FIELD WHICH IS GRAZED BY SHEEP. DEVELOPMENT PLANNED FOR AREA.
General: 15 PLANTS OBSERVED IN 1990.
Owner/Manager: UNKNOWN

Source Codes
BRA90F35

CENTROMADIA PUNGENS SSP LAEVIS (cont.)
SMOOTH TARPLANT — Element Code: PDAST4R0R4

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-3

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND, CHENOPOD SCRUB, MEADOWS, PLAYAS, RIPARIAN WOODLAND.
Micro: ALKALI MEADOW, ALKALI SCRUB; ALSO IN DISTURBED PLACES. 0-480M.

Occurrence No. 14 — Map Index: 28233
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1990 (OBS)
Dates Last Seen — Element: 1990-07-20 — Site: 1990-07-20

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: PERRIS VALLEY AIRPORT, BETWEEN NORTH-END OF AIRSTRIP AND CASE ROAD, SOUTH OF PERRIS.

Lat/Long: 33°45'59" / 117°12'53"
UTM: Zone-11 N3736094 E480113
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 15.0 ac
Township: 05S
Range: 03W
Section: 05 Qtr NW
Meridian: S
Elevation: 1420 ft

Comments
Distribution: MAPPED WITHIN THE SE 1/4 OF THE NW 1/4 OF SECTION 05.
Ecological: VALLEY SINK SCRUB WITH ATRIPLEX ARGENTEA, A. SEMIBACCATA, SUAEDA TORREYANA, SALSOLA IBERICA, FRANKENIA GRANDIFOLIA, SIDA LEPROSA, ERODIUM CICUTARIUM, BROMUS DIANDRUS, B. RUBENS, SALICORNIA SUBTERMINALIS, LEPIDIUM DICTYOCARPUM, ET AL.
Threat: FIELD TO THE WEST HAS BEEN DISKED.
General: 130 PLANTS OBSERVED IN 1990. THE AREA ATRIPLEX CORONATA VAR. NOTATIOR IS ALSO IN THIS AREA.
Owner/Manager: UNKNOWN

Source Codes
BRA90F30

LASTHENIA GLABRATA SSP COULTERI
COULTER'S GOLDFIELDS — Element Code: PDAST5L0A1

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: COASTAL SALT MARSHES, PLAYAS, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS.
Micro: USUALLY FOUND ON ALKALINE SOILS IN PLAYAS, SINKS, AND GRASSLANDS. 1-1400M.

Occurrence No. 15 — Map Index: 23766
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1991 (OBS)
Dates Last Seen — Element: 1992-04-09 — Site: 1992-04-09

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: SOUTHEAST OF LAKEVIEW HOT SPRINGS, ALONG EITHER SIDE OF THE SAN JACINTO RIVER.

Lat/Long: 33°50'04" / 117°08'31"
UTM: Zone-11 N3743603 E486866
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 16.6 ac
Township: 04S
Range: 03W
Section: 12 Qtr SE
Meridian: S
Elevation: 1420 ft

Comments
Distribution: APPROX. 0.8 KM (0.5 MI) SOUTH OF THE RAMONA EXPRESSWAY. MOSTLY WITHIN THE SE 1/4 OF THE SE 1/4 OF SECTION 12. ONE SUBPOPULATION IS LOCATRD 100 FT EAST OF THE SAN JACINTO RIVER AND 500 FT NORTH OF THE MWD AQUEDUCT.
Ecological: GROWING IN ALKALINE SINK SCRUB AND ALKALI PLAYA COMMUNITIES. ASSOCIATES INCLUDE CRESSA TRUXILLENSIS, SUAEDA TORREYANA, PLAGIOBOTHRYS LEPTOCLADUS, SPERGULARIA MARINA, LASTHENIA CALIFORNICA, ATRIPLEX ARGENTA, AND HEMIZONIA FASCICULATA.
Threat: SHEEP GRAZING, PORTION OF AREA IS ZONED FOR RESIDENTIAL AND THE REST FOR A FLOOD CONTROL PROJECT.
General: 8000 PLANTS OBSERVED EAST OF RIVER IN 1992. PROPOSED RIVERSIDE COUNTY MULTISPECIES HCP SHOWS THE SAN JACINTO RIVER AREA AS A POTENTIAL RESERVE. TWO OTHER SENSITIVE PLANTS, NAVARRETIA FOSSALIS AND ATRIPLEX CORONATA VAR. NOTATIOR, CO-OCCUR.
Owner/Manager: UNKNOWN

Source Codes
BRA91F14, BRA93U02, SAN92U01, FER92U01, SAN92U04

LASTHENIA GLABRATA SSP COULTERI (cont.)
COULTER'S GOLDFIELDS — Element Code: PDAST5L0A1

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: COASTAL SALT MARSHES, PLAYAS, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS.
Micro: USUALLY FOUND ON ALKALINE SOILS IN PLAYAS, SINKS, AND GRASSLANDS. 1-1400M.

Occurrence No. 16 — Map Index: 23767
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1993 (PERS)
Dates Last Seen — Element: 1992-04-09 — Site: 1992-04-09

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: EAST SIDE OF SAN JACINTO RIVER, 0.8 KM (0.5 MI) WEST OF THE END OF 10TH STREET.

Lat/Long: 33°49'41" / 117°08'37"
UTM: Zone-11 N3742915 E486698
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 6.2 ac
Township: 04S
Range: 03W
Section: 13 Qtr NE
Meridian: S
Elevation: 1420 ft

Comments
Distribution: 2.6 KM WEST OF LAKE VIEW AND 15-100M EAST OF THE SAN JACINTO RIVER AND JUST WEST OF AN EXISTING DIRT ACCESS ROAD, APPROX. 440 M SOUTH OF MWD EASEMENT ROAD. WITHIN THE NE 1/4 OF THE NE 1/4 OF SECTION 13.
Ecological: GROWING IN AN ALKALI GRASSLAND.
Threat: URBANIZATION AND AGRCULTURAL DEVELOPMENT ARE THREATS.
General: APPROX. 800 PLANTS OBSERVED IN 1992. ONLY SOURCE OF SITE INFORMATION IS COLLECTION #2220 BY D. BRAMLET.
Owner/Manager: UNKNOWN

Source Codes
BRA93U02, FER92U01

LASTHENIA GLABRATA SSP COULTERI (cont.)
COULTER'S GOLDFIELDS — Element Code: PDAST5L0A1

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: COASTAL SALT MARSHES, PLAYAS, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS.
Micro: USUALLY FOUND ON ALKALINE SOILS IN PLAYAS, SINKS, AND GRASSLANDS. 1-1400M.

Occurrence No. 17 — Map Index: 23768
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1993 (PERS)
Dates Last Seen — Element: 1992-04-09 — Site: 1992-04-09

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: EAST SIDE OF THE SAN JACINTO RIVER, BETWEEN 11TH STREET AND THE RIVER; WEST OF LAKEVIEW.

Lat/Long: 33°49'25" / 117°08'44"
UTM: Zone-11 N3742428 E486542
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 16.7 ac
Township: 04S
Range: 03W
Section: 13 Qtr NE
Meridian: S
Elevation: 1420 ft

Comments
Distribution: 1.6 KM WEST OF NUEVO AND 120M NORTH OF THE END OF 11TH STREET AND 45M EAST OF THE SAN JACINTO RIVER. THE SITE IS NEAR MAN MADE PONDS. WITHIN THE SW 1/4 OF THE NE 1/4 OF SECTION 13.
Ecological: GROWING IN AN ALKALI PLAYA.
Threat: URBANIZATION AND AGRICULTURAL DEVELOPMENT ARE THREATS.
General: APPROX. 5000 PLANTS OBSERVED IN 1992. ONLY SOURCE OF SITE INFORMATION IS COLLECTION #2221 BY D. BRAMLET.
Owner/Manager: UNKNOWN

Source Codes
BRA93U02, FER92U01

LASTHENIA GLABRATA SSP COULTERI (cont.)
COULTER'S GOLDFIELDS — Element Code: PDAST5L0A1

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: COASTAL SALT MARSHES, PLAYAS, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS.
Micro: USUALLY FOUND ON ALKALINE SOILS IN PLAYAS, SINKS, AND GRASSLANDS. 1-1400M.

Occurrence No. 18 — Map Index: 23771
Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1991 (OBS)
Dates Last Seen — Element: 1991-06-19 — Site: 1991-06-19

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: WEST OF THE SAN JACINTO RIVER, 0.9 KM (0.55 MI) SOUTH OF THE END OF POZOS AVE. WEST OF LAKEVIEW.

Lat/Long: 33°49'07" / 117°09'22"
UTM: Zone-11 N3741867 E485545
Mapping Precision: SPECIFIC
Symbol Type: POINT
Radius: 80 meters
Township: 04S
Range: 03W
Section: 14 Qtr SE
Meridian: S
Elevation: 1420 ft

Comments
Distribution: APPROX. 1 MI WEST OF NUEVO AND 1.2 MILES S OF THE RAMONA EXPRESSWAY, ALONG THE WEST SIDE OF DIRT ROAD (CONTINUATION OF POZOS ROAD?) APPROX. 200 FT SOUTH OF FORK IN RD AND 1300 FT NW OF RIVER. WITHIN THE SE 1/4 OF THE SE 1/4 OF SECTION 14.
Ecological: GROWING IN ALKALINE SINK SCRUB WITHIN A SWALE. ASSOCIATES INCLUDE ATRIPLEX ARGENTEA SSP. EXPANSA, LEPIDIUM DICTYOTUM, SUAEDA TORREYANA, CRESSA TRUXILLENSIS, PLAGIOBOTHRYS LEPTOCLADUS, MATRICARIA MATRICARIOIDES, AND POLYGONUM AVICULARE.
Threat: SITE IS ZONED FOR RESIDENTIAL DEVELOPMENT AND IS PRESENTLY USED FOR SHEEP GRAZING.
General: AREA IS SHOWN AS A POTENTIAL RESERVE AREA IN THE RIVERSIDE CO. MULTISPECIES HCP. MEASURES SHOULD BE DEVELOPED TO FORMALIZE A RESERVE IN THIS AREA TO PROTECT THE SEVERAL RARE PLANTS THAT OCCUR HERE.
Owner/Manager: UNKNOWN

Source Codes
BRA91F14, FER92U01

LASTHENIA GLABRATA SSP COULTERI (cont.)
COULTER'S GOLDFIELDS — Element Code: PDAST5L0A1

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: COASTAL SALT MARSHES, PLAYAS, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS.
Micro: USUALLY FOUND ON ALKALINE SOILS IN PLAYAS, SINKS, AND GRASSLANDS. 1-1400M.

Occurrence No. 19 — Map Index: 23769
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1993 (PERS)
Dates Last Seen — Element: 1992-04-15 — Site: 1992-04-15

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: EAST OF THE SAN JACINTO RIVER, BETWEEN 12TH ST. AND THE RIVER. WEST OF LAKEVIEW.

Lat/Long: 33°48'54" / 117°09'08"
UTM: Zone-11 N3741460 E485904
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 15.3 ac
Township: 04S
Range: 03W
Section: 24 Qtr NW
Meridian: S
Elevation: 1420 ft

Comments
Distribution: 1.4 KM WEST OF NUEVO ADJACENT TO THE RIVER. APPROX. 270M SOUTH OF 12TH ST. AND 120M EAST OF THE RIVER. WITHIN THE NW 1/4 OF THE NW 1/4 OF SECTION 24.
Ecological: GROWING IN ALKALI PLAYA.
Threat: SITE IS ADJACENT TO RECENTLY DISTURBED RIGHT OF WAY FOR RECLAIMED WATER PIPELINE. URBANIZATION AND AGRICULTURE THREATEN.
General: APPROX. 30,000 PLANTS OBSERVED IN 1992. ONLY SOURCE OF SITE INFORMATION IS COLLECTION #2233 BY D. BRAMLET.
Owner/Manager: UNKNOWN

Source Codes
BRA93U02, FER92U01

LASTHENIA GLABRATA SSP COULTERI (cont.)
COULTER'S GOLDFIELDS — Element Code: PDAST5L0A1

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: COASTAL SALT MARSHES, PLAYAS, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS.
Micro: USUALLY FOUND ON ALKALINE SOILS IN PLAYAS, SINKS, AND GRASSLANDS. 1-1400M.

Occurrence No. 20 — Map Index: 23770
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1993 (PERS)
Dates Last Seen — Element: 1992-04-15 — Site: 1992-04-15

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: NUEVO, ALONG EITHER SIDE OF THE END OF 12TH STREET. WEST OF LAKEVIEW.

Lat/Long: 33°48'34" / 117°09'06"
UTM: Zone-11 N3740836 E485957
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 8.1 ac
Township: 04S
Range: 03W
Section: 24 Qtr NW
Meridian: S
Elevation: 1420 ft

Comments
Distribution: 1.3 KM WEST OF NUEVO AND JUST EAST OF THE INTERSECTION OF 13TH STREET AND TRANSMISSION LINE, POPULATIONS FOUND ON BOTH SIDES OF THE STREET. WITHIN THE SW 1/4 OF THE NW 1/4 OF SECTION 24.
Ecological: GROWING IN AN ALKALI GRASSLAND.
Threat: URBANIZATION AND AGRICULTURAL DEVELOPMENT THREATEN.
General: 10,000 PLANTS OBSERVED IN 1992. ONLY SOURCE OF SITE INFORMATION IS COLLECTION #2232 BY D. BRAMLET.
Owner/Manager: UNKNOWN

Source Codes
BRA93U02, FER92U01

LASTHENIA GLABRATA SSP COULTERI (cont.)
COULTER'S GOLDFIELDS — Element Code: PDAST5L0A1

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: COASTAL SALT MARSHES, PLAYAS, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS.
Micro: USUALLY FOUND ON ALKALINE SOILS IN PLAYAS, SINKS, AND GRASSLANDS. 1-1400M.

Occurrence No. 48 — Map Index: 31524
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: DICE, J. 1993 (MAP)
Dates Last Seen — Element: 199X-XX-XX; Site: 199X-XX-XX

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN JACINTO WILDLIFE AREA, 2 MI NNE OF LAKEVIEW HOT SPRINGS AND 1.8 MI N OF RAMONA EXPWY CROSSING OF SAN JACINTO RIVER.

Lat/Long: 33°51'58" / 117°07'46"
UTM: Zone-11 N3747123 E488024
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 6.3 ac
Township: 03S
Range: 02W
Section: XX Qtr XX
Meridian: S
Elevation: 1450 ft

Comments
Distribution: MAPPED BETWEEN PIPELINE AND DIRT ROAD NEAR THE CENTER OF PROJECTED SECTION 31.
Ecological:
Threat:
General: ONLY SOURCE OF INFORMATION FOR THIS SITE IS MAP DETAIL PROVIDED BY J. DICE (1993).
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
DIC93M01

TRICHOCORONIS WRIGHTII VAR WRIGHTII
WRIGHT'S TRICHOCORONIS — Element Code: PDAST9F031

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T5?	CNPS List: 2
State: None	State: S1.1	R-E-D Code: 3-3-1

Habitat Associations
General: MARSHES AND SWAMPS, RIPARIAN FOREST, MEADOWS AND SEEPS, VERNAL POOLS.
Micro: MUD FLATS OF VERNAL LAKES, DRYING RIVER BEDS, ALKALI MEADOWS. 5-435M.

Occurrence No. 1 — Map Index: 24638
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1991 (OBS)
Dates Last Seen — Element: 1991-06-18; Site: 1991-06-18

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: 1 KM (0.7 MI) SOUTHWEST OF LAKEVIEW HOT SPRINGS.

Lat/Long: 33°49'50" / 117°09'05"
UTM: Zone-11 N3743184 E485992
Mapping Precision: SPECIFIC
Symbol Type: POINT
Radius: 80 meters
Township: 04S
Range: 03W
Section: 12 Qtr SW
Meridian: S
Elevation: 1420 ft

Comments
Distribution: IN A SMALL MARSH AREA 833M WEST OF THE SAN JACINTO RIVER, 433M EAST OF THE INTERSECTION OF POZOS AVE AND THE MWD COLORADO AQUEDUCT EASEMENT.
Ecological: GROWING IN AN ALKALI MEADOW. ASSOCIATES INCLUDE CRYPSIS SCHOENOIDES, CRESSA TRUXILLENSIS, FRANKENIA GRANDIFOLIA, JUNCUS MEXICANUS, ATRIPLEX ARGENTEA, BOISDUVALIA, HORDEUM DEPRESSUM, POLYPOGON MONSPELIENSIS, AND TYPHA DOMINGENSIS.
Threat: OPEN AREAS ARE USED FOR SHEEP GRAZING.
General: 315 PLANTS OBSERVED IN 1991. SOILS ARE WILLOWS SILTY CLAY AND ARE DEEP AND STRONGLY SALINE-ALKALINE. NAVARRETIA FOSSALIS IS ALSO FOUND AT THIS SITE.
Owner/Manager: PVT

Source Codes
BRA91F15, BRA93R01

TRICHOCORONIS WRIGHTII VAR WRIGHTII (cont.)
WRIGHT'S TRICHOCORONIS — Element Code: PDAST9F031

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T5?	CNPS List: 2
State: None	State: S1.1	R-E-D Code: 3-3-1

Habitat Associations
General: MARSHES AND SWAMPS, RIPARIAN FOREST, MEADOWS AND SEEPS, VERNAL POOLS.
Micro: MUD FLATS OF VERNAL LAKES, DRYING RIVER BEDS, ALKALI MEADOWS. 5-435M.

Occurrence No. 2 — Map Index: 24636
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: DICE, J. 1993 (MAP)
Dates Last Seen — Element: 1993-XX-XX; Site: 1993-XX-XX

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: 1 KM (0.7 MI) NORTH OF THE RAMONA EXPRESSWAY AT THE SAN JACINTO RIVER, NORTHWEST OF LAKEVIEW.

Lat/Long: 33°50'59" / 117°07'59"
UTM: Zone-11 N3745302 E487688
Mapping Precision: SPECIFIC
Symbol Type: POINT
Radius: 80 meters
Township: 04S
Range: 02W
Section: 06 Qtr SW
Meridian: S
Elevation: 1420 ft

Comments
Distribution:
Ecological:
Threat:
General: MAP DETAIL IS ONLY SOURCE OF INFORMATION FOR THIS OCCURRENCE.
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
BRA93R01, DIC93M01

TRICHOCORONIS WRIGHTII VAR WRIGHTII (cont.)
WRIGHT'S TRICHOCORONIS — Element Code: PDAST9F031

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T5?	CNPS List: 2
State: None	State: S1.1	R-E-D Code: 3-3-1

Habitat Associations
General: MARSHES AND SWAMPS, RIPARIAN FOREST, MEADOWS AND SEEPS, VERNAL POOLS.
Micro: MUD FLATS OF VERNAL LAKES, DRYING RIVER BEDS, ALKALI MEADOWS. 5-435M.

Occurrence No. 3 — Map Index: 24637
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: SANDERS, A. 1987 (PERS)
Dates Last Seen — Element: 1980-05-19; Site: 1980-05-19

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: 2.5 KM (1.5 MI) WEST OF LAKEVIEW ALONG THE RAMONA EXPRESSWAY.

Lat/Long: 33°50'28" / 117°08'42"
UTM: Zone-11 N3744342 E486591
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile
Township: 04S
Range: 03W
Section: 12 Qtr NE
Meridian: S
Elevation: 1400 ft

Comments
Distribution: MAPPED NORTH OF LAKEVIEW HOT SPRINGS.
Ecological: GROWING ON THE DRYING BED OF THE SAN JACINTO RIVER.
Threat:
General: ONLY SOURCE OF INFORMATION FOR THIS OCCURRENCE IS 1980 COLLECTION BY SANDERS AND BOYD (#1418, UCR).
Owner/Manager: UNKNOWN

Source Codes
SAN87U03

CAULANTHUS SIMULANS
PAYSON'S JEWEL-FLOWER — Element Code: PDBRA0M0H0

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G3	CNPS List: 4
State: None	State: S3.2	R-E-D Code: 1-2-3

Habitat Associations
General: CHAPARRAL, COASTAL SCRUB. ONLY KNOWN FROM RIVERSIDE AND SAN DIEGO COUNTIES.
Micro: FREQUENTLY IN BURNED AREAS, OR IN DISTURBED SITES SUCH AS STREAMBEDS; ALSO ON ROCKY, STEEP SLOPES. 90-2200M.

Occurrence No. 8 — Map Index: 03963
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: PEARSON, D. 1982 (OBS)
Dates Last Seen — Element: 1982-04-26 — Site: 1982-04-26

Quad Summary: LAKEVIEW (3311771/085D)*, PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: LAKEVIEW MTNS, WEST OF JUNIPER FLAT.

Lat/Long: 33°46'43" / 117°07'25" — Township: 04S
UTM: Zone-11 N3737422 E488555 — Range: 02W
Mapping Precision: NON-SPECIFIC — Section: 31 Qtr SE
Symbol Type: POINT — Meridian: S
Radius: 1/5 mile — Elevation: 2400 ft

Comments
Distribution:
Ecological: LAKEVIEW MOUNTAINS-CHAMISE CHAPARRAL AND COASTAL SAGE SCRUB ON THIN COBBLY SOIL.
Threat: ALONG PROPOSED SOUTHERN CAL EDISON TRANSMISSION LINE ROUTE. AREA SUBJECT TO HOUSING DEVELOPMENT.
General: ACCORDING TO ROY BUCK (1992) PLANTS AT THIS SITE ARE PROBABLY C. HETEROPHYLLUS. MORE STUDIES NEEDED.
Owner/Manager: PVT

Source Codes
BUC92U01, PEA82F06

CAULANTHUS SIMULANS (cont.)
PAYSON'S JEWEL-FLOWER — Element Code: PDBRA0M0H0

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G3	CNPS List: 4
State: None	State: S3.2	R-E-D Code: 1-2-3

Habitat Associations
General: CHAPARRAL, COASTAL SCRUB. ONLY KNOWN FROM RIVERSIDE AND SAN DIEGO COUNTIES.
Micro: FREQUENTLY IN BURNED AREAS, OR IN DISTURBED SITES SUCH AS STREAMBEDS; ALSO ON ROCKY, STEEP SLOPES. 90-2200M.

Occurrence No. 9 — Map Index: 03935
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: PEARSON, D. 1982 (OBS)
Dates Last Seen — Element: 1982-04-26 — Site: 1982-04-26

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: LAKEVIEW MTNS, 0.4 MI NE OF JCT GUNTHER RD & BRIGGS RD.

Lat/Long: 33°46'34" / 117°07'48" — Township: 04S
UTM: Zone-11 N3737146 E487962 — Range: 02W
Mapping Precision: NON-SPECIFIC — Section: 31 Qtr SW
Symbol Type: POINT — Meridian: S
Radius: 1/5 mile — Elevation: 2300 ft

Comments
Distribution:
Ecological: LAKEVIEW MOUNTAINS. IN CHAMISE CHAPARRAL AND COASTAL SAGE SCRUB ON THIN COBBLY SOIL.
Threat: ALONG PROPOSED SOUTHERN CAL EDISON TRANSMISSION LINE ROUTE. AREA SUBJECT TO HOUSING DEVELOPMENT.
General: ACCORDING TO ROY BUCK (1992) PLANTS AT THIS SITE ARE PROBABLY C. HETEROPHYLLUS.
Owner/Manager: PVT

Source Codes
BUC92U01, PEA82F06

CAULANTHUS SIMULANS (cont.)
PAYSON'S JEWEL-FLOWER — Element Code: PDBRA0M0H0

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G3	CNPS List: 4
State: None	State: S3.2	R-E-D Code: 1-2-3

Habitat Associations
General: CHAPARRAL, COASTAL SCRUB. ONLY KNOWN FROM RIVERSIDE AND SAN DIEGO COUNTIES.
Micro: FREQUENTLY IN BURNED AREAS, OR IN DISTURBED SITES SUCH AS STREAMBEDS; ALSO ON ROCKY, STEEP SLOPES. 90-2200M.

Occurrence No. 17 — Map Index: 03551
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: SANDERS, A. & S. BOYD #1396 UCR (HERB)
Dates Last Seen — Element: 1980-05-02 — Site: 1980-05-02

Quad Summary: PERRIS (3311772/085C)*, STEELE PEAK (3311773/086D)
County Summary: RIVERSIDE
SNA Summary: Perris

Location: MOTTE RESERVE, 2.5 MI NW OF PERRIS.

Lat/Long: 33°48'31" / 117°14'58" — Township: 04S
UTM: Zone-11 N3740769 E476911 — Range: 04W
Mapping Precision: NON-SPECIFIC — Section: 24 Qtr NE
Symbol Type: POINT — Meridian: S
Radius: 1 mile — Elevation: 1700 ft

Comments
Distribution:
Ecological: ON SEEPY BANK ABOVE A SMALL STREAM IN ROCKY HILLS. IN COASTAL SAGE SCRUB WHICH WAS BURNED IN AUGUST 1979.
Threat:
General: ACCORDING TO ROY BUCK (1992) PLANTS AT THIS SITE ARE PROBABLY C. HETEROPHYLLUS. MORE STUDIES NEEDED.
Owner/Manager: UCLWRS-MOTTE RIMROCK RESERVE

Source Codes
SAN80S04, BUC92U01

ATRIPLEX CORONATA VAR NOTATIOR
SAN JACINTO VALLEY CROWNSCALE — Element Code: PDCHE040C2

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G4T1	CNPS List: 1B
State: None	State: S1.1	R-E-D Code: 3-3-3

Habitat Associations
General: PLAYAS, CHENOPOD SCRUB, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS. ENDEMIC TO RIVERSIDE COUNTY.
Micro: DRY, ALKALINE FLATS IN THE SAN JACINTO RIVER VALLEY. 400-500M.

Occurrence No. 2 — Map Index: 03738
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1990 (OBS)
Dates Last Seen — Element: 1990-07-20 — Site: 1990-07-20

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary: Perris East

Location: SOUTHEAST OF PERRIS, EAST OF ELLIS AND NORTHEAST OF PERRIS VALLEY AIRPORT.

Lat/Long: 33°46'12" / 117°12'41" — Township: 05S
UTM: Zone-11 N3736466 E480428 — Range: 03W
Mapping Precision: SPECIFIC — Section: 05 Qtr NE
Symbol Type: POLYGON — Meridian: S
Area: 40.6 ac — Elevation: 1420 ft

Comments
Distribution: THREE COLONIES MAPPED AT CNDDB. ONE ON EITHER SIDE OF CASE ROAD ABOUT 0.5 MILE SE OF ELLIS AND ONE BETWEEN THE NORTH END OF THE RUNWAY AT PERRIS VALLEY AIRPORT AND CASE ROAD.
Ecological: GROWING IN VALLEY SINK SCRUB WITH ATRIPLEX ARGENTEA, SUAEDA TORREYANA, SALICORNIA SUBTERMINALIS, HAPLOPAPPUS PALMERI VAR. PACHYLEPIS, BROMUS DIANDRUS, SALSOLA IBERICA, LEPIDIUM DICTYOCARPUM, ERODIUM, HEMIZONIA LAEVIS, BRODIAEA FILIFOLIA.
Threat: ACC TO SANDERS (1987), THIS AREA HAS LARGELY BEEN CONVERTED TO AG. ORVS, ILLEGAL DUMPING, AND DEVELOPMENT ALSO THREATEN.
General: THE SITE HAS SOME OF THE LAST VALLEY SALTBUSH SCRUB REMAINING OUTSIDE THE SAN JACINTO WILDLIFE AREA (IN THIS AREA). INCLUDES FORMER OCCURRENCE #1. SMALL POPULATION OF BRODIAEA FILIFOLIA OCCURS TO THE NORTH OF CASE ROAD.
Owner/Manager: PVT

Source Codes
BRA90M01, BRA90F13, SAN87U03, RO052S07, BRA90S08, BRA9XU01, MIT90F05, RO065S03, BRA92U04, CNP79N09, HO068S05

ATRIPLEX CORONATA VAR NOTATIOR (cont.)
SAN JACINTO VALLEY CROWNSCALE — Element Code: PDCHE040C2

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G4T1	CNPS List: 1B
State: None	State: S1.1	R-E-D Code: 3-3-3

Habitat Associations
General: PLAYAS, CHENOPOD SCRUB, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS. ENDEMIC TO RIVERSIDE COUNTY.
Micro: DRY, ALKALINE FLATS IN THE SAN JACINTO RIVER VALLEY. 400-500M.

Occurrence No. 3 — Map Index: 28301
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1990 (OBS)
Dates Last Seen — Element: 1991-06-19 — Site: 1991-06-19

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary: San Jacinto Wildlife Refuge

Location: VICINITY OF THE SAN JACINTO RIVER FROM RAMONA EXPRESSWAY SOUTH TO NUEVO.

Lat/Long: 33°49'32" / 117°08'43" — Township: 04S
UTM: Zone-11 N3742641 E486564 — Range: 03W
Mapping Precision: SPECIFIC — Section: 13 Qtr XX
Symbol Type: POLYGON — Meridian: S
Area: 212.9 ac — Elevation: 1420 ft

Comments
Distribution: MANY COLONIES, ESPECIALLY EAST OF THE EAST LEVEE. MAPPED WITHIN T04S 03W E 1/2 SECTION 12, NE 1/4 SECTION 13, SW 1/4 SECTION 13, SE 1/4 SECTION 14, NE 1/4 SECTION 23, NW 1/4 SECTION 24 AND T04S R02W W 1/2 SECTION 7.
Ecological: GROWING IN VALLEY SALTBUSH SCRUB IN ASSOCIATION WITH SUAEDA TORREYANA, SALICORNIA SUBTERMINALIS, ATRIPLEX ARGENTA, CRESSA TRUXILLENSIS, BASSIA HYPOSSIFOLIA, LEPIDIUM DICTYOTUM, ERODIUM CICUTARIUM, LASTHENIA SP., ATRIPLEX SEMIBACCATA, ET AL.
Threat: POPULATION IS IN AGRICULTURAL FIELD IN AREAS THAT ARE TOO ALKALINE FOR CROPS. THREAT FROM FUTURE FLOOD CONTROL PROJECT.
General: SIGNS OF INUNDATION IN THIS AREA. PLANT MAY REQUIRE INUNDATION FOR GERMINATION. SITE SHOULD BE INCLUDED IN PROPOSED MULTI-SPECIES HABITAT CONSERVATION PLAN IN RIVERSIDE COUNTY GENERAL PLAN. INCLUDES FORMER OCCURRENCE #6.
Owner/Manager: PVT

Source Codes
BRA90M01, HOA91U03, SAN87U03, BRA91S25, BRA91S29, MIT90F06, BRA90F14, BRA9XU01, BRA91S26, MIT90S03, CLA74S02, BRA91S27, BRA91S23, BRA92U04, BRA90S10, BRA91S24, BRA91F13, BRA90S09

ATRIPLEX CORONATA VAR NOTATIOR (cont.)
SAN JACINTO VALLEY CROWNSCALE — Element Code: PDCHE040C2

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G4T1	CNPS List: 1B
State: None	State: S1.1	R-E-D Code: 3-3-3

Habitat Associations
General: PLAYAS, CHENOPOD SCRUB, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS. ENDEMIC TO RIVERSIDE COUNTY.
Micro: DRY, ALKALINE FLATS IN THE SAN JACINTO RIVER VALLEY. 400-500M.

Occurrence No. 7 — Map Index: 22021
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1990 (OBS)
Dates Last Seen — Element: 1990-07-25 — Site: 1990-07-25

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: WEST OF NUEVO, ON EITHER SIDE OF SAN JACINTO RIVER LEVEE JUST NORTH OF NUEVO ROAD.

Lat/Long: 33°48'11" / 117°09'59" — Township: 04S
UTM: Zone-11 N3740145 E484592 — Range: 03W
Mapping Precision: SPECIFIC — Section: 23 Qtr S
Symbol Type: POLYGON — Meridian: S
Area: 23.0 ac — Elevation: 1420 ft

Comments
Distribution: TWO COLONIES. ONE ABOUT 200 FEET NORTH OF NUEVO ROAD AND 100 FEET WEST OF SAN JACINTO RIVER, SECOND COLONY IS 800 FEET WEST OF PICO AVE ON THE NORTH SIDE OF NUEVO ROAD.
Ecological: GROWING IN VALLEY SINK SCRUB IN ASSOCIATION WITH BASSIA HYSSOPIFOLIA, ATRIPLEX ARGENTA, SISYMBRIUM SP., SIDA LEPROSA, SUAEDA TORREYANA, LEPIDIUM DICTYOTUM, HORDEUM SP., CRESSA TRUXILLENSIS, SALSOLA IBERICA, AND HEMIZONIA FASCICULATA.
Threat: PRESENT THREATS ARE CONTINUED AGRICULTURAL CULTIVATION AND SHEEP GRAZING. FUTURE FLOOD CONTROL PROJECT ALSO THREATENS.
General: 4500 PLANTS SEEN IN TWO MAIN AREAS IN 1990. THIS AREA SHOULD BE INCLUDED IN THE PROPOSED RIVERSIDE COUNTY MULTI-SPECIES RESERVE SYSTEM.
Owner/Manager: PVT

Source Codes
BRA90M01, MIT90F07, BAK90S10, BRA9XU01, BRA90F18, BRA90S15

ATRIPLEX CORONATA VAR NOTATIOR (cont.)
SAN JACINTO VALLEY CROWNSCALE — Element Code: PDCHE040C2

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G4T1	CNPS List: 1B
State: None	State: S1.1	R-E-D Code: 3-3-3

Habitat Associations
General: PLAYAS, CHENOPOD SCRUB, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS. ENDEMIC TO RIVERSIDE COUNTY.
Micro: DRY, ALKALINE FLATS IN THE SAN JACINTO RIVER VALLEY. 400-500M.

Occurrence No. 8 — Map Index: 22022
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1990 (OBS)
Dates Last Seen — Element: 1990-07-25 — Site: 1990-07-25

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary: Perris East

Location: EAST OF PERRIS, 0.6 MILE EAST OF INTERSATE 15B, ALONG BOTH SIDES OF ELLIS AVENUE.

Lat/Long: 33°46'22" / 117°11'13" — Township: 04S
UTM: Zone-11 N3736775 E482679 — Range: 03W
Mapping Precision: SPECIFIC — Section: 34 Qtr SW
Symbol Type: POLYGON — Meridian: S
Area: 18.8 ac — Elevation: 1420 ft

Comments
Distribution: INCLUDES T5S R03W NE 1/4 OF NE 1/4 OF SECTION 4.
Ecological: GROWING IN VALLEY SINK SCRUB ON OPEN SALT PANS IN ASSOC.W/ ATRIPLEX ARGENTEA, SALSOLA IBERICA, CRESSA TRUXILLENSIS, HORDEUM LEPORINUM, SUAEDA TORREYANA, HAPLOPAPPUS PALMERI, MARRUBIUM VULGARE, BRASSICA GENICULATA, AND DISTICHLIS SP.
Threat: SOME SHEEP GRAZING, ORV ACTIVITY AND TRASH DUMPING ARE PRESENT THREATS. URBAN DEVELOPMENT IS PROPOSED FOR GENERAL AREA.
General: 90 PLANTS SEEN IN 1990. SW PORTION OF POPULATION EXTIRPATED ACCORDING TO BRAMLET. THIS SITE SHOULD BE INCLUDED IN A SAN JACINTO RIVER CORRIDOR AS PART OF THE PROPOSED MULTISPECIES RESERVE SYSTEM FOR RIVERSIDE COUNTY.
Owner/Manager: UNKNOWN

Source Codes
BRA90M01, LAP88S01, BRA90S14, BRA9XU01, HOO68S07, BRA90F18

ATRIPLEX CORONATA VAR NOTATIOR (cont.)
SAN JACINTO VALLEY CROWNSCALE — Element Code: PDCHE040C2

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G4T1	CNPS List: 1B
State: None	State: S1.1	R-E-D Code: 3-3-3

Habitat Associations
General: PLAYAS, CHENOPOD SCRUB, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS. ENDEMIC TO RIVERSIDE COUNTY.
Micro: DRY, ALKALINE FLATS IN THE SAN JACINTO RIVER VALLEY. 400-500M.

Occurrence No. 11 — Map Index: 28302
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. #2195 UNK HERBARIUM (HERB)
Dates Last Seen — Element: 1991-06-19 — Site: 1991-06-19

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: ABOUT 2 MILES WEST OF LAKEVIEW AND 0.5 MILE SOUTHWEST OF LAKEVIEW HOT SPRINGS ALONG THE COLORADO RIVER AQUEDUCT.

Lat/Long: 33°49'54" / 117°09'04" — Township: 04S
UTM: Zone-11 N3743309 E486022 — Range: 03W
Mapping Precision: SPECIFIC — Section: 12 Qtr SW
Symbol Type: POLYGON — Meridian: S
Area: 11.8 ac — Elevation: 1420 ft

Comments
Distribution: SITE IS ABOUT 810 METERS WEST OF THE SAN JACINTO RIVER, 500 METERS EAST OF POZOS AVE AT THE MWD AQUEDUCT EASEMENT ROAD, AND 4 METERS NORTH OF THE EASEMENT ROAD ALONG THE AQUEDUCT.
Ecological:
Threat:
General: ONLY SOURCE OF INFORMATION FOR THIS SITE IS 1991 COLLECTION AND 1992 MAP BY BRAMLET.
Owner/Manager: UNKNOWN

Source Codes
BRA91S28, BRA92U04, BRA91S22

ATRIPLEX PACIFICA
SOUTH COAST SALTSCALE — Element Code: PDCHE041C0

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G3G4	CNPS List: 1B
State: None	State: S2.2	R-E-D Code: 3-2-2

Habitat Associations
General: COASTAL SCRUB, COASTAL BLUFF SCRUB, PLAYAS, CHENOPOD SCRUB.
Micro: ALKALI SOILS. 1-500M.

Occurrence No. 19 — Map Index: 34627
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1991 (OBS)
Dates Last Seen — Element: 1991-06-01 — Site: 1991-06-01

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: EAST SIDE OF THE SAN JACINTO RIVER, 0.2 MI NE OF AQUEDUCT CROSSING.

Lat/Long: 33°49'14" / 117°08'57" — Township: 04S
UTM: Zone-11 N3742074 E486196 — Range: 03W
Mapping Precision: SPECIFIC — Section: 13 Qtr SW
Symbol Type: POLYGON — Meridian: S
Area: 8.5 ac — Elevation: 1420 ft

Comments
Distribution: 1.9 MI W OF NUEVO, 900 FT S OF THE END OF 11 ST AND 10 FT E OF THE EXISTING DIRT ACCESS ROAD.
Ecological: ALKALINE SINK SCRUB. ASSOCIATES INCLUDE SUAEDA TORREYANA, SALICORNIA SUBTERMINALIS, LASTHENIA CALIFORNICA, ERODIUM CICUTARIUM, AND ATRIPLEX ARGENTEA SSP. EXPANSA.
Threat: SHEEP GRAZING AND POTENTIAL GRADING FOR FLOOD CONTROL PROJECT THREATEN.
General: 55 PLANTS SEEN IN 1991. D. TAYLOR BELIEVES THIS MAY BE A SUB-SPECIES OF A. PACIFICA.
Owner/Manager: UNKNOWN

Source Codes
BRA91S12, BRA93U06, BRA91F16

ATRIPLEX PARISHII
PARISH'S BRITTLESCALE — Element Code: PDCHE041D0

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G2?	CNPS List: 1B
State: None	State: S1.1	R-E-D Code: 3-3-2

Habitat Associations
General: ALKALI MEADOWS, VERNAL POOLS, CHENOPOD SCRUB, PLAYAS. PLANT COLLECTED ONLY ONCE IN CALIFORNIA SINCE 1974 (IN 1993).
Micro: USUALLY ON DRYING ALKALI FLATS WITH FINE SOILS. 4-140M.

Occurrence No. 2 — Map Index: 03914
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 199X (PERS)
Dates Last Seen — Element: 1974-06-19 — Site: 1974-06-19

Quad Summary: PERRIS (3311772/085C)*, LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: 1 KM (1/2 MI) NW OF LAKEVIEW, SOUTH OF THE RAMONA EXPRESSWAY (AKA MARTIN STREET).

Lat/Long: 33°50'11" / 117°07'38" — Township: 04S
UTM: Zone-11 N3743834 E488224 — Range: 02W
Mapping Precision: NON-SPECIFIC — Section: 07 Qtr SE
Symbol Type: POINT — Meridian: S
Radius: 1/5 mile — Elevation: 1420 ft

Comments
Distribution:
Ecological: GROWS IN THE FINE ALKALINE SOILS OF DRY LAKE BEDS.
Threat: LARGE AREAS OF HABITAT LOST TO AGRICULTURE CONVERSION, MUCH OF REMAINING HABITAT IS CURRENTLY PROPOSED FOR DEVELOPMENT.
General: BRAMLET BELIEVES THAT HABITAT STILL EXISTS FOR A. PARISHII IN THIS AREA. SPECIES HAS NOT BEEN COLLECTED SINCE 1974. HERB LABEL (CLARKE & J. DERBY, 19 JUNE 1974, UCI) IS ONLY SOURCE OF LOCATION INFORMATION; NEEDS ADDITIONAL FIELDWORK.
Owner/Manager: UNKNOWN

Source Codes
BRA92U01, TAY93U02, TAY92U01, BRA9XU03

CHORIZANTHE POLYGONOIDES VAR LONGISPINA
LONG-SPINED SPINEFLOWER — Element Code: PDPGN040K1

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T3	CNPS List: 1B
State: None	State: S2.2	R-E-D Code: 2-2-2

Habitat Associations
General: CHAPARRAL, COASTAL SCRUB, MEADOWS, VALLEY AND FOOTHILL GRASSLAND.
Micro: GABBROIC CLAY. 30-1450M.

Occurrence No. 18 — Map Index: 03551
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: SANDERS, A. #1449 UCR #20972 (HERB)
Dates Last Seen — Element: 1980-05-02 — Site: 1980-05-02

Quad Summary: PERRIS (3311772/085C)*, STEELE PEAK (3311773/086D)
County Summary: RIVERSIDE
SNA Summary: Perris

Location: MOTTE RESERVE, HILLS ABOUT 2.5 MILES NORTHWEST OF PERRIS.

Lat/Long: 33°48'31" / 117°14'58" — Township: 04S
UTM: Zone-11 N3740769 E476911 — Range: 04W
Mapping Precision: NON-SPECIFIC — Section: 24 Qtr NE
Symbol Type: POINT — Meridian: S
Radius: 1 mile — Elevation: 1700 ft

Comments
Distribution:
Ecological:
Threat:
General: ONLY SOURCE OF INFORMATION FOR THIS SITE IS 1980 COLLECTION BY SANDERS.
Owner/Manager: UCLWRS-MOTTE RIMROCK RESERVE

Source Codes
SAN80S07

NAVARRETIA FOSSALIS
SPREADING NAVARRETIA — Element Code: PDPLM0C080

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: VERNAL POOLS, CHENOPOD SCRUB, MARSHES AND SWAMPS, PLAYAS. IN CALIFORNIA, KNOWN ONLY FROM RIVERSIDE AND SAN DIEGO CO.
Micro: SAN DIEGO HARDPAN & SAN DIEGO CLAYPAN VERNAL POOLS; IN SWALES & V.P'S, OFTEN SURR. BY OTHER HABITAT TYPES. 30-1300M.

Occurrence No. 17 — Map Index: 03716
Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1995 (OBS)
Dates Last Seen — Element: 1995-07-26 — Site: 1995-07-26

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: 1.3 AIR MILES SOUTHEAST OF PERRIS; SOUTH SIDE OF CASE ROAD, 0.2 MILE EAST OF PERRIS VALLEY AIRPORT.

Lat/Long: 33°45'55" / 117°12'40" — Township: 05S
UTM: Zone-11 N3735944 E480455 — Range: 03W
Mapping Precision: SPECIFIC — Section: 05 Qtr NE
Symbol Type: POINT — Meridian: S
Radius: 80 meters — Elevation: 1410 ft

Comments
Distribution: SW1/4 OF NE1/4 OF SECTION 5.
Ecological: MARGINS OF LARGE VERNAL POOL W/CRYPSIS SCHOENOIDES, EPILOBIUM DENSIFLORUM, PSILOCARPHUS BREVISSIMUS, PLAGIOBOTHRYS LEPTOCLADUS, ATRIPLEX CORONATA NOTATIOR, HORDEUM INTERCEDENS, HEMIZONIA FASCICULATA, JUNCUS BUFONIUS, AND MALVELLA LEPROSA.
Threat:
General: 1425 PLANTS IN 1995. ORIGINALLY COLLECTED IN THIS AREA BY R. HOOVER (#11152 UC) DATE UNKNOWN.
Owner/Manager: UNKNOWN

Source Codes
HOONDS02, BRA92U06, BRA95F12, MOR77A01, RO052S09

NAVARRETIA FOSSALIS (cont.)
SPREADING NAVARRETIA — Element Code: PDPLM0C080

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: VERNAL POOLS, CHENOPOD SCRUB, MARSHES AND SWAMPS, PLAYAS. IN CALIFORNIA, KNOWN ONLY FROM RIVERSIDE AND SAN DIEGO CO.
Micro: SAN DIEGO HARDPAN & SAN DIEGO CLAYPAN VERNAL POOLS; IN SWALES & V.P'S, OFTEN SURR. BY OTHER HABITAT TYPES. 30-1300M.

Occurrence No. 22 — Map Index: 22006
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1991 (OBS)

Dates Last Seen — Element: 1991-06-19 — Site: 1991-06-19

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: ALONG THE SAN JACINTO RIVER FLOOD CONTROL CHANNEL, FROM 0.3 MI S OF RAMONA EXPRESSWAY, S TO 11TH STREET.

Lat/Long: 33°50'05" / 117°08'16"
UTM: Zone-11 N3743650 E487247
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 34.9 ac
Township: 04S
Range: 03W
Section: 12 Qtr XX
Meridian: S
Elevation: 1420 ft

Comments
Distribution: IN DITCHES ON BOTH SIDES OF CHANNEL, EXTENDS 0.5 MI TO W AND 0.1 MI E. ON BOTH SIDES OF MWD AQUEDUCT MAINTENANCE RD.
Ecological: IN SWALES AND DEPRESSIONS IN ALKALINE SINK SCRUB WITH ATRIPLEX ARGENTEA, A. SERENANA, A. ARGENTEA EXPANSA, A. CORONATA NOTATIOR, SUAEDA SP., CRESSA SP., CRYPSIS SCHOENOIDES, PHALARIS PARADOXA. IN WILLOWS; SILTY CLAY, SALINE-ALKALINE SOILS.
Threat: SITE ZONED FOR RES. DEV. OPEN SPACE SUBJECT TO FLOOD CONTROL PROJECT. OPEN AREAS USED FOR SHEEP GRAZING & ORV USE.
General: 550 PLANTS SEEN IN 1991 IN SEVERAL SUBPOPULATIONS. MORE INTENSIVE SURVEYS NEEDED SINCE POTENTIAL FOR MORE POPULATIONS EXISTS.
Owner/Manager: UNKNOWN

Source Codes
SAN80S06, BRA91S01, BRA91S02, BRA91F06, R0052S04, BRA91F04, BRA91F05

NAVARRETIA FOSSALIS (cont.)
SPREADING NAVARRETIA — Element Code: PDPLM0C080

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: VERNAL POOLS, CHENOPOD SCRUB, MARSHES AND SWAMPS, PLAYAS. IN CALIFORNIA, KNOWN ONLY FROM RIVERSIDE AND SAN DIEGO CO.
Micro: SAN DIEGO HARDPAN & SAN DIEGO CLAYPAN VERNAL POOLS; IN SWALES & V.P'S, OFTEN SURR. BY OTHER HABITAT TYPES. 30-1300M.

Occurrence No. 23 — Map Index: 22007
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1991 (OBS)

Dates Last Seen — Element: 1991-06-01 — Site: 1991-06-01

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: AT ENDS OF 12TH AND 13TH STREETS; ALONG THE SAN JACINTO RIVER FLOOD CHANNEL.

Lat/Long: 33°48'56" / 117°09'14"
UTM: Zone-11 N3741511 E485753
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 9.4 ac
Township: 04S
Range: 03W
Section: 24 Qtr NW
Meridian: S
Elevation: 1420 ft

Comments
Distribution: S SIDE OF THE END OF 12TH STREET, AND N SIDE OF THE END OF 13TH STREET. ALSO IN SW 1/4 OF SEC 13 AND NE 1/4 OF SEC 23.
Ecological: SWALE AREA WITHIN ALKALINE SINK SCRUB. IN WILLOWS SILTY CLAY ASSOCIATED WITH ATRIPLEX ARGENTEA, A. CORONATA NOTATIOR, BASSIA HYSSOPIFOLIA, CRESSA TRUXILLENSIS, RUMEX SP., ETC.
Threat: PROPOSED CHANNELIZATION OF THE SAN JACINTO RIVER. AREA TO E RECENTLY ZONED FOR RESIDENTIAL DEVEL. ALSO SHEEP GRAZING.
General: ABOUT 10,100 PLANTS SEEN IN 1991. MORE PLANTS EXPECTED IN AREA; MORE SURVEYS NEEDED.
Owner/Manager: RIV COUNTY?

Source Codes
BRA91F08, BRA91F07

NAVARRETIA FOSSALIS (cont.)
SPREADING NAVARRETIA — Element Code: PDPLM0C080

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: VERNAL POOLS, CHENOPOD SCRUB, MARSHES AND SWAMPS, PLAYAS. IN CALIFORNIA, KNOWN ONLY FROM RIVERSIDE AND SAN DIEGO CO.
Micro: SAN DIEGO HARDPAN & SAN DIEGO CLAYPAN VERNAL POOLS; IN SWALES & V.P'S, OFTEN SURR. BY OTHER HABITAT TYPES. 30-1300M.

Occurrence No. 28 — Map Index: 22179
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: MITCHELL, D. 1990 (OBS)

Dates Last Seen — Element: 1990-06-01 — Site: 1990-06-01

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: RAMONA EXPRESSWAY (FORMERLY MARTIN STREET), 0.1 MILE WEST OF SAN JACINTO RIVER FLOOD CONTROL CHANNEL, WEST OF LAKEVIEW.

Lat/Long: 33°50'29" / 117°08'15"
UTM: Zone-11 N3744384 E487286
Mapping Precision: SPECIFIC
Symbol Type: POINT
Radius: 80 meters
Township: 04S
Range: 02W
Section: 07 Qtr NW
Meridian: S
Elevation: 1420 ft

Comments
Distribution: BOTH SIDES OF EXPRESSWAY.
Ecological: ROADSIDE DITCH AND DEPRESSION IN VALLEY SALTBUSH SCRUB HABITAT. VERY LOCALIZED TO AREAS WHERE RAINWATER HAS AN OPPORTUNITY TO POOL. WITH CHENOPODIUM ALBUM, SALSOLA IBERICA, ATRIPLEX ARGENTEA, A. SEMIBACCATA, A. ROSEA, AND SUAEDA SP.
Threat: SOME PAST BULLDOZING. WIDENING AND RAISING OF RAMONA EXPRESSWAY NOW PLANNED.
General: 20 PLANTS SSEN IN 1990.
Owner/Manager: RIV COUNTY FLOOD CONTROL

Source Codes
MIT90F04, BRA92U06, MIT90S04, SAN80S13

NAVARRETIA FOSSALIS (cont.)
SPREADING NAVARRETIA — Element Code: PDPLM0C080

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: VERNAL POOLS, CHENOPOD SCRUB, MARSHES AND SWAMPS, PLAYAS. IN CALIFORNIA, KNOWN ONLY FROM RIVERSIDE AND SAN DIEGO CO.
Micro: SAN DIEGO HARDPAN & SAN DIEGO CLAYPAN VERNAL POOLS; IN SWALES & V.P'S, OFTEN SURR. BY OTHER HABITAT TYPES. 30-1300M.

Occurrence No. 37 — Map Index: 38919
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. #2273 UNKNKOWN HERB (HERB)

Dates Last Seen — Element: 1992-05-08 — Site: 1992-05-08

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: EAST SIDE OF SAN JACINTO RIVER ABOUT 0.5 MILE NE OF RAMONA EXPRESSWAY CROSSING, NORTHWEST OF LAKEVIEW.

Lat/Long: 33°50'43" / 117°07'40"
UTM: Zone-11 N3744814 E488174
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/10 mile
Township: 04S
Range: 02W
Section: 06 Qtr SE
Meridian: S
Elevation: 1420 ft

Comments
Distribution: ABOUT 975M NORTHWEST OF LAKEVIEW; 700M WEST OF DAVIS ROAD AND 60M EAST OF RIVER. MAPPED WITHIN THE SW 1/4 SE 1/4 SECTION 6.
Ecological:
Threat:
General: MAIN SOURCE OF INFORMATION FOR THIS SITE IS 1992 COLLECTION BY BRAMLET #2273.
Owner/Manager: UNKNOWN

Source Codes
BRA92U06, BRA92S11

NAVARRETIA FOSSALIS (cont.)
SPREADING NAVARRETIA — Element Code: PDPLM0C080

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: VERNAL POOLS, CHENOPOD SCRUB, MARSHES AND SWAMPS, PLAYAS. IN CALIFORNIA, KNOWN ONLY FROM RIVERSIDE AND SAN DIEGO CO.
Micro: SAN DIEGO HARDPAN & SAN DIEGO CLAYPAN VERNAL POOLS; IN SWALES & V.P'S, OFTEN SURR. BY OTHER HABITAT TYPES. 30-1300M.

Occurrence No. 38 — Map Index: 38920
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. #2285 UNKNKOWN HERB (HERB)

Dates Last Seen — Element: 1992-05-15 — Site: 1992-05-15

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: EAST SIDE OF OLD SAN JACINTO RIVER CHANNEL ABOUT 0.7 MILE NNE OF RAMONA EXPRESSWAY CROSSING, NORTHWEST OF LAKEVIEW.

Lat/Long: 33°50'59" / 117°07'41" — Township: 04S
UTM: Zone-11 N3745309 E488152 — Range: 02W
Mapping Precision: NON-SPECIFIC — Section: 06 Qtr SE
Symbol Type: POINT — Meridian: S
Radius: 1/10 mile — Elevation: 1420 ft

Comments
Distribution: ABOUT 50M EAST OF RIVER LEVER. MAPPED WITHIN THE SW 1/4 SE 1/4 SECTION 6.
Ecological:
Threat:
General: 1331 PLANTS OBSERVED IN 1992. MAIN SOURCE OF INFORMATION FOR THIS SITE IS 1992 COLLECTION BY BRAMLET #2285.
Owner/Manager: UNKNOWN

Source Codes
BRA92U06, BRA92S12

NAVARRETIA FOSSALIS (cont.)
SPREADING NAVARRETIA — Element Code: PDPLM0C080

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: VERNAL POOLS, CHENOPOD SCRUB, MARSHES AND SWAMPS, PLAYAS. IN CALIFORNIA, KNOWN ONLY FROM RIVERSIDE AND SAN DIEGO CO.
Micro: SAN DIEGO HARDPAN & SAN DIEGO CLAYPAN VERNAL POOLS; IN SWALES & V.P'S, OFTEN SURR. BY OTHER HABITAT TYPES. 30-1300M.

Occurrence No. 39 — Map Index: 38921
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1992 (LIT)

Dates Last Seen — Element: 1992-XX-XX — Site: 1992-XX-XX

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: ALONG SAN JACINTO RIVER SOUTH OF NUEVO ROAD, EAST OF PERRIS.

Lat/Long: 33°47'48" / 117°10'25" — Township: 04S
UTM: Zone-11 N3739422 E483927 — Range: 03W
Mapping Precision: NON-SPECIFIC — Section: 26 Qtr XX
Symbol Type: POLYGON — Meridian: S
Area: 89.4 ac — Elevation: 1420 ft

Comments
Distribution: EXACT LOCATION NOT KNOWN; MAPPED ALONG RIVER FROM NUEVO ROAD SOUTH ABOUT 1 MILE.
Ecological:
Threat:
General: THIS IS AN ANECDOTAL RECORD FROM 1992 THAT WAS REPORTED TO D. BRAMLET. NO OTHER INFORMATION AVAILABLE FOR THIS SITE.
Owner/Manager: UNKNOWN

Source Codes
BRA92U03

BRODIAEA FILIFOLIA
THREAD-LEAVED BRODIAEA — Element Code: PMLIL0C050

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2	CNPS List: 1B
State: Endangered	State: S2.1	R-E-D Code: 3-3-3

Habitat Associations
General: CISMONTANE WOODLAND, COASTAL SCRUB, PLAYAS, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS.
Micro: USUALLY ASSOCIATED WITH ANNUAL GRASSLAND AND VERNAL POOLS; OFTEN SURR BY SHRUBLAND HABITATS. CLAY SOILS. 35-855M.

Occurrence No. 1 — Map Index: 03663
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Possibly Extirpated
Trend: Unknown
Main Source: HOWELL, J. #4790 CAS (HERB)

Dates Last Seen — Element: 1930-XX-XX — Site: 1996-09-XX

Quad Summary: PERRIS (3311772/085C)*, ROMOLAND (3311762/068B)
County Summary: RIVERSIDE
SNA Summary:

Location: 2 MI S OF PERRIS. (ON GOETZ RD).

Lat/Long: 33°45'11" / 117°13'22" — Township: 05S
UTM: Zone-11 N3734592 E479364 — Range: 03W
Mapping Precision: NON-SPECIFIC — Section: 07 Qtr E
Symbol Type: POINT — Meridian: S
Radius: 1 mile — Elevation: 1410 ft

Comments
Distribution: ACC. TO S. WHITE (1996), SUITABLE HABITAT STILL EXISTS (ESPECIALLY NE OF BRIDGE OVER SAN JACINTO RIVER). SOME OF THE SURROUNDING FIELDS HAD BEEN RECENTLY PLOWED, BUT BULBS MAY BE SALVAGEABLE; MORE SURVEYS NEEDED TO DETERMINE STATUS.
Ecological: ON CLAY FLATS.
Threat:
General: LAST SEEN 1930. MAY BE EXTIRPATED AS AREA NOW AGRICULTURAL PER 1983 PRESERVATION PLAN (LARRY LAPRE).
Owner/Manager: PVT

Source Codes
PEI79R01, NIE71A02, HOW30S02, WHI97U02, COX83U09

BRODIAEA FILIFOLIA (cont.)
THREAD-LEAVED BRODIAEA — Element Code: PMLIL0C050

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2	CNPS List: 1B
State: Endangered	State: S2.1	R-E-D Code: 3-3-3

Habitat Associations
General: CISMONTANE WOODLAND, COASTAL SCRUB, PLAYAS, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS.
Micro: USUALLY ASSOCIATED WITH ANNUAL GRASSLAND AND VERNAL POOLS; OFTEN SURR BY SHRUBLAND HABITATS. CLAY SOILS. 35-855M.

Occurrence No. 2 — Map Index: 22074
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: MITCHELL, D. 1990 (OBS)

Dates Last Seen — Element: 1996-04-20 — Site: 1996-04-20

Quad Summary: PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: SOUTHEAST OF PERRIS, EAST OF ELLIS AND NORTHEAST OF PERRIS VALLEY AIRPORT.

Lat/Long: 33°46'09" / 117°12'30" — Township: 05S
UTM: Zone-11 N3736383 E480698 — Range: 03W
Mapping Precision: SPECIFIC — Section: 05 Qtr NE
Symbol Type: POLYGON — Meridian: S
Area: 37.8 ac — Elevation: 1420 ft

Comments
Distribution: ON FLOODPLAIN N. OF CASE ROAD AND W. OF MURRIETA ROAD. IN 1996, AREA S OF RR TRACKS, E OF AIRPORT, & NW OF SAN JACINTO RIVER CHANNEL SEARCHED BRIEFLY; SUITABLE HABITAT APPEARED TO EXIST. MORE SURVEYS NEEDED AT THE APPROPRIATE TIME OF YEAR.
Ecological: SALTBUSH SCRUB ON SALINE-ALKALINE DOMINO SILTY LOAM/WILLOWS SILTY CLAY SOILS. ASSOCIATED WITH SUAEDA SP, HORDEUM SP, SALSOLA IBERICA, ATRIPLEX ARGENTA, ATRIPLEX CORONATA NOTATIOR, AND HEMIZONIA PUNGENS.
Threat: SITE IS SUBJECT TO OCCASIONAL ORV USE AND ILLEGAL DUMPING. MAY BE SUBJECT TO DEVELOPMENT IN THE FUTURE.
General: 25 PLANTS SEEN IN 1990, 50 PLANTS IN 1996, BUT SEARCH WAS EARLY AND NOT THOROUGH. AREA CONTAINS SOME OF THE LAST VALLEY SALTBRUSH SCRUB REMAINING IN THE REGION OUTSIDE OF THE WILDLIFE AREA.
Owner/Manager: PVT

Source Codes
BRA92U02, PEI79R01, NIE71A02, WHI96F03, MIT90F09, RO052S01, COX83U08, WHI97U02, CNP79M09, WHI96S01

BRODIAEA FILIFOLIA (cont.)
THREAD-LEAVED BRODIAEA — Element Code: PMLIL0C050

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2	CNPS List: 1B
State: Endangered	State: S2.1	R-E-D Code: 3-3-3

Habitat Associations

General: CISMONTANE WOODLAND, COASTAL SCRUB, PLAYAS, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS.

Micro: USUALLY ASSOCIATED WITH ANNUAL GRASSLAND AND VERNAL POOLS; OFTEN SURR BY SHRUBLAND HABITATS. CLAY SOILS. 35-855M.

Occurrence No. 27 — Map Index: 22073

Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1992 (OBS)

Dates Last Seen
Element: 1995-05-03
Site: 1995-05-03

Quad Summary: LAKEVIEW (3311771/085D)*, PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: 1 KM NORTH OF LAKEVIEW; SOUTH OF SAN JACINTO WILDLIFE AREA.

Lat/Long: 33°50'48" / 117°07'37"
UTM: Zone-11 N3744980 E488254
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 35.9 ac

Township: 04S
Range: 02W
Section: 06 Qtr SE
Meridian: S
Elevation: 1420 ft

Comments

Distribution: TWO LARGE POPULATION GROUPS; ONE IS 650 FT WEST OF DAVIS RD. AND 5-150 FT NORTH OF MARVIN RD., THE OTHER IS 750-1000 FT NORTH OF MARVIN RD. AND 100-200 FT WEST OF DAVIS RD.

Ecological: GROWING ON STRONGLY SALINE-ALKALINE WAUKENA LOAM/DOMINO SILT LOAM IN ANNUAL GRASSLAND/ALKALI SINK SCRUB HABITAT. ASSOCIATES INCLUDE HORDEUM DEPRESSUM, PLAGIOBOTHRYS LEPTOCLADUS, LASTHENIA CALIFORNICA, LEPIDIUM DICTYOTUM, AND ATRIPLEX SP.

Threat: SITE IS PRESENTLY GRAZED BY SHEEP AND IN THE PAST HAS BEEN DEGRADED BY PHALARIS MINOR SEEDING OR PLANTING.

General: 518 PLANTS SEEN IN 1992, 2,580 IN 1995. SITE STILL RETAINS A LARGE PORTION OF THE NATIVE FLORA DISTURBED. PART OF THE SAN JACINTO WILDLIFE AREA.

Owner/Manager: DFG-SAN JACINTO WA

Source Codes

BRA92U02, HIC95U03, BRA92F01

Romoland

AQUILA CHRYSAETOS (NESTING AND WINTERING)
GOLDEN EAGLE — Element Code: ABNKC22010

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4	CDFG Status: SC
State: None	State: S3	

Habitat Associations
General: ROLLING FOOTHILL OR COAST-RANGE TERRAIN, WHERE OPEN GRASSLAND TURNS TO SCATTERED OAKS, SYCAMORES, OR LARGE DIGGER PINES.
Micro: CLIFF-WALLED CANYONS PROVIDE NESTING HABITAT IN MOST PARTS OF RANGE; ALSO, LARGE TREES IN OPEN AREAS.

Occurrence No. 2 — Map Index: 03778
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: SCHMITT, N. 1974 (OBS)
Dates Last Seen — Element: 1974-05-25 — Site: 1974-05-25

Quad Summary: ROMOLAND (3311762/068B)
County Summary: RIVERSIDE
SNA Summary:

Location: SIX MI W OF WINCHESTER.

Lat/Long: 33°42'20" / 117°10'41"
UTM: Zone-11 N3729333 E483499
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1 mile
Township: 05S
Range: 03W
Section: 27 Qtr SE
Meridian: S
Elevation: 1580 ft

Comments
Distribution: NEST WITH ONE YOUNG FOUND IN A FREMONT COTTONWOOD.
Ecological: GRASSLAND WITH RABBITBRUSH.
Threat:
General: FROM NORTH AMERICAN NEST RECORD CARD PROGRAM.
Owner/Manager: UNKNOWN

Source Codes
SCH74F03

POLIOPTILA CALIFORNICA CALIFORNICA
COASTAL CALIFORNIA GNATCATCHER — Element Code: ABPBJ08080

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2T2	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: OBLIGATE, PERMANENT RESIDENT OF COASTAL SAGE SCRUB BELOW 2500 FT IN SOUTHERN CALIFORNIA.
Micro: LOW, COASTAL SAGE SCRUB IN ARID WASHES, ON MESAS & SLOPES. NOT ALL AREAS CLASSIFIED AS COASTAL SAGE SCRUB ARE OCCUPIED.

Occurrence No. 532 — Map Index: 41322
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: PRINCIPE, P. A. 1998 (OBS)
Dates Last Seen — Element: 1998-04-23 — Site: 1998-04-23

Quad Summary: ROMOLAND (3311762/068B)
County Summary: RIVERSIDE
SNA Summary:

Location: 2 MILES NORTH OF NEWPORT ROAD AND 0.5 MILE WEST OF MURRIETA ROAD, ON THE WESTERN EDGE OF SUN CITY.

Lat/Long: 33°42'44" / 117°12'48"
UTM: Zone-11 N3730084 E480229
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Area: 11.7 ac
Township: 05S
Range: 03W
Section: 29 Qtr NW
Meridian: S
Elevation: 1490 ft

Comments
Distribution:
Ecological: HABITAT CONSISTS OF RIVERSIDEAN SAGE SCRUB AND NON-NATIVE ANNUAL GRASSLAND.
Threat: THREATENED BY A PROPOSED DEVELOPMENT.
General: 3 ADULTS AND 3 JUVENILES OBSERVED ON 23 APR 1998.
Owner/Manager: PVT

Source Codes
PRI98R03, PRI98F08

AIMOPHILA RUFICEPS CANESCENS
SOUTHERN CALIFORNIA RUFOUS-CROWNED SPARROW — Element Code: ABPBX91091

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T2T3	CDFG Status: SC
State: None	State: S2S3	

Habitat Associations
General: RESIDENT IN SOUTHERN CALIFORNIA COASTAL SAGE SCRUB AND SPARSE MIXED CHAPARRAL.
Micro: FREQUENTS RELATIVELY STEEP, OFTEN ROCKY HILLSIDES WITH GRASS & FORB PATCHES.

Occurrence No. 33 — Map Index: 41322
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: PRINCIPE, P. A. 1998 (OBS)
Dates Last Seen — Element: 1998-04-23 — Site: 1998-04-23

Quad Summary: ROMOLAND (3311762/068B)
County Summary: RIVERSIDE
SNA Summary:

Location: 2 MILES NORTH OF NEWPORT ROAD AND 0.5 MILE WEST OF MURRIETA ROAD, ON THE WESTERN EDGE OF SUN CITY.

Lat/Long: 33°42'44" / 117°12'48"
UTM: Zone-11 N3730084 E480229
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Area: 11.7 ac
Township: 05S
Range: 03W
Section: 29 Qtr NW
Meridian: S
Elevation: 1490 ft

Comments
Distribution:
Ecological: HABITAT CONSISTS OF RIVERSIDEAN SAGE SCRUB AND NON-NATIVE ANNUAL GRASSLAND.
Threat: THREATENED BY A PROPOSED DEVELOPMENT.
General: 2 ADULTS OBSERVED ON 23 APR 1998.
Owner/Manager: PVT

Source Codes
PRI98F07, PRI98R03

LEPUS CALIFORNICUS BENNETTII
SAN DIEGO BLACK-TAILED JACKRABBIT — Element Code: AMAEB03051

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T3?	CDFG Status: SC
State: None	State: S3?	

Habitat Associations
General: INTERMEDIATE CANOPY STAGES OF SHRUB HABITATS & OPEN SHRUB / HERBACEOUS & TREE / HERBACEOUS EDGES.
Micro: COASTAL SAGE SCRUB HABITATS IN SOUTHERN CALIFORNIA.

Occurrence No. 6 — Map Index: 41322
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: PRINCIPE, P. A. 1998 (OBS)
Dates Last Seen — Element: 1998-04-23 — Site: 1998-04-23

Quad Summary: ROMOLAND (3311762/068B)
County Summary: RIVERSIDE
SNA Summary:

Location: 2 MILES NORTH OF NEWPORT ROAD AND 0.5 MILE WEST OF MURRIETA ROAD, ON THE WESTERN EDGE OF SUN CITY

Lat/Long: 33°42'44" / 117°12'48" — Township: 05S
UTM: Zone-11 N3730084 E480229 — Range: 03W
Mapping Precision: NON-SPECIFIC — Section: 29 Qtr NW
Symbol Type: POLYGON — Meridian: S
Area: 11.7 ac — Elevation: 1490 ft

Comments
Distribution:
Ecological: HABITAT CONSISTS OF RIVERSIDEAN SAGE SCRUB AND NON-NATIVE ANNUAL GRASSLAND.
Threat: THREATENED BY A PROPOSED DEVELOPMENT.
General: 4 ADULTS OBSERVED ON 23 APR 1998.
Owner/Manager: PVT

Source Codes
PRI98F09, PRI98R03

DIPODOMYS STEPHENSI
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 6 — Map Index: 20354
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: O'FARRELL, M. 1988 (OBS)
Dates Last Seen — Element: 1988-09-10 — Site: 1988-09-10

Quad Summary: ROMOLAND (3311762/068B)*, LAKE ELSINORE (3311763/069A)
County Summary: RIVERSIDE
SNA Summary:

Location: 2 MILES NORTH OF QUAIL VALLEY COUNTRY CLUB.

Lat/Long: 33°44'24" / 117°14'47" — Township: 05S
UTM: Zone-11 N3733173 E477173 — Range: 04W
Mapping Precision: NON-SPECIFIC — Section: 13 Qtr NE
Symbol Type: POLYGON — Meridian: S
Area: 49.0 ac — Elevation: 1500 ft

Comments
Distribution: TRACE--30 ACRES. LOW--25 ACRES.
Ecological: NON-NATIVE GRASSLAND WITH RIVERSIDIAN SAGE SCRUB. SLOPE: 0-15%. SOIL: ESCONDIDO, LODO.
Threat: ORV USE, DEVELOPMENT.
General:
Owner/Manager: UNKNOWN

Source Codes
OFA88F68, THO73R01

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 28 — Map Index: 03980
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Decreasing
Main Source: MONTGOMERY, S. 1990 (OBS)
Dates Last Seen — Element: 1990-09-17 — Site: 1990-09-17

Quad Summary: WINCHESTER (3311761/068A)*, ROMOLAND (3311762/068B)
County Summary: RIVERSIDE
SNA Summary:

Location: AREA FROM THE NORTHWEST TO THE SOUTH OF WINCHESTER.

Lat/Long: 33°41'32" / 117°06'34" — Township: 05S
UTM: Zone-11 N3727838 E489850 — Range: 02W
Mapping Precision: NON-SPECIFIC — Section: 32 Qtr XX
Symbol Type: POLYGON — Meridian: S
Area: 4,754.1 ac — Elevation: 1480 ft

Comments
Distribution: DISTRIBUTION IS MOST LIKELY PATCHY ALONG DIRT ROADS AND AT THE BORDERS OF HILLY AREAS.
Ecological: SAGE SCRUB AND DISTURBED GRASSLAND WITH LARGE PATCHES OF AGRICULTURE.
Threat: SOME HISTORIC POPULATIONS WITHIN THE AREA HAVE BEEN EXTIRPATED BY AGRICULTURE AND DEVELOPMENT.
General: MVZ #135498 FROM T5S, R2W, SE 1/4 OF SEC 19.
Owner/Manager: PVT, OTHERS

Source Codes
MON90F27, OFA88F87, OFA88F81, OFA88F88, OFA88F89, OFA89R01, OFA88F15, MVZ81S01, MON90F28

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 36 — Map Index: 03881
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Extirpated
Trend: Unknown
Main Source: OFARRELL, M. & C. UPTAIN 1988 (OBS)
Dates Last Seen — Element: 1938-01-08 — Site: 1988-08-16

Quad Summary: ROMOLAND (3311762/068B)
County Summary: RIVERSIDE
SNA Summary:

Location: 0.7 MI NNE OF MENIFEE RD JCT WITH GRAND AVE. ABOUT 2.5 MILES EAST OF THE NORTH END OF SUN CITY.

Lat/Long: 33°43'29" / 117°08'56" — Township: 05S
UTM: Zone-11 N3731446 E486215 — Range: 03W
Mapping Precision: NON-SPECIFIC — Section: 24 Qtr NW
Symbol Type: POINT — Meridian: S
Radius: 1/5 mile — Elevation: 1480 ft

Comments
Distribution: EXTIRPATED
Ecological: AGRICULTURAL FIELDS
Threat: AGRICULTURE
General: MVZ #80676. ORIGINALLY REPORTED BY BOWLUS (1938)
Owner/Manager: UNKNOWN

Source Codes
OFA88F83, MVZ81S01

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 42 — Map Index: 03575
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Stable
Main Source: MONTGOMERY, S. 1989 (OBS)
Dates Last Seen — Element: 1989-09-25 — Site: 1989-09-25

Quad Summary: ROMOLAND (3311762/068B)*, LAKE ELSINORE (3311763/069A)
County Summary: RIVERSIDE
SNA Summary:

Location: VICINITY OF SAN JACINTO RIVER. NORTHWEST OF SUN CITY, NORTH OF RAILROAD CYN AND EAST OF HWY 74.

Lat/Long: 33°44'01" / 117°15'50" — Township: 05S
UTM: Zone-11 N3732452 E475542 — Range: 04W
Mapping Precision: NON-SPECIFIC — Section: 13 Qtr XX
Symbol Type: POLYGON — Meridian: S
Area: 1,257.6 ac — Elevation: 1500 ft

Comments
Distribution: ABUNDANCE VARIES FROM TRACE TO MEDIUM.
Ecological: NON-NATIVE GRASSLAND AT BASE OF SLOPES BORDERED BY RIVERSIDIAN SAGE SCRUB. SOME ABANDONED AGRICULTURAL FIELDS. SOILS: CAJALCO, CIENEBA, ESCONDIDO, GARRETSON, LAS POSAS, LODO, YSIDORA.
Threat: DISKED FIELDS NORTH AND DOWN SLOPE. SHEEP GRAZING, HEAVY OFF-ROAD VEHICLE USE, DUMPING, SHOOTING, URBAN DEVELOPMENT.
General: K-RATS TRAPPED HERE IN 1980 ALSO.
Owner/Manager: BLM, PVT?

Source Codes
RIG89F12, OFA89F10, OFA88F14, MON89F21, MYE88F02, RIG89F13, RIG89F11, PEA80R01, PEA78U01

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 132 — Map Index: 20977
Occ Rank: Poor
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: OFARRELL, M. & C. UPTAIN 1988 (OBS)
Dates Last Seen — Element: 1988-09-10 — Site: 1988-09-10

Quad Summary: ROMOLAND (3311762/068B)
County Summary: RIVERSIDE
SNA Summary:

Location: ABOUT 2 MILES NW OF SUN CITY. BETWEEN SAN JACINTO RIVER AND GOETZ RD.

Lat/Long: 33°44'25" / 117°13'45" — Township: 05S
UTM: Zone-11 N3733187 E478782 — Range: 03W
Mapping Precision: NON-SPECIFIC — Section: 18 Qtr XX
Symbol Type: POLYGON — Meridian: S
Area: 21.0 ac — Elevation: 1500 ft

Comments
Distribution: LOW DENSITY OVER ABOUT 5 ACRES. DISTRIBUTION ALONG BASE OF HILLS AND ALONG ROADWAY.
Ecological: NON-NATIVE GRASSLAND BORDERED BY RIVERSIDIAN SAGE SCRUB ON HILLS AND AGRICULTURAL FIELDS ON FLATS. SOILS: ARBUCKLE, ESCONDIDO, GARRETSON, LODO.
Threat: SURROUNDED BY AGRICULTURE
General:
Owner/Manager: UNKNOWN

Source Codes
OFA88F1C

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 133 — Map Index: 20984
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: MONTGOMERY, S. 1989 (OBS)
Dates Last Seen — Element: 1989-08-27 — Site: 1989-08-27

Quad Summary: ROMOLAND (3311762/068B)
County Summary: RIVERSIDE
SNA Summary:

Location: 0.8 MI SSW OF LINDBERGER RD. JCT. WITH NEWPORT RD. MENIFEE VALLEY.

Lat/Long: 33°40'23" / 117°08'56" — Township: 06S
UTM: Zone-11 N3725720 E486197 — Range: 03W
Mapping Precision: NON-SPECIFIC — Section: 01 Qtr SW
Symbol Type: POLYGON — Meridian: S
Area: 56.4 ac — Elevation: 1500 ft

Comments
Distribution: 8 ADULTS AND3 SUBADULTS FOUND.
Ecological: AREA PRODOMINANTLY LEVEL AND RECENTLY CULTIVATED; SOUTHERN AREA OF SITE EXHIBITS LEVEL TO SLOPING LOWLANDS AND RELATIVELY STEEP HILLS AND RIDGELINES, MOST OF THIS LATTER AREA COVERED IN SPARSE TO MODERATELY DENSE SAGE SCRUB; LOAMY SOILS.
Threat: SHOOTING, ORV ACTIVITY, DUMPING, SHEEP GRAZING.
General:
Owner/Manager: PVT

Source Codes
MON89F22

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 134 — Map Index: 20981
Occ Rank: Poor
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Decreasing
Main Source: BEHRENDS, P. 1990 (OBS)
Dates Last Seen — Element: 1990-09-27 — Site: 1990-09-27

Quad Summary: ROMOLAND (3311762/068B)
County Summary: RIVERSIDE
SNA Summary:

Location: 0.6 MI SSE OF NEWPORT RD JCT WITH RAILROAD CANYON RD. ABOUT 2 MILES SW OF SUN CITY.

Lat/Long: 33°40'37" / 117°13'45" — Township: 06S
UTM: Zone-11 N3726178 E478769 — Range: 03W
Mapping Precision: NON-SPECIFIC — Section: 06 Qtr SE
Symbol Type: POLYGON — Meridian: S
Area: 6.3 ac — Elevation: 1500 ft

Comments
Distribution: 1 INDIVIDUAL FOUND
Ecological: NON-NATIVE GRASSLAND SURROUNDED BY RIVERSIDEAN SAGE SCRUB. SOIL: YSIDORA FINE SANDY LOAM, LODO ROCKY LOAM. ROLLING HILLS.
Threat: A RESIDENT COMMENTED ON RODENTICIDE USE TO CONTROL GROUND SQUIRRELS. THIS SITE ADJACENT TO DRY LAND FARMING.
General: A POPULATION DIRECTLY NORTH WAS REPORTED EXTIRPATED BY O'FARREL (1988).
Owner/Manager: PVT

Source Codes
BEH90F04

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 135 — Map Index: 20988
Occ Rank: Poor
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: MONTGOMERY, S. 1989 (OBS)

Dates Last Seen — Element: 1989-09-19 — Site: 1989-09-19

Quad Summary: ROMOLAND (3311762/068B)
County Summary: RIVERSIDE
SNA Summary:

Location: 1.5 MI NORTH OF NEWPORT RD JCT WITH RAILROAD CANYON RD. QUAIL VALLEY, ABOUT 1 MILE WEST OF SUN CITY.

Lat/Long: 33°42'27" / 117°13'46" — Township: 05S
UTM: Zone-11 N3729562 E478736 — Range: 03W
Mapping Precision: NON-SPECIFIC — Section: 30 Qtr XX
Symbol Type: POINT — Meridian: S
Radius: 2/5 mile — Elevation: 1850 ft

Comments
Distribution: 1 INDIVIDUAL FOUND.
Ecological: MOSTLY RUGGED MOUNTAIN WITH STEEP SLOPES; WESTERN EXTREMITY EXHIBITS SOME LEVEL TO GENTLY SLOPING TOPOGRAPHY; SAGE SCRUB PREVALENT.
Threat: ORV, GRAZING
General: MARGINAL VALUE DUE TO LIMITED POPULATION AND MARGINAL HABITAT QUALITY.
Owner/Manager: BLM

Source Codes
MON89F23

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 136 — Map Index: 20989
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: RIGGAN, R. 1989 (OBS)

Dates Last Seen — Element: 1989-01-02 — Site: 1989-01-02

Quad Summary: ROMOLAND (3311762/068B)
County Summary: RIVERSIDE
SNA Summary:

Location: 0.6 SW OF BRADLEY RD. JCT. WITH NEWPORT RD. ABOUT 1 MILE SOUTH OF SUN CITY.

Lat/Long: 33°40'36" / 117°11'45" — Township: 06S
UTM: Zone-11 N3726121 E481853 — Range: 03W
Mapping Precision: NON-SPECIFIC — Section: 04 Qtr S
Symbol Type: POINT — Meridian: S
Radius: 1/5 mile — Elevation: 1460 ft

Comments
Distribution: SKR WERE FOUND IN LOW DENSITY POPULATIONS SCATTERED ALONG THE SAGE SCRUB/FARMED LAND EDGE. ISOLATED POCKETS WERE FOUND WITHIN THE ROADS AND FARMED AREAS. THIS WAS NOT A COMPREHENSIVE SITE SURVEY.
Ecological: EASTERLY PORTION OF THE SECTION IS FLAT-LYING AND HAS BEEN PREVIOUSLY GRADED AND DRY FARMED. THE WESTERLY PART OF THE SECTION INCLUDES LOW-ROUGH HILLS AT THE EDGE OF MENIFEE VALLEY WHICH SUPPORT RIVERSIDIAN SAGE AND NON-NATIVE GRASSLAND.
Threat: RESIDENTIAL DEVELOPMENT IS ANTICIPATED IN THE FUTURE.
General:
Owner/Manager: PVT

Source Codes
RIG89F14

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 137 — Map Index: 20991
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Decreasing
Main Source: MONTGOMERY, S. 1990 (OBS)

Dates Last Seen — Element: 1990-01-24 — Site: 1990-01-24

Quad Summary: ROMOLAND (3311762/068B)
County Summary: RIVERSIDE
SNA Summary:

Location: NE OF I-15E JCT WITH NEWPORT RD. SE OF SUN CITY.

Lat/Long: 33°41'33" / 117°09'38" — Township: 05S
UTM: Zone-11 N3727866 E485121 — Range: 06W
Mapping Precision: NON-SPECIFIC — Section: 35 Qtr XX
Symbol Type: POINT — Meridian: S
Radius: 3/5 mile — Elevation: 1460 ft

Comments
Distribution: 21 INDIVIDUALS TRAPPED.
Ecological: RIVERSIDIAN SAGE SCRUB, DISTURBED ANNUAL GRASSLAND, AND AGRICULTURAL FIELDS.
Threat: EASTERN PORTION OF SITE HAS BEEN EXTIRPATED BY AGRICULTURE; DEVELOPMENT IS ALSO A THREAT.
General:
Owner/Manager: PVT

Source Codes
MON90F24, OFA88F81

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 138 — Map Index: 20990
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Extirpated
Trend: Unknown
Main Source: OFARRELL & UPTAIN 1988 (OBS)

Dates Last Seen — Element: 1981-XX-XX — Site: 1988-08-16

Quad Summary: ROMOLAND (3311762/068B)
County Summary: RIVERSIDE
SNA Summary:

Location: 1.5 MI WNW OF HOLLAND RD JCT WITH BRIGGS RD

Lat/Long: 33°40'27" / 117°09'47" — Township: 06S
UTM: Zone-11 N3725854 E484891 — Range: 03W
Mapping Precision: NON-SPECIFIC — Section: 02 Qtr SW
Symbol Type: POINT — Meridian: S
Radius: 1/5 mile — Elevation: 1460 ft

Comments
Distribution: EXTIRPATED BY AGRICULTURE AND URBAN DEVELOPMENT.
Ecological:
Threat: AGRICULTURE AND URBAN DEVELOPMENT
General: REPORTED IN 1981 BY BEIM ET AL. (1981; FROM USFWS MAPS)
Owner/Manager: UNKNOWN

Source Codes
OFA88F81

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 140 — Map Index: 20993
Occ Rank: Poor
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: MONTGOMERY, S. 1990 (OBS)

Dates Last Seen
Element: 1990-01-XX
Site: 1990-01-XX

Quad Summary: ROMOLAND (3311762/068B)
County Summary: RIVERSIDE
SNA Summary:

Location: 0.4 MI ESE OF LINDENBERGER RD JCT WITH SIMPSON RD. ABOUT 3 MILES EAST OF SUN CITY.

Lat/Long: 33°42'17" / 117°08'16"
UTM: Zone-11 N3729241 E487230
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile

Township: 05S
Range: 03W
Section: 25 Qtr SE
Meridian: S
Elevation: 1440 ft

Comments
Distribution: 1 ADULT MALE AND 2 ADULT FEMALES TRAPPED.
Ecological: SAGE SCRUB AND NON-NATIVE GRASSLAND.
Threat:
General:
Owner/Manager: PVT

Source Codes
MON90F25

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 141 — Map Index: 20987
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: MONTGOMERY, S. 1989 (OBS)

Dates Last Seen
Element: 1989-08-24
Site: 1989-08-24

Quad Summary: ROMOLAND (3311762/068B)*, LAKE ELSINORE (3311763/069A), PERRIS (3311772/085C), STEELE PEAK (3311773/086D)
County Summary: RIVERSIDE
SNA Summary:

Location: 3.5 MILES E OF ROMOLAND.

Lat/Long: 33°44'57" / 117°14'43"
UTM: Zone-11 N3734168 E477288
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 2/5 mile

Township: 05S
Range: 04W
Section: 12 Qtr XX
Meridian: S
Elevation: 1500 ft

Comments
Distribution: 6 INDIVIDUALS FOUND. K-RATS OCCUR THROUGHOUT THE PROPERTY.
Ecological: FLAT TO GENTLY ROLLING HILLS WITH NON-NATIVE GRASSLANDS AND SAGE SCRUB. SOME EUCALYPTUS GROVES. SOILS ARE LOAMY.
Threat: INTENSE ORV USE AND DUMPING. NORTHERN PORTION OF THE SITE DISKED IN 1987.
General:
Owner/Manager: PVT

Source Codes
MON89F24

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 142 — Map Index: 20986
Occ Rank: Poor
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: OFARRELL, M. & C. UPTAIN 1988 (OBS)

Dates Last Seen
Element: 1988-08-16
Site: 1988-08-16

Quad Summary: ROMOLAND (3311762/068B)
County Summary: RIVERSIDE
SNA Summary:

Location: 0.5 MILES NW OF MENIFEE ROAD JCT. WITH GRAND AVE. ABOUT 1.75 MILES E OF SUN CITY.

Lat/Long: 33°43'17" / 117°09'40"
UTM: Zone-11 N3731076 E485076
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Area: 5.0 ac

Township: 05S
Range: 03W
Section: 23 Qtr NE
Meridian: S
Elevation: 1550 ft

Comments
Distribution: TRACE TO LOW ABUNDANCE.
Ecological: NON-NATIVE GRASSLAND. SOIL: CIENEBA, LODO. SLOPE: 0-30%
Threat: AGRICULTURE ON EAST, HOUSING ON NORTH.
General:
Owner/Manager: UNKNOWN

Source Codes
OFA88F82

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 143 — Map Index: 20983
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Decreasing
Main Source: OFARRELL, M. & C. UPTAIN 1988 (OBS)

Dates Last Seen
Element: 1988-08-16
Site: 1988-08-16

Quad Summary: ROMOLAND (3311762/068B)
County Summary: RIVERSIDE
SNA Summary:

Location: 1.6 MI NNE OF NEWPORT RD JCT WITH BRADLEY RD. JUST EAST OF SUN CITY.

Lat/Long: 33°42'22" / 117°10'54"
UTM: Zone-11 N3729394 E483168
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Area: 16.5 ac

Township: 05S
Range: 03W
Section: 27 Qtr XX
Meridian: S
Elevation: 1470 ft

Comments
Distribution: LOW--15 ACRES.
Ecological: AGRICULTURAL FIELDS. SOIL: CAJALCO, ESCONDIDO, FRIANT, LODO. SLOPE: 0-10%.
Threat: AGRICULTURE, URBAN DEVELOPMENT. LAPRE (1982) REPORTED THE NORTHERN SITE WHICH IS NOW EXTIRPATED.
General:
Owner/Manager: UNKNOWN

Source Codes
OFA88F84

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 144 — Map Index: 20985
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: OFARRELL, M. & C. UPTAIN 1988 (OBS)
Dates Last Seen — Element: 1988-08-16 — Site: 1988-08-16

Quad Summary: ROMOLAND (3311762/068B)
County Summary: RIVERSIDE
SNA Summary:

Location: 0.1 MILE SW OF MENIFEE ROAD JCT WITH GRAND AVE. ABOUT 2 MILES EAST OF SUN CITY.

Lat/Long: 33°42'35" / 117°09'21" — Township: 05S
UTM: Zone-11 N3729792 E485560 — Range: 03W
Mapping Precision: NON-SPECIFIC — Section: 26 Qtr E
Symbol Type: POLYGON — Meridian: S
Area: 41.2 ac — Elevation: 1600 ft

Comments
Distribution: ABUNDANCE IS LOW OVER ABOUT 40 ACRES. DISTRIBUTION ON RIDGE LINES, SWALES, ALONG ROADS, AND THE APRON OF HILLS.
Ecological: NON-NATIVE GRASSLAND. SOIL: CIENEBA, ESCONDIDO, FRIANT, LODO. SLOPE:0-15%
Threat: URBAN DEVELOPMENT
General:
Owner/Manager: UNKNOWN

Source Codes
OFA88F1D

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 145 — Map Index: 20980
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: OFARRELL, M. & C. UPTAIN 1988 (OBS)
Dates Last Seen — Element: 1988-08-16 — Site: 1988-08-16

Quad Summary: ROMOLAND (3311762/068B)
County Summary: RIVERSIDE
SNA Summary:

Location: 1.3 MI W OF HOLLAND RD JCT. WITH MURRIETA RD. ABOUT 2.5 MILES SW OF SUN CITY.

Lat/Long: 33°40'03" / 117°14'38" — Township: 06S
UTM: Zone-11 N3725137 E477392 — Range: 03W
Mapping Precision: NON-SPECIFIC — Section: 07 Qtr N
Symbol Type: POLYGON — Meridian: S
Area: 51.4 ac — Elevation: 1600 ft

Comments
Distribution: PATCHY TRACE TO LOW ABUNDANCE OVER 40 ACRES. LOWER ELEVATIONS BELOW CURRENT SKR DISTRIBUTION COVERED BY DENSE GRASS.
Ecological: NON-NATIVE GRASSLAND. SOIL: ESCONDIDO, FRIANT, LODO, VALLECITOS. SLOPE: 0-10%
Threat: WINCHESTER PHEASANT CLUB. ACTIVELY DISKED FOR HABITAT ENHANCEMENT FOR UPLAND GAME SPECIES.
General:
Owner/Manager: PVT

Source Codes
OFA88F1E

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 146 — Map Index: 20982
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: MONTGOMERY, S. 1990 (OBS)
Dates Last Seen — Element: 1990-06-20 — Site: 1990-06-20

Quad Summary: LAKE ELSINORE (3311763/069A)*, ROMOLAND (3311762/068B)
County Summary: RIVERSIDE
SNA Summary:

Location: NORTH AND EAST OF RAILROAD CYN RESERVOIR. 0.7 MI NW OF GOETZ RD JCT WITH NEWPORT RD.

Lat/Long: 33°42'11" / 117°15'04" — Township: 05S
UTM: Zone-11 N3729052 E476735 — Range: 04W
Mapping Precision: NON-SPECIFIC — Section: 36 Qtr XX
Symbol Type: POLYGON — Meridian: S
Area: 385.5 ac — Elevation: 1500 ft

Comments
Distribution: 24 INDIVIDUALS FOUND
Ecological:
Threat: DEVELOPMENT
General:
Owner/Manager: PVT

Source Codes
MON90F26

CHAETODIPUS CALIFORNICUS FEMORALIS
DULZURA POCKET MOUSE — Element Code: AMAFD05021

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T2T3	CDFG Status: SC
State: None	State: S2?	

Habitat Associations
General: VARIETY OF HABITATS INCLUDING COASTAL SCRUB, CHAPARRAL & GRASSLAND IN SAN DIEGO CO.
Micro: ATTRACTED TO GRASS-CHAPARRAL EDGES.

Occurrence No. 1 — Map Index: 43866
Occ Rank: Poor
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BEHRENDS, P. 1993 (OBS)
Dates Last Seen — Element: 1993-07-08 — Site: 1993-07-08

Quad Summary: ROMOLAND (3311762/068B)
County Summary: RIVERSIDE
SNA Summary:

Location: SW CORNER OF BRIGGS ROAD AND MATHEWS ROAD. 3 MILES EAST OF SUN CITY, 1.4 MILES SOUTH OF STATE HWY 74.

Lat/Long: 33°43'18" / 117°08'11" — Township: 05S
UTM: Zone-11 N3731137 E487339 — Range: 03W
Mapping Precision: NON-SPECIFIC — Section: 24 Qtr NE
Symbol Type: POINT — Meridian: S
Radius: 1/10 mile — Elevation: 1480 ft

Comments
Distribution:
Ecological: RUDERAL HABITAT CONSISTING OF BROMUS MADRITENSIS SSP. RUBENS, B. DIANDRUS, PLAGIOBOTHRYS SP., BRASSIA NIGRA, HEMIZONIA SP., CENTAUREA MELITENSIS, STEPHANOMERIA, ERINOCARPUS SETIGERUS.
Threat: STRIP IS HIGHLY DISTURBED BETWEEN DIRT ROAD AND RAILROAD TRACKS.
General: SOILS: CIENEBA ROCKY SANDY LOAM, EXETER SANDY LOAM, GREENFIELD SANDY LOAM, HANFORD COARSE SANDY LOAM. 1 BREEDING INDIVIDUAL CAPTURED AT THE BURROW SITE IN 1993.
Owner/Manager: EMWD

Source Codes
BEH93F02

SOUTHERN COAST LIVE OAK RIPARIAN FOREST
Element Code: CTT61310CA

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4	
State: None	State: S4	

Habitat Associations
General:
Micro:

Occurrence No. 199 Map Index: 03629
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: HOLLAND, R. 1988 (MAP)

Dates Last Seen
Element: 1980-05-04
Site: 1980-05-04

Quad Summary: ROMOLAND (3311752/068B)
County Summary: RIVERSIDE
SNA Summary:

Location: COTTONWOOD CANYON, FROM ABOUT 1640 TO 1540 FT, APPROX 4 MI EOF LAKE ELSINORE, NW-FACING.

Lat/Long: 33°39'02" / 117°13'52"
UTM: Zone-11 N3723235 E478582
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 70.1 ac

Township: 06S
Range: 03W
Section: 18 Qtr NW
Meridian: S
Elevation: 1580 ft

Comments
Distribution: EXTANT, 1980, PER INTERPRETATION OF AERIAL PHOTOS.
Ecological:
Threat:
General: NEEDS FIELD VERIFICATION OF VEGETATION CONDITION, COMPOSITION. THIS WAS OCC #199 OF CTT61310CA.
Owner/Manager: UNKNOWN

Source Codes
HOL88M01

SOUTHERN COAST LIVE OAK RIPARIAN FOREST (cont.)
Element Code: CTT61310CA

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4	
State: None	State: S4	

Habitat Associations
General:
Micro:

Occurrence No. 200 Map Index: 03582
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: HOLLAND, R. 1988 (MAP)

Dates Last Seen
Element: 1980-05-04
Site: 1980-05-04

Quad Summary: MURRIETA (3311752/068C)*, WILDOMAR (3311753/069D), ROMOLAND (3311762/068B), LAKE ELSINORE (3311763/069A)
County Summary: RIVERSIDE
SNA Summary:

Location: UNNAMED TRIBUTARY TO BUNDY CANYON, ABOUT 2.5 MI S OF RAIL- ROAD CANYON RESERVOIR.

Lat/Long: 33°37'32" / 117°14'29"
UTM: Zone-11 N3720476 E477605
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 92.3 ac

Township: 06S
Range: 04W
Section: 25 Qtr N
Meridian: S
Elevation: 1600 ft

Comments
Distribution: EXTANT, 1980, AND BOUNDARY INCREASED PER INTERPRETATION OF AERIAL PHOTOS.
Ecological: MAPPED BY WIESLANDER SURVEY (1935) AS CLOSED CANOPY QUERCUS AGRIFOLIA.
Threat:
General: NEEDS FIELD VERIFICATION OF VEGETATION CONDITION, COMPOSITION. THIS WAS OCC #200 OF CTT61310CA.
Owner/Manager: UNKNOWN

Source Codes
HOL88M01, USF35M01

SOUTHERN COAST LIVE OAK RIPARIAN FOREST (cont.)
Element Code: CTT61310CA

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4	
State: None	State: S4	

Habitat Associations
General:
Micro:

Occurrence No. 201 Map Index: 03775
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: HOLLAND, R. 1988 (MAP)

Dates Last Seen
Element: 1980-05-04
Site: 1980-05-04

Quad Summary: MURRIETA (3311752/068C)*, ROMOLAND (3311762/068B)
County Summary: RIVERSIDE
SNA Summary:

Location: UNNAMED TRIBUTARY TO PALOMA VALLEY, ABOUT 2.5 MI SW OF BELL MTN, NE-FACING SLOPE.

Lat/Long: 33°37'27" / 117°10'49"
UTM: Zone-11 N3720296 E483285
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 36.1 ac

Township: 06S
Range: 03W
Section: 27 Qtr N
Meridian: S
Elevation: 1560 ft

Comments
Distribution: EXTANT, 1980, PER INTERPRETATION OF AERIAL PHOTOS.
Ecological: MAPPED BY WIESLANDER SURVEY (1935) AS CLOSED CANOPY QUERCUS AGRIFOLIA.
Threat:
General: NEEDS FIELD VERIFICATION OF VEGETATION CONDITION, COMPOSITION. THIS WAS OCC #201 OF CTT61310CA.
Owner/Manager: UNKNOWN

Source Codes
HOL88M01, USF35M01

SOUTHERN COTTONWOOD WILLOW RIPARIAN FOREST
Element Code: CTT61330CA

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G3	
State: None	State: S3.2	

Habitat Associations
General:
Micro:

Occurrence No. 96 Map Index: 03815
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: HOLLAND, R. 1988 (MAP)

Dates Last Seen
Element: 1980-05-04
Site: 1980-05-04

Quad Summary: ROMOLAND (3311762/068B)
County Summary: RIVERSIDE
SNA Summary:

Location: PALOMA VALLEY, APPROX 1 MI SW OF BELL MTN.

Lat/Long: 33°39'16" / 117°09'58"
UTM: Zone-11 N3723674 E484590
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 25.6 ac

Township: 06S
Range: 03W
Section: 14 Qtr NW
Meridian: S
Elevation: 1460 ft

Comments
Distribution: MAPPED FROM INTERPRETATION OF 1988 AERIAL PHOTOS.
Ecological: UNABLE TO CONVERT TO FLORISTIC CLASSIFICATION, LACKS SPP. INFO.
Threat:
General: NEEDS FIELD VERIFICATION OF VEGETATION CONDITION, COMPOSITION.
Owner/Manager: UNKNOWN

Source Codes
HOL88M01

CENTROMADIA PUNGENS SSP LAEVIS
SMOOTH TARPLANT — Element Code: PDAST4R0R4

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-3

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND, CHENOPOD SCRUB, MEADOWS, PLAYAS, RIPARIAN WOODLAND.
Micro: ALKALI MEADOW, ALKALI SCRUB; ALSO IN DISTURBED PLACES. 0-480M.

Occurrence No. 31 — Map Index: 28213
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1989 (OBS)
Dates Last Seen — Element: 1989-08-08 — Site: 1989-08-08

Quad Summary: LAKE ELSINORE (3311763/069A)
County Summary: RIVERSIDE
SNA Summary:

Location: SOUTHEAST SIDE OF CLANCY STREET AT ALBERHILL CREEK CROSSING, LAKE ELSINORE.

Lat/Long: 33°40'52" / 117°20'11" — Township: 06S
UTM: Zone-11 N3726645 E468807 — Range: 04W
Mapping Precision: SPECIFIC — Section: 06 Qtr NW
Symbol Type: POINT — Meridian: S
Radius: 80 meters — Elevation: 1270 ft

Comments
Distribution: MAPPED ABOUT 0.5 MILE SOUTH OF THE INTERSECTION OF COLLIER AVE AND CHANEY STREET.
Ecological: RUDERAL HABITAT ALONG CREEK. ASSOCIATED WITH BROMUS RUBENS, BRASSICA GENICULATA, ATRIPLEX ARGENTEA, A. SERENANA, AVENA BARBATA, HORDEUM LEPORINUM, SALSOLA IBERICA, BASSIA HYSSOPIFOLIA, POLYGONUM AVICULARE, LOTUS PURSHIANAUS, ET AL.
Threat: MOWING, FLOOD CONTROL.
General: 50 PLANTS OBSERVED IN 1989.
Owner/Manager: UNKNOWN

Source Codes
BRA89F28

CENTROMADIA PUNGENS SSP LAEVIS (cont.)
SMOOTH TARPLANT — Element Code: PDAST4R0R4

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-3

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND, CHENOPOD SCRUB, MEADOWS, PLAYAS, RIPARIAN WOODLAND.
Micro: ALKALI MEADOW, ALKALI SCRUB; ALSO IN DISTURBED PLACES. 0-480M.

Occurrence No. 32 — Map Index: 28214
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1989 (OBS)
Dates Last Seen — Element: 1989-08-07 — Site: 1989-08-07

Quad Summary: LAKE ELSINORE (3311763/069A)
County Summary: RIVERSIDE
SNA Summary:

Location: SOUTHEAST END OF LAKE ELSINORE, NORTHWEST OF ROME HILL, ABOUT 0.3 MILE NORTH OF GRAND AVE.

Lat/Long: 33°38'00" / 117°19'44" — Township: 06S
UTM: Zone-11 N3721351 E469495 — Range: 04W
Mapping Precision: SPECIFIC — Section: XX Qtr XX
Symbol Type: POINT — Meridian: S
Radius: 80 meters — Elevation: 1280 ft

Comments
Distribution: MAPPED ABOUT 0.5 MILE WNW OF THE SUMMIT OF ROME HILL.
Ecological: OPEN FIELDS WITH ALKALI MEADOW. ASSOCIATED WITH ATRIPLEX SERENANA, DISTICHLIS SPICATA, BASSIA HYSSOPIFOLIA, AMBROSIA PSILOSTACHYA, HELIOTROPUM, LACTUCA, BACCHARIS EMORYI, CRESSA, BROMUS MOLLIS, BRASSICA GENICULATA, JUNCUS, AND FRANKENIA.
Threat: RECENTLY DISKED, ENCROACHING URBANIZATION.
General: 350 PLANTS OBSERVED IN 1989.
Owner/Manager: UNKNOWN

Source Codes
BRA89F26, THO68S09

CENTROMADIA PUNGENS SSP LAEVIS (cont.)
SMOOTH TARPLANT — Element Code: PDAST4R0R4

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-3

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND, CHENOPOD SCRUB, MEADOWS, PLAYAS, RIPARIAN WOODLAND.
Micro: ALKALI MEADOW, ALKALI SCRUB; ALSO IN DISTURBED PLACES. 0-480M.

Occurrence No. 33 — Map Index: 28215
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1989 (OBS)
Dates Last Seen — Element: 1989-08-07 — Site: 1989-08-07

Quad Summary: LAKE ELSINORE (3311763/069A)
County Summary: RIVERSIDE
SNA Summary:

Location: SOUTHEAST END OF LAKE ELSINORE, SOUTHWEST OF ROME HILL, ABOUT 0.3 MILE NORTH OF GRAND AVE.

Lat/Long: 33°37'47" / 117°19'21" — Township: 06S
UTM: Zone-11 N3720958 E470094 — Range: 04W
Mapping Precision: SPECIFIC — Section: XX Qtr XX
Symbol Type: POINT — Meridian: S
Radius: 80 meters — Elevation: 1285 ft

Comments
Distribution: MAPPED ABOUT 0.1 MILE SOUTHWEST OF SUMMIT OF ROME HILL.
Ecological: OPEN FIELDS WITH ALKALI MEADOW. ASSOCIATED WITH ATRIPLEX SERENANA, DISTICHLIS SPICATA, BASSIA HYSSOPIFOLIA, AMBROSIA PSILOSTACHYA, BACCHARIS EMORYI, HELIOTROPUM, LACTUCA, CRESSA, BROMUS, BRASSICA, JUNCUS, FRANKENIA, AND ANEMOPSIS.
Threat: RECENTLY DISKED, ENCROACHING URBANIZATION.
General: 400 PLANTS OBSERVED IN 1989.
Owner/Manager: UNKNOWN

Source Codes
BRA89F26

LASTHENIA GLABRATA SSP COULTERI
COULTER'S GOLDFIELDS — Element Code: PDAST5L0A1

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: COASTAL SALT MARSHES, PLAYAS, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS.
Micro: USUALLY FOUND ON ALKALINE SOILS IN PLAYAS, SINKS, AND GRASSLANDS. 1-1400M.

Occurrence No. 21 — Map Index: 23760
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: ORNDUFF, R. 1966 (LIT)
Dates Last Seen — Element: 1922-04-29 — Site: 1922-04-29

Quad Summary: LAKE ELSINORE (3311763/069A)
County Summary: RIVERSIDE
SNA Summary:

Location: 0.5 MI SOUTH OF LAKE ELSINORE.

Lat/Long: 33°38'36" / 117°19'52" — Township: 06S
UTM: Zone-11 N3722460 E469305 — Range: 04W
Mapping Precision: NON-SPECIFIC — Section: XX Qtr XX
Symbol Type: POINT — Meridian: S
Radius: 1 mile — Elevation: 1240 ft

Comments
Distribution:
Ecological:
Threat:
General: TWO COLLECTIONS MADE ON SAME DATE IN 1922; P.A.MUNZ 5078 AND F.W PIERSON 2956. LABEL INFORMATION NOT CLEAR IF COLLECTIONS WERE MADE 1/2 MILE SOUTH OF THE TOWN OR THE LAKE. EXPANSION OF THE LAKE MAY HAVE INUNDATED COLLECTION SITE.
Owner/Manager: UNKNOWN

Source Codes
BRA93U02, ORN66A01

LASTHENIA GLABRATA SSP COULTERI (cont.)
COULTER'S GOLDFIELDS — Element Code: PDAST5L0A1

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: COASTAL SALT MARSHES, PLAYAS, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS.
Micro: USUALLY FOUND ON ALKALINE SOILS IN PLAYAS, SINKS, AND GRASSLANDS. 1-1400M.

Occurrence No. 57 — Map Index: 38707
Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1997 (OBS)

Dates Last Seen — Element: 1997-03-13 — Site: 1997-03-13

Quad Summary: LAKE ELSINORE (3311763/069A)
County Summary: RIVERSIDE
SNA Summary:

Location: WARM SPRINGS VALLEY, SOUTH OF NICHOLS ROAD AND WEST OF COLLIER AVE, ABOUT 2 MILES NW OF LAKE ELSINORE (TOWN).

Lat/Long: 33°42'17" / 117°21'34" — Township: 05S
UTM: Zone-11 N3729284 E466683 — Range: 05W
Mapping Precision: SPECIFIC — Section: 25 Qtr SW
Symbol Type: POINT — Meridian: S
Radius: 80 meters — Elevation: 1250 ft

Comments
Distribution: LOCATED ABOUT 335M SE OF NICHOLS ROAD AND 91M WEST OF COLLIER ROAD AND 305M WEST OF I-15. MAPPED WITHIN THE NW 1/4 SW 1/4 SECTION 25.
Ecological: ALKALI PLAYA WITH CRESSA TRUXILLENSIS, SUAEDA MOQUINII, FRANKENIA SALINA, HORDEUM INTERCEDENS, PLAGIOBOTHRYS LEPTOCLADUS, BASSIA HYSSOPIFOLIA, PLANTAGO ELONGATA, AND ATRIPLEX ARGENTEA. WILLOWS SILTY CLAY, SALINE SOILS.
Threat: DISTURBED BY ORV ACTIVITY. POSSIBLE THREAT FROM FUTURE DEVELOPMENT.
General: 1500 PLANTS OBSERVED IN 1997. MUCH LARGER STANDS OF THIS SPECIES ARE FOUND IN THIS WETLAND AREA AND ADDITIONAL SURVEYS ARE NEEDED.
Owner/Manager: UNKNOWN

Source Codes
BRA97F03

ATRIPLEX CORONATA VAR NOTATIOR
SAN JACINTO VALLEY CROWNSCALE — Element Code: PDCHE040C2

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G4T1	CNPS List: 1B
State: None	State: S1.1	R-E-D Code: 3-3-3

Habitat Associations
General: PLAYAS, CHENOPOD SCRUB, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS. ENDEMIC TO RIVERSIDE COUNTY.
Micro: DRY, ALKALINE FLATS IN THE SAN JACINTO RIVER VALLEY. 400-500M.

Occurrence No. 16 — Map Index: 37956
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1997 (OBS)

Dates Last Seen — Element: 1997-03-13 — Site: 1997-03-13

Quad Summary: LAKE ELSINORE (3311763/069A)
County Summary: RIVERSIDE
SNA Summary:

Location: NICHOLS ROAD WETLANDS NEAR MOUTH OF WALKER CANYON, NORTH OF LAKE ELSINORE AT NW END OF WARM SPRINGS VALLEY.

Lat/Long: 33°42'22" / 117°21'38" — Township: 05S
UTM: Zone-11 N3729437 E466585 — Range: 05W
Mapping Precision: SPECIFIC — Section: 25 Qtr NW
Symbol Type: POINT — Meridian: S
Radius: 80 meters — Elevation: 1250 ft

Comments
Distribution: ABOUT 183M SOUTHEAST OF NICHOLS ROAD, 91M WEST OF OF COLLIER ROAD, AND 196M WEST OF I-15. SITE IS MAPPED JUST SOUTH OF ABANDONDED RR GRADE AND WEST OF ALBERHILL CREEK. WITHIN THE SW 1/4 OF THE NW 1/4 SECTION 25.
Ecological: ALKALI PLAYA WITH SPERGULARIA MARINA, MESEMBRYANTHEMUM NODIFLORUM, HORDEUM INTERCEDENS, CRESSA TRUXILLENSIS, SUAEDA MOQUINII, LACTUCA SERRIOLA, LEPIDIUM LATIPES, AND ATRIPLEX ARGENTEA. ON WILLOWS SILTY CALY, SALINE ALKALI.
Threat: OHVS, POTENTIAL ROAD EXPANSION, INCREASE IN LOCAL URBANIZATION. PRESENCE OF MESEMBRYANTHEMUM DECREASES SITE QUALITY.
General: 185 PLANTS OBSERVED IN 1997. FURTHER SURVEYS NEEDED AT THIS LOCALITY, ADDITIONAL POPULATIONS ANTICIPATED IN NEARBY PLAYA HABITAT.
Owner/Manager: UNKNOWN

Source Codes
BRA97F01

DUDLEYA MULTICAULIS
MANY-STEMMED DUDLEYA — Element Code: PDCRA040H0

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 1-2-3

Habitat Associations
General: CHAPARRAL, COASTAL SCRUB, VALLEY AND FOOTHILL GRASSLAND. ENDEMIC TO SOUTHERN CALIFORNIA.
Micro: IN HEAVY, OFTEN CLAYEY SOILS OR GRASSY SLOPES. 0-790M.

Occurrence No. 6 — Map Index: 09319
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Decreasing
Main Source: BOYD, S. 1982 (OBS)

Dates Last Seen — Element: 1986-05-07 — Site: 1986-05-07

Quad Summary: LAKE ELSINORE (3311763/069A)*, ALBERHILL (3311764/069B)
County Summary: RIVERSIDE
SNA Summary: Alberhill Mountain

Location: S SIDE OF ALBERHILL MTN, ADJACENT TO OPEN PIT CLAY MINES.

Lat/Long: 33°42'46" / 117°22'24" — Township: 05S
UTM: Zone-11 N3730169 E465400 — Range: 05W
Mapping Precision: SPECIFIC — Section: 26 Qtr NW
Symbol Type: POLYGON — Meridian: S
Area: 78.0 ac — Elevation: 1700 ft

Comments
Distribution: ALSO IN SEC. 26 AND 27.
Ecological: AROUND ROCK OUTCROPS AND UNDER SHRUBS ON ADOBE IN CHAPARRAL. ASSOCIATED WITH HARPAOGONELLA PALMERI, ALLIUM FIMBRIATUM MUNZII, FRITILLARIA BIFLORA, ERIOGONUM FASCICULATUM.
Threat: FUTURE CLAY MINING WILL DESTROY POPULATION. AREA EXTREMELY DISTURBED BY CLAY MINING.
General: LESS THAN 1000 IN 1982.
Owner/Manager: PVT

Source Codes
BOY86S07, BOY82F04, BOY86F07

CHORIZANTHE PARRYI VAR PARRYI
PARRY'S SPINEFLOWER — Element Code: PDPGN040J2

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G2T2?	CNPS List: 3
State: None	State: S2.1	R-E-D Code: ?-2-3

Habitat Associations
General: COASTAL SCRUB, CHAPARRAL.
Micro: DRY SLOPES AND FLATS; SOMETIMES AT INTERFACE OF 2 VEG TYPES, SUCH AS CHAP AND OAK WDLAND; DRY, SANDY SOILS. 40-1705M.

Occurrence No. 26 — Map Index: 41054
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: MCCLATCHIE, A. #49 UC (HERB)

Dates Last Seen — Element: 1892-05-XX — Site: 1892-05-XX

Quad Summary: LAKE ELSINORE (3311763/069A)*, WILDOMAR (3311753/069D), SITTON PEAK (3311754/069C), ROMOLAND (3311762/068B), ALBERHILL (3311764/069B)
County Summary: ORANGE, RIVERSIDE
SNA Summary:

Location: NEAR ELSINORE.

Lat/Long: 33°40'23" / 117°19'39" — Township: 06S
UTM: Zone-11 N3725761 E469620 — Range: 04W
Mapping Precision: NON-SPECIFIC — Section: 06 Qtr XX
Symbol Type: POINT — Meridian: S
Radius: 5 mile — Elevation: 1300 ft

Comments
Distribution:
Ecological:
Threat:
General: ONLY SOURCE OF INFORMATION FOR THIS SITE IS 1892 COLLECTION BY A. MCCLATCHIE.
Owner/Manager: UNKNOWN

Source Codes
MCC92S03

DODECAHEMA LEPTOCERAS
SLENDER-HORNED SPINEFLOWER — Element Code: PDPGN0V010

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G1	CNPS List: 1B
State: Endangered	State: S1.1	R-E-D Code: 3-3-3

Habitat Associations
General: CHAPARRAL, COASTAL SCRUB (ALLUVIAL FAN SAGE SCRUB). HIST. FROM LAX, RIV, AND SBD COUNTIES; EXTIRP. FROM MUCH OF RANGE.
Micro: FLOOD DEPOSITED TERRACES AND WASHES; ASSOC INCLUDE ENCELIA, DALEA, LEPIDOSPARTUM, ETC. 200-760M.

Occurrence No. 12 — Map Index: 41054
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Extirpated
Trend: Unknown
Main Source: ABRAMS, J. SN DS (HERB)

Dates Last Seen — Element: 1901-05-XX — Site: 1983-XX-XX

Quad Summary: LAKE ELSINORE (3311763/069A)*, WILDOMAR (3311753/069D), SITTON PEAK (3311754/069C), ROMOLAND (3311762/068B), ALBERHILL (3311764/069B)
County Summary: ORANGE, RIVERSIDE
SNA Summary:

Location: ELSINORE.

Lat/Long: 33°40'23" / 117°19'39" — Township: 06S
UTM: Zone-11 N3725761 E469620 — Range: 04W
Mapping Precision: NON-SPECIFIC — Section: 06 Qtr XX
Symbol Type: POINT — Meridian: S
Radius: 5 mile — Elevation: 1300 ft

Comments
Distribution: MAPPED IN VICINITY OF LAKE ELSINORE.
Ecological:
Threat: URBANIZATION, FLOOD CONTROL HAVE ELIMINATED HABITAT IN THIS VICINITY.
General: MAIN SOURCE OF INFORMATION FOR THIS SITE IS 1901 COLLECTION BY ABRAMS. PROBABLY EXTIRPATED AT THIS SITE (KRANTZ 1979).
Owner/Manager: UNKNOWN

Source Codes
ABR01S01, MCC92S02, ANO88U03, KRA79U10

ALLIUM MUNZII
MUNZ'S ONION — Element Code: PMLIL022Z0

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G1	CNPS List: 1B
State: Threatened	State: S1.1	R-E-D Code: 3-3-3

Habitat Associations
General: CHAPARRAL, COASTAL SCRUB, CISMONTANE WOODLAND, PINYON-JUNIPER WOODLAND, VALLEY AND FOOTHILL GRASSLAND. ONLY IN RIV. CO.
Micro: HEAVY CLAY SOILS; GROWS IN GRASSLANDS & OPENINGS WITHIN SHRUBLANDS OR WOODLANDS. 300-1035M.

Occurrence No. 6 — Map Index: 09319
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Possibly Extirpated
Trend: Decreasing
Main Source: BOYD, S. 1982 (OBS)

Dates Last Seen — Element: 1986-05-07 — Site: 199X-XX-XX

Quad Summary: LAKE ELSINORE (3311763/069A)*, ALBERHILL (3311764/069B)
County Summary: RIVERSIDE
SNA Summary: Alberhill Mountain

Location: SOUTH SLOPE OF ALBERHILL MOUNTAIN, DIRECTLY ADJACENT TO OPEN PIT CLAY MINES.

Lat/Long: 33°42'46" / 117°22'24" — Township: 05S
UTM: Zone-11 N3730169 E465400 — Range: 05W
Mapping Precision: SPECIFIC — Section: 26 Qtr NW
Symbol Type: POLYGON — Meridian: S
Area: 78.0 ac — Elevation: 1700 ft

Comments
Distribution: ALSO IN SEC. 23 AND 27.
Ecological: PLANTS ON GRASSY OPENING IN COASTAL SAGE SCRUB ON HEAVY ADOBE SOIL. ASSOCIATED WITH ERIOGONUM FASCICULATUM, DUDLEYA MULTICAULIS, HARPAGONELLA PALMERI PALMERI.
Threat: CONTINUED MINING ACTIVITIES, SHEEP GRAZING, AND WEEDS THREATEN PLANTS HERE.
General: LESS THAN 1000 PLANTS IN 1982, 150-200 IN 1986 AFTER EXTENSIVE MINING OF CLAY. ACC. TO MISTRETTA (1993), RECENT GROUND DISTURBING ACTIVITIES MAY HAVE DESTROYED THIS OCCURRENCE.
Owner/Manager: PVT

Source Codes
BOY86F07, BOY86S14, MIS93U01, BIT86U09, BOY82F01

ALLIUM MUNZII (cont.)
MUNZ'S ONION — Element Code: PMLIL022Z0

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G1	CNPS List: 1B
State: Threatened	State: S1.1	R-E-D Code: 3-3-3

Habitat Associations
General: CHAPARRAL, COASTAL SCRUB, CISMONTANE WOODLAND, PINYON-JUNIPER WOODLAND, VALLEY AND FOOTHILL GRASSLAND. ONLY IN RIV. CO.
Micro: HEAVY CLAY SOILS; GROWS IN GRASSLANDS & OPENINGS WITHIN SHRUBLANDS OR WOODLANDS. 300-1035M.

Occurrence No. 15 — Map Index: 24166
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BOYD, S. 1993 (MAP)

Dates Last Seen — Element: 1993-XX-XX — Site: 1993-XX-XX

Quad Summary: LAKE ELSINORE (3311763/069A)
County Summary: RIVERSIDE
SNA Summary:

Location: NORTH OF LAKE ELSINORE, NORTH PEAK POPULATION.

Lat/Long: 33°43'04" / 117°19'15" — Township: 05S
UTM: Zone-11 N3730703 E470268 — Range: 04W
Mapping Precision: SPECIFIC — Section: 20 Qtr SW
Symbol Type: POINT — Meridian: S
Radius: 80 meters — Elevation: 1600 ft

Comments
Distribution: SITE MAPPED ABOUT 0.75 MILE NNE OF BENCHMARK 1423 ON HIGHWAY 74.
Ecological: N-FACING SLOPE ON ROCK OUTCROPS AND HEAVY SOIL.
Threat:
General: SEVERAL THOUSAND PLANTS IN 1993.
Owner/Manager: UNKNOWN

Source Codes
BOY93M01

BRODIAEA FILIFOLIA
THREAD-LEAVED BRODIAEA — Element Code: PMLIL0C050

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2	CNPS List: 1B
State: Endangered	State: S2.1	R-E-D Code: 3-3-3

Habitat Associations
General: CISMONTANE WOODLAND, COASTAL SCRUB, PLAYAS, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS.
Micro: USUALLY ASSOCIATED WITH ANNUAL GRASSLAND AND VERNAL POOLS; OFTEN SURR BY SHRUBLAND HABITATS. CLAY SOILS. 35-855M.

Occurrence No. 25 — Map Index: 21689
Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: MITCHELL, D. 1990 (OBS)

Dates Last Seen — Element: 1990-05-03 — Site: 1996-04-XX

Quad Summary: LAKE ELSINORE (3311763/069A)*, ROMOLAND (3311762/068B)
County Summary: RIVERSIDE
SNA Summary:

Location: RAILROAD CANYON NORTH OF RABIAN COUNTY PARK.

Lat/Long: 33°44'07" / 117°15'16" — Township: 05S
UTM: Zone-11 N3732638 E476439 — Range: 04W
Mapping Precision: SPECIFIC — Section: 13 Qtr SW
Symbol Type: POLYGON — Meridian: S
Area: 17.4 ac — Elevation: 1400 ft

Comments
Distribution: TO THE SOUTH OF THE SAN JACINTO RIVER. SITE VISITED IN 1996 BY S. WHITE; NO PLANTS SEEN. AREA WAS MOSTLY WEEDY GRASSLAND. MORE SURVEYS NEEDED.
Ecological: GROWING IN MIXED INTRODUCED ANNUAL GRASSLAND ON SALINE-ALKALINE GRANGEVILLE FINE SANDY LOAM. ASSOCIATES INCLUDE BROMUS DIANDRUS, BROMUS RUBENS, AVENA BARBATA, AND SPOROBOLUS AIROIDES.
Threat: FLOOD CONTROL CHANNEL ALTERATIONS WOULD IMPACT ENTIRE POPULATION.
General: A LARGE VIABLE POPULATION (1,500 +) OF ROBUST INDIVIDUAL PLANTS. THE SITE CANNOT BE PROTECTED DUE TO ENGINEERING CONSTRAINTS ON CHANNEL DESIGN.
Owner/Manager: RIV COUNTY FLOOD CONTROL

Source Codes
BRA92U02, EAS88S01, MIT90F08, WHI97U02

Lakeview

AMBYSTOMA CALIFORNIENSE
CALIFORNIA TIGER SALAMANDER — Element Code: AAAAA01147

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2G3	CDFG Status: SC
State: None	State: S2S3	

Habitat Associations
General: FEDERAL LISTING REFERS TO POPULATIONS IN SANTA BARBARA COUNTY ONLY.
Micro: NEED UNDERGROUND REFUGES, ESPECIALLY GROUND SQUIRREL BURROWS & VERNAL POOLS OR OTHER SEASONAL WATER SOURCES FOR BREEDING

Occurrence No. 2 — Map Index: 37896
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Possibly Extirpated
Trend: Unknown
Main Source: BRODE, J. 1986 (PERS)

Dates Last Seen — Element: 1892-XX-XX; Site: 1892-XX-XX

Quad Summary: SAN JACINTO (3311678/084C)*, HEMET (3311668/067B), LAKE FULMOR (3311677/084D), WINCHESTER (3311761/068A), LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN JACINTO.

Lat/Long: 33°47'02" / 116°57'29" — Township: 04S
UTM: Zone-11 N3737998 E503892 — Range: 01W
Mapping Precision: NON-SPECIFIC — Section: 35 Qtr XX
Symbol Type: POINT — Meridian: S
Radius: 5 mile — Elevation: 1540 ft

Comments
Distribution: HISTORIC RECORD, EXACT LOCATION UNKNOWN.
Ecological: GENERAL HABITAT TYPE FOR TIGER SALAMANDER IS FOOTHILL AND VALLEY GRASSLAND.
Threat: UNKNOWN IF DEVELOPMENT HAS EXTIRPATED THE SALAMADER IN THIS AREA.
General: MUSEUM SPECIMEN SU #695.
Owner/Manager: UNKNOWN

Source Codes
BRO86U03

ATHENE CUNICULARIA (BURROW SITES)
BURROWING OWL — Element Code: ABNSB10010

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T2	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: FOUND IN OPEN, DRY ANNUAL OR PERENIAL GRASSLANDS, DESERTS & SCRUBLANDS CHARACTERIZED BY LOW-GROWING VEGETATION.
Micro: SUBTERRANEAN NESTER, DEPENDENT UPON BURROWING MAMMALS, MOST NOTABLY, THE CALIFORNIA GROUND SQUIRREL.

Occurrence No. 79 — Map Index: 03967
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: CRAIG, A. & N. CRAIG 1982 (PERS)

Dates Last Seen — Element: 1982-07-03; Site: 1982-07-03

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary: San Jacinto Wildlife Refuge

Location: SAN JACINTO WILDLIFE AREA, 2 MILES NORTH OF LAKEVIEW.

Lat/Long: 33°51'58" / 117°07'16" — Township: 03S
UTM: Zone-11 N3747123 E488798 — Range: 02W
Mapping Precision: NON-SPECIFIC — Section: 31 Qtr SE
Symbol Type: POINT — Meridian: S
Radius: 1/5 mile — Elevation: 1425 ft

Comments
Distribution:
Ecological:
Threat:
General: ACTIVE BURROW WITH 2 ADULTS AND 5 FLEDGED YOUNG.
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
CRA82U02, JOH88U01

ATHENE CUNICULARIA (BURROW SITES) (cont.)
BURROWING OWL — Element Code: ABNSB10010

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T2	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: FOUND IN OPEN, DRY ANNUAL OR PERENIAL GRASSLANDS, DESERTS & SCRUBLANDS CHARACTERIZED BY LOW-GROWING VEGETATION.
Micro: SUBTERRANEAN NESTER, DEPENDENT UPON BURROWING MAMMALS, MOST NOTABLY, THE CALIFORNIA GROUND SQUIRREL.

Occurrence No. 80 — Map Index: 04009
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: CRAIG, A. & N. CRAIG 1982 (PERS)

Dates Last Seen — Element: 1982-05-26; Site: 1982-05-26

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary: San Jacinto Wildlife Refuge

Location: SAN JACINTO WILDLIFE AREA, 1.5 MILES NNE OF LAKEVIEW.

Lat/Long: 33°51'31" / 117°06'38" — Township: 04S
UTM: Zone-11 N3746287 E489760 — Range: 02W
Mapping Precision: NON-SPECIFIC — Section: 05 Qtr NE
Symbol Type: POINT — Meridian: S
Radius: 1/5 mile — Elevation: 1430 ft

Comments
Distribution:
Ecological:
Threat:
General: ACTIVE BURROW WITH 2 BIRDS PRESENT.
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
CRA82U02, JOH88U01

ATHENE CUNICULARIA (BURROW SITES) (cont.)
BURROWING OWL — Element Code: ABNSB10010

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T2	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: FOUND IN OPEN, DRY ANNUAL OR PERENIAL GRASSLANDS, DESERTS & SCRUBLANDS CHARACTERIZED BY LOW-GROWING VEGETATION.
Micro: SUBTERRANEAN NESTER, DEPENDENT UPON BURROWING MAMMALS, MOST NOTABLY, THE CALIFORNIA GROUND SQUIRREL.

Occurrence No. 81 — Map Index: 03996
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: CRAIG, A. & N. CRAIG 1982 (PERS)
Dates Last Seen — Element: 1982-05-28 — Site: 1982-05-28

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary: San Jacinto Wildlife Refuge

Location: SAN JACINTO WILDLIFE AREA, 0.5 MILE NORTH OF LAKEVIEW.

Lat/Long: 33°50'44" / 117°06'54"
UTM: Zone-11 N3744855 E489365
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile
Township: 04S
Range: 02W
Section: 05 Qtr SW
Meridian: S
Elevation: 1430 ft

Comments
Distribution:
Ecological:
Threat:
General: TWO BIRDS PRESENT AT THIS LOCATION ON BOTH 26 AND 28 MAY 1982; NO SEARCH MADE FOR BURROW.
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
CRA82U02, JOH88U01

ATHENE CUNICULARIA (BURROW SITES) (cont.)
BURROWING OWL — Element Code: ABNSB10010

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T2	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: FOUND IN OPEN, DRY ANNUAL OR PERENIAL GRASSLANDS, DESERTS & SCRUBLANDS CHARACTERIZED BY LOW-GROWING VEGETATION.
Micro: SUBTERRANEAN NESTER, DEPENDENT UPON BURROWING MAMMALS, MOST NOTABLY, THE CALIFORNIA GROUND SQUIRREL.

Occurrence No. 82 — Map Index: 03974
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: CRAIG, A. & N. CRAIG 1982 (PERS)
Dates Last Seen — Element: 1982-07-15 — Site: 1982-07-15

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary: San Jacinto Wildlife Refuge

Location: SAN JACINTO WILDLIFE AREA, APPROX 2-4 MILES NORTH OF LAKEVIEW.

Lat/Long: 33°52'17" / 117°07'11"
UTM: Zone-11 N3747716 E488929
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile
Township: 03S
Range: 02W
Section: 32 Qtr NW
Meridian: S
Elevation: 1430 ft

Comments
Distribution:
Ecological:
Threat:
General: TWO ADULTS AND FOUR FLEDGED YOUNG OBSERVED.
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
CRA82U02, JOH88U01

ATHENE CUNICULARIA (BURROW SITES) (cont.)
BURROWING OWL — Element Code: ABNSB10010

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T2	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: FOUND IN OPEN, DRY ANNUAL OR PERENIAL GRASSLANDS, DESERTS & SCRUBLANDS CHARACTERIZED BY LOW-GROWING VEGETATION.
Micro: SUBTERRANEAN NESTER, DEPENDENT UPON BURROWING MAMMALS, MOST NOTABLY, THE CALIFORNIA GROUND SQUIRREL.

Occurrence No. 83 — Map Index: 03995
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: CRAIG, A. & N. CRAIG 1982 (PERS)
Dates Last Seen — Element: 1982-XX-XX — Site: 1982-XX-XX

Quad Summary: EL CASCO (3311781/085A)*, LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary: San Jacinto Wildlife Refuge

Location: SAN JACINTO WILDLIFE AREA, 2.6 MILES NORTH OF LAKEVIEW.

Lat/Long: 33°52'33" / 117°06'51"
UTM: Zone-11 N3748187 E489432
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile
Township: 03S
Range: 02W
Section: 29 Qtr SW
Meridian: S
Elevation: 1440 ft

Comments
Distribution:
Ecological:
Threat:
General: ACTIVE BURROW WITH 1-2 BIRDS FROM SEPTEMBER THROUGH EARLY OCTOBER OF 1982.
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
JOH88U01, CRA82U01

ATHENE CUNICULARIA (BURROW SITES) (cont.)
BURROWING OWL — Element Code: ABNSB10010

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T2	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: FOUND IN OPEN, DRY ANNUAL OR PERENIAL GRASSLANDS, DESERTS & SCRUBLANDS CHARACTERIZED BY LOW-GROWING VEGETATION.
Micro: SUBTERRANEAN NESTER, DEPENDENT UPON BURROWING MAMMALS, MOST NOTABLY, THE CALIFORNIA GROUND SQUIRREL.

Occurrence No. 130 — Map Index: 20703
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: WHITE, S. 1992 (OBS)
Dates Last Seen — Element: 1992-XX-XX — Site: 1992-XX-XX

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: 0.6 MI ENE OF THE JUNCTION OF JUNIPER FLAT ROAD AND HANSEN AVENUE, APPROXIMATELY 2 MI SE OF LAKEVIEW.

Lat/Long: 33°48'47" / 117°06'14"
UTM: Zone-11 N3741224 E490392
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile
Township: 04S
Range: 02W
Section: 20 Qtr NE
Meridian: S
Elevation: 1600 ft

Comments
Distribution:
Ecological: HABITAT IS RUDERAL GRASSLAND WITH ONE SMALL PATCH OF COASTAL SAGE SCRUB, IN THE VICINITY OF AGRICULTURAL FIELDS.
Threat: THREATENED PRIMARILY BY CONSTRUCTION OF A FLOOD CONTROL DAM; SECONDARILY, BY AN INCREASING RURAL POPULATION.
General: TWO ADULTS AND TWO ACTIVE BURROWS OBSERVED.
Owner/Manager: UNKNOWN

Source Codes
WHI92F01

POLIOPTILA CALIFORNICA CALIFORNICA
COASTAL CALIFORNIA GNATCATCHER — Element Code: ABPBJ08080

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2T2	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: OBLIGATE, PERMANENT RESIDENT OF COASTAL SAGE SCRUB BELOW 2500 FT IN SOUTHERN CALIFORNIA.
Micro: LOW, COASTAL SAGE SCRUB IN ARID WASHES, ON MESAS & SLOPES. NOT ALL AREAS CLASSIFIED AS COASTAL SAGE SCRUB ARE OCCUPIED.

Occurrence No. 536 — Map Index: 42495
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: RESECK, J. 1999 (OBS)
Dates Last Seen — Element: 1999-04-02 — Site: 1999-04-02

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: 0.2 MILE SE OF JCT OF BRIDGE ST & HIGHWAY 79, ~1 MILE NW OF LABORDE CANYON, ~5 MILES NE OF LAKEVIEW, SAN JACINTO VALLEY.

Lat/Long: 33°52'01" / 117°02'30" — Township: 03S
UTM: Zone-11 N3747217 E496136 — Range: 02W
Mapping Precision: NON-SPECIFIC — Section: 36 Qtr XX
Symbol Type: POINT — Meridian: S
Radius: 2/5 mile — Elevation: 1500 ft

Comments
Distribution: MAPPED TO COORDINATES (LAT 33 52 00; LONG 117 02 30) GIVEN, AND ALSO TO COVER ELEVATION GIVEN.
Ecological: RIVERSIDIAN SAGE SCRUB DOMINATED BY ENCELIA FARINOSA, ARTEMISIA CALIFORNICA, ERIOGONUM FASCICULATUM.
Threat: BURNING; FIRE ABATEMANT (MOWING); CATTLE GRAZING.
General: 2 OBSERVED FORAGING, 1999.
Owner/Manager: UNKNOWN

Source Codes
RES99F32

AGELAIUS TRICOLOR (NESTING COLONY)
TRICOLORED BLACKBIRD — Element Code: ABPBXB0020

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G3	CDFG Status: SC
State: None	State: S3	

Habitat Associations
General: HIGHLY COLONIAL SPECIES, MOST NUMBEROUS IN THE CENTRAL VALLEY & VICINITY. LARGELY ENDEMIC TO CALIFORNIA.
Micro: REQUIRES OPEN WATER, PROTECTED NESTING SUBSTRATE, & FORAGING AREA WITH INSECT PREY WITHIN A FEW KM OF THE COLONY.

* SENSITIVE *
Occurrence No. 219 — Map Index: 21597
Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: DENCER, M. 1992 (OBS)
Dates Last Seen — Element: 1992-04-01 — Site: 1992-04-01

Quad Summary: LAKEVIEW (3311771/085D)*, EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary: San Jacinto Wildlife Refuge

Location: *SENSITIVE* Location information suppressed.

* SENSITIVE * Lat/Long: / — Township:
UTM: — Range:
Mapping Precision: — Section: Qtr
Symbol Type: — Meridian:
Radius: — Elevation:

Comments
Distribution: Please contact the Calfornia Natural Diversity Database, California Department of Fish and Game, for more information: (916) 324-3812.
Ecological: NESTING SUBSTRATE IS TYPHA SPP. AND WILLOWS. SURROUNDING LAND USE IS AGRICULTURE.
Threat:
General:
Owner/Manager:

Source Codes
DEN92F03

DIPODOMYS STEPHENSI
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 3 — Map Index: 03895
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Stable
Main Source: PRICE, M. 1991 (OBS)
Dates Last Seen — Element: 1991-10-XX — Site: 1991-10-XX

Quad Summary: SUNNYMEAD (3311782/085B)*, LAKEVIEW (3311771/085D), PERRIS (3311772/085C), EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: SURROUNDING PERRIS LAKE; MOST OF THE HABITAT IS LOCATED NORTH AND EAST OF THE LAKE.

Lat/Long: 33°52'15" / 117°10'18" — Township: 03S
UTM: Zone-11 N3747661 E484129 — Range: 03W
Mapping Precision: NON-SPECIFIC — Section: 24 Qtr XX
Symbol Type: POLYGON — Meridian: S
Area: 8,057.7 ac — Elevation: 1750 ft

Comments
Distribution: PATCHY DISTRIBUTION THROUGHOUT AREA. OBSERVATIONS SINCE 1972 INDICATE TRACE TO MEDIUM ABUNDANCES. THERE IS MUCH DISTRIBUTION DETAIL ON THE SOURCE MAPS. THE EXTREME SE PORTION HAS AN OBSERVATION WHICH RECORDS PRESENCE OF 239 INDIVIDUALS.
Ecological: PREVIOUSLY-CULTIVATED ANNUAL GRASSLAND BASIN SURROUNDED BY RIVERSIDIAN SAGE SCRUB. SOIL: CIENEBA, EXETER, GORGONIO, GREENFIELD, HANFORD, MONSERATE, PACHAPPA, PLACENTIA, RAMONA, VISTA. SLOPE: 0-15%.
Threat: DEVELOPMENT AND AGIRCULTURE ARE THREATS. THE SAN JACINTO PORTION (SE) HAS THE THREAT OF IMMINENT DEVELOPMENT.
General: A LARGE PORTION OF THIS SITE IS THE LAKE PERRIS SRA AND SAN JACINTO WILDLIFE AREA. WEST PORTIONS UNDER STUDY FOR HABITAT ENHANCEMENT. FUTURE STATE PARK PRACTICES NEED TO ADDRESS PROPER MANAGEMENT FOR SKR HABITAT. 13 SOURCE DOCUMENTS.
Owner/Manager: DPR, DFG, PVT

Source Codes
BEH90F02, MCC89F04, PRI91F02, PRI89F07, PRI89F03, PRI91F03, MCC91F03, FRI89F09, BEH90F01, OFA88F51, FRI89F08, MCC90F08, THO73R01, LSA91R02

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 45 — Map Index: 04090
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Extirpated
Trend: Unknown
Main Source: O'FARRELL, M. & C. UPTAIN 1988 (OBS)
Dates Last Seen — Element: 1980-03-XX — Site: 1988-09-18

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: ABOUT 2.0 MI SE LAKEVIEW. SW OF JUNIPER FLAT RD.

Lat/Long: 33°48'20" / 117°05'36" — Township: 04S
UTM: Zone-11 N3740411 E491362 — Range: 02W
Mapping Precision: NON-SPECIFIC — Section: 21 Qtr SE
Symbol Type: POINT — Meridian: S
Radius: 1/5 mile — Elevation: 1700 ft

Comments
Distribution: 1 TRAPPED IN 1980 BY PEARSON. O'FARRELL (1988) REPORTS ANIMALS AS BEING EXTIRPATED.
Ecological: ECOTONE OF COASTAL SAGE SCRUB, CHAMISE CHAPARRAL. ALSO NON-NATIVE GRASSLAND.
Threat: POWER-LINE RIGHT OF WAY, RURAL HOUSING, DISKED, BURNED.
General:
Owner/Manager: UNKNOWN

Source Codes
PEA80R01, OFA88F56

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 46 — Map Index: 04335
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: PEARSON, D. 1980 (LIT)
Dates Last Seen — Element: 1994-09-15 — Site: 1994-09-15

Quad Summary: LAKEVIEW (3311771/085D)*, SAN JACINTO (3311678/084C)
County Summary: RIVERSIDE
SNA Summary:

Location: 1.0 MI NORTHWEST OF GILMAN HOT SPRINGS, EAST OF INTERSECTION GILMAN SPRINGS ROAD AND HIGHWAY 79.

Lat/Long: 33°50'48" / 117°00'06"
UTM: Zone-11 N3744959 E499838
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Area: 36.9 ac
Township: 04S
Range: 01W
Section: 05 Qtr SE
Meridian: S
Elevation: 1700 ft

Comments
Distribution: 3 CAPTURED IN THE WESTERN PORTION OF TRAP LINE 12, 1994. 1 TRAPPED, 1980.
Ecological: COASTAL SAGE SCRUB HABITAT. SPARCE RUDERAL GRASSLAND, WITH GENERALLY LOAMY SOILS AND PATCHES OF SANDY/LOAMY SUBSTRATE.
Threat: ROAD, HIGHWAY EXPANSION PROJECT.
General:
Owner/Manager: RIV CO HWY COMMISSION

Source Codes
PEA80R01, MON94R01

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 47 — Map Index: 04319
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Extirpated
Trend: Unknown
Main Source: O'FARRELL, M. & C. UPTAIN 1988 (OBS)
Dates Last Seen — Element: 1980-03-04 — Site: 1988-09-19

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN JACINTO VALLEY, ABOUT 1.5 MI NW GILMAN HOT SPRINGS.

Lat/Long: 33°50'46" / 117°00'30"
UTM: Zone-11 N3744886 E499220
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile
Township: 04S
Range: 01W
Section: 05 Qtr S
Meridian: S
Elevation: 1650 ft

Comments
Distribution:
Ecological: AGRICULTURAL FIELD BORDERED BY RIVERSIDIAN SAGE SCRUB. SLOPE 0 TO 25%.
Threat: AGRICULTURE.
General:
Owner/Manager: PVT

Source Codes
PEA80R01, OFA88F55

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 68 — Map Index: 04023
Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: PRICE, M. 1988 (OBS)
Dates Last Seen — Element: 1991-08-XX — Site: 1991-08-XX

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN JACINTO WILDLIFE AREA, EAST OF LAKE PERRIS, 0.5 KM EAST DAVIS ROAD AND 2 KM NORTH OF RAMONA HWY.

Lat/Long: 33°51'47" / 117°06'22"
UTM: Zone-11 N3746782 E490184
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile
Township: 03S
Range: 02W
Section: 32 Qtr SE
Meridian: S
Elevation: 1430 ft

Comments
Distribution: 10 INDIVIDUALS TRAPPED IN 1988.
Ecological: ANNUAL GRASSLAND DOMINATED BY ERODIUM, BROMUS AND AVENA. SMALL AND COARSE SANDY LOAM.
Threat:
General: REPORT: INDIVIDUAL GROWTH, RAINFALL PATTERNS, SURVIVORSHIP, REPRODUCTION PHENOLOGY, CHANGES IN POPULATION DENSITY, STUDY SITES AND LIVE TRAPPING PROTOCOLS, MICROHABITAT MEASUREMENTS, SPATIAL DISTRIBUTIONS OF KANGAROO RATS, VEG STRUCTURE.
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
PRI88F01, RIV95R01

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 83 — Map Index: 20103
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: O'FARRELL, M. 1989 (OBS)
Dates Last Seen — Element: 1993-05-19 — Site: 1993-05-19

Quad Summary: SAN JACINTO (3311678/084C)*, BEAUMONT (3311688/084B), LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: 2 MILES SE OF BEAUMONT

Lat/Long: 33°52'02" / 116°57'17"
UTM: Zone-11 N3747247 E504176
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Area: 11,707.1 ac
Township: 03S
Range: 01W
Section: XX Qtr XX
Meridian: S
Elevation: 2400 ft

Comments
Distribution: 1993 OBSERVATIONS IN T3S, R1W, SECTIONS 15 & 22.
Ecological: NON-NATIVE GRASSLAND AND OVER-GRAZED DRYLAND GRAIN FIELDS. SOIL SEEMS TO BE LIMITING FACTOR FOR D. STEPHENSI.
Threat: HEAVY GRAZING, DRYLAND GRAIN CROPS, HEAVY EQUIPMENT TRAINING SITE; PROPOSED RESERVOIR SITE. PROPOSED HOUSING DEVELOPMENT
General: 3 SITES SURVEYED IN AREA IN 1989, A TOTAL OF 9 ANIMALS TRAPPED IN 2 SITES; THIRD SITE WAS A SURVEY OF 18 SECTIONS ON 2 ADJACENT QUADS; FOUND CONSISTENT MEDIUM ABUNDANCE OF STEPHEN'S K-RAT. UNKNOWN NUMBER OBS IN 1993.
Owner/Manager: PVT, BLM

Source Codes
MON89F08, BAX93F02, OFA89F03, OFA88F76, MON89F07

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 118 — Map Index: 20487
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: MONTGOMERY, S. 1989 (OBS)
Dates Last Seen — Element: 1989-08-31 — Site: 1989-08-31

Quad Summary: LAKEVIEW (3311771/085D)*, SAN JACINTO (3311678/084C)
County Summary: RIVERSIDE
SNA Summary:

Location: EAST OF HWY 79. 3 MI N OF SANDERSON AVE. JCT. WITH MEAD RD.

Lat/Long: 33°51'42" / 117°00'05" — Township: 03S
UTM: Zone-11 N3746619 E499871 — Range: 01W
Mapping Precision: NON-SPECIFIC — Section: 32 Qtr SE
Symbol Type: POINT — Meridian: S
Radius: 1/5 mile — Elevation: 2000 ft

Comments
Distribution: HIGH QUALITY HABITAT IN EXTREME SE CORNER. LIMITED IN AREA ALONG RIDGELINE. 2 INDIVIDUALS FOUND.
Ecological: STEEP CANYONS AND SLOPES WITH ROUNDED RIDGES; SAGE SCRUB WITH SOME DENSE CAHPARRAL STANDS. BURNED IN SEVERAL AREAS.
Threat: SHEEP GRAZING.
General:
Owner/Manager: BLM

Source Codes
MON89F19

CHAETODIPUS (=PEROGNATHUS) FALLAX FALLAX
NORTHWESTERN SAN DIEGO POCKET MOUSE — Element Code: AMAFD05031

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3?	CDFG Status: SC
State: None	State: S2S3	

Habitat Associations
General: COASTAL SCRUB, CHAPARRAL, GRASSLANDS, SAGEBRUSH, ETC. IN WESTERN SAN DIEGO CO.
Micro: SANDY, HERBACEOUS AREAS, USUALLY IN ASSOCIATION WITH ROCKS OR COARSE GRAVEL.

Occurrence No. 3 — Map Index: 04335
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: MONTGOMERY, S. 1994 (OBS)
Dates Last Seen — Element: 1994-09-16 — Site: 1994-09-19

Quad Summary: LAKEVIEW (3311771/085D)*, SAN JACINTO (3311678/084C)
County Summary: RIVERSIDE
SNA Summary:

Location: 1.0 MI NORTHWEST OF GILMAN HOT SPRINGS, EAST OF INTERSECTION GILMAN SPRINGS ROAD AND HIGHWAY 79.

Lat/Long: 33°50'48" / 117°00'06" — Township: 04S
UTM: Zone-11 N3744959 E499838 — Range: 01W
Mapping Precision: NON-SPECIFIC — Section: 05 Qtr SE
Symbol Type: POLYGON — Meridian: S
Area: 36.9 ac — Elevation: 1700 ft

Comments
Distribution: CAPTURED AT TRAP SITES 12 AND 13.
Ecological: COASTAL SAGE SCRUB HABITAT. SPARCE RUDERAL GRASSLAND, WITH GENERALLY LOAMY SOILS AND PATCHES OF SANDY/LOAMY SUBSTRATE.
Threat: ROAD, HIGHWAY EXPANSION PROJECT (RIVERSIDE COUNTY HIGHWAY COMMISSION)
General: 3 CAPTURED JULY 1994 AND 2 CAPTURED SEPT 1994.
Owner/Manager: RIV CO HWY COMMISSION

Source Codes
MON94F12, MON94R01

CHAETODIPUS (=PEROGNATHUS) FALLAX FALLAX (cont.)
NORTHWESTERN SAN DIEGO POCKET MOUSE — Element Code: AMAFD05031

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3?	CDFG Status: SC
State: None	State: S2S3	

Habitat Associations
General: COASTAL SCRUB, CHAPARRAL, GRASSLANDS, SAGEBRUSH, ETC. IN WESTERN SAN DIEGO CO.
Micro: SANDY, HERBACEOUS AREAS, USUALLY IN ASSOCIATION WITH ROCKS OR COARSE GRAVEL.

Occurrence No. 4 — Map Index: 38453
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: MONTGOMERY, S. 1994 (OBS)
Dates Last Seen — Element: 1994-07-28 — Site: 1994-07-27

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: HIGHWAY 79, 2 AIR MILES NNW OF GILMAN HOT SPRINGS AND 0.3 MILE NE OF WATER TANKS IN LAMB CANYON.

Lat/Long: 33°51'47" / 117°00'29" — Township: 03S
UTM: Zone-11 N3746789 E499266 — Range: 01W
Mapping Precision: SPECIFIC — Section: 32 Qtr SW
Symbol Type: POINT — Meridian: S
Radius: 80 meters — Elevation: 1980 ft

Comments
Distribution: TRAP SITE #4, UPHILL AND WEST OF HIGHWAY 79
Ecological: COASTAL SAGE SCRUB HABITAT.
Threat: ROAD, HIGHWAY EXPANSION PROJECT (RIVERSIDE COUNTY HIGHWAY COMMISSION)
General: 1 CAPTURED, 1994, AGE UNDETERMINED.
Owner/Manager: FVT

Source Codes
MON94F13, MON94R01

PHRYNOSOMA CORONATUM BLAINVILLEI
SAN DIEGO HORNED LIZARD — Element Code: ARACF12021

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3T4	CDFG Status: SC
State: None	State: S2S3	

Habitat Associations
General: INHABITS COASTAL SAGE SCRUB AND CHAPARRAL IN ARID AND SEMI-ARID CLIMATE CONDIT
Micro: PREFERS FRIABLE, ROCKY, OR SHALLOW SANDY SOILS.

Occurrence No. 229 — Map Index: 04330
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRODE, J. 1986 (PERS)
Dates Last Seen — Element: XXXX-XX-XX — Site: XXXX-XX-XX

Quad Summary: LAKEVIEW (3311771/085D)*, SAN JACINTO (3311678/084C)
County Summary: RIVERSIDE
SNA Summary:

Location: 3 MI NW SAN JACINTO.

Lat/Long: 33°49'24" / 117°00'15" — Township: 04S
UTM: Zone-11 N3742374 E499614 — Range: 01W
Mapping Precision: NON-SPECIFIC — Section: 17 Qtr E
Symbol Type: POINT — Meridian: S
Radius: 1 mile — Elevation: 1460 ft

Comments
Distribution:
Ecological:
Threat:
General: LACM SPECIMEN; COLLECTION DATE UNKNOWN.
Owner/Manager: UNKNOWN

Source Codes
ER086U05

CNEMIDOPHORUS HYPERYTHRUS
ORANGE-THROATED WHIPTAIL — Element Code: ARACJ02060

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: INHABITS LOW-ELEVATION COASTAL SCRUB, CHAPARRAL, AND VALLEY-FOOTHILL HARDWOOD HABITATS.
Micro: PREFERS WASHES & OTHER SANDY AREAS WITH PATCHES OF BRUSH & ROCKS. PERENNIAL PLANTS NECESSARY FOR ITS MAJOR FOOD-TERMITES

Occurrence No. 126 — Map Index: 17868
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: LA RUE, E. 1989 (OBS)

Dates Last Seen — Element: 1989-06-11 — Site: 1989-06-11

Quad Summary: PERRIS (3311772/085C)*, LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: IN LAKEVIEW MOUNTAINS, ABOUT 3 MILES NORTHEAST OF ROMOLAND.

Lat/Long: 33°46'47" / 117°07'48" — Township: 04S
UTM: Zone-11 N3737559 E487972 — Range: 02W
Mapping Precision: NON-SPECIFIC — Section: 31 Qtr XX
Symbol Type: POINT — Meridian: S
Radius: 3/5 mile — Elevation: 2000 ft

Comments
Distribution: 2 ADULTS OBSERVED IN SPARSE BURNED CHAPARRAL ON BANKS OF SEASONAL DRAINAGES (NO WATER PRESENT).
Ecological: AREA HAD BEEN BURNED WITHIN THE LAST YEAR. COMMON PLANTS INCLUDE ADENOSTOMA FASCICULATA, ERIOGONIUM FASCICULATUM, RHUS OVATA. SPARSE VEGETATION ON SIDES OF DRY DRAINAGES WITH GRANITE ROCK OUTCROPS.
Threat: PLANNED DEVELOPMENT.
General:
Owner/Manager: PVT

Source Codes
LAR89F09

CNEMIDOPHORUS HYPERYTHRUS (cont.)
ORANGE-THROATED WHIPTAIL — Element Code: ARACJ02060

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: INHABITS LOW-ELEVATION COASTAL SCRUB, CHAPARRAL, AND VALLEY-FOOTHILL HARDWOOD HABITATS.
Micro: PREFERS WASHES & OTHER SANDY AREAS WITH PATCHES OF BRUSH & ROCKS. PERENNIAL PLANTS NECESSARY FOR ITS MAJOR FOOD-TERMITES

Occurrence No. 128 — Map Index: 17862
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: MITCHELL, D. 1991 (OBS)

Dates Last Seen — Element: 1991-06-28 — Site: 1991-06-28

Quad Summary: LAKEVIEW (3311771/085D)*, SAN JACINTO (3311678/084C)
County Summary: RIVERSIDE
SNA Summary:

Location: ALONG STATE ROUTE 79 FROM JUNCTION WITH GILMAN SPRINGS ROAD NORTH INTO THE BADLANDS.

Lat/Long: 33°51'20" / 117°00'26" — Township: 04S
UTM: Zone-11 N3745943 E499334 — Range: 01W
Mapping Precision: NON-SPECIFIC — Section: 05 Qtr N
Symbol Type: POINT — Meridian: S
Radius: 1 mile — Elevation: 1600 ft

Comments
Distribution: LIZARDS SEEN DURING SEVERAL VISITS TO THIS SITE, MOST NEAR THE JUNCTION OF GILMAN SPRINGS ROAD.
Ecological: MIXED RIVERSIDEAN COASTAL SAGE SCRUB AND RUDERAL PLANT ASSOCIATION; BRITTLE-BRUSH, SHORT-POD MUSTARD, SLENDER WILD OATS, PRICKLY PEAS, RANCHER'S FIDDLENECK.
Threat: PLANNED HIGHWAY IMPROVEMENTS MAY IMPACT THE HABITAT AND POPULATION NUMBERS IN THIS AREA.
General: DATES OF SITINGS ARE AS FOLLOWS: 19 APRIL 1991 (ONE OBSERVED), 13 MAY 1991 (ONE OBSERVED), AND 28 JUNE 1991 (TWO OBSERVED).
Owner/Manager: RIV COUNTY, CALTRANS

Source Codes
MIT91F01, MIT91F02

CNEMIDOPHORUS HYPERYTHRUS (cont.)
ORANGE-THROATED WHIPTAIL — Element Code: ARACJ02060

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: INHABITS LOW-ELEVATION COASTAL SCRUB, CHAPARRAL, AND VALLEY-FOOTHILL HARDWOOD HABITATS.
Micro: PREFERS WASHES & OTHER SANDY AREAS WITH PATCHES OF BRUSH & ROCKS. PERENNIAL PLANTS NECESSARY FOR ITS MAJOR FOOD-TERMITES

Occurrence No. 182 — Map Index: 20929
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRATTSTROM, B. 1991 (LIT)

Dates Last Seen — Element: 1990-06-11 — Site: 1990-06-11

Quad Summary: WINCHESTER (3311761/068A)*, LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: HOMELAND, 0.75 MI NE OF JUNCTION OF JUNIPER FLAT ROAD AND HWY 74.

Lat/Long: 33°44'59" / 117°06'18" — Township: 05S
UTM: Zone-11 N3734227 E490285 — Range: 02W
Mapping Precision: NON-SPECIFIC — Section: 08 Qtr E
Symbol Type: POINT — Meridian: S
Radius: 1/5 mile — Elevation: 1740 ft

Comments
Distribution:
Ecological: PERENNIALS: MALOSMA LAURINA, ERIOGONUM SP, ARTEMISIA TRIDENTATA, SALVIA LUECOPHYLOA , SALVIA APIANA
Threat: ORVS, ROADS
General: 1 OBSERVED BY LEATERMAN AND STRONG, 1990.
Owner/Manager: UNKNOWN

Source Codes
BRA91R02, LEA90F07

SOUTHERN COTTONWOOD WILLOW RIPARIAN FOREST
Element Code: CTT61330CA

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G3	
State: None	State: S3.2	

Habitat Associations
General:
Micro:

Occurrence No. 81 — Map Index: 04304
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: HOLLAND, R. 1988 (MAP)

Dates Last Seen — Element: 1980-04-10 — Site: 1991-05-13

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: LAMB CANYON, FROM ABOUT 1600 TO 1800 FT, TRIBUTARY TO SAN JACINTO RIVER, E OF LAKEVIEW.

Lat/Long: 33°51'48" / 117°00'37" — Township: 03S
UTM: Zone-11 N3746822 E499039 — Range: 01W
Mapping Precision: SPECIFIC — Section: 32 Qtr SW
Symbol Type: POLYGON — Meridian: S
Area: 28.9 ac — Elevation: 1680 ft

Comments
Distribution: MAPPED FROM INTERPRETATION OF 1980 AERIAL PHOTOS. THE FOREST IS CONFINED TO THE BOTTOM OF THE STEEP-WALLED CANYON.
Ecological: MAPPED BY WIESLANDER SURVEY (1935) AS CLOSED CANOPY POPULUS FREMONTII.
Threat:
General: NEEDS FIELD VERIFICATION OF VEGETATION CONDITION, COMPOSITION. THIS WAS OCC #081 OF CTT61330CA.
Owner/Manager: BLM

Source Codes
MIT91F03, HOL88M01, USF35M01

SOUTHERN COTTONWOOD WILLOW RIPARIAN FOREST (cont.)
Element Code: CTT61330CA

Status: Federal: None, State: None
NDDB Element Ranks: Global: G3, State: S3.2
Other Lists:

Habitat Associations
General:
Micro:

Occurrence No. 101 Map Index: 04443
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Extirpated
Trend: Unknown
Main Source: HOLLAND, R. 1988 (MAP)
Dates Last Seen: Element: 1935-XX-XX, Site: 1980-04-10

Quad Summary: SAN JACINTO (3311678/084C)*, LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN JACINTO RIVER BED, FROM JUST S OF GILAMN HOT SPRINGS FOR2 MI U/S.

Lat/Long: 33°49'01" / 116°58'13"
UTM: Zone-11 N3741668 E502758
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 408.4 ac
Township: 04S
Range: 01W
Section: XX Qtr XX
Meridian: S
Elevation: 1500 ft

Comments
Distribution: EXTIRPATED BY AGRICULTURE PER INTERPRETATION OF AERIAL PHOTOS.
Ecological: MAPPED BY WIESLANDER SURVEY (1935) AS CLOSED CANOPY POPULUS FREMONTII.
Threat:
General: THIS WAS OCC #101 OF CTT61330CA.
Owner/Manager: PVT

Source Codes
HOL88M01, USF35M01

SOUTHERN COTTONWOOD WILLOW RIPARIAN FOREST (cont.)
Element Code: CTT61330CA

Status: Federal: None, State: None
NDDB Element Ranks: Global: G3, State: S3.2
Other Lists:

Habitat Associations
General:
Micro:

Occurrence No. 102 Map Index: 04411
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Extirpated
Trend: Unknown
Main Source: HOLLAND, R. 1988 (MAP)
Dates Last Seen: Element: 1935-XX-XX, Site: 1980-04-10

Quad Summary: SAN JACINTO (3311678/084C)*, LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN JACINTO RIVER BED, FROM JUST BELOW (W OF) GILMAN HOT SPRINGS TO 2 MI ABOVE (E).

Lat/Long: 33°49'41" / 116°58'51"
UTM: Zone-11 N3742912 E501784
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 415.5 ac
Township: 04S
Range: 01W
Section: XX Qtr XX
Meridian: S
Elevation: 1490 ft

Comments
Distribution: EXTIRPATED BY DEVELOPMENT OF A GOLF COURSE PER INTERPRETATION OF 1980 AERIAL PHOTOS.
Ecological: MAPPED BY WIESLANDER SURVEY (1935) AS CLOSED CANOPY POPULUS FREMONTII.
Threat:
General: THIS WAS OCC #102 OF CTT61330CA.
Owner/Manager: PVT

Source Codes
HOL88M01, USF35M01

SOUTHERN RIPARIAN SCRUB
Element Code: CTT63300CA

Status: Federal: None, State: None
NDDB Element Ranks: Global: G3, State: S3.2
Other Lists:

Habitat Associations
General:
Micro:

Occurrence No. 45 Map Index: 04230
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: HOLLAND, R. 1988 (MAP)
Dates Last Seen: Element: 1980-04-10, Site: 1980-04-10

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: UNNAMED INTERMITTENT CRK PARALLEL TO AND JUST SW OF PICO RD, SAN JACINTO VALLEY.

Lat/Long: 33°49'38" / 117°02'47"
UTM: Zone-11 N3742817 E495700
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 102.7 ac
Township: 04S
Range: 02W
Section: 13 Qtr XX
Meridian: S
Elevation: 1450 ft

Comments
Distribution:
Ecological: 1980 EXTENT MAPPED FROM INTERPRETATION OF AERIAL PHOTOGRAPHS. UNABLE TO CONVERT TO FLORISTIC CLASSIFICATION, LACKS SPP. INFO
Threat:
General: NEEDS FIELD VERIFICATION OF VEGETATION CONDITION, COMPOSITION.
Owner/Manager: PVT

Source Codes
HOL88M01

CENTROMADIA PUNGENS SSP LAEVIS
SMOOTH TARPLANT
Element Code: PDAST4R0R4

Status: Federal: None, State: None
NDDB Element Ranks: Global: G5T2, State: S2.1
Other Lists: CNPS List: 1B, R-E-D Code: 2-3-3

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND, CHENOPOD SCRUB, MEADOWS, PLAYAS, RIPARIAN WOODLAND.
Micro: ALKALI MEADOW, ALKALI SCRUB; ALSO IN DISTURBED PLACES. 0-480M.

Occurrence No. 15 Map Index: 28231
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1990 (OBS)
Dates Last Seen: Element: 1990-07-20, Site: 1990-07-20

Quad Summary: LAKEVIEW (3311771/085D)*, EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: CDFG SAN JACINTO WILDLIFE AREA, ABOUT 0.6 MILE NORTH OF SUMMIT OF HILL "1981" AND 2.5 MILES NORTH OF LAKEVIEW.

Lat/Long: 33°52'29" / 117°06'44"
UTM: Zone-11 N3748082 E489609
Mapping Precision: SPECIFIC
Symbol Type: POINT
Radius: 80 meters
Township: 03S
Range: 02W
Section: 29 Qtr SW
Meridian: S
Elevation: 1425 ft

Comments
Distribution: JUST WEST OF THE OLD SAN JACINTO RIVER CHANNEL AND EAST OF PEAK 1890, WITHIN THE SE 1/4 OF THE SW 1/4 OF SECTION 29.
Ecological: VALLEY SINK SCRUB W/ATRIPLEX ARGENTEA, A. ROSEA, SUAEDA TORREYANA, SALSOLA IBERICA, SISYMBRIUM IRIO, FRANKENIA GRANDIFOLIA, SALICORNIA SUBTERMINALIS, HORDEUM LEPORINUM, AND MEDICAGO POLYMORPHA. SOIL IS SANDY LOAM AND SILTY CLAY, ALKALINE.
Threat:
General: 1200 PLANTS OBSERVED IN 1990. ALSO GROWING HERE IS THE RARE ATRIPLEX CORONATA VAR. NOTATIOR.
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
BRA90F34

CENTROMADIA PUNGENS SSP LAEVIS (cont.)
SMOOTH TARPLANT — Element Code: PDAST4R0R4

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-3

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND, CHENOPOD SCRUB, MEADOWS, PLAYAS, RIPARIAN WOODLAND.
Micro: ALKALI MEADOW, ALKALI SCRUB; ALSO IN DISTURBED PLACES. 0-480M.

Occurrence No. 16 — Map Index: 28230
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1990 (OBS)

Dates Last Seen
Element: 1990-07-20
Site: 1990-07-20

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: CDFG SAN JACINTO WILDLIFE AREA, JUST EAST OF DAVIS ROAD AND ABOUT 2.3 MILES NORTH OF LAKEVIEW.

Lat/Long: 33°52'17" / 117°07'12"
UTM: Zone-11 N3747716 E488913
Mapping Precision: SPECIFIC
Symbol Type: POINT
Radius: 80 meters
Township: 03S
Range: 02W
Section: 32 Qtr NW
Meridian: S
Elevation: 1425 ft

Comments
Distribution: SITE IS JUST ACROSS ROAD (SOUTH OF) WILDLIFE AREA HEADQUARTERS BUILDING.
Ecological: RUDERAL HABITAT WITH ATRIPLEX ROSEA, SALSOLA IBERICA, SCHISMUS BARBATUS, AND BROMUS RUBENS.
Threat:
General: 200 PLANTS OBESERVED IN 1990.
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
BRA90F35

CENTROMADIA PUNGENS SSP LAEVIS (cont.)
SMOOTH TARPLANT — Element Code: PDAST4R0R4

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-3

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND, CHENOPOD SCRUB, MEADOWS, PLAYAS, RIPARIAN WOODLAND.
Micro: ALKALI MEADOW, ALKALI SCRUB; ALSO IN DISTURBED PLACES. 0-480M.

Occurrence No. 17 — Map Index: 28229
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: ERC 1990 (MAP)

Dates Last Seen
Element: 1990-XX-XX
Site: 1990-XX-XX

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: CDFG SAN JACINTO WILDLIFE AREA, IN DUCK PONDS 1.5 MILES EAST OF DAVIS ROAD AND 0.5 MILE NORTH OF SAN JACINTO RIVER.

Lat/Long: 33°51'58" / 117°05'39"
UTM: Zone-11 N3747125 E491281
Mapping Precision: SPECIFIC
Symbol Type: POINT
Radius: 80 meters
Township: 03S
Range: 02W
Section: 33 Qtr SW
Meridian: S
Elevation: 1430 ft

Comments
Distribution: MAPPED NEAR THE NE CORNER OF THE SW 1/4 OF SECTION 33.
Ecological:
Threat:
General: 3 PLANTS OBSERVED IN 1990. ONLY SOURCE OF INFORMATION FOR THIS SITE IS 1990 MAP BY ERC ENVIRONMENTAL AND ENERGY SERVICES CO.
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
ERC90M02

CENTROMADIA PUNGENS SSP LAEVIS (cont.)
SMOOTH TARPLANT — Element Code: PDAST4R0R4

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-3

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND, CHENOPOD SCRUB, MEADOWS, PLAYAS, RIPARIAN WOODLAND.
Micro: ALKALI MEADOW, ALKALI SCRUB; ALSO IN DISTURBED PLACES. 0-480M.

Occurrence No. 18 — Map Index: 28228
Occ Rank: Poor
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: WOOD, M. 1990 (OBS)

Dates Last Seen
Element: 1990-05-10
Site: 1990-05-10

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: 1 MILE EAST OF DAVIS ROAD AND 0.7 MILE NORTH OF THE RAMONA EXPRESSWAY, NORTHEAST OF LAKEVIEW.

Lat/Long: 33°50'59" / 117°06'12"
UTM: Zone-11 N3745292 E490436
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 9.7 ac
Township: 04S
Range: 02W
Section: 05 Qtr SE
Meridian: S
Elevation: 1430 ft

Comments
Distribution: TWO COLONIES MAPPED; NORTHERN ONE IN DRY TIRE TRACKS ON EAST SIDE OF DIRT ROAD 200 METERS NORTH OF MARVIN ROAD, SOUTH OF THE SAN JACINTO RIVER CHANNEL. SECOND COLONY IS ABOUT 300 METERS TO THE SOUTH.
Ecological: GROWING IN DISTURBED FIELD/ALKALI MEADOW WITH CRESSA, BASSIA, DISTICHLIS, AND ATRIPLEX.
Threat:
General: 548 PLANTS OBSERVED IN 1990 (533 IN ONE STAND; 15 IN THE OTHER). PLANTS ARE SMALL, DISPERSED - NOT A HIGH QUALITY STAND.
Owner/Manager: UNKNOWN

Source Codes
ERC90M02, WOO90F73

CENTROMADIA PUNGENS SSP LAEVIS (cont.)
SMOOTH TARPLANT — Element Code: PDAST4R0R4

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-3

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND, CHENOPOD SCRUB, MEADOWS, PLAYAS, RIPARIAN WOODLAND.
Micro: ALKALI MEADOW, ALKALI SCRUB; ALSO IN DISTURBED PLACES. 0-480M.

Occurrence No. 19 — Map Index: 28227
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: ERC 1990 (MAP)

Dates Last Seen
Element: 1990-XX-XX
Site: 1990-XX-XX

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: SOUTH SIDE OF SAN JACINTO RIVER, ABOUT 1.1 MILES NORTHWEST OF BRIDGE STREET CROSSING, NORTHEAST OF LAKEVIEW.

Lat/Long: 33°51'34" / 117°05'03"
UTM: Zone-11 N3746379 E492220
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 4.4 ac
Township: 04S
Range: 02W
Section: 03 Qtr NW
Meridian: S
Elevation: 1430 ft

Comments
Distribution: MAPPED IN THE NW-MOST CORNER OF SECTION 3 ALONG THE RIVER LEVEE.
Ecological:
Threat:
General: 1100 PLANTS OBSERVED IN 1990. ONLY SOURCE OF INFORMATION FOR THIS SITE IS 1990 MAP BY ERC.
Owner/Manager: UNKNOWN

Source Codes
ERC90M02

CENTROMADIA PUNGENS SSP LAEVIS (cont.)
SMOOTH TARPLANT — Element Code: PDAST4R0R4

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-3

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND, CHENOPOD SCRUB, MEADOWS, PLAYAS, RIPARIAN WOODLAND.
Micro: ALKALI MEADOW, ALKALI SCRUB; ALSO IN DISTURBED PLACES. 0-480M.

Occurrence No. 20 — Map Index: 28226
Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: WOOD, M. 1990 (OBS)
Dates Last Seen — Element: 1990-04-10 — Site: 1990-04-10

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: BOTH SIDES OF BRIDGE STREET ON NORTH SIDE OF SAN JACINTO RIVER, NORTHEAST OF LAKEVIEW.

Lat/Long: 33°51'16" / 117°04'07" — Township: 04S
UTM: Zone-11 N3745840 E493658 — Range: 02W
Mapping Precision: SPECIFIC — Section: 03 Qtr NE
Symbol Type: POLYGON — Meridian: S
Area: 16.5 ac — Elevation: 1430 ft

Comments
Distribution: TWO COLONIES ALONG THE NORTH LEVEE OF THE RIVER; NORTH COLONY IS ABOUT 50 FEET WEST OF BRIDGE STREET, THE SECOND IS NEAR THE GAGING STATION EAST OF BRIGE STREET.
Ecological: FALLOW, PLOWED FIELD WITH DENSE, HEAVY SOILS AND LEVEL TOPOGRAPHY.
Threat: AGRICULTURE.
General: 5000 PLANTS OBERSERVED IN WESTERN COLONY AND 10 IN EASTERN COLONY IN 1990. WESTERN COLONY IS A RELATIVELY PURE, EXTENSIVE STAND.
Owner/Manager: UNKNOWN

Source Codes
ERC90M02, WOO90F75

CENTROMADIA PUNGENS SSP LAEVIS (cont.)
SMOOTH TARPLANT — Element Code: PDAST4R0R4

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-3

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND, CHENOPOD SCRUB, MEADOWS, PLAYAS, RIPARIAN WOODLAND.
Micro: ALKALI MEADOW, ALKALI SCRUB; ALSO IN DISTURBED PLACES. 0-480M.

Occurrence No. 21 — Map Index: 28225
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: WOOD, M. 1990 (OBS)
Dates Last Seen — Element: 1990-04-10 — Site: 1990-04-10

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: 0.15 MILE NORTH OF SAN JACINTO RIVER AND 1.2 MILE EAST OF BRIDGE STREET, SAN JACINTO VALLEY.

Lat/Long: 33°50'59" / 117°02'46" — Township: 04S
UTM: Zone-11 N3745315 E495735 — Range: 02W
Mapping Precision: SPECIFIC — Section: 01 Qtr SW
Symbol Type: POINT — Meridian: S
Radius: 80 meters — Elevation: 1450 ft

Comments
Distribution: SCATTERED CLUMPS IN UNCULTIVATED BASIN NEXT TO STAGING AREA FOR FARM EQUIPMENT.
Ecological: LARGE INDIVIDUALS INTERSPERSED AMONG DENSE COVER OF PHALARIS, CONYZA, LACTUCA, BRASSICA, AND HELIANTHUS.
Threat:
General: 140 PLANTS OBSERVED IN 1990.
Owner/Manager: UNKNOWN

Source Codes
WOO90F72

CENTROMADIA PUNGENS SSP LAEVIS (cont.)
SMOOTH TARPLANT — Element Code: PDAST4R0R4

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-3

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND, CHENOPOD SCRUB, MEADOWS, PLAYAS, RIPARIAN WOODLAND.
Micro: ALKALI MEADOW, ALKALI SCRUB; ALSO IN DISTURBED PLACES. 0-480M.

Occurrence No. 22 — Map Index: 28224
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: WOOD, M. 1990 (OBS)
Dates Last Seen — Element: 1990-04-10 — Site: 1990-04-10

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: NORTHEAST EDGE OF DUCK POND/AG DRAINAGE DITCH ABOUT 0.7 MI NORTH OF RAMONA EXPRESSWAY AT WARREN RD, SAN JACINTO VALLEY.

Lat/Long: 33°49'58" / 117°01'51" — Township: 04S
UTM: Zone-11 N3743426 E497144 — Range: 01W
Mapping Precision: SPECIFIC — Section: 07 Qtr SW
Symbol Type: POLYGON — Meridian: S
Area: 6.9 ac — Elevation: 1450 ft

Comments
Distribution: PLANTS DISTRIBUTED IN SEVERAL PATCHES NEAR THE 'ELBOW' OF A NARROW AGRICULTURAL DRANAGE DITCH (DUCK POND?) ALONG EASTERN AND NORTHERN FOOT OF SMALL HILL.
Ecological: AGRICULTURAL DRAINAGE DITCH WITH MELILOTUS, HELIANTHUS, LACTUCA, AND BASSIA.
Threat: AGRICULTURE.
General: 1524 PLANTS OBSERVED IN 1990. SITE/OCCURRENCE COULD BE ENHANCED BY CLEARING THE WEEDY SPECIES.
Owner/Manager: UNKNOWN

Source Codes
WOO90F74

CENTROMADIA PUNGENS SSP LAEVIS (cont.)
SMOOTH TARPLANT — Element Code: PDAST4R0R4

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-3

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND, CHENOPOD SCRUB, MEADOWS, PLAYAS, RIPARIAN WOODLAND.
Micro: ALKALI MEADOW, ALKALI SCRUB; ALSO IN DISTURBED PLACES. 0-480M.

Occurrence No. 23 — Map Index: 28223
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1991 (OBS)
Dates Last Seen — Element: 1991-06-18 — Site: 1991-06-18

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: BOTH SIDES OF WARREN ROAD JUST SOUTH OF THE RAMONA EXPRESSWAY, SAN JACINTO VALLEY.

Lat/Long: 33°49'16" / 117°01'50" — Township: 04S
UTM: Zone-11 N3742135 E497166 — Range: 01W
Mapping Precision: SPECIFIC — Section: 18 Qtr S
Symbol Type: POLYGON — Meridian: S
Area: 52.5 ac — Elevation: 1460 ft

Comments
Distribution: SEVERAL COLONIES MAPPED AS 4 POLYGONS IN THIS AREA. WESTERNMOST IS JUST SOUTHWEST OF THE JUNCTION OF WARREN ROAD AND THE EXPRESSWAY, THE EASTERNMOST IS ABOUT 0.8 MILE EAST OF WARREN ROAD AND 0.2 MILE SOUTH OF THE EXPRESSWAY.
Ecological: ALKALINE SINK SCRUB WITH SUAEDA TORREYANA, BASSIA HYSSOPIFOLIA, SISYMBRIUM IRIO, HORDEUM LEPORINUM, ATRIPLEX ARGENTEA EXPANSA, A. SERENANA, DISTICHLIS SPICATA, LEPIDIUM DICTYOTUM, MATRICARIA MATRICARIOIDES, AND PLANTAGO BIGELOVII.
Threat: SITE MAY BE GRAZED BY SHEEP.
General: ABOUT 31,000 PLANTS OBSERVED IN 11 COLONIES IN 1990-1991.
Owner/Manager: UNKNOWN

Source Codes
BRA90S06, ERC90R05, BRA91F18, BRA90U05, BRA91F19, JAE32S02

CENTROMADIA PUNGENS SSP LAEVIS (cont.)
SMOOTH TARPLANT — Element Code: PDAST4R0R4

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-3

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND, CHENOPOD SCRUB, MEADOWS, PLAYAS, RIPARIAN WOODLAND.
Micro: ALKALI MEADOW, ALKALI SCRUB; ALSO IN DISTURBED PLACES. 0-480M.

Occurrence No. 24 — Map Index: 28221
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1991 (OBS)
Dates Last Seen — Element: 1991-06-01 — Site: 1991-06-01

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: ALONG ROADSIDE ON THE SOUTHEAST CORNER OF SANDERSON AVE AND RAMONA BLVD, SAN JACINTO VALLEY.

Lat/Long: 33°49'11" / 117°00'10" — Township: 04S
UTM: Zone-11 N3741972 E499731 — Range: 01W
Mapping Precision: SPECIFIC — Section: 17 Qtr SE
Symbol Type: POLYGON — Meridian: S
Area: 7.6 ac — Elevation: 1460 ft

Comments
Distribution: IN DITCH EAST OF SANDERSON AVE AND CONTINUING IN A DITCH ON THE SOUTHERN EDGE OF RAMONA BLVD WHICH CONTAINS THE LARGEST NUMBER OF PLANTS.
Ecological: DISTURBED ALKALINE MEADOW WITH BASSIA HYSSOPIFOLIA, AVENA FATUA, HORDEUM LEPORINUM, BROMUS DIANDRUS, SISYMBRIUM IRIO, ATRIPLEX ARGENTEA EXPANSA, SUAEDA TORREYANA, SPERGULARIA MARINA, DISTICHLIS SPICATA, LEPIDIUM DICTYOTUM, AND HELIANTHUS.
Threat: DITCH IS SUBJECT TO VARIOUS MAINTENANCE ACTIVITIES INCLUDING MOWING. POTENTIAL ROAD EXPANSION THREATENS THIS SITE.
General: 7000 PLANTS OBSERVED IN 1991.
Owner/Manager: UNKNOWN

Source Codes
BRA91F17

CENTROMADIA PUNGENS SSP LAEVIS (cont.)
SMOOTH TARPLANT — Element Code: PDAST4R0R4

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-3

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND, CHENOPOD SCRUB, MEADOWS, PLAYAS, RIPARIAN WOODLAND.
Micro: ALKALI MEADOW, ALKALI SCRUB; ALSO IN DISTURBED PLACES. 0-480M.

Occurrence No. 25 — Map Index: 28222
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: WHITE, S. 1992 (OBS)
Dates Last Seen — Element: 1992-05-XX — Site: 1992-05-XX

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: JUST EAST OF WARREN ROAD, ABOUT 0.8 MILE SOUTH OF THE RAMONA EXPRESSWAY, SAN JACINTO VALLEY.

Lat/Long: 33°48'43" / 117°01'52" — Township: 04S
UTM: Zone-11 N3741115 E497133 — Range: 01W
Mapping Precision: SPECIFIC — Section: 19 Qtr NW
Symbol Type: POLYGON — Meridian: S
Area: 5.6 ac — Elevation: 1480 ft

Comments
Distribution: SINGLE COLONY MAPPED FOR THIS OCCURRENCE. PLANTS ALSO OCCUR IN SECTIONS 20, 28 AND 29 ACCORDING TO WHITE. CNDDB ONLY HAS MAP DETAIL FOR COLONY IN SECTION 19. MORE INFO NEEDED FOR OTHER COLONIES.
Ecological: AGRICULTURAL FIELDS, DRAINAGE DITCH, DIRT BERMS AND ROADSIDES.
Threat: AGRICULTURE AND DEVELOPMENT; SITE IS HEAVILY DISTURBED.
General: 2000 PLANTS OBSERVED IN 1990. SPECIES ABUNDANT IN THE AREA (SECTIONS 19, 20, 28, 29) IN 1992. PROTECTION OF SITE IS DOUBTFUL ACCORDING TO WHITE.
Owner/Manager: PVT

Source Codes
ERC90R05, WHI92F05

CENTROMADIA PUNGENS SSP LAEVIS (cont.)
SMOOTH TARPLANT — Element Code: PDAST4R0R4

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-3

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND, CHENOPOD SCRUB, MEADOWS, PLAYAS, RIPARIAN WOODLAND.
Micro: ALKALI MEADOW, ALKALI SCRUB; ALSO IN DISTURBED PLACES. 0-480M.

Occurrence No. 26 — Map Index: 28220
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: ERC 1990 (MAP)
Dates Last Seen — Element: 1990-XX-XX — Site: 1990-XX-XX

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: BOTH SIDES OF COTTONWOOD AVE, ALONG EAST SIDE OF THE SAN DIEGO CANAL, SAN JACINTO VALLEY.

Lat/Long: 33°47'22" / 117°01'44" — Township: 04S
UTM: Zone-11 N3738605 E497327 — Range: 01W
Mapping Precision: SPECIFIC — Section: 30 Qtr SW
Symbol Type: POLYGON — Meridian: S
Area: 9.9 ac — Elevation: 1490 ft

Comments
Distribution: TWO COLONIES; ONE JUST SE OF JUNCTION OF SAN DIEGO CANAL AND CASA LOMA CANAL, THE OTHER IS ALONG CANAL ABOUT 0.15 MILE SOUTH OF COTTONWOOD AVE.
Ecological:
Threat:
General: 4000 PLANTS OBSERVED IN TWO COLONIES IN 1990. ONLY SOURCE OF INFORMATION FOR THIS SITE IS MAP DETAIL PROVIDED BY ERC (1990).
Owner/Manager: UNKNOWN

Source Codes
ERC90R05

CENTROMADIA PUNGENS SSP LAEVIS (cont.)
SMOOTH TARPLANT — Element Code: PDAST4R0R4

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-3

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND, CHENOPOD SCRUB, MEADOWS, PLAYAS, RIPARIAN WOODLAND.
Micro: ALKALI MEADOW, ALKALI SCRUB; ALSO IN DISTURBED PLACES. 0-480M.

Occurrence No. 27 — Map Index: 28219
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: ERC 1990 (MAP)
Dates Last Seen — Element: 1990-XX-XX — Site: 1990-XX-XX

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: SOUTH SIDE OF COTTONWOOD AVE, ABOUT 0.5 MILE WEST OF SANDERSON AVE, SAN JACINTO VALLEY.

Lat/Long: 33°47'12" / 117°00'55" — Township: 04S
UTM: Zone-11 N3738307 E498598 — Range: 01W
Mapping Precision: SPECIFIC — Section: 31 Qtr NE
Symbol Type: POLYGON — Meridian: S
Area: 5.9 ac — Elevation: 1500 ft

Comments
Distribution: SINGLE COLONY MAPPED ALONG THE SOUTH SIDE OF THE ROAD, DUE NORTH OF CAWSTON AVE.
Ecological:
Threat:
General: 95 PLANTS OBSERVED IN 1990. ONLY SOURCE OF INFORMATION FOR THIS OCCURRENCE IS MAP BY ERC (1990).
Owner/Manager: UNKNOWN

Source Codes
ERC90R05

CENTROMADIA PUNGENS SSP LAEVIS (cont.)
SMOOTH TARPLANT — Element Code: PDAST4R0R4

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-3

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND, CHENOPOD SCRUB, MEADOWS, PLAYAS, RIPARIAN WOODLAND.
Micro: ALKALI MEADOW, ALKALI SCRUB; ALSO IN DISTURBED PLACES. 0-480M.

Occurrence No. 28 — Map Index: 28218
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: ERC 1990 (MAP)
Dates Last Seen — Element: 1990-XX-XX, Site: 1990-XX-XX

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: EAST SIDE OF WARREN ROAD, JUST SOUTH OF ESPLANADE AVE, SAN JACINTO VALLEY.

Lat/Long: 33°46'12" / 117°01'55"
UTM: Zone-11 N3736453 E497047
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 12.7 ac
Township: 05S
Range: 01W
Section: 06 Qtr NW
Meridian: S
Elevation: 1510 ft

Comments
Distribution: TWO COLONIES ALONG THE ROAD BETWEEN ESPLANADE AVE AND THE FOOT OF TRES CERRITOS.
Ecological:
Threat:
General: 8000 PLANTS IN TWO COLONIES IN 1990. ONLY SOURCE OF INFORMATION FOR THIS SITE IS MAP BY ERC (1990).
Owner/Manager: UNKNOWN

Source Codes
ERC90R05

CENTROMADIA PUNGENS SSP LAEVIS (cont.)
SMOOTH TARPLANT — Element Code: PDAST4R0R4

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-3

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND, CHENOPOD SCRUB, MEADOWS, PLAYAS, RIPARIAN WOODLAND.
Micro: ALKALI MEADOW, ALKALI SCRUB; ALSO IN DISTURBED PLACES. 0-480M.

Occurrence No. 29 — Map Index: 28217
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: TILFORTH & WISURA #2112 RSA (HERB)
Dates Last Seen — Element: 1981-08-10, Site: 1981-08-10

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: ALONG REINHARDT CREEK SOUTH OF MAZE STONE COUNTY PARK, BETWEEN HEMET AND HOMELAND NORTH OF HIGHWAY 74.

Lat/Long: 33°46'13" / 117°03'12"
UTM: Zone-11 N3736496 E495056
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 3/5 mile
Township: 04S
Range: 02W
Section: 02 Qtr NE
Meridian: S
Elevation: 1800 ft

Comments
Distribution:
Ecological: LOCALLY COMMON IN DENSE WEEDY GROWTH AT EDGE OF STREAM IN MOIST GRANITIC SOIL.
Threat:
General: ONLY SOURCE OF INFORMATION FOR THIS SITE IS 1981 COLLECTION BY TILFORTH AND WISURA.
Owner/Manager: UNKNOWN

Source Codes
TIL81S01

CENTROMADIA PUNGENS SSP LAEVIS (cont.)
SMOOTH TARPLANT — Element Code: PDAST4R0R4

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-3

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND, CHENOPOD SCRUB, MEADOWS, PLAYAS, RIPARIAN WOODLAND.
Micro: ALKALI MEADOW, ALKALI SCRUB; ALSO IN DISTURBED PLACES. 0-480M.

Occurrence No. 34 — Map Index: 28212
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: ERC 1990 (MAP)
Dates Last Seen — Element: 1990-XX-XX, Site: 1990-XX-XX

Quad Summary: WINCHESTER (3311761/068A)*, LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: NORTH OF HIGHWAY 74 ALONG BOTH SIDES OF WARREN ROAD, SAN JACINTO VALLEY.

Lat/Long: 33°44'50" / 117°02'08"
UTM: Zone-11 N3733928 E496714
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 14.4 ac
Township: 05S
Range: 02W
Section: 12 Qtr E
Meridian: S
Elevation: 1500 ft

Comments
Distribution: 3 COLONIES MAPPED ABOUT 0.3 MILE - 0.7 MILE FROM HWY 74 ALONG WARREN ROAD.
Ecological:
Threat:
General: 4800+ PLANTS OBSERVED IN 1990.
Owner/Manager: UNKNOWN

Source Codes
ERC90R05

LASTHENIA GLABRATA SSP COULTERI
COULTER'S GOLDFIELDS — Element Code: PDAST5L0A1

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: COASTAL SALT MARSHES, PLAYAS, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS.
Micro: USUALLY FOUND ON ALKALINE SOILS IN PLAYAS, SINKS, AND GRASSLANDS. 1-1400M.

Occurrence No. 10 — Map Index: 23775
Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1993 (PERS)
Dates Last Seen — Element: 1992-04-15, Site: 1992-04-15

Quad Summary: EL CASCO (3311781/085A)*, LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN JACINTO WILDLIFE AREA, EAST OF KNOLL BETWEEN DUCK PONDS AND DAVIS ROAD.

Lat/Long: 33°52'59" / 117°07'02"
UTM: Zone-11 N3748994 E489147
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 57.8 ac
Township: 03S
Range: 02W
Section: 29 Qtr W
Meridian: S
Elevation: 1430 ft

Comments
Distribution: SAN JACINTO WILDLIFE AREA, ABOUT 0.6 MI EAST OF DAVIS ROAD. FROM OLD SAN JACINTO RIVER CHANNEL TO LARGE ALKALINE FLAT NEAR THE HORSE RANCH AND 1ST WILDLIFE POND. MAPPED AS TWO POLYGONS.
Ecological: GROWING ON AN ALKAINE PLAYA.
Threat: URBANIZATION AND AGRICULTURE DEVELOPMENT A THREAT.
General: 500,000 PLANTS SEEN IN 1992. SOURCE OF SITE INFORMATION WAS COLLECTION BY BRAMLET #2235; MAP DETAIL PROVIDED BY J. DICE (1993).
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
BRA93U02, DIC93M01, FER92U01

LASTHENIA GLABRATA SSP COULTERI (cont.)
COULTER'S GOLDFIELDS — Element Code: PDAST5L0A1

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: COASTAL SALT MARSHES, PLAYAS, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS.
Micro: USUALLY FOUND ON ALKALINE SOILS IN PLAYAS, SINKS, AND GRASSLANDS. 1-1400M.

Occurrence No. 12 — Map Index: 23763
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1993 (PERS)
Dates Last Seen — Element: 1992-04-03 — Site: 1992-04-03

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: NORTH OF LAKEVIEW, 1 MILE NORTH OF SAN JACINTO RIVER ALONG DAVIS ROAD.

Lat/Long: 33°52'11" / 117°07'16"
UTM: Zone-11 N3747520 E488792
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 21.5 ac
Township: 03S
Range: 02W
Section: 32 Qtr NW
Meridian: S
Elevation: 1430 ft

Comments
Distribution: THREE COLONIES NEAR ENTRANCE TO THE SAN JACINTO WILDLIFE AREA. MOSLTY WITHIN THE W 1/2 OF THE NW 1/4 OF SECTION 32 AND THE E 1/2 OF THE NE 1/4 OF SECTION 31.
Ecological: GROWING IN AN ALKALI GRASSLAND.
Threat: URBANIZATION AND AGRICULTURAL DEVELOPMENT ARE THREATS.
General: 1000 PLANTS OBSERVED IN 1992.
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
BRA93U02, DIC93M01, FER92U01, SAN92U04

LASTHENIA GLABRATA SSP COULTERI (cont.)
COULTER'S GOLDFIELDS — Element Code: PDAST5L0A1

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: COASTAL SALT MARSHES, PLAYAS, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS.
Micro: USUALLY FOUND ON ALKALINE SOILS IN PLAYAS, SINKS, AND GRASSLANDS. 1-1400M.

Occurrence No. 13 — Map Index: 23764
Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1993 (PERS)
Dates Last Seen — Element: 1992-05-06 — Site: 1992-05-06

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: LAKEVIEW, 0.6 MILE NORTH OF RESERVOIR ROAD (RAMONA EXPRESSWAY) ALONG EITHER SIDE OF DAVIS ROAD.

Lat/Long: 33°50'52" / 117°06'54"
UTM: Zone-11 N3745096 E489369
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 27.6 ac
Township: 04S
Range: 02W
Section: 05 Qtr SW
Meridian: S
Elevation: 1430 ft

Comments
Distribution: TWO COLONIES MAPPED AT CNDDB; 0.2 MILE WEST OF DAVIS ROAD AND 0.3 MILE EAST OF DAVIS ROAD. MAPPED WITHIN THE SE 1/4 OF THE SE 1/4 OF SECTION 6 AND THE S 1/2 OF THE SW 1/4 OF SECTION 5.
Ecological: GROWING IN ALKALI PLAYA AND GRASSLAND COMMUNITIES.
Threat: URBANIZATION AND AGRICULTURAL DEVLOPMENT AREA THREATS.
General: AN ESTIMATED 350,000 PLANTS WERE OBSERVED IN THIS AREA IN 1992. A SMALL PORTION OF THIS POPULATION OCCURS IN THE SAN JACINTO WILDLIFE AREA.
Owner/Manager: UNKNOWN, DFG-SAN JACINTO WA

Source Codes
BRA93U02, DIC93M01, FER92U01

LASTHENIA GLABRATA SSP COULTERI (cont.)
COULTER'S GOLDFIELDS — Element Code: PDAST5L0A1

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: COASTAL SALT MARSHES, PLAYAS, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS.
Micro: USUALLY FOUND ON ALKALINE SOILS IN PLAYAS, SINKS, AND GRASSLANDS. 1-1400M.

Occurrence No. 14 — Map Index: 23765
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1991 (OBS)
Dates Last Seen — Element: 1992-04-15 — Site: 1992-04-15

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN JACINTO VALLEY, 0.6 KM (0.4 MI) EAST OF WARREN ROAD AND 0.2 KM (0.15 MI) SOUTH OF MEAD ROAD.

Lat/Long: 33°49'18" / 117°01'33"
UTM: Zone-11 N3742189 E497598
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 12.2 ac
Township: 04S
Range: 01W
Section: 18 Qtr SW
Meridian: S
Elevation: 1460 ft

Comments
Distribution: 0-150M NORTH OF MWD AQUEDUCT MAINTENANCE ROAD, 620-750M EAST OF WARREN ROAD, AND 150-300M SOUTH OF THE RAMONA EXPRESSWAY.
Ecological: GROWING WITIN ALKALI PLAYA AND ALKALINE SINK SCRUB COMMUNITIES. ASSOCIATES INCLUDE SUAEDA TORREYANA, BASSIA HYSSOPIFOLIA, ATRIPLEX ARGENTEA, DISTICHLIS SPICATA, SPERGULARIA MARINA, HORDEUM LEPORINUM, LEPIDIUM, AND PLANTAGO BIGELOVII.
Threat: URBANIZATION AND AGRICULTURAL DEVELOPMENT ARE THREATS.
General: APPROX. 130,000 PLANTS OBSERVED IN 1992. SITE APPEARS TO BE IN OPEN SPACE PRESENTLY.
Owner/Manager: UNKNOWN

Source Codes
BRA93U02, FER92U01, BRA91F12

LASTHENIA GLABRATA SSP COULTERI (cont.)
COULTER'S GOLDFIELDS — Element Code: PDAST5L0A1

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: COASTAL SALT MARSHES, PLAYAS, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS.
Micro: USUALLY FOUND ON ALKALINE SOILS IN PLAYAS, SINKS, AND GRASSLANDS. 1-1400M.

Occurrence No. 47 — Map Index: 31522
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: DICE, J. 1993 (MAP)
Dates Last Seen — Element: 199X-XX-XX — Site: 199X-XX-XX

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN JACINTO WILDLIFE AREA, 2 MILES NORTHEAST OF LAKEVIEW BETWEEN HILLS AND SAN JACINTO RIVER.

Lat/Long: 33°51'47" / 117°06'03"
UTM: Zone-11 N3746773 E490679
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 27.7 ac
Township: 03S
Range: 02W
Section: 33 Qtr SW
Meridian: S
Elevation: 1430 ft

Comments
Distribution: MAPPED IN POND WITHIN THE W 1/2 OF THE SW 1/4 OF SECTION 33.
Ecological:
Threat:
General: ONLY SOURCE OF INFORMATION FOR THIS SITE IS MAP DETAIL PROVIDED BY J. DICE (1993).
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
DIC93M01

TRICHOCORONIS WRIGHTII VAR WRIGHTII
WRIGHT'S TRICHOCORONIS — Element Code: PDAST9F031

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T5?	CNPS List: 2
State: None	State: S1.1	R-E-D Code: 3-3-1

Habitat Associations
General: MARSHES AND SWAMPS, RIPARIAN FOREST, MEADOWS AND SEEPS, VERNAL POOLS.
Micro: MUD FLATS OF VERNAL LAKES, DRYING RIVER BEDS, ALKALI MEADOWS. 5-435M.

Occurrence No. 4 — Map Index: 24635
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: SANDERS, A. 1987 (PERS)
Dates Last Seen — Element: 1937-06-07 — Site: 1937-06-07

Quad Summary: EL CASCO (3311781/085A)*, LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN JACINTO LAKE (AKA MYSTIC LAKE), NORTH OF LAKEVIEW.

Lat/Long: 33°53'16" / 117°05'50" — Township: 03S
UTM: Zone-11 N3749535 E491004 — Range: 02W
Mapping Precision: NON-SPECIFIC — Section: XX Qtr XX
Symbol Type: POINT — Meridian: S
Radius: 1 mile — Elevation: 1420 ft

Comments
Distribution: SAN JACINTO LAKE = VERNAL LAKE IN THE SAN JACINTO VALLEY NORTH OF LAKEVIEW.
Ecological: GROWING IN MUD FLAT OF VERNAL LAKE.
Threat:
General: AREA KNOWN FROM THREE COLLECTIONS, THE MOST RECENT BEING A 1937 COLLECTION BY ROOS (#2505, UCR). AREA SHOULD BE FIELD CHECKED FOR PRESENCE OF SUITABLE HABITAT.
Owner/Manager: UNKNOWN

Source Codes
SAN87U03, PEI22S09, BRA93R01, MUN22S13

CAULANTHUS SIMULANS
PAYSON'S JEWEL-FLOWER — Element Code: PDBRA0M0H0

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G3	CNPS List: 4
State: None	State: S3.2	R-E-D Code: 1-2-3

Habitat Associations
General: CHAPARRAL, COASTAL SCRUB. ONLY KNOWN FROM RIVERSIDE AND SAN DIEGO COUNTIES.
Micro: FREQUENTLY IN BURNED AREAS, OR IN DISTURBED SITES SUCH AS STREAMBEDS; ALSO ON ROCKY, STEEP SLOPES. 90-2200M.

Occurrence No. 1 — Map Index: 04186
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: PEARSON, D. 1982 (OBS)
Dates Last Seen — Element: 1982-04-26 — Site: 1982-04-26

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: LAKEVIEW MTNS, MT RUDOLPH, 0.5 AIRMI SSE OF JCT BRIDGE ST & PICO RD (RAMONA EXPRESSWAY).

Lat/Long: 33°50'01" / 117°03'49" — Township: 04S
UTM: Zone-11 N3743515 E494114 — Range: 02W
Mapping Precision: NON-SPECIFIC — Section: 11 Qtr SW
Symbol Type: POINT — Meridian: S
Radius: 1/5 mile — Elevation: 1940 ft

Comments
Distribution:
Ecological: IN LAKEVIEW MOUNTAINS, IN CHAMISE CHAPARRAL AND COASTAL SAGE SCRUB ON THIN COBBLY SOIL.
Threat: PLANTS ALONG EXISTING ROAD BERMS, ALONG SOUTHERN CAL EDISON TRANSMISSION LINE RTE. AREA ALSO SUBJECT TO HOUSING DEVELOP.
General: ACCORDING TO ROY BUCK (1992) PLANTS AT THIS SITE ARE PROBABLY C. HETEROPHYLLUS. MORE STUDIES NEEDED.
Owner/Manager: PVT

Source Codes
BUC92U01, PEA82F06

CAULANTHUS SIMULANS (cont.)
PAYSON'S JEWEL-FLOWER — Element Code: PDBRA0M0H0

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G3	CNPS List: 4
State: None	State: S3.2	R-E-D Code: 1-2-3

Habitat Associations
General: CHAPARRAL, COASTAL SCRUB. ONLY KNOWN FROM RIVERSIDE AND SAN DIEGO COUNTIES.
Micro: FREQUENTLY IN BURNED AREAS, OR IN DISTURBED SITES SUCH AS STREAMBEDS; ALSO ON ROCKY, STEEP SLOPES. 90-2200M.

Occurrence No. 2 — Map Index: 04128
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: PEARSON, D. 1982 (OBS)
Dates Last Seen — Element: 1982-04-26 — Site: 1982-04-26

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: LAKEVIEW MTNS, FROM TOP OF MT RUDOLPH TO SOUTHWEST FOR ABOUT 1.5 MI.

Lat/Long: 33°49'03" / 117°04'32" — Township: 04S
UTM: Zone-11 N3741731 E493014 — Range: 02W
Mapping Precision: SPECIFIC — Section: 22 Qtr NW
Symbol Type: POLYGON — Meridian: S
Area: 183.7 ac — Elevation: 2400 ft

Comments
Distribution:
Ecological: ON GRANITE COBBLES AND BOULDERS IN CHAMISE CHAPARRAL AND COASTAL SAGE SCRUB.
Threat: ALONG EXISTING ROADS & BERMS. ALONG PROPOSED SOUTHERN CAL EDISON TRANSMISSION LINE RTE. SUBJECT TO HOUSING DEVELOPMENT.
General: SEVERAL POPULATIONS. ACCORDING TO ROY BUCK (1992) PLANTS AT THIS SITE ARE PROBABLY C. HETEROPHYLLUS. MORE STUDIES NEEDED.
Owner/Manager: PVT

Source Codes
BUC92U01, PEA82F06, BOY81F09

CAULANTHUS SIMULANS (cont.)
PAYSON'S JEWEL-FLOWER — Element Code: PDBRA0M0H0

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G3	CNPS List: 4
State: None	State: S3.2	R-E-D Code: 1-2-3

Habitat Associations
General: CHAPARRAL, COASTAL SCRUB. ONLY KNOWN FROM RIVERSIDE AND SAN DIEGO COUNTIES.
Micro: FREQUENTLY IN BURNED AREAS, OR IN DISTURBED SITES SUCH AS STREAMBEDS; ALSO ON ROCKY, STEEP SLOPES. 90-2200M.

Occurrence No. 6 — Map Index: 04043
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: PEARSON, D. 1982 (OBS)
Dates Last Seen — Element: 1982-04-26 — Site: 1982-04-26

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: LAKEVIEW MTNS, APPROX 0.5 AIRMI NW OF BAR V RANCH.

Lat/Long: 33°47'56" / 117°06'09" — Township: 04S
UTM: Zone-11 N3739668 E490512 — Range: 02W
Mapping Precision: NON-SPECIFIC — Section: 29 Qtr NE
Symbol Type: POINT — Meridian: S
Radius: 1/5 mile — Elevation: 1940 ft

Comments
Distribution:
Ecological: LAKEVIEW MOUNTAINS-IN CHAMISE CHAPARRAL AND COASTAL SAGE SCRUB ON THIN COBBLY SOILS.
Threat: ALONG PROPOSED SOUTHERN CAL EDISON TRANSMISSION LINE ROUTE. AREA SUBJECT TO HOUSING DEVELOPMENT.
General: ACCORDING TO ROY BUCK (1992) PLANTS AT THIS SITE ARE PROBABLY C. HETEROPHYLLUS. MORE STUDIES NEEDED.
Owner/Manager: PVT

Source Codes
BUC92U01, PEA82F06

CAULANTHUS SIMULANS (cont.)
PAYSON'S JEWEL-FLOWER — Element Code: PDBRA0M0H0

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G3	CNPS List: 4
State: None	State: S3.2	R-E-D Code: 1-2-3

Habitat Associations
General: CHAPARRAL, COASTAL SCRUB. ONLY KNOWN FROM RIVERSIDE AND SAN DIEGO COUNTIES.
Micro: FREQUENTLY IN BURNED AREAS, OR IN DISTURBED SITES SUCH AS STREAMBEDS; ALSO ON ROCKY, STEEP SLOPES. 90-2200M.

Occurrence No. 7 — Map Index: 03987
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: PEARSON, D. 1982 (OBS)
Dates Last Seen — Element: 1982-04-26 — Site: 1982-04-26

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: LAKEVIEW MTNS, WNW OF JUNIPER FLAT.

Lat/Long: 33°47'06" / 117°07'07" — Township: 04S
UTM: Zone-11 N3738130 E489018 — Range: 02W
Mapping Precision: NON-SPECIFIC — Section: 32 Qtr NW
Symbol Type: POINT — Meridian: S
Radius: 1/5 mile — Elevation: 2300 ft

Comments
Distribution: 2 POPULATIONS-ONE IS 0.2 MILES TO THE SOUTHWEST OF MAPPED LOCATION.
Ecological: LAKEVIEW MOUNTAINS-IN CHAMISE CHAPARRAL AND COASTAL SAGE SCRUB ON THIN COBBLY SOILS.
Threat: ALONG PROPOSED SOUTHERN CAL EDISON TRANSMISSION LINE ROUTE. AREA SUBJECT TO HOUSING DEVELOPMENT.
General: ACCORDING TO ROY BUCK (1992) PLANTS AT THIS SITE ARE PROBABLY C. HETEROPHYLLUS. MORE STUDIES NEEDED.
Owner/Manager: PVT

Source Codes
BUC92U01, PEA82F06

CAULANTHUS SIMULANS (cont.)
PAYSON'S JEWEL-FLOWER — Element Code: PDBRA0M0H0

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G3	CNPS List: 4
State: None	State: S3.2	R-E-D Code: 1-2-3

Habitat Associations
General: CHAPARRAL, COASTAL SCRUB. ONLY KNOWN FROM RIVERSIDE AND SAN DIEGO COUNTIES.
Micro: FREQUENTLY IN BURNED AREAS, OR IN DISTURBED SITES SUCH AS STREAMBEDS; ALSO ON ROCKY, STEEP SLOPES. 90-2200M.

Occurrence No. 8 — Map Index: 03963
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: PEARSON, D. 1982 (OBS)
Dates Last Seen — Element: 1982-04-26 — Site: 1982-04-26

Quad Summary: LAKEVIEW (3311771/085D)*, PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: LAKEVIEW MTNS, WEST OF JUNIPER FLAT.

Lat/Long: 33°46'43" / 117°07'25" — Township: 04S
UTM: Zone-11 N3737422 E488555 — Range: 02W
Mapping Precision: NON-SPECIFIC — Section: 31 Qtr SE
Symbol Type: POINT — Meridian: S
Radius: 1/5 mile — Elevation: 2400 ft

Comments
Distribution:
Ecological: LAKEVIEW MOUNTAINS-CHAMISE CHAPARRAL AND COASTAL SAGE SCRUB ON THIN COBBLY SOIL.
Threat: ALONG PROPOSED SOUTHERN CAL EDISON TRANSMISSION LINE ROUTE. AREA SUBJECT TO HOUSING DEVELOPMENT.
General: ACCORDING TO ROY BUCK (1992) PLANTS AT THIS SITE ARE PROBABLY C. HETEROPHYLLUS. MORE STUDIES NEEDED.
Owner/Manager: PVT

Source Codes
BUC92U01, PEA82F06

ATRIPLEX CORONATA VAR NOTATIOR
SAN JACINTO VALLEY CROWNSCALE — Element Code: PDCHE040C2

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G4T1	CNPS List: 1B
State: None	State: S1.1	R-E-D Code: 3-3-3

Habitat Associations
General: PLAYAS, CHENOPOD SCRUB, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS. ENDEMIC TO RIVERSIDE COUNTY.
Micro: DRY, ALKALINE FLATS IN THE SAN JACINTO RIVER VALLEY. 400-500M.

Occurrence No. 5 — Map Index: 04133
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1990 (OBS)
Dates Last Seen — Element: 1990-07-20 — Site: 1990-07-20

Quad Summary: LAKEVIEW (3311771/085D)*, EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary: San Jacinto Wildlife Refuge

Location: SAN JACINTO WILDLIFE AREA VICINITY, APPROX 4 KM NORTH OF LAKEVIEW.

Lat/Long: 33°52'18" / 117°06'06" — Township: 03S
UTM: Zone-11 N3747724 E490601 — Range: 02W
Mapping Precision: SPECIFIC — Section: 33 Qtr NW
Symbol Type: POLYGON — Meridian: S
Area: 194.5 ac — Elevation: 1420 ft

Comments
Distribution: SEVERAL COLONIES MAPPED WITHIN THE S 1/2 OF SECTION 29, NW 1/4 OF SECTION 31, N 1/2 OF SECTION 32, AND NE 1/4 OF SECTION 33.
Ecological: FOUND AROUND THE DUCK PONDS OR DISTURBED AREAS IN THE VICINITY.
Threat: FORMER PORTIONS OF POPULATION MAY HAVE OCCURRED IN LAKEBED WHICH IS POSSIBLY IN AGRICULTURE NOW.
General: APPROX. 1000 PLANTS SEEN IN 1990. SIGNS OF INUNDATION WERE EVIDENT. SPECIES MAY BENEFIT FROM INUNDATION.
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
BRA90M01, BRA90F17, CRA89U01, BRA90S11, BRA9XU01, WES88R01, BRA90F16, HAL01S05, HAL01S06, BRA92U04, BRA90F15, RUF90S01, BRA90S07

ATRIPLEX CORONATA VAR NOTATIOR (cont.)
SAN JACINTO VALLEY CROWNSCALE — Element Code: PDCHE040C2

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G4T1	CNPS List: 1B
State: None	State: S1.1	R-E-D Code: 3-3-3

Habitat Associations
General: PLAYAS, CHENOPOD SCRUB, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS. ENDEMIC TO RIVERSIDE COUNTY.
Micro: DRY, ALKALINE FLATS IN THE SAN JACINTO RIVER VALLEY. 400-500M.

Occurrence No. 14 — Map Index: 28318
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1992 (PERS)
Dates Last Seen — Element: 1996-05-04 — Site: 1996-05-04

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: BOTH SIDES OF DAVIS ROAD NORTH OF THE SAN JACINTO RIVER, ABOUT 1 MILE NORTH OF LAKEVIEW.

Lat/Long: 33°51'09" / 117°07'17" — Township: 04S
UTM: Zone-11 N3745602 E488780 — Range: 02W
Mapping Precision: SPECIFIC — Section: 06 Qtr NE
Symbol Type: POLYGON — Meridian: S
Area: 27.7 ac — Elevation: 1420 ft

Comments
Distribution: TWO COLONIES ALONG WEST SIDE OF ROAD AND TWO EAST OF THE ROAD.
Ecological: ALKALI MEADOW ADJACENT TO ANNUAL GRASSLAND. ASSOCIATED WITH PLAGIOBOTHRYS LEPTOCLADUS, SPERGULARIA MARINA, RUMEX MARITIMUS, SUAEDA MOQUINII, HORDEUM INTERCEDENS (?), LASTHENIA CALIFORNICA, MICROSERIS DOUGLASII, BRODIAEA FILIFOLIA, ET AL.
Threat: ONE COLONY LOCATED IN PROPOSED BORROW SITE.
General: MAIN SOURCE OF INFORMATION FOR THIS SITE IS MAP DETAIL PROVIDED BY BRAMLET. 78 PLANTS OBSERVED IN SE-MOST COLONY IN 1996.
Owner/Manager: UNKNOWN

Source Codes
BRA96U01, BRA96F01, BRA92U04

ATRIPLEX CORONATA VAR NOTATIOR (cont.)
SAN JACINTO VALLEY CROWNSCALE — Element Code: PDCHE040C2

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G4T1	CNPS List: 1B
State: None	State: S1.1	R-E-D Code: 3-3-3

Habitat Associations
General: PLAYAS, CHENOPOD SCRUB, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS. ENDEMIC TO RIVERSIDE COUNTY.
Micro: DRY, ALKALINE FLATS IN THE SAN JACINTO RIVER VALLEY. 400-500M.

Occurrence No. 15 — Map Index: 28300
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1992 (PERS)
Dates Last Seen — Element: XXXX-XX-XX; Site: XXXX-XX-XX

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: ABOUT 0.2 MILE EAST OF DAVIS ROAD AND 0.3 MILE SOUTH OF THE SAN JACINTO RIVER, NORTH OF LAKEVIEW.

Lat/Long: 33°50'50" / 117°07'01"
UTM: Zone-11 N3745037 E489181
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 8.3 ac
Township: 04S
Range: 02W
Section: 05 Qtr SW
Meridian: S
Elevation: 1430 ft

Comments
Distribution:
Ecological:
Threat:
General: ONLY SOURCE OF INFORMATION FOR THIS SITE IS MAP DETAIL PROVIDED BY BRAMLET.
Owner/Manager: UNKNOWN

Source Codes
BRA92U04

ATRIPLEX PACIFICA
SOUTH COAST SALTSCALE — Element Code: PDCHE041C0

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G3G4	CNPS List: 1B
State: None	State: S2.2	R-E-D Code: 3-2-2

Habitat Associations
General: COASTAL SCRUB, COASTAL BLUFF SCRUB, PLAYAS, CHENOPOD SCRUB.
Micro: ALKALI SOILS. 1-500M.

Occurrence No. 25 — Map Index: 34728
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1996 (PERS)
Dates Last Seen — Element: 1996-05-04; Site: 1996-05-04

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN JACINTO WILDLIFE AREA, EAST OF DAVIS ROAD AND NORTH OF THE SAN JACINTO RIVER.

Lat/Long: 33°51'11" / 117°07'09"
UTM: Zone-11 N3745672 E488980
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 11.4 ac
Township: 04S
Range: 02W
Section: 05 Qtr NW
Meridian: S
Elevation: 1430 ft

Comments
Distribution: TWO COLONIES: WEST COLONY IS 8M EAST OF ROAD AND 120M NORTH OF LEVEE; EAST COLONY IS 143M EAST OF ROAD AND 120M NORTH OF LEVEE. SITE IS IN OLD RIVERBED AREA BESIDE THE EXISTING CHANNELIZED AREA OF THE SAN JACINTO RIVER.
Ecological: ALKALINE MEADOW WITH ASSOCIATES CRESSA TRUXILLENSIS, BASSIA HYSSOPIFOLIA, PSILOCARPHUS BREVISSIMUS, ATRIPLEX ARGENTEA, JUNCUS BUFONIUS, PLAGIOBOTHRYS LEPTOCLADUS, RUMEX MARITIMUS, FRANKENIA SALINA, PHALARIS MINOR, MONOLEPIS NUTTALLIANA,ETC.
Threat: EASTERN COLONY IS WITHIN PROPOSED BORROW SITE.
General: 7 PLANTS IN EAST COLONY IN 1996. ACCORDING TO BRAMLET, IDENTIFICATION OF THESE PLANTS IS UNCLEAR, MAY BE A. DAVIDSONII, ANOTHER RARE PLANT.
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
BRA91S13, BRA96U01, BRA93U06, BRA96F01

ATRIPLEX PACIFICA (cont.)
SOUTH COAST SALTSCALE — Element Code: PDCHE041C0

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G3G4	CNPS List: 1B
State: None	State: S2.2	R-E-D Code: 3-2-2

Habitat Associations
General: COASTAL SCRUB, COASTAL BLUFF SCRUB, PLAYAS, CHENOPOD SCRUB.
Micro: ALKALI SOILS. 1-500M.

Occurrence No. 26 — Map Index: 34727
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. #2215 UNK HERBARIUM (HERB)
Dates Last Seen — Element: 1992-04-03; Site: 1992-04-03

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN JACINTO WA ENTRANCE, 0.1 MI E OF DAVIS ROAD.

Lat/Long: 33°52'19" / 117°07'11"
UTM: Zone-11 N3747761 E488936
Mapping Precision: SPECIFIC
Symbol Type: POINT
Radius: 80 meters
Township: 03S
Range: 02W
Section: 32 Qtr NW
Meridian: S
Elevation: 1430 ft

Comments
Distribution: SITE IS 137 METERS SOUTH OF THE EXISTING HEADQUARTERS BUILDING AND 76 METERS SOUTH OF A WATERFOWL POND.
Ecological:
Threat:
General: 150 PLANTS OBSERVED IN 1992.
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
BRA93U06, BRA92S06

ATRIPLEX PARISHII
PARISH'S BRITTLESCALE — Element Code: PDCHE041D0

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G2?	CNPS List: 1B
State: None	State: S1.1	R-E-D Code: 3-3-2

Habitat Associations
General: ALKALI MEADOWS, VERNAL POOLS, CHENOPOD SCRUB, PLAYAS. PLANT COLLECTED ONLY ONCE IN CALIFORNIA SINCE 1974 (IN 1993).
Micro: USUALLY ON DRYING ALKALI FLATS WITH FINE SOILS. 4-140M.

Occurrence No. 2 — Map Index: 03914
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 199X (PERS)
Dates Last Seen — Element: 1974-06-19; Site: 1974-06-19

Quad Summary: PERRIS (3311772/085C)*, LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: 1 KM (1/2 MI) NW OF LAKEVIEW, SOUTH OF THE RAMONA EXPRESSWAY (AKA MARTIN STREET).

Lat/Long: 33°50'11" / 117°07'38"
UTM: Zone-11 N3743834 E488224
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile
Township: 04S
Range: 02W
Section: 07 Qtr SE
Meridian: S
Elevation: 1420 ft

Comments
Distribution:
Ecological: GROWS IN THE FINE ALKALINE SOILS OF DRY LAKE BEDS.
Threat: LARGE AREAS OF HABITAT LOST TO AGRICULTURE CONVERSION, MUCH OF REMAINING HABITAT IS CURRENTLY PROPOSED FOR DEVELOPMENT.
General: BRAMLET BELIEVES THAT HABITAT STILL EXISTS FOR A. PARISHII IN THIS AREA. SPECIES HAS NOT BEEN COLLECTED SINCE 1974. HERB LABEL (CLARKE & J. DERBY, 19 JUNE 1974, UCI) IS ONLY SOURCE OF LOCATION INFORMATION; NEEDS ADDITIONAL FIELDWORK.
Owner/Manager: UNKNOWN

Source Codes
BRA92U01, TAY93U02, TAY92U01, BRA9XU03

ATRIPLEX PARISHII (cont.)
PARISH'S BRITTLESCALE — Element Code: PDCHE041D0

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G2?	CNPS List: 1B
State: None	State: S1.1	R-E-D Code: 3-3-2

Habitat Associations
General: ALKALI MEADOWS, VERNAL POOLS, CHENOPOD SCRUB, PLAYAS. PLANT COLLECTED ONLY ONCE IN CALIFORNIA SINCE 1974 (IN 1993).
Micro: USUALLY ON DRYING ALKALI FLATS WITH FINE SOILS. 4-140M.

Occurrence No. 11 — Map Index: 28296
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. #2360A RSA (HERB)
Dates Last Seen — Element: 1993-07-09 — Site: 1993-07-09

Quad Summary: WINCHESTER (3311761/068A)*, LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: ABOUT 5 MILES WEST OF HEMET, SAN JACINTO VALLEY.

Lat/Long: 33°44'11" / 117°02'27" — Township: 05S
UTM: Zone-11 N3732746 E496227 — Range: 02W
Mapping Precision: NON-SPECIFIC — Section: 13 Qtr XX
Symbol Type: POINT — Meridian: S
Radius: 1 mile — Elevation: 1500 ft

Comments
Distribution: BASED ON COLLECTION BY BRAMLET FROM SECTION 13.
Ecological: ALKALINE FLAT.
Threat:
General: TWO COLLECTIONS ATTRIBUTED TO THIS SITE; ROOS #1214 IN 1937, AND BRAMLET #2360A IN 1993.
Owner/Manager: UNKNOWN

Source Codes
TAY93U02, BRA93S06, RO037S06

SIDALCEA NEOMEXICANA
SALT SPRING CHECKERBLOOM — Element Code: PDMAL110J0

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4?	CNPS List: 2
State: None	State: S2S3	R-E-D Code: 2-2-1

Habitat Associations
General: ALKALI PLAYAS, BRACKISH MARSHES, CHAPARRAL, COASTAL SCRUB, LOWER MONTANE CONIFEROUS FOREST, MOJAVEAN DESERT SCRUB.
Micro: ALKALI SPRINGS AND MARSHES. 0-1500M.

Occurrence No. 1 — Map Index: 35238
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: ROOS, J. SN UCR #23558 (HERB)
Dates Last Seen — Element: 1966-05-19 — Site: 1966-05-19

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: 3 MILES WEST OF SAN JACINTO, SAN JACINTO VALLEY.

Lat/Long: 33°47'11" / 117°01'05" — Township: 04S
UTM: Zone-11 N3738273 E498328 — Range: 01W
Mapping Precision: NON-SPECIFIC — Section: 31 Qtr XX
Symbol Type: POINT — Meridian: S
Radius: 1 mile — Elevation: 1500 ft

Comments
Distribution: EXACT LOCATION UNKNOWN. SITE MAPPED BY CNDDB WEST OF SAN JACINTO ALONG COTTONWOOD AVENUE NEAR WARREN ROAD.
Ecological: SEMI-ALKALINE SWAMP WITH ANEMOPSIS AND SPERGULARIA MACROTHECA.
Threat:
General: ONLY SOURCE OF INFORMATION FOR THIS SITE IS 1966 COLLECTION BY ROOS.
Owner/Manager: UNKNOWN

Source Codes
RO066S02

CHORIZANTHE PARRYI VAR PARRYI
PARRY'S SPINEFLOWER — Element Code: PDPGN040J2

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G2T2?	CNPS List: 3
State: None	State: S2.1	R-E-D Code: ?-2-3

Habitat Associations
General: COASTAL SCRUB, CHAPARRAL.
Micro: DRY SLOPES AND FLATS; SOMETIMES AT INTERFACE OF 2 VEG TYPES, SUCH AS CHAP AND OAK WDLAND; DRY, SANDY SOILS. 40-1705M.

Occurrence No. 21 — Map Index: 22521
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: SANDERS, A. 1992 (LIT)
Dates Last Seen — Element: 1969-05-05 — Site: 1969-05-05

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: HIGHWAY 79, 1.5 MI NW OF GILMAN HOT SPRINGS ON SOUTH FACING SLOPE; 100 YARDS FROM ROAD.

Lat/Long: 33°51'01" / 117°00'38" — Township: 04S
UTM: Zone-11 N3745348 E499022 — Range: 01W
Mapping Precision: NON-SPECIFIC — Section: 05 Qtr SW
Symbol Type: POINT — Meridian: S
Radius: 1/5 mile — Elevation: 1520 ft

Comments
Distribution:
Ecological: OPEN GRASSLAND WITH MANY SHRUBS ESPECIALLY ADENOSTOMA FASCICULATUM AND ENCELIA FARINOSA. FAIRLY HARD-PACKED SANDY DRY SOIL.
Threat:
General: HERBARIUM LABEL (HOLIDAY #40 UCR #19724) IS ONLY SOURCE OF INFORMATION FOR THIS SITE; NEEDS FIELDWORK.
Owner/Manager: UNKNOWN

Source Codes
SAN92U02

CHORIZANTHE PARRYI VAR PARRYI (cont.)
PARRY'S SPINEFLOWER — Element Code: PDPGN040J2

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G2T2?	CNPS List: 3
State: None	State: S2.1	R-E-D Code: ?-2-3

Habitat Associations
General: COASTAL SCRUB, CHAPARRAL.
Micro: DRY SLOPES AND FLATS; SOMETIMES AT INTERFACE OF 2 VEG TYPES, SUCH AS CHAP AND OAK WDLAND; DRY, SANDY SOILS. 40-1705M.

Occurrence No. 22 — Map Index: 22520
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: SANDERS, A. 1992 (LIT)
Dates Last Seen — Element: 1981-05-22 — Site: 1981-05-22

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: LAKEVIEW MOUNTAINS, 3 MILES ESE OF LAKEVIEW.

Lat/Long: 33°49'19" / 117°04'02" — Township: 04S
UTM: Zone-11 N3742225 E493791 — Range: 02W
Mapping Precision: NON-SPECIFIC — Section: XX Qtr XX
Symbol Type: POINT — Meridian: S
Radius: 1/5 mile — Elevation: 2600 ft

Comments
Distribution: MAPPED JUST SE OF MT. RUDOLPH.
Ecological: OPENINGS IN ADENOSTOMA CHAPARRAL.
Threat:
General: HERBARIUM LABEL (BOYD SN UCR #37414) IS ONLY SOURCE OF INFORMATION FOR THIS SITE; NEEDS FIELDWORK.
Owner/Manager: UNKNOWN

Source Codes
SAN92U02

NAVARRETIA FOSSALIS
SPREADING NAVARRETIA — Element Code: PDPLM0C080

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: VERNAL POOLS, CHENOPOD SCRUB, MARSHES AND SWAMPS, PLAYAS. IN CALIFORNIA, KNOWN ONLY FROM RIVERSIDE AND SAN DIEGO CO.
Micro: SAN DIEGO HARDPAN & SAN DIEGO CLAYPAN VERNAL POOLS; IN SWALES & V.P'S, OFTEN SURR. BY OTHER HABITAT TYPES. 30-1300M.

Occurrence No. 27 — Map Index: 22008
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. #2199 UNKNKOWN HERB (HERB)

Dates Last Seen — Element: 1991-06-20 — Site: 1991-06-20

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN JACINTO WILDLIFE AREA, ABOUT 0.5 MILE EAST OF DAVIS ROAD, NORTH OF THE SAN JACINTO RIVER, NORTH OF LAKEVIEW.

Lat/Long: 33°51'20" / 117°06'47" — Township: 04S
UTM: Zone-11 N3745957 E489537 — Range: 02W
Mapping Precision: NON-SPECIFIC — Section: 05 Qtr NW
Symbol Type: POINT — Meridian: S
Radius: 1/10 mile — Elevation: 1420 ft

Comments
Distribution: ABOUT 670M EAST OF DAVIS ROAD AND 60M NORTH OF LEVEE IN OLD RIVERBED AREA BESIDE THE CHANNELIZED AREA OF THE RIVER WITHIN THE SE 1/4 NW 1/4 SECTION 5.
Ecological: IN RIVERBED, ALKALINE MEADOW (?)/VERNAL POOL-LIKE HABITATS. WITH CRESSA TRUXILLENSIS, BASSIA HYSSOPIFOLIA, BERGIA TEXANA, MARSILEA VESTITA, VERONICA PEREGRINA, SUAEDA TORREYANA, ETC. IN WILLOWS SILTY CLAY, & TRAVER LOAMY, FINE SAND SOILS.
Threat:
General: TOTAL OF 326 PLANTS SEEN IN 1991. SITE BASED UPON 1991 BRAMLET COLLECTION #2199.
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
BRA91S04, BRA92U06

NAVARRETIA FOSSALIS (cont.)
SPREADING NAVARRETIA — Element Code: PDPLM0C080

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: VERNAL POOLS, CHENOPOD SCRUB, MARSHES AND SWAMPS, PLAYAS. IN CALIFORNIA, KNOWN ONLY FROM RIVERSIDE AND SAN DIEGO CO.
Micro: SAN DIEGO HARDPAN & SAN DIEGO CLAYPAN VERNAL POOLS; IN SWALES & V.P'S, OFTEN SURR. BY OTHER HABITAT TYPES. 30-1300M.

Occurrence No. 33 — Map Index: 31992
Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1995 (OBS)

Dates Last Seen — Element: 1995-06-14 — Site: 1995-06-14

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN JACINTO WILDLIFE AREA, 500 FT E OF DAVIS ROAD, 300 FT N OF THE OLD SAN JACINTO WATER CHANNEL.

Lat/Long: 33°52'15" / 117°07'07" — Township: 03S
UTM: Zone-11 N3747659 E489027 — Range: 02W
Mapping Precision: SPECIFIC — Section: 32 Qtr NW
Symbol Type: POLYGON — Meridian: S
Area: 3.2 ac — Elevation: 1425 ft

Comments
Distribution: SITE IS 200-600 FT W OF THE EXISTING WATERFOWL POND.
Ecological: ALKALI PLAYA WITH PLAGIOBOTHRYS LEPTOCLADUS, POLYGONUM ARGYROCOLEON, FRANKENIA SALINA, PHALARIS MINOR, VERONICA PEREGRINA, HORDEUM DEPRESSUM, EPILOBIUM DENSIFOLIUM. MAPPED NEAR ANOTHER RARE PLANT: LASTHENIA GLABRATA COULTERI.
Threat:
General: 100,000 PLANTS ESTIMATED IN 1995.
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
BRA95F11

NAVARRETIA FOSSALIS (cont.)
SPREADING NAVARRETIA — Element Code: PDPLM0C080

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: VERNAL POOLS, CHENOPOD SCRUB, MARSHES AND SWAMPS, PLAYAS. IN CALIFORNIA, KNOWN ONLY FROM RIVERSIDE AND SAN DIEGO CO.
Micro: SAN DIEGO HARDPAN & SAN DIEGO CLAYPAN VERNAL POOLS; IN SWALES & V.P'S, OFTEN SURR. BY OTHER HABITAT TYPES. 30-1300M.

Occurrence No. 36 — Map Index: 38918
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. #2201 UNKNKOWN HERB (HERB)

Dates Last Seen — Element: 1991-06-01 — Site: 1991-06-01

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN JACINTO WILDLIFE AREA, ABOUT 0.5 MILE EAST OF DAVIS ROAD, NORTH OF THE SAN JACINTO RIVER, NORTH OF LAKEVIEW.

Lat/Long: 33°51'13" / 117°07'06" — Township: 04S
UTM: Zone-11 N3745726 E489057 — Range: 02W
Mapping Precision: NON-SPECIFIC — Section: 05 Qtr NW
Symbol Type: POINT — Meridian: S
Radius: 1/10 mile — Elevation: 1420 ft

Comments
Distribution: ABOUT 8M EAST OF DAVIS ROAD AND 150M NORTH OF RIVER LEVEE. MAPPED WITHIN THE SW 1/4 NW 1/4 SECTION 5.
Ecological:
Threat:
General: MAIN SOURCE OF INFORMATION FOR THIS SITE IS 1991 COLLECTION BY BRAMLET #2201.
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
BRA92U06, BRA91S05

BRODIAEA FILIFOLIA
THREAD-LEAVED BRODIAEA — Element Code: PMLIL0C050

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2	CNPS List: 1B
State: Endangered	State: S2.1	R-E-D Code: 3-3-3

Habitat Associations
General: CISMONTANE WOODLAND, COASTAL SCRUB, PLAYAS, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS.
Micro: USUALLY ASSOCIATED WITH ANNUAL GRASSLAND AND VERNAL POOLS; OFTEN SURR BY SHRUBLAND HABITATS. CLAY SOILS. 35-855M.

Occurrence No. 27 — Map Index: 22073
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1992 (OBS)

Dates Last Seen — Element: 1995-05-03 — Site: 1995-05-03

Quad Summary: LAKEVIEW (3311771/085D)*, PERRIS (3311772/085C)
County Summary: RIVERSIDE
SNA Summary:

Location: 1 KM NORTH OF LAKEVIEW; SOUTH OF SAN JACINTO WILDLIFE AREA.

Lat/Long: 33°50'48" / 117°07'37" — Township: 04S
UTM: Zone-11 N3744980 E488254 — Range: 02W
Mapping Precision: SPECIFIC — Section: 06 Qtr SE
Symbol Type: POLYGON — Meridian: S
Area: 35.9 ac — Elevation: 1420 ft

Comments
Distribution: TWO LARGE POPULATION GROUPS; ONE IS 650 FT WEST OF DAVIS RD. AND 5-150 FT NORTH OF MARVIN RD., THE OTHER IS 750-1000 FT NORTH OF MARVIN RD. AND 100-200 FT WEST OF DAVIS RD.
Ecological: GROWING ON STRONGLY SALINE-ALKALINE WAUKENA LOAM/DOMINO SILT LOAM IN ANNUAL GRASSLAND/ALKALI SINK SCRUB HABITAT. ASSOCIATES INCLUDE HORDEUM DEPRESSUM, PLAGIOBOTHRYS LEPTOCLADUS, LASTHENIA CALIFORNICA, LEPIDIUM DICTYOTUM, AND ATRIPLEX SP.
Threat: SITE IS PRESENTLY GRAZED BY SHEEP AND IN THE PAST HAS BEEN DEGRADED BY PHALARIS MINOR SEEDING OR PLANTING.
General: 518 PLANTS SEEN IN 1992, 2,580 IN 1995. SITE STILL RETAINS A LARGE PORTION OF THE NATIVE FLORA DISTURBED. PART OF THE SAN JACINTO WILDLIFE AREA.
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
BRA92U02, HIC95U03, BRA92F01

BRODIAEA FILIFOLIA (cont.)
THREAD-LEAVED BRODIAEA — Element Code: PMLIL0C050

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2	CNPS List: 1B
State: Endangered	State: S2.1	R-E-D Code: 3-3-3

Habitat Associations

General: CISMONTANE WOODLAND, COASTAL SCRUB, PLAYAS, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS.

Micro: USUALLY ASSOCIATED WITH ANNUAL GRASSLAND AND VERNAL POOLS; OFTEN SURR BY SHRUBLAND HABITATS. CLAY SOILS. 35-855M.

Occurrence No. 43 — Map Index: 31922

Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1995 (OBS)

Dates Last Seen
Element: 1996-04-22
Site: 1996-04-22

Quad Summary: LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN JACINTO WILDLIFE AREA, 1.2 MILES NORTH OF LAKEVIEW, JUST NORTH OF THE SAN JACINTO RIVER.

Lat/Long: 33°51'26" / 117°06'40"
UTM: Zone-11 N3746127 E489715
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 14.9 ac

Township: 04S
Range: 02W
Section: 05 Qtr NW
Meridian: S
Elevation: 436 ft

Comments

Distribution: 150 METERS E OF DAVIS ROAD AND 34 METERS S OF THE EXISTING ACCESS ROAD.

Ecological: IN ANNUAL GRASSLAND ADJACENT TO ALKALI PLAYA HABITAT. W/VULPIA MYUROS, BROMUS MADRITENSIS, AVENA BARBATA, HEMIZONIA PUNGENS, AMSINCKIA MENZIESII, SALICORNIA SUBTERMINALIS, AND ISOCOMA MENZIESII. ATRIPLEX CORONATA NOTATIOR ALSO HERE.

Threat: SEASONAL WATERFOWL POND PROPOSED AT THE EDGE OF THIS SITE. ALSO PROPOSED BORROW SITE FOR THE WEST SIDE LEVEE.

General: 900 PLANTS SEEN BY BRAMLET IN 1995, 45 PLANTS IN 1996 IN EXTREME W. PART OF OCCURRENCE.

Owner/Manager: DFG-SAN JACINTO WA

Source Codes

BRA95F01, BRA96F01, BRA95F02

Sunnymead

ATHENE CUNICULARIA (BURROW SITES)
BURROWING OWL — Element Code: ABNSB10010

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T2	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: FOUND IN OPEN, DRY ANNUAL OR PERENIAL GRASSLANDS, DESERTS & SCRUBLANDS CHARACTERIZED BY LOW-GROWING VEGETATION.
Micro: SUBTERRANEAN NESTER, DEPENDENT UPON BURROWING MAMMALS, MOST NOTABLY, THE CALIFORNIA GROUND SQUIRREL.

Occurrence No. 65 — Map Index: 03755
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: SPEAKS, J. 1983 (PERS)
Dates Last Seen — Element: 1980-XX-XX; Site: 1980-XX-XX

Quad Summary: PERRIS (3311772/085C)*, SUNNYMEAD (3311782/085B)
County Summary: RIVERSIDE
SNA Summary:

Location: LAKE PERRIS STATE RECREATION AREA, BETWEEN DAM AND PARKING LOT.

Lat/Long: 33°52'09" / 117°11'05"
UTM: Zone-11 N3747465 E482908
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1 mile
Township: 03S
Range: 03W
Section: 34 Qtr XX
Meridian: S
Elevation: 1650 ft

Comments
Distribution:
Ecological:
Threat:
General: COLONY OF MANY OWLS OBSERVED IN 1980 BY J. SPEAKS.
Owner/Manager: DPR-LAKE PERRIS SRA

Source Codes
JOH88U01, SPE83U02

POLIOPTILA CALIFORNICA CALIFORNICA
COASTAL CALIFORNIA GNATCATCHER — Element Code: ABPBJ08080

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2T2	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: OBLIGATE, PERMANENT RESIDENT OF COASTAL SAGE SCRUB BELOW 2500 FT IN SOUTHERN CALIFORNIA.
Micro: LOW, COASTAL SAGE SCRUB IN ARID WASHES, ON MESAS & SLOPES. NOT ALL AREAS CLASSIFIED AS COASTAL SAGE SCRUB ARE OCCUPIED.

Occurrence No. 136 — Map Index: 03531
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: EASTON, J. 1988 (OBS)
Dates Last Seen — Element: 1988-06-27; Site: 1988-06-27

Quad Summary: RIVERSIDE EAST (3311783/086A)*, SUNNYMEAD (3311782/085B)
County Summary: RIVERSIDE
SNA Summary: Box Springs Mountains

Location: LAWLESS RANCH, 2.3 MI N OF SUNNYMEAD, E OF RIVERSIDE.

Lat/Long: 33°58'46" / 117°15'06"
UTM: Zone-11 N3759711 E476752
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile
Township: 02S
Range: 04W
Section: 24 Qtr SE
Meridian: S
Elevation: 1900 ft

Comments
Distribution:
Ecological: HABITAT IS ECOTONE BETWEEN RIPARIAN SYCAMORE WOODLAND AND COASTAL SAGE SCRUB; MODERATE TO STEEPLY SW SLOPING ASPECT, ADJOINING DISTURBED HABITAT.
Threat: SCATTERED RESIDENCES AND PROPOSED DEVELOPMENT.
General: 4 ADULTS OBSERVED.
Owner/Manager: PVT

Source Codes
EAS88F01

POLIOPTILA CALIFORNICA CALIFORNICA (cont.)
COASTAL CALIFORNIA GNATCATCHER — Element Code: ABPBJ08080

Status	NDDB Element Ranks	Other Lists
Federal: Threatened	Global: G2T2	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: OBLIGATE, PERMANENT RESIDENT OF COASTAL SAGE SCRUB BELOW 2500 FT IN SOUTHERN CALIFORNIA.
Micro: LOW, COASTAL SAGE SCRUB IN ARID WASHES, ON MESAS & SLOPES. NOT ALL AREAS CLASSIFIED AS COASTAL SAGE SCRUB ARE OCCUPIED.

Occurrence No. 454 — Map Index: 24993
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: HANNA, W. 1928 (MUS)
Dates Last Seen — Element: 1928-04-10; Site: 1928-04-10

Quad Summary: SAN BERNARDINO SOUTH (3411713/107D)*, SUNNYMEAD (3311782/085B), RIVERSIDE EAST (3311783/086A), REDLANDS (3411712/106C)
County Summary: RIVERSIDE, SAN BERNARDINO
SNA Summary:

Location: RECHE CANYON, SE OF COLTON.

Lat/Long: 34°01'07" / 117°16'13"
UTM: Zone-11 N3764071 E475050
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Area: 2,755.2 ac
Township: 02S
Range: 04W
Section: XX Qtr XX
Meridian: S
Elevation: 1600 ft

Comments
Distribution:
Ecological: 3 OF THE 4 NESTS WERE BUILT IN BLACK SAGE, 3-3.5 FEET FROM THE GROUND.
Threat:
General: 4 HISTORICAL EGG SET COLLECTIONS. IN ALL 4 CASES, BOTH MEMBERS OF PAIR WERE PRESENT AND 4 EGGS WERE COLLECTED (HANNA, SETS #1915, 2941, 4650, AND 7605 SAN BERNARDINO COUNTY MUSEUM).
Owner/Manager: UNKNOWN

Source Codes
HAN24S02, HAN23S01, HAN28S02, HAN23S02

PEROGNATHUS LONGIMEMBRIS BREVINASUS
LOS ANGELES POCKET MOUSE — Element Code: AMAFD01041

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T1?	CDFG Status: SC
State: None	State: S1?	

Habitat Associations
General: LOWER ELEVATION GRASSLANDS & COASTAL SAGE COMMUNITIES IN THE LOS ANGELES BASIN
Micro: OPEN GROUND WITH FINE SANDY SOILS. MAY NOT DIG EXTENSIVE BURROWS, HIDING UNDER WEEDS & DEAD LEAVES INSTEAD.

Occurrence No. 12 — Map Index: 24993
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: GRINNELL, J. 1916 (MUS)
Dates Last Seen — Element: 1916-10-31 — Site: 1916-10-31

Quad Summary: SAN BERNARDINO SOUTH (3411713/107D)*, SUNNYMEAD (3311782/085B), RIVERSIDE EAST (3311783/086A), REDLANDS (3411712/106C)
County Summary: RIVERSIDE, SAN BERNARDINO
SNA Summary:

Location: RECHE CANYON. SOUTHEAST OF COLTON, SOUTH OF THE SANTA ANA RIVER.

Lat/Long: 34°01'07" / 117°16'13" — Township: 02S
UTM: Zone-11 N3764071 E475050 — Range: 04W
Mapping Precision: NON-SPECIFIC — Section: XX Qtr XX
Symbol Type: POLYGON — Meridian: S
Area: 2,755.2 ac — Elevation: 1600 ft

Comments
Distribution: COLLECTED FROM THE MOUTH OF THE CANYON AND THE INTERIOR OF THE CANYON.
Ecological:
Threat:
General: MVZ #2656 COLLECTED BY C.H. RICHARDSON FROM THE MOUTH OF RECHE CANYON ON 27 JUL 1908. MVZ #24496 COLLECTED BY GRINNELL FROM RECHE CANYON ABOUT 4 MILES SOUTHEAST OF COLTON ON 31 OCT 1916.
Owner/Manager: UNKNOWN

Source Codes
MVZ81S01

DIPODOMYS STEPHENSI
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 3 — Map Index: 03895
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Stable
Main Source: PRICE, M. 1991 (OBS)
Dates Last Seen — Element: 1991-10-XX — Site: 1991-10-XX

Quad Summary: SUNNYMEAD (3311782/085B)*, LAKEVIEW (3311771/085D), PERRIS (3311772/085C), EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: SURROUNDING PERRIS LAKE; MOST OF THE HABITAT IS LOCATED NORTH AND EAST OF THE LAKE.

Lat/Long: 33°52'15" / 117°10'18" — Township: 03S
UTM: Zone-11 N3747661 E484129 — Range: 03W
Mapping Precision: NON-SPECIFIC — Section: 24 Qtr XX
Symbol Type: POLYGON — Meridian: S
Area: 8,057.7 ac — Elevation: 1750 ft

Comments
Distribution: PATCHY DISTRIBUTION THROUGHOUT AREA. OBSERVATIONS SINCE 1972 INDICATE TRACE TO MEDIUM ABUNDANCES. THERE IS MUCH DISTRIBUTION DETAIL ON THE SOURCE MAPS. THE EXTREME SE PORTION HAS AN OBSERVATION WHICH RECORDS PRESENCE OF 239 INDIVIDUALS.
Ecological: PREVIOUSLY-CULTIVATED ANNUAL GRASSLAND BASIN SURROUNDED BY RIVERSIDIAN SAGE SCRUB. SOIL: CIENEBA, EXETER, GORGONIO, GREENFIELD, HANFORD, MONSERATE, PACHAPPA, PLACENTIA, RAMONA, VISTA. SLOPE: 0-15%.
Threat: DEVELOPMENT AND AGIRCULTURE ARE THREATS. THE SAN JACINTO PORTION (SE) HAS THE THREAT OF IMMINENT DEVELOPMENT.
General: A LARGE PORTION OF THIS SITE IS THE LAKE PERRIS SRA AND SAN JACINTO WILDLIFE AREA. WEST PORTIONS UNDER STUDY FOR HABITAT ENHANCEMENT. FUTURE STATE PARK PRACTICES NEED TO ADDRESS PROPER MANAGEMENT FOR SKR HABITAT. 13 SOURCE DOCUMENTS.
Owner/Manager: DPR, DFG, PVT

Source Codes
BEH90F02, MCC89F04, PRI91F02, PRI89F07, PRI89F03, PRI91F03, MCC91F03, PRI89F09, BEH90F01, OFA88F51, PRI89F08, MCC90F08, THO73R01, LSA91R02

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 88 — Map Index: 20453
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: KIRTLAND, K. 1990 (OBS)
Dates Last Seen — Element: 1990-09-29 — Site: 1990-09-29

Quad Summary: SUNNYMEAD (3311782/085B)
County Summary: RIVERSIDE
SNA Summary:

Location: 0.1 MI NE INDIAN ST. JCT WITH NECTAR AVE.

Lat/Long: 33°58'20" / 117°13'46" — Township: 02S
UTM: Zone-11 N3758908 E478816 — Range: 03W
Mapping Precision: NON-SPECIFIC — Section: 30 Qtr NE
Symbol Type: POINT — Meridian: S
Radius: 2/5 mile — Elevation: 2000 ft

Comments
Distribution: 8 INDIVIDUALS REPORTED ON SITE.
Ecological: CHARACTERIZED BY HILLS AND DRAINAGES. MESIC AND XERIC TYPES OF COASTAL SAGE SCRUB ON HILLSIDES, MESIC ON NORTH-FACING & XERIC ON SOUTH-FACING. MESIC: ARTEMISIA TRIDENTATA, SAVIA MELLLIFERA, ERIUGONUM FASCICULATUM. XERIC: ENCILIA FARINOSA.
Threat: ORV USE AND DEVELOPMENT.
General:
Owner/Manager: PVT

Source Codes
KIR88F01, KIR88F02, KIR88F03, KIR90F01

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 89 — Map Index: 20452
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: O'FARRELL, M. ET AL 1988 (OBS)
Dates Last Seen — Element: 1988-08-14 — Site: 1988-08-14

Quad Summary: SUNNYMEAD (3311782/085B)
County Summary: RIVERSIDE
SNA Summary:

Location: 1.5 MI. ENE INDIAN ST JCT. WITH NECTAR AVE.

Lat/Long: 33°58'30" / 117°12'27" — Township: 02S
UTM: Zone-11 N3759206 E480821 — Range: 03W
Mapping Precision: NON-SPECIFIC — Section: 28 Qtr XX
Symbol Type: POLYGON — Meridian: S
Area: 58.0 ac — Elevation: 2300 ft

Comments
Distribution: ABUNDANCE LOW WITH SMALL PATCHES OF MEDIUM OVER 50 ACRES. DISTRIBUTION CONCENTRATED ON HILLTOPS, RIDGES, SWALES.
Ecological: NON-NATIVE GRASSLAND. AREA SURROUNDED BY CHAMISE CHAPARRAL COVERED SLOPES AND DRAINAGES WITH RIPARIAN. SLOPE: 0-10%. SOIL: CIENEBA, GREENFIELD.
Threat: ORV USE
General:
Owner/Manager: UNKNOWN

Source Codes
OFA88F29

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 90 — Map Index: 20454
Occ Rank: Poor
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: O'FARRELL, M. ET AL 1988 (OBS)
Dates Last Seen — Element: 1988-08-14 — Site: 1988-08-14

Quad Summary: SUNNYMEAD (3311782/085B)
County Summary: RIVERSIDE
SNA Summary:

Location: 0.2 MI WNW LOCUST AVE. JCT. WITH HENDRICK RD. ABOUT 2.5 MILES ENE OF SUNNYMEAD.

Lat/Long: 33°57'34" / 117°10'59" — Township: 02S
UTM: Zone-11 N3757483 E483075 — Range: 03W
Mapping Precision: NON-SPECIFIC — Section: 34 Qtr N
Symbol Type: POLYGON — Meridian: S
Area: 29.1 ac — Elevation: 2000 ft

Comments
Distribution: ABUNDANCE TRACE WITH PATCHES OF LOW, OVER 35 ACRES.
Ecological: NON-NATIVE GRASSSLAND BORDERED BY RIVERSIDIAN SAGE SCRUB. SLOPE: 0-10%, SOIL: GORGONIO, HANFORD, MONSERATE.
Threat: DISKING AND ORV USE
General:
Owner/Manager: UNKNOWN

Source Codes
OFA88F30

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 91 — Map Index: 20451
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Decreasing
Main Source: O'FARRELL, M. ET AL 1988 (OBS)
Dates Last Seen — Element: 1988-08-14 — Site: 1988-08-14

Quad Summary: SUNNYMEAD (3311782/085B)
County Summary: RIVERSIDE
SNA Summary:

Location: 2 MI NW LOCUST AVE JCT. WITH HENDRICK RD. NE OF SUNNYMEAD.

Lat/Long: 33°59'04" / 117°11'48" — Township: 02S
UTM: Zone-11 N3760269 E481834 — Range: 03W
Mapping Precision: NON-SPECIFIC — Section: 21 Qtr XX
Symbol Type: POLYGON — Meridian: S
Area: 343.5 ac — Elevation: 2500 ft

Comments
Distribution: LOW ABUNDANCE OVER 360 ACRES. DISTRIBUTION ON RIDGE TOPS AND IN SWALES. POPULATION IN THE SE QUARTER OF SEC 21 HAS BEEN EXTIRPATED BY RURAL HOUSING.
Ecological: NON-NATIVE GRASSLAND SURROUNDED BY CHAMISE CHAPARRAL. SLOPE: 0-40%. SOIL: CIENEBA, GREENFIELD, VISTA.
Threat: ORV, GRAZING, AND DEVELOPMENT.
General:
Owner/Manager: UNKNOWN

Source Codes
OFA88F31

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 91 — Map Index: 20451
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Decreasing
Main Source: O'FARRELL, M. ET AL 1988 (OBS)
Dates Last Seen — Element: 1988-08-14 — Site: 1988-08-14

Quad Summary: SUNNYMEAD (3311782/085B)
County Summary: RIVERSIDE
SNA Summary:

Location: 2 MI NW LOCUST AVE JCT. WITH HENDRICK RD. NE OF SUNNYMEAD.

Lat/Long: 33°59'04" / 117°11'48" — Township: 02S
UTM: Zone-11 N3760269 E481834 — Range: 03W
Mapping Precision: NON-SPECIFIC — Section: 21 Qtr XX
Symbol Type: POLYGON — Meridian: S
Area: 343.5 ac — Elevation: 2500 ft

Comments
Distribution: LOW ABUNDANCE OVER 360 ACRES. DISTRIBUTION ON RIDGE TOPS AND IN SWALES. POPULATION IN THE SE QUARTER OF SEC 21 HAS BEEN EXTIRPATED BY RURAL HOUSING.
Ecological: NON-NATIVE GRASSLAND SURROUNDED BY CHAMISE CHAPARRAL. SLOPE: 0-40%. SOIL: CIENEBA, GREENFIELD, VISTA.
Threat: ORV, GRAZING, AND DEVELOPMENT.
General:
Owner/Manager: UNKNOWN

Source Codes
OFA88F31

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 93 — Map Index: 20455
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: MONTGOMERY, S. 1989 (OBS)
Dates Last Seen — Element: 1989-08-30 — Site: 1989-08-30

Quad Summary: SUNNYMEAD (3311782/085B)
County Summary: RIVERSIDE
SNA Summary:

Location: DIRECTLY NW OF PETIT ST. JCT WITH COTTONWOOD AVE. SOUTH OF HWY 60, SOUTHEAST OF SUNNYMEAD.

Lat/Long: 33°55'41" / 117°10'39" — Township: 03S
UTM: Zone-11 N3753987 E483605 — Range: 03W
Mapping Precision: NON-SPECIFIC — Section: 10 Qtr NE
Symbol Type: POINT — Meridian: S
Radius: 2/5 mile — Elevation: 1870 ft

Comments
Distribution: 5 INDIVIDUALS LOCATED ON SITE.
Ecological: STEEP ROCKY SLOPES TO GENTLY SLOPING TERRAIN. ROCKY OUTCROPS OCCUR IN THE WESTERN, EASTERN, AND SOUTHERN SECTIONS OF THE SITE. VEGETATION CONSISTS OF SAGE SCRUB AND DISTURBED GRASSLAND. LOAMY SOILS.
Threat: ORV ACTIVITY AND DUMPING.
General: SITE IS ISOLATED. POPULATION IS SMALL.
Owner/Manager: PVT

Source Codes
MON89F14

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 119 — Map Index: 20484
Occ Rank: Poor
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BEHRENDS, P. 1990 (OBS)
Dates Last Seen — Element: 1990-07-26 — Site: 1993-02-05

Quad Summary: EL CASCO (3311781/085A)*, SUNNYMEAD (3311782/085B)
County Summary: RIVERSIDE
SNA Summary:

Location: 1.5 MILES SOUTH OF HIGHWAY 60 AND GILMAN SPRINGS ROAD, ~2 MILES EAST OF MORENO, NORTH OF THE SAN JACINTO WILDLIFE AREA.

Lat/Long: 33°54'58" / 117°07'02" — Township: 03S
UTM: Zone-11 N3752671 E489171 — Range: 02W
Mapping Precision: NON-SPECIFIC — Section: 17 Qtr NW
Symbol Type: POLYGON — Meridian: S
Area: 156.8 ac — Elevation: 1560 ft

Comments
Distribution: LOW DENSITY. 1991 NE CORNER SEC 18 PIPELINE SURVEY.
Ecological: ABANDONED DAIRY OPERATION. RUDERAL FIELDS. DISTURBED, WEEDY VEGETATION; DOMINATED BY CHEESEWEED, RUSSIAN-THISTLE, RED BROME, RED-STEMMED FILAREE. SOILS ARE SILTY: SAN EMIGDIO FINE SANDY LOAM. SITE IS FLAT.
Threat: SITE HAS BEEN RECOLONIZED BY SKR USING GROUND SQUIRREL AND GOPHER BURROWS: THREAT--POOR HABITAT AND DEVELOPMENT.
General: THE AREA IS PART OF SAN JACINTO WILDLIFE AREA SKR STUDY AREA. BEING CONSIDERED FOR DEVELOPMENT UNDER SECTION 10(A) PERMIT AND REMOVAL FROM SKR STUDY AREA. 33 BURROWS OBSERVED AT 4 POINTS IN SAMPLE AREA, 1991. NO K-RATS FOUND 1993
Owner/Manager: PVT

Source Codes
BEH90F02, BEH93F01, LSA91R02

CHAETODIPUS (=PEROGNATHUS) FALLAX FALLAX
NORTHWESTERN SAN DIEGO POCKET MOUSE — Element Code: AMAFD05031

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3?	CDFG Status: SC
State: None	State: S2S3	

Habitat Associations
General: COASTAL SCRUB, CHAPARRAL, GRASSLANDS, SAGEBRUSH, ETC. IN WESTERN SAN DIEGO CO.
Micro: SANDY, HERBACEOUS AREAS, USUALLY IN ASSOCIATION WITH ROCKS OR COARSE GRAVEL.

Occurrence No. 14 — Map Index: 38525
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: MONTGOMERY, S. 1992 (LIT)
Dates Last Seen — Element: 1992-06-26 — Site: 1992-06-26

Quad Summary: SUNNYMEAD (3311782/085B)*, EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: THE BADLANDS, NORTH OF HIGHWAY 60 AND EAST OF REDLANDS BLVD, 6.5 MILES EAST OF SUNNYMEAD.

Lat/Long: 33°57'15" / 117°07'52" — Township: 02S
UTM: Zone-11 N3756889 E487876 — Range: 02W
Mapping Precision: NON-SPECIFIC — Section: 31 Qtr XX
Symbol Type: POLYGON — Meridian: S
Area: 1,860.0 ac — Elevation: 2100 ft

Comments
Distribution: THE HIGHEST FREQUENCY OF OCCURRNCE OF SDPM IN TRAPLINES WAS IN THE WESTERN AND SOUTHERN AREAS OF THE PROPERTY.
Ecological: SAGE SCRUB IS THE PREDOMINANT VEGETATION COMMUNITY OVER MOST OF THE PROPERTY, OTHERS ARE: SOUTHERN MIXED CHAPARRAL, DISTURBED GRASSLAND, COAST LIVE OAK WOODLAND, CULTIVATED FIELDS, AND LIMITED RIPARIAN SCRUB & WOODLAND HABITATS.
Threat: PROPOSED FOR EXTENSIVE CAR RACEWAY, OTHER USES: COUNTY DUMP, HUNTING RANCH, SPARSE HOUSING.
General: 61 CAPTURED MAY AND JUNE, 1992, TRAPLINES F, H, I, J, K, L,M, N, O, P, Q, T, V.
Owner/Manager: UNKNOWN

Source Codes
MON92F01, MON92R02

PHRYNOSOMA CORONATUM BLAINVILLEI
SAN DIEGO HORNED LIZARD — Element Code: ARACF12021

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3T4	CDFG Status: SC
State: None	State: S2S3	

Habitat Associations
General: INHABITS COASTAL SAGE SCRUB AND CHAPARRAL IN ARID AND SEMI-ARID CLIMATE CONDIT
Micro: PREFERS FRIABLE, ROCKY, OR SHALLOW SANDY SOILS.

Occurrence No. 216 — Map Index: 03699
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRODE, J. 1986 (PERS)
Dates Last Seen — Element: 1967-04-25 — Site: 1967-04-25

Quad Summary: SUNNYMEAD (3311782/085B)
County Summary: RIVERSIDE
SNA Summary:

Location: RECHE CYN, 7.6 MI S BARTON RD INTERSECTION.

Lat/Long: 33°58'36" / 117°12'30" — Township: 02S
UTM: Zone-11 N3759391 E480766 — Range: 03W
Mapping Precision: NON-SPECIFIC — Section: 20 Qtr SE
Symbol Type: POINT — Meridian: S
Radius: 1/5 mile — Elevation: 2400 ft

Comments
Distribution:
Ecological:
Threat:
General: LACM SPECIMEN.
Owner/Manager: UNKNOWN

Source Codes
BRO86U05

CNEMIDOPHORUS HYPERYTHRUS
ORANGE-THROATED WHIPTAIL — Element Code: ARACJ02060

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: INHABITS LOW-ELEVATION COASTAL SCRUB, CHAPARRAL, AND VALLEY-FOOTHILL HARDWOOD HABITATS.
Micro: PREFERS WASHES & OTHER SANDY AREAS WITH PATCHES OF BRUSH & ROCKS. PERENNIAL PLANTS NECESSARY FOR ITS MAJOR FOOD-TERMITES

Occurrence No. 43 — Map Index: 03615
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: MCGURTY, B. 1980 (LIT)
Dates Last Seen — Element: 1966-05-13 — Site: 1966-05-13

Quad Summary: SUNNYMEAD (3311782/085B)*, REDLANDS (3411712/106C)
County Summary: RIVERSIDE, SAN BERNARDINO
SNA Summary:

Location: 2 MI NW UP RECHE CANYON.

Lat/Long: 33°59'32" / 117°13'41" — Township: 02S
UTM: Zone-11 N3761122 E478937 — Range: 03W
Mapping Precision: NON-SPECIFIC — Section: 18 Qtr SE
Symbol Type: POINT — Meridian: S
Radius: 1 mile — Elevation: 1900 ft

Comments
Distribution:
Ecological:
Threat:
General: LACM SPECIMEN #99905 COLLECTED BY V.A.PARIS. ACCORDING TO BRATTSTROM, STILL EXTANT AT OR NEAR THIS SITE IN 1990.
Owner/Manager: UNKNOWN

Source Codes
BRA90U01, MCG80R01

CNEMIDOPHORUS HYPERYTHRUS (cont.)
ORANGE-THROATED WHIPTAIL — Element Code: ARACJ02060

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: INHABITS LOW-ELEVATION COASTAL SCRUB, CHAPARRAL, AND VALLEY-FOOTHILL HARDWOOD HABITATS.
Micro: PREFERS WASHES & OTHER SANDY AREAS WITH PATCHES OF BRUSH & ROCKS. PERENNIAL PLANTS NECESSARY FOR ITS MAJOR FOOD-TERMITES

Occurrence No. 188 — Map Index: 21088
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRATTSTROM, B. 1991 (LIT)

Dates Last Seen
Element: 1989-07-25
Site: 1989-07-25

Quad Summary: SUNNYMEAD (3311782/085B)
County Summary: RIVERSIDE
SNA Summary:

Location: 0.7 MILES NW OF MORENO BEACH DRIVE (HENDRICK RD) & LOCUST AVENUE, ON RECHE CANYON ROAD, ABOUT 3 MILES ENE OF SUNNYMEAD.

Lat/Long: 33°57'45" / 117°11'15"
UTM: Zone-11 N3757826 E482661
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile

Township: 02S
Range: 03W
Section: 27 Qtr SW
Meridian: S
Elevation: 2080 ft

Comments
Distribution: TWO SURVEYS AT THIS LOCATION; #7 CUT SHORT DUE TO A RAPTOR'S NEST WITH YOUNG PRESENT.
Ecological: SITE #7: RIPARIAN; STRONG SLOPE; BACHARIS SP, CHAMISE, ERIOGONUM FASCICULATUM. SITE #8: CHAPARRAL; GENTAL SLOPE; ADENOSTOMA FASCICULATUM, ERIOGONUM FASCICULATUM.
Threat: ORVS, ROADS
General: SOURCE CITED AS D. STRONG AND B. LEATHERMAN. SURVEY NUMBERS 7 AND 8; OBSERVED 1 AND 2 LIZARDS RESPECTIVELY.
Owner/Manager: UNKNOWN

Source Codes
LEA89F17, BRA91R02

CNEMIDOPHORUS HYPERYTHRUS (cont.)
ORANGE-THROATED WHIPTAIL — Element Code: ARACJ02060

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: INHABITS LOW-ELEVATION COASTAL SCRUB, CHAPARRAL, AND VALLEY-FOOTHILL HARDWOOD HABITATS.
Micro: PREFERS WASHES & OTHER SANDY AREAS WITH PATCHES OF BRUSH & ROCKS. PERENNIAL PLANTS NECESSARY FOR ITS MAJOR FOOD-TERMITES

Occurrence No. 189 — Map Index: 21090
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRATTSTROM, B. 1991 (LIT)

Dates Last Seen
Element: 1989-07-28
Site: 1989-07-28

Quad Summary: SUNNYMEAD (3311782/085B)
County Summary: RIVERSIDE
SNA Summary:

Location: 0.3 MILES WEST OF THEODORE ROAD ON IRONWOOD AVENUE, MORENO VALLEY, 5 MILES EAST OF SUNNYMEAD.

Lat/Long: 33°56'48" / 117°08'41"
UTM: Zone-11 N3756067 E486625
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile

Township: 03S
Range: 03W
Section: 36 Qtr SE
Meridian: S
Elevation: 1840 ft

Comments
Distribution:
Ecological: COASTAL SAGE. PERENNIALS: SALVIA MELLIFERA, S. OPIANA, ERIOGONUM FASCICULATUM.
Threat: ORV, ROADS
General: 1 LIZARD COLLECTED ON SURVEY #10, 1989.
Owner/Manager: UNKNOWN

Source Codes
BRA91R02, LEA89F18

CNEMIDOPHORUS HYPERYTHRUS (cont.)
ORANGE-THROATED WHIPTAIL — Element Code: ARACJ02060

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: INHABITS LOW-ELEVATION COASTAL SCRUB, CHAPARRAL, AND VALLEY-FOOTHILL HARDWOOD HABITATS.
Micro: PREFERS WASHES & OTHER SANDY AREAS WITH PATCHES OF BRUSH & ROCKS. PERENNIAL PLANTS NECESSARY FOR ITS MAJOR FOOD-TERMITES

Occurrence No. 190 — Map Index: 21089
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRATTSTROM, B. 1991 (LIT)

Dates Last Seen
Element: 1989-08-03
Site: 1989-08-03

Quad Summary: SUNNYMEAD (3311782/085B)
County Summary: RIVERSIDE
SNA Summary:

Location: HILL AREA 0.5 MILES SOUTH OF THE POMONA FREEWAY AT MORENO BEACH DRIVE, 3 MILES ESE OF SUNNYMEAD, MORENO VALLEY.

Lat/Long: 33°55'51" / 117°10'43"
UTM: Zone-11 N3754298 E483480
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 2/5 mile

Township: 03S
Range: 03W
Section: 10 Qtr NE
Meridian: S
Elevation: 1840 ft

Comments
Distribution: LIZARD FOUND 0.4 MILES UP A DIRT ROAD WEST OFF MORENO BEACH DR.
Ecological: COASTAL SAGE. SALVIA OPIANA, ADENOSTOMA FASCICULATUM, ERIOGONUM FASCICULATUM.
Threat: ORVS, ROADS
General: 2 MALES AND 1 FEMALE OBSERVED ON SURVEYS NUMBERS 13 AND 14.
Owner/Manager: UNKNOWN

Source Codes
BRA91R02, LEA89F19

CNEMIDOPHORUS HYPERYTHRUS (cont.)
ORANGE-THROATED WHIPTAIL — Element Code: ARACJ02060

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: INHABITS LOW-ELEVATION COASTAL SCRUB, CHAPARRAL, AND VALLEY-FOOTHILL HARDWOOD HABITATS.
Micro: PREFERS WASHES & OTHER SANDY AREAS WITH PATCHES OF BRUSH & ROCKS. PERENNIAL PLANTS NECESSARY FOR ITS MAJOR FOOD-TERMITES

Occurrence No. 259 — Map Index: 03755
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: LEATHERMAN B. & D. STRONG 1989 (OBS)

Dates Last Seen
Element: 1989-08-03
Site: 1989-08-03

Quad Summary: PERRIS (3311772/085C)*, SUNNYMEAD (3311782/085B)
County Summary: RIVERSIDE
SNA Summary:

Location: 20 METERS WEST OF CAMP NATURE THEATRE, LOT 17, LAKE PERRIS STATE RECREATIONAL AREA.

Lat/Long: 33°52'09" / 117°11'05"
UTM: Zone-11 N3747465 E482908
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1 mile

Township: 03S
Range: 03W
Section: 34 Qtr XX
Meridian: S
Elevation: 1650 ft

Comments
Distribution:
Ecological: VEGETATION TYPE CLASSIFIED AS GRASSLAND , 80% GRASS COVER. PERENNIALS PRESENT, IN ORDER OF DOMINANCE: SALVIA OPIANA & ADENOSTOMA FASCICULATUM.
Threat: BUILDINGS
General: 1 OBSERVED, 1989.
Owner/Manager: DPR-LAKE PERRIS SRA

Source Codes
LEA89F11

SOUTHERN SYCAMORE ALDER RIPARIAN WOODLAND
Element Code: CTT62400CA

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4	
State: None	State: S4	

Habitat Associations
General:
Micro:

Occurrence No. 169 Map Index: 03673
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Decreasing
Main Source: HOLLAND, R. 1988 (MAP)

Dates Last Seen
Element: 1985-02-13
Site: 1985-02-13

Quad Summary: SUNNYMEAD (3311782/085B)
County Summary: RIVERSIDE
SNA Summary:

Location: RECHE CANYON, FROM CONSOLE SPRINGS TO <1 MILE UPSTREAM, NORTHEAST OF SUNNYMEAD.

Lat/Long: 33°59'01" / 117°13'00"
UTM: Zone-11 N3760163 E479994
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 32.4 ac

Township: 02S
Range: 03W
Section: 20 Qtr XX
Meridian: S
Elevation: 2200 ft

Comments
Distribution: MAPPED PER INTERPRETATION OF 1985 AERIAL PHOTOS BUT BOUNDARY DECREASED PER INTERPRETATION OF AERIAL PHOTOS.
Ecological: CLOSED CANOPY PLATANUS RACEMOSA ACCORDING TO WIESLANDER SURVEY.
Threat:
General: NEEDS FIELD VERIFICATION. THIS WAS OCC #169 OF CTT62400CA.
Owner/Manager: PVT

Source Codes
HOL88M01, USF35M01

SOUTHERN SYCAMORE ALDER RIPARIAN WOODLAND (cont.)
Element Code: CTT62400CA

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4	
State: None	State: S4	

Habitat Associations
General:
Micro:

Occurrence No. 170 Map Index: 03757
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Decreasing
Main Source: HOLLAND, R. 1988 (MAP)

Dates Last Seen
Element: 1985-02-13
Site: 1985-02-13

Quad Summary: SUNNYMEAD (3311782/085B)
County Summary: RIVERSIDE
SNA Summary:

Location: TWO N-FACING DRAINAGES IN THE BADLANDS, EAST OF CAMP TREE MONT.

Lat/Long: 33°59'14" / 117°10'40"
UTM: Zone-11 N3760544 E483568
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 112.9 ac

Township: 02S
Range: 03W
Section: 15 Qtr S
Meridian: S
Elevation: 1920 ft

Comments
Distribution: IN 1935 INCL REACH D/S OF CONFL, NOW CULTIVATED. THE REMAINDER EXTANT, 1935, PER INTERPRETATION OF AERIAL PHOTOS.
Ecological: CLOSED CANOPY PLATANUS RACEMOSA ACCORDING TO WIESLANDER SURVEY.
Threat:
General: NEEDS FIELD VERIFICATION. THIS WAS OCC #170 OF CTT62400CA.
Owner/Manager: PVT

Source Codes
HOL88M01, USF35M01

CENTROMADIA PUNGENS SSP LAEVIS
SMOOTH TARPLANT
Element Code: PDAST4R0R4

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-3

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND, CHENOPOD SCRUB, MEADOWS, PLAYAS, RIPARIAN WOODLAND.
Micro: ALKALI MEADOW, ALKALI SCRUB; ALSO IN DISTURBED PLACES. 0-480M.

Occurrence No. 5 Map Index: 28275
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: LARUE SN RSA (HERB)

Dates Last Seen
Element: 1989-XX-XX
Site: 1989-XX-XX

Quad Summary: SUNNYMEAD (3311782/085B)
County Summary: RIVERSIDE
SNA Summary:

Location: ABOUT 1 MILE SOUTH OF HIGHWAY 60 ON WEST SIDE OF NASON STREET AND SOUTH OF DRACAEA AVENUE, MORENO VALLEY.

Lat/Long: 33°55'36" / 117°11'39"
UTM: Zone-11 N3753854 E482054
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile

Township: 03S
Range: 03W
Section: 09 Qtr NE
Meridian: S
Elevation: 1660 ft

Comments
Distribution:
Ecological: GROWING IN GRASSLAND AND WILLOW RIPARIAN.
Threat:
General: MAIN SOURCE OF INFORMATION FOR THIS SITE IS 1989 COLLECTION BY LAPRE.
Owner/Manager: UNKNOWN

Source Codes
LAR89S01, BRA90U05, REI94U02

CENTROMADIA PUNGENS SSP LAEVIS (cont.)
SMOOTH TARPLANT
Element Code: PDAST4R0R4

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-3

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND, CHENOPOD SCRUB, MEADOWS, PLAYAS, RIPARIAN WOODLAND.
Micro: ALKALI MEADOW, ALKALI SCRUB; ALSO IN DISTURBED PLACES. 0-480M.

Occurrence No. 6 Map Index: 28240
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BALLMER, G. SN UCR (HERB)

Dates Last Seen
Element: 1992-06-XX
Site: 1992-06-XX

Quad Summary: SUNNYMEAD (3311782/085B)*, REDLANDS (3411712/106C)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN TIMETEO CANYON, JUST SOUTH OF SAN BERNARDINO COUNTY LINE.

Lat/Long: 33°59'49" / 117°09'43"
UTM: Zone-11 N3761631 E485053
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 2/5 mile

Township: 02S
Range: 03W
Section: 14 Qtr XX
Meridian: S
Elevation: 1600 ft

Comments
Distribution: FOUND ACROSS THE ROAD FROM THE OLD SCHOOL HOUSE.
Ecological:
Threat:
General: ONLY SOURCE OF INFORMATION FOR THIS SITE IS 1992 COLLECTION BY BALLMER.
Owner/Manager: UNKNOWN

Source Codes
SAN92U01, BAL91S01

CAULANTHUS SIMULANS
PAYSON'S JEWEL-FLOWER — Element Code: PDBRA0M0H0

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G3	CNPS List: 4
State: None	State: S3.2	R-E-D Code: 1-2-3

Habitat Associations
General: CHAPARRAL, COASTAL SCRUB. ONLY KNOWN FROM RIVERSIDE AND SAN DIEGO COUNTIES.
Micro: FREQUENTLY IN BURNED AREAS, OR IN DISTURBED SITES SUCH AS STREAMBEDS; ALSO ON ROCKY, STEEP SLOPES. 90-2200M.

Occurrence No. 43 — Map Index: 03603
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: MILLER, W. #720414-5 UCR (HERB)
Dates Last Seen — Element: 1972-04-14 — Site: 1972-04-14

Quad Summary: REDLANDS (3411712/106C)*, SUNNYMEAD (3311782/085B)
County Summary: RIVERSIDE, SAN BERNARDINO
SNA Summary:

Location: RECHE CYN, 5 MI FROM BARTON RD TURNOFF ON RECHE CYN RD.

Lat/Long: 34°00'06" / 117°13'47"
UTM: Zone-11 N3762170 E478785
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1 mile
Township: 02S
Range: 03W
Section: 18 Qtr NE
Meridian: S
Elevation: 2000 ft

Comments
Distribution:
Ecological: CLEARED LOT.
Threat:
General: ACCORDING TO ROY BUCK (1992) PLANTS AT THIS SITE ARE PROBABLY C. HETEROPHYLLUS. MORE STUDIES NEEDED.
Owner/Manager: PVT

Source Codes
MIL72S01, BUC92U01

CHORIZANTHE PARRYI VAR PARRYI
PARRY'S SPINEFLOWER — Element Code: PDPGN040J2

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G2T2?	CNPS List: 3
State: None	State: S2.1	R-E-D Code: 2-2-3

Habitat Associations
General: COASTAL SCRUB, CHAPARRAL.
Micro: DRY SLOPES AND FLATS; SOMETIMES AT INTERFACE OF 2 VEG TYPES, SUCH AS CHAP AND OAK WDLAND; DRY, SANDY SOILS. 40-1705M.

Occurrence No. 20 — Map Index: 22519
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: SANDERS, A. 1992 (LIT)
Dates Last Seen — Element: 1950-05-27 — Site: 1950-05-27

Quad Summary: SUNNYMEAD (3311782/085B)
County Summary: RIVERSIDE
SNA Summary:

Location: HILLS NORTHEAST OF RECHE CANYON SUMMIT.

Lat/Long: 33°58'48" / 117°12'19"
UTM: Zone-11 N3759754 E481038
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile
Township: 02S
Range: 03W
Section: 21 Qtr SW
Meridian: S
Elevation: 2500 ft

Comments
Distribution:
Ecological: GROWING WITH ADENOSTOMA FASCICULATUM, BROMUS RUBRUS, AND STYLOCLINE SP. ALONG A DISTURBED SANDY SLOPE.
Threat:
General: HERBARUM LABEL (ROSS, J.C. #4819 UCR #19249) IS ONLY INFORMATION FOR THIS SITE; NEEDS FIELDWORK.
Owner/Manager: UNKNOWN

Source Codes
SAN92U02

DODECAHEMA LEPTOCERAS
SLENDER-HORNED SPINEFLOWER — Element Code: PDPGN0V010

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G1	CNPS List: 1B
State: Endangered	State: S1.1	R-E-D Code: 3-3-3

Habitat Associations
General: CHAPARRAL, COASTAL SCRUB (ALLUVIAL FAN SAGE SCRUB). HIST. FROM LAX, RIV, AND SBD COUNTIES; EXTIRP. FROM MUCH OF RANGE.
Micro: FLOOD DEPOSITED TERRACES AND WASHES; ASSOC INCLUDE ENCELIA, DALEA, LEPIDOSPARTUM, ETC. 200-760M.

Occurrence No. 11 — Map Index: 41053
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Possibly Extirpated
Trend: Unknown
Main Source: LEMMON, J. SN (HERB)
Dates Last Seen — Element: 1923-05-08 — Site: 1983-XX-XX

Quad Summary: YUCAIPA (3411711/106D)*, BEAUMONT (3311688/084B), EL CASCO (3311781/085A), SUNNYMEAD (3311782/085B), FOREST FALLS (3411618/105C), REDLANDS (3411712/106C)
County Summary: RIVERSIDE, SAN BERNARDINO
SNA Summary:

Location: YUCAYPA VALLEY (YUCAIPA VALLEY).

Lat/Long: 34°01'01" / 117°03'58"
UTM: Zone-11 N3763847 E493893
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 5 mile
Township: 02S
Range: 02W
Section: 11 Qtr XX
Meridian: S
Elevation: 2200 ft

Comments
Distribution:
Ecological:
Threat: DEVELOPMENT, FLOOD CONTROL ACTIVITIES HAVE ELIMINATED MOST HABITAT HERE (KRANTZ 1979, 1983).
General: MAIN SOURCE OF INFORMATION FOR THIS SITE IS 1923 COLLECTION BY LEMMON.
Owner/Manager: UNKNOWN

Source Codes
LEMNDS05, LEM23S01, KRA83U04, ANO88U03, KRA79U10

El Casco

ATHENE CUNICULARIA (BURROW SITES)
BURROWING OWL — Element Code: ABNSB10010

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T2	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: FOUND IN OPEN, DRY ANNUAL OR PERENIAL GRASSLANDS, DESERTS & SCRUBLANDS CHARACTERIZED BY LOW-GROWING VEGETATION.
Micro: SUBTERRANEAN NESTER, DEPENDENT UPON BURROWING MAMMALS, MOST NOTABLY, THE CALIFORNIA GROUND SQUIRREL.

Occurrence No. 83 — Map Index: 03995
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: CRAIG, A. & N. CRAIG 1982 (PERS)
Dates Last Seen — Element: 1982-XX-XX — Site: 1982-XX-XX

Quad Summary: EL CASCO (3311781/085A)*, LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary: San Jacinto Wildlife Refuge

Location: SAN JACINTO WILDLIFE AREA, 2.6 MILES NORTH OF LAKEVIEW.

Lat/Long: 33°52'33" / 117°06'51"
UTM: Zone-11 N3748187 E489432
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile
Township: 03S
Range: 02W
Section: 29 Qtr SW
Meridian: S
Elevation: 1440 ft

Comments
Distribution:
Ecological:
Threat:
General: ACTIVE BURROW WITH 1-2 BIRDS FROM SEPTEMBER THROUGH EARLY OCTOBER OF 1982.
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
JOH88U01, CRA82U01

ATHENE CUNICULARIA (BURROW SITES) (cont.)
BURROWING OWL — Element Code: ABNSB10010

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T2	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: FOUND IN OPEN, DRY ANNUAL OR PERENIAL GRASSLANDS, DESERTS & SCRUBLANDS CHARACTERIZED BY LOW-GROWING VEGETATION.
Micro: SUBTERRANEAN NESTER, DEPENDENT UPON BURROWING MAMMALS, MOST NOTABLY, THE CALIFORNIA GROUND SQUIRREL.

Occurrence No. 84 — Map Index: 03971
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: CRAIG, A. & N. CRAIG 1982 (PERS)
Dates Last Seen — Element: 1982-07-XX — Site: 1982-07-XX

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary: San Jacinto Wildlife Refuge

Location: SAN JACINTO WILDLIFE AREA, 2.8 MILES NORTH OF LAKEVIEW.

Lat/Long: 33°52'42" / 117°07'10"
UTM: Zone-11 N3748481 E488955
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile
Township: 03S
Range: 02W
Section: 29 Qtr SW
Meridian: S
Elevation: 1480 ft

Comments
Distribution:
Ecological:
Threat:
General: UP TO FOUR BIRDS IN THIS AREA DURING JULY OF 1982.
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
CRA82U02, JOH88U01

VIREO BELLII PUSILLUS (NESTING)
LEAST BELL'S VIREO — Element Code: ABPBW01114

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G5T2	CDFG Status:
State: Endangered	State: S2	

Habitat Associations
General: SUMMER RESIDENT OF SOUTHERN CALIF. INHABITS LOW RIPARIAN GROWTH IN VIC OF WATER OR IN DRY RIVER BOTTOMS; BELOW 2000 FT.
Micro: NESTS PLACED ALONG MARGINS OF BUSHES OR ON TWIGS PROJECTING INTO PATHWAYS, USUALLY WILLOW, BACCHARIS, MESQUITE.

Occurrence No. 11 — Map Index: 04033
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: GOLDWASSER, S. 1978
Dates Last Seen — Element: 1978-07-XX — Site: 1978-07-XX

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN TIMOTEO CANYON; ACROSS FROM FISHERMANS RETREAT RESORT.

Lat/Long: 33°58'23" / 117°06'03"
UTM: Zone-11 N3758978 E490685
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1 mile
Township: 02S
Range: 02W
Section: 28 Qtr XX
Meridian: S
Elevation: 2000 ft

Comments
Distribution:
Ecological: CONTIGUOUS RIPARIAN HABITAT EXTENDS FOR APPROXIMATELY 6 MILES, FROM ABOUT 3 MILES WEST OF I-10 TO REDLANDS BLVD.
Threat: COWBIRDS ABUNDANT. SOME ORV IMPACTS.
General: ONE TERRITORIAL MALE OBSERVED DURING SUMMER OF 1978.
Owner/Manager: UNKNOWN

Source Codes
WIL81U03, GOL78R01, FWS85U02

AGELAIUS TRICOLOR (NESTING COLONY)
TRICOLORED BLACKBIRD — Element Code: ABPBXB0020

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G3	CDFG Status: SC
State: None	State: S3	

Habitat Associations
General: HIGHLY COLONIAL SPECIES, MOST NUMBEROUS IN THE CENTRAL VALLEY & VICINITY. LARGELY ENDEMIC TO CALIFORNIA.
Micro: REQUIRES OPEN WATER, PROTECTED NESTING SUBSTRATE, & FORAGING AREA WITH INSECT PREY WITHIN A FEW KM OF THE COLONY.

* SENSITIVE *
Occurrence No. 219 — Map Index: 21597
Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: DENCER, M. 1992 (OBS)
Dates Last Seen — Element: 1992-04-01 — Site: 1992-04-01

Quad Summary: LAKEVIEW (3311771/085D)*, EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary: San Jacinto Wildlife Refuge

Location: *SENSITIVE* Location information suppressed.

* SENSITIVE * Lat/Long: / Township:
UTM: Range:
Mapping Precision: Section: Qtr
Symbol Type: Meridian:
Radius: Elevation:

Comments
Distribution: Please contact the Calfornia Natural Diversity Database, California Department of Fish and Game, for more information: (916) 324-3812.
Ecological: NESTING SUBSTRATE IS TYPHA SPP. AND WILLOWS. SURROUNDING LAND USE IS AGRICULTURE.
Threat:
General:
Owner/Manager:

Source Codes
DEN92F03

PEROGNATHUS LONGIMEMBRIS BREVINASUS
LOS ANGELES POCKET MOUSE — Element Code: AMAFD01041

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T1?	CDFG Status: SC
State: None	State: S1?	

Habitat Associations
General: LOWER ELEVATION GRASSLANDS & COASTAL SAGE COMMUNITIES IN THE LOS ANGELES BASIN
Micro: OPEN GROUND WITH FINE SANDY SOILS. MAY NOT DIG EXTENSIVE BURROWS, HIDING UNDER WEEDS & DEAD LEAVES INSTEAD.

Occurrence No. 11 — Map Index: 15995
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: DURHAM, F. 1940 (MUS)
Dates Last Seen — Element: 1940-03-21 — Site: 1940-03-21

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: EDEN HOT SPRINGS.

Lat/Long: 33°53'43" / 117°03'15" Township: 09X
UTM: Zone-11 N3750361 E494991 Range: 09X
Mapping Precision: NON-SPECIFIC Section: XX Qtr XX
Symbol Type: POINT Meridian: S
Radius: 1 mile Elevation:

Comments
Distribution:
Ecological:
Threat:
General: MVZ #90713
Owner/Manager: UNKNOWN

Source Codes
DUR40S02

DIPODOMYS STEPHENSI
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 3 — Map Index: 03895
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Stable
Main Source: PRICE, M. 1991 (OBS)
Dates Last Seen — Element: 1991-10-XX — Site: 1991-10-XX

Quad Summary: SUNNYMEAD (3311782/085B)*, LAKEVIEW (3311771/085D), PERRIS (3311772/085C), EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: SURROUNDING PERRIS LAKE; MOST OF THE HABITAT IS LOCATED NORTH AND EAST OF THE LAKE.

Lat/Long: 33°52'15" / 117°10'18" Township: 03S
UTM: Zone-11 N3747661 E484129 Range: 03W
Mapping Precision: NON-SPECIFIC Section: 24 Qtr XX
Symbol Type: POLYGON Meridian: S
Area: 8,057.7 ac Elevation: 1750 ft

Comments
Distribution: PATCHY DISTRIBUTION THROUGHOUT AREA. OBSERVATIONS SINCE 1972 INDICATE TRACE TO MEDIUM ABUNDANCES. THERE IS MUCH DISTRIBUTION DETAIL ON THE SOURCE MAPS. THE EXTREME SE PORTION HAS AN OBSERVATION WHICH RECORDS PRESENCE OF 239 INDIVIDUALS.
Ecological: PREVIOUSLY-CULTIVATED ANNUAL GRASSLAND BASIN SURROUNDED BY RIVERSIDIAN SAGE SCRUB. SOIL: CIENEBA, EXETER, GORGONIO, GREENFIELD, HANFORD, MONSERATE, PACHAPPA, PLACENTIA, RAMONA, VISTA. SLOPE: 0-15%.
Threat: DEVELOPMENT AND AGIRCULTURE ARE THREATS. THE SAN JACINTO PORTION (SE) HAS THE THREAT OF IMMINENT DEVELOPMENT.
General: A LARGE PORTION OF THIS SITE IS THE LAKE PERRIS SRA AND SAN JACINTO WILDLIFE AREA. WEST PORTIONS UNDER STUDY FOR HABITAT ENHANCEMENT. FUTURE STATE PARK PRACTICES NEED TO ADDRESS PROPER MANAGEMENT FOR SKR HABITAT. 13 SOURCE DOCUMENTS.
Owner/Manager: DPR, DFG, PVT

Source Codes
BEH90F02, MCC89F04, PRI91F02, FRI89F07, PRI89F03, PRI91F03, MCC91F03, FRI89F09, BEH90F01, OFA88F51, FRI89F08, MCC90F08, THO73R01, LSA91R02

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 31 — Map Index: 04212
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Decreasing
Main Source: BAXTER, R. 1991 (OBS)
Dates Last Seen — Element: 1991-08-01 — Site: 1991-08-01

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: ABOUT 4-5 MILES NORTHEAST OF PERRIS RESERVOIR. ON THE WESTERN SLOPES OF THE MORENO BADLANDS.

Lat/Long: 33°54'23" / 117°04'34" Township: 03S
UTM: Zone-11 N3751573 E492972 Range: 02W
Mapping Precision: NON-SPECIFIC Section: 22 Qtr XX
Symbol Type: POLYGON Meridian: S
Area: 2,875.5 ac Elevation: 1800 ft

Comments
Distribution: PATCHY BETWEEN LOW AND TRACE DISTRIBUTION. POPULATIONS ARE BEING ISOLATED AND EXTIRPATED BY DEVELOPMENT.
Ecological: NON-NATIVE GRASSLAND; GRAZED GRAIN FIELDS; GOLF COURSE; BORDERS OF RIVERSIDIAN SAGE SCRUB. SOILS: METZ, SAN EMIGDIO.
Threat: DEVELOPMENT AND AGRICULTURE WHICH IS CAUSING HABITAT FRAGMENTATION.
General: SAMPLE TAKEN IN 1938: MVZ #88407. SOME HABITATS NEAR THE BADLANDS COULD BE PRESERVED AS A BUFFER FOR STUDY AREA TO THE NORTH.
Owner/Manager: PVT

Source Codes
BAX91F04, OFA89F09, OFA88F53, OFA88F52, MVZ81S01

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 116 — Map Index: 20486
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: RIGGAN, R. 1989 (OBS)

Dates Last Seen
Element: 1990-03-XX
Site: 1990-03-XX

Quad Summary: EL CASCO (3311781/085A)*, BEAUMONT (3311688/084B)
County Summary: RIVERSIDE
SNA Summary:

Location: 0.3 MI SOUTH OF SAN TIMOTEO CANYON RD. JCT. WITH I-10 AND NORTH OF HWY 60.

Lat/Long: 33°56'15" / 117°00'08"
UTM: Zone-11 N3755020 E499784
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Area: 114.5 ac
Township: 03S
Range: 01W
Section: 05 Qtr E
Meridian: S
Elevation: 2400 ft

Comments
Distribution:
Ecological: HEAVILY GRAZED FIELDS OCCUPIED PRIMARILY BY NON-NATIVE ANNUAL GRASSES AND FORBS WITH OCCASIONAL REINVASIVE ERIOGONUM FASCICULATUM. SHEEP GRAZING SUSTAINS SPARSE VEGETATION.
Threat: INTENSE ORV USE AND DEVELOPMENT.
General: SITE IS ISOLATED BY SR-60 AND I-10 FROM OTHER POPULATIONS.
Owner/Manager: PVT

Source Codes
RIG89F09

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 117 — Map Index: 20485
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: FRIESEN, R. 1989 (OBS)

Dates Last Seen
Element: 1989-12-XX
Site: 1989-12-XX

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: 2.2 MI S OF SAN TIMOTEO CANYON RD JCT. WITH I-10

Lat/Long: 33°54'11" / 117°00'19"
UTM: Zone-11 N3751222 E499510
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Area: 117.3 ac
Township: 03S
Range: 01W
Section: 17 Qtr SE
Meridian: S
Elevation: 2500 ft

Comments
Distribution: LOW ABUNDANCE OVER 110 ACRES.
Ecological: NON-NATIVE GRASSLAND WITH SCATTERED RIVERSIDIAN SAGE SCRUB AT THE SOUTH. SOIL: CIENEBA, RAMONA, SAN TIMOTEO, VISTA. SLOPE: 0-5%.
Threat: DEVELOPMENT, AGRICULTURE, AND GRAZING.
General:
Owner/Manager: PVT

Source Codes
OFA88F54, FRI89F10

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 119 — Map Index: 20484
Occ Rank: Poor
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BEHRENDS, P. 1990 (OBS)

Dates Last Seen
Element: 1990-07-26
Site: 1993-02-05

Quad Summary: EL CASCO (3311781/085A)*, SUNNYMEAD (3311782/085B)
County Summary: RIVERSIDE
SNA Summary:

Location: 1.5 MILES SOUTH OF HIGHWAY 60 AND GILMAN SPRINGS ROAD, ~2 MILES EAST OF MORENO, NORTH OF THE SAN JACINTO WILDLIFE AREA.

Lat/Long: 33°54'58" / 117°07'02"
UTM: Zone-11 N3752671 E489171
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Area: 156.8 ac
Township: 03S
Range: 02W
Section: 17 Qtr NW
Meridian: S
Elevation: 1560 ft

Comments
Distribution: LOW DENSITY. 1991 NE CORNER SEC 18 PIPELINE SURVEY.
Ecological: ABANDONED DAIRY OPERATION. RUDERAL FIELDS. DISTURBED, WEEDY VEGETATION; DOMINATED BY CHEESEWEED, RUSSIAN-THISTLE, RED BROME, RED-STEMMED FILAREE. SOILS ARE SILTY: SAN EMIGDIO FINE SANDY LOAM. SITE IS FLAT.
Threat: SITE HAS BEEN RECOLONIZED BY SKR USING GROUND SQUIRREL AND GOPHER BURROWS: THREAT--POOR HABITAT AND DEVELOPMENT.
General: THE AREA IS PART OF SAN JACINTO WILDLIFE AREA SKR STUDY AREA. BEING CONSIDERED FOR DEVELOPMENT UNDER SECTION 10(A) PERMIT AND REMOVAL FROM SKR STUDY AREA. 33 BURROWS OBSERVED AT 4 POINTS IN SAMPLE AREA, 1991. NO K-RATS FOUND 1993
Owner/Manager: PVT

Source Codes
BEH90F02, BEH93F01, LSA91R02

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 120 — Map Index: 20483
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BEHRENDS, P. 1990 (OBS)

Dates Last Seen
Element: 1990-07-26
Site: 1990-07-26

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: 1 MI NW OF ALESSANDRO BLVD. JCT. WITH GILMAN SPRINGS RD. WESTERN SLOPE OF THE BADLANDS.

Lat/Long: 33°55'40" / 117°07'01"
UTM: Zone-11 N3753968 E489189
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Area: 20.4 ac
Township: 03S
Range: 02W
Section: 08 Qtr NW
Meridian: S
Elevation: 1800 ft

Comments
Distribution: LOW DENSITY.
Ecological: DISTURBED WEEDY VEGETATION; DOMINATED BY CHEESEWEED, RUSSIAN-THISTLE, RED BROME, RED-STEMMED FILAREE. SOIL: SAN EMIGDIO FINE SANDY LOAM.
Threat: DEVELOPMENT
General: NE OF SAN JACINTO WILDLIFE AREA.
Owner/Manager: PVT

Source Codes
BEH90F02

CHAETODIPUS (=PEROGNATHUS) FALLAX FALLAX
NORTHWESTERN SAN DIEGO POCKET MOUSE — Element Code: AMAFD05031

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3?	CDFG Status: SC
State: None	State: S2S3	

Habitat Associations
General: COASTAL SCRUB, CHAPARRAL, GRASSLANDS, SAGEBRUSH, ETC. IN WESTERN SAN DIEGO CO.
Micro: SANDY, HERBACEOUS AREAS, USUALLY IN ASSOCIATION WITH ROCKS OR COARSE GRAVEL.

Occurrence No. 14 — Map Index: 38525
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: MONTGOMERY, S. 1992 (LIT)

Dates Last Seen
Element: 1992-06-26
Site: 1992-06-26

Quad Summary: SUNNYMEAD (3311782/085B)*, EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: THE BADLANDS, NORTH OF HIGHWAY 60 AND EAST OF REDLANDS BLVD, 6.5 MILES EAST OF SUNNYMEAD.

Lat/Long: 33°57'15" / 117°07'52" — Township: 02S
UTM: Zone-11 N3756889 E487876 — Range: 02W
Mapping Precision: NON-SPECIFIC — Section: 31 Qtr XX
Symbol Type: POLYGON — Meridian: S
Area: 1,850.0 ac — Elevation: 2100 ft

Comments
Distribution: THE HIGHEST FREQUENCY OF OCCURRENCE OF SDPM IN TRAPLINES WAS IN THE WESTERN AND SOUTHERN AREAS OF THE PROPERTY.
Ecological: SAGE SCRUB IS THE PREDOMINANT VEGETATION COMMUNITY OVER MOST OF THE PROPERTY, OTHERS ARE: SOUTHERN MIXED CHAPARRAL, DISTURBED GRASSLAND, COAST LIVE OAK WOODLAND, CULTIVATED FIELDS, AND LIMITED RIPARIAN SCRUB & WOODLAND HABITATS.
Threat: PROPOSED FOR EXTENSIVE CAR RACEWAY, OTHER USES: COUNTY DUMP, HUNTING RANCH, SPARSE HOUSING.
General: 61 CAPTURED MAY AND JUNE, 1992, TRAPLINES F, H, I, J, K, L,M, N, O, P, Q, T, V.
Owner/Manager: UNKNOWN

Source Codes
MON92F01, MON92R02

PHRYNOSOMA CORONATUM BLAINVILLEI
SAN DIEGO HORNED LIZARD — Element Code: ARACF12021

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3T4	CDFG Status: SC
State: None	State: S2S3	

Habitat Associations
General: INHABITS COASTAL SAGE SCRUB AND CHAPARRAL IN ARID AND SEMI-ARID CLIMATE CONDIT
Micro: PREFERS FRIABLE, ROCKY, OR SHALLOW SANDY SOILS.

Occurrence No. 243 — Map Index: 04203
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRODE, J. 1986 (PERS)

Dates Last Seen
Element: XXXX-XX-XX
Site: XXXX-XX-XX

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: EDEN HOT SPRINGS.

Lat/Long: 33°53'44" / 117°03'15" — Township: 03S
UTM: Zone-11 N3750382 E494991 — Range: 02W
Mapping Precision: NON-SPECIFIC — Section: 23 Qtr SE
Symbol Type: POINT — Meridian: S
Radius: 1/5 mile — Elevation: 1500 ft

Comments
Distribution:
Ecological:
Threat:
General: LMK SPECIMEN #27299.
Owner/Manager: UNKNOWN

Source Codes
BRO86U05

SOUTHERN COAST LIVE OAK RIPARIAN FOREST
Element Code: CTT61310CA

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4	
State: None	State: S4	

Habitat Associations
General:
Micro:

Occurrence No. 163 — Map Index: 04283
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Decreasing
Main Source: HOLLAND, R. 1988 (MAP)

Dates Last Seen
Element: 1980-02-13
Site: 1980-02-13

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: UNNAMED TRIBUTARY TO LABORDE CANYON, CONFL ABOUT 1.5 MI U/S OF SAN JACINTO VALLEY.

Lat/Long: 33°53'06" / 117°01'00" — Township: 03S
UTM: Zone-11 N3749196 E498458 — Range: 01W
Mapping Precision: SPECIFIC — Section: 30 Qtr NE
Symbol Type: POLYGON — Meridian: S
Area: 38.0 ac — Elevation: 1820 ft

Comments
Distribution: EXTANT, 1980, PER INTERPRETATION OF AERIAL PHOTOS BUT BOUNDARY REDUCED D/S BECAUSE COVER IS VERY THIN.
Ecological: MAPPED BY WIESLANDER SURVEY (1935) AS CLOSED CANOPY QUERCUS AGRIFOLIA.
Threat:
General: NEEDS FIELD VERIFICATION OF VEGETATION CONDITION, COMPOSITION. THIS WAS OCC #163 OF CTT61310CA.
Owner/Manager: PVT

Source Codes
HOL88M01, USF35M01

CNEMIDOPHORUS HYPERYTHRUS
ORANGE-THROATED WHIPTAIL — Element Code: ARACJ02060

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: INHABITS LOW-ELEVATION COASTAL SCRUB, CHAPARRAL, AND VALLEY-FOOTHILL HARDWOOD HABITATS.
Micro: PREFERS WASHES & OTHER SANDY AREAS WITH PATCHES OF BRUSH & ROCKS. PERENNIAL PLANTS NECESSARY FOR ITS MAJOR FOOD-TERMITES

Occurrence No. 193 — Map Index: 21134
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRATTSTROM, B. 1991 (LIT)

Dates Last Seen
Element: 1989-08-01
Site: 1989-08-01

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: ABOUT 1 MILE NORTH OF GILMAN SPRINGS ROAD ON JACKRABBIT TRAIL, ABOUT 0.5 MILES NW OF EDEN HOT SPRINGS, IN THE BADLANDS.

Lat/Long: 33°53'58" / 117°03'46" — Township: 03S
UTM: Zone-11 N3750818 E494198 — Range: 02W
Mapping Precision: NON-SPECIFIC — Section: 23 Qtr NW
Symbol Type: POINT — Meridian: S
Radius: 1/5 mile — Elevation: 1800 ft

Comments
Distribution: STRONG SLOPE; AVERAGE 75 DEGREES; EAST FACING.
Ecological: MIX OF GRASSLAND, COASTAL SAGE, AND CHAPARRAL. PERENNIALS: SAVIA OPIANA, S. MELLIFERA.
Threat: ROADS
General: 1 PREGNANT FEMALE OBSERVED ON SURVEY, NUMBER 12, 1989.
Owner/Manager: UNKNOWN

Source Codes
BRA91R02, LEA89F16

SOUTHERN COTTONWOOD WILLOW RIPARIAN FOREST
Element Code: CTT61330CA

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G3	
State: None	State: S3.2	

Habitat Associations
General:
Micro:

Occurrence No. 98 Map Index: 04180
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: HOLLAND, R. 1988 (MAP)

Dates Last Seen
Element: 1980-02-01
Site: 1980-02-01

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN TIMENTO CANYON, NEAR HINDA.

Lat/Long: 33°57'18" / 117°03'45"
UTM: Zone-11 N3756964 E494222
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 37.9 ac

Township: 02S
Range: 02W
Section: XX Qtr XX
Meridian: S
Elevation: 2170 ft

Comments
Distribution: MAPPED FROM INTERPRETATION OF 1980 AERIAL PHOTOS.
Ecological: UNABLE TO CONVERT TO FLORISTIC CLASSIFICATION, LACKS SPP. INFO
Threat:
General: NEEDS FIELD VERIFICATION OF VEGETATION CONDITION, COMPOSITION.
Owner/Manager: PVT

Source Codes
HOL88M01

CENTROMADIA PUNGENS SSP LAEVIS
SMOOTH TARPLANT
Element Code: PDAST4R0R4

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T2	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-3

Habitat Associations
General: VALLEY AND FOOTHILL GRASSLAND, CHENOPOD SCRUB, MEADOWS, PLAYAS, RIPARIAN WOODLAND.
Micro: ALKALI MEADOW, ALKALI SCRUB; ALSO IN DISTURBED PLACES. 0-480M.

Occurrence No. 15 Map Index: 28231
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1990 (OBS)

Dates Last Seen
Element: 1990-07-20
Site: 1990-07-20

Quad Summary: LAKEVIEW (3311771/085D)*, EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: CDFG SAN JACINTO WILDLIFE AREA, ABOUT 0.6 MILE NORTH OF SUMMIT OF HILL "1981" AND 2.5 MILES NORTH OF LAKEVIEW.

Lat/Long: 33°52'29" / 117°06'44"
UTM: Zone-11 N3748082 E489609
Mapping Precision: SPECIFIC
Symbol Type: POINT
Radius: 80 meters

Township: 03S
Range: 02W
Section: 29 Qtr SW
Meridian: S
Elevation: 1425 ft

Comments
Distribution: JUST WEST OF THE OLD SAN JACINTO RIVER CHANNEL AND EAST OF PEAK 1890, WITHIN THE SE 1/4 OF THE SW 1/4 OF SECTION 29.
Ecological: VALLEY SINK SCRUB W/ATRIPLEX ARGENTEA, A. ROSEA, SUAEDA TORREYANA, SALSOLA IBERICA, SISYMBRIUM IRIO, FRANKENIA GRANDIFOLIA, SALICORNIA SUBTERMINALIS, HORDEUM LEPORINUM, AND MEDICAGO POLYMORPHA. SOIL IS SANDY LOAM AND SILTY CLAY, ALKALINE.
Threat:
General: 1200 PLANTS OBSERVED IN 1990. ALSO GROWING HERE IS THE RARE ATRIPLEX CORONATA VAR. NOTATIOR.
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
BRA90F34

LASTHENIA GLABRATA SSP COULTERI
COULTER'S GOLDFIELDS
Element Code: PDAST5L0A1

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: COASTAL SALT MARSHES, PLAYAS, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS.
Micro: USUALLY FOUND ON ALKALINE SOILS IN PLAYAS, SINKS, AND GRASSLANDS. 1-1400M.

Occurrence No. 8 Map Index: 23773
Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1992 (OBS)

Dates Last Seen
Element: 1992-04-29
Site: 1992-04-29

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN JACINTO VALLEY, NORTHEAST OF DUCK PONDS AND WEST OF THE GOLF COURSE.

Lat/Long: 33°53'48" / 117°05'10"
UTM: Zone-11 N3750516 E492025
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 87.8 ac

Township: 03S
Range: 02W
Section: 21 Qtr E
Meridian: S
Elevation: 1430 ft

Comments
Distribution: ALONG THE NORTHEAST MARGIN OF MYSTIC LAKE. WITHIN THE SE 1/4 OF THE NE 1/4 SECTION 21, NE 1/4 OF THE SE 1/4 OF SECTION 21, AND THE NW 1/4 OF THE SW 1/4 OF SECTION 22.
Ecological: ALKALI PLAYA; GROWING IN WET AREAS WITH DENSE STANDS OF LASTHENIA. ASSOCIATED WITH SUAEDA TORREYANA, SCIRPUS MARITIMUS, POLYPOGON MONSPELIENSIS, BASSIA HYSSOPIFOLIA, JUNCUS BUFONIUS, ATRIPLEX ARGENTEA, FRANKENIA GRANDIFOLIA, MICROSERIS SP.
Threat: URBANIZATION, AGRICULTURE DEVELOPMENT, AND ORV ACTIVITY.
General: DESCRIBED AS AN EXCELLENT EXAMPLE OF ALKALI PLAYA AND ALKALI GRASSLAND COMMUNITIES. RECOMMENDED FOR INCLUSION WITHIN THE SAN JACINTO WILDLIFE AREA. ATRIPLEX CORONATA VAR. NOTATIOR AT THIS SITE ALSO.
Owner/Manager: PVT

Source Codes
BRA92F03, BRA92F05, BRA93U02, FER92U01, MUN22815

LASTHENIA GLABRATA SSP COULTERI (cont.)
COULTER'S GOLDFIELDS
Element Code: PDAST5L0A1

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: COASTAL SALT MARSHES, PLAYAS, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS.
Micro: USUALLY FOUND ON ALKALINE SOILS IN PLAYAS, SINKS, AND GRASSLANDS. 1-1400M.

Occurrence No. 9 Map Index: 23774
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1992 (OBS)

Dates Last Seen
Element: 1992-05-06
Site: 1992-05-06

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN JACINTO VALLEY, ALONG UNNAMED STREAMCOURSE 1.6 KM (1.1 MI) SOUTHWEST OF GOLF COURSE.

Lat/Long: 33°52'55" / 117°05'29"
UTM: Zone-11 N3748890 E491539
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 12.9 ac

Township: 03S
Range: 02W
Section: 28 Qtr N
Meridian: S
Elevation: 1420 ft

Comments
Distribution: ALONG THE NORTHERN DUCK CLUB PONDS, SOUTH OF S. CONTOUR ROAD.
Ecological: GROWING IN ALKALINE SINK PLAYA IN ASSOCIATION WITH ATRIPLEX CORONATA VAR. NOTATIOR, PLAGIOBOTHRYS LEPTOCLADUS, PHACELIA CILIATA, RUMEX PERSICARIOIDES, BASSIA HYSSOPIFOLIA, ATRIPLEX ARGENTEA, SPERGULARIA MARINA, & MATRICARIA MATRICARIOIDES.
Threat: BARLEY FARMING OCCURS NEARBY AND SITE HAS BEEN CULTIVATED IN THE PAST, URBANIZATION IS ALSO A THREAT.
General: SITE IS OWNED BY A LOCAL DUCK CLUB. CURRENTLY THE SAN JACINTO WILDLIFE AREA HAS A CONSERVATION EASEMENT ON THE SITE FOR OPEN SPACE.
Owner/Manager: PVT, DFG-SAN JACINTO WA

Source Codes
FER92U01, BRA92F04

LASTHENIA GLABRATA SSP COULTERI (cont.)
COULTER'S GOLDFIELDS — Element Code: PDAST5L0A1

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: COASTAL SALT MARSHES, PLAYAS, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS.
Micro: USUALLY FOUND ON ALKALINE SOILS IN PLAYAS, SINKS, AND GRASSLANDS. 1-1400M.

Occurrence No. 10 — Map Index: 23775
Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1993 (PERS)
Dates Last Seen — Element: 1992-04-15 — Site: 1992-04-15

Quad Summary: EL CASCO (3311781/085A)*, LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN JACINTO WILDLIFE AREA, EAST OF KNOLL BETWEEN DUCK PONDS AND DAVIS ROAD.

Lat/Long: 33°52'59" / 117°07'02" — Township: 03S
UTM: Zone-11 N3748994 E489147 — Range: 02W
Mapping Precision: SPECIFIC — Section: 29 Qtr W
Symbol Type: POLYGON — Meridian: S
Area: 57.8 ac — Elevation: 1430 ft

Comments
Distribution: SAN JACINTO WILDLIFE AREA, ABOUT 0.6 MI EAST OF DAVIS ROAD. FROM OLD SAN JACINTO RIVER CHANNEL TO LARGE ALKALINE FLAT NEAR THE HORSE RANCH AND 1ST WILDLIFE POND. MAPPED AS TWO POLYGONS.
Ecological: GROWING ON AN ALKAINE PLAYA.
Threat: URBANIZATION AND AGRICULTURE DEVELOPMENT A THREAT.
General: 500,000 PLANTS SEEN IN 1992. SOURCE OF SITE INFORMATION WAS COLLECTION BY BRAMLET #2235; MAP DETAIL PROVIDED BY J. DICE (1993).
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
BRA93U02, DIC93M01, FER92U01

LASTHENIA GLABRATA SSP COULTERI (cont.)
COULTER'S GOLDFIELDS — Element Code: PDAST5L0A1

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: COASTAL SALT MARSHES, PLAYAS, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS.
Micro: USUALLY FOUND ON ALKALINE SOILS IN PLAYAS, SINKS, AND GRASSLANDS. 1-1400M.

Occurrence No. 49 — Map Index: 31523
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: DICE, J. 1993 (MAP)
Dates Last Seen — Element: 199X-XX-XX — Site: 199X-XX-XX

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN JACINTO WILDLIFE AREA, 1.5 MILE SOUTH OF ALLESANDRO BLVD AND 0.7 MILE EAST OF DAVIS RD.

Lat/Long: 33°53'52" / 117°06'59" — Township: 03S
UTM: Zone-11 N3750622 E489231 — Range: 02W
Mapping Precision: SPECIFIC — Section: 20 Qtr NW
Symbol Type: POLYGON — Meridian: S
Area: 15.6 ac — Elevation: 1460 ft

Comments
Distribution: MAPPED IN THE S 1/2 OF THE NW 1/4 OF SECTION 20.
Ecological:
Threat:
General: ONLY SOURCE OF INFORMATION FOR THIS SITE IS MAP DETAIL PROVIDED BY J. DICE (1993).
Owner/Manager: UNKNOWN

Source Codes
DIC93M01

TRICHOCORONIS WRIGHTII VAR WRIGHTII
WRIGHT'S TRICHOCORONIS — Element Code: PDAST9F031

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T5?	CNPS List: 2
State: None	State: S1.1	R-E-D Code: 3-3-1

Habitat Associations
General: MARSHES AND SWAMPS, RIPARIAN FOREST, MEADOWS AND SEEPS, VERNAL POOLS.
Micro: MUD FLATS OF VERNAL LAKES, DRYING RIVER BEDS, ALKALI MEADOWS. 5-435M.

Occurrence No. 4 — Map Index: 24635
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: SANDERS, A. 1987 (PERS)
Dates Last Seen — Element: 1937-06-07 — Site: 1937-06-07

Quad Summary: EL CASCO (3311781/085A)*, LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN JACINTO LAKE (AKA MYSTIC LAKE), NORTH OF LAKEVIEW.

Lat/Long: 33°53'16" / 117°05'50" — Township: 03S
UTM: Zone-11 N3749535 E491004 — Range: 02W
Mapping Precision: NON-SPECIFIC — Section: XX Qtr XX
Symbol Type: POINT — Meridian: S
Radius: 1 mile — Elevation: 1420 ft

Comments
Distribution: SAN JACINTO LAKE = VERNAL LAKE IN THE SAN JACINTO VALLEY NORTH OF LAKEVIEW.
Ecological: GROWING IN MUD FLAT OF VERNAL LAKE.
Threat:
General: AREA KNOWN FROM THREE COLLECTIONS, THE MOST RECENT BEING A 1937 COLLECTION BY ROOS (#2505, UCR). AREA SHOULD BE FIELD CHECKED FOR PRESENCE OF SUITABLE HABITAT.
Owner/Manager: UNKNOWN

Source Codes
SAN87U03, PEI22S09, BRA93R01, MUN22S13

ATRIPLEX CORONATA VAR NOTATIOR
SAN JACINTO VALLEY CROWNSCALE — Element Code: PDCHE040C2

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G4T1	CNPS List: 1B
State: None	State: S1.1	R-E-D Code: 3-3-3

Habitat Associations
General: PLAYAS, CHENOPOD SCRUB, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS. ENDEMIC TO RIVERSIDE COUNTY.
Micro: DRY, ALKALINE FLATS IN THE SAN JACINTO RIVER VALLEY. 400-500M.

Occurrence No. 5 — Map Index: 04133
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1990 (OBS)
Dates Last Seen — Element: 1990-07-20 — Site: 1990-07-20

Quad Summary: LAKEVIEW (3311771/085D)*, EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary: San Jacinto Wildlife Refuge

Location: SAN JACINTO WILDLIFE AREA VICINITY, APPROX 4 KM NORTH OF LAKEVIEW.

Lat/Long: 33°52'18" / 117°06'06" — Township: 03S
UTM: Zone-11 N3747724 E490601 — Range: 02W
Mapping Precision: SPECIFIC — Section: 33 Qtr NW
Symbol Type: POLYGON — Meridian: S
Area: 194.5 ac — Elevation: 1420 ft

Comments
Distribution: SEVERAL COLONIES MAPPED WITHIN THE S 1/2 OF SECTION 29, NW 1/4 OF SECTION 31, N 1/2 OF SECTION 32, AND NE 1/4 OF SECTION 33.
Ecological: FOUND AROUND THE DUCK PONDS OR DISTURBED AREAS IN THE VICINITY.
Threat: FORMER PORTIONS OF POPULATION MAY HAVE OCCURRED IN LAKEBED WHICH IS POSSIBLY IN AGRICULTURE NOW.
General: APPROX. 1000 PLANTS SEEN IN 1990. SIGNS OF INUNDATION WERE EVIDENT. SPECIES MAY BENEFIT FROM INUNDATION.
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
BRA90M01, BRA90F17, CRA89U01, BRA90S11, BRA9XU01, WES88R01, BRA90F16, HAL01S05, HAL01S06, BRA92U04, BRA90F15, RUF90S01, BRA90S07

ATRIPLEX CORONATA VAR NOTATIOR (cont.)
SAN JACINTO VALLEY CROWNSCALE — Element Code: PDCHE040C2

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G4T1	CNPS List: 1B
State: None	State: S1.1	R-E-D Code: 3-3-3

Habitat Associations
General: PLAYAS, CHENOPOD SCRUB, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS. ENDEMIC TO RIVERSIDE COUNTY.
Micro: DRY, ALKALINE FLATS IN THE SAN JACINTO RIVER VALLEY. 400-500M.

Occurrence No. 12 — Map Index: 23774
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1992 (OBS)

Dates Last Seen — Element: 1992-05-06 — Site: 1992-05-06

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: JUST EAST OF THE SAN JACINTO WILDLIFE AREA, NORTHERN DUCK CLUB PONDS.

Lat/Long: 33°52'55" / 117°05'29" — UTM: Zone-11 N3748890 E491539
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 12.9 ac
Township: 03S — Range: 02W — Section: 28 Qtr N — Meridian: S — Elevation: 1420 ft

Comments
Distribution: TWO COLONIES: ONE IS 122 M SOUTH OF THE POND THAT IS ON THE EASTERN BOUNDARY OF THE DUCK CLUB AREA; THE SECOND IS 60 M NORTHEAST OF THE MAIN DUCK POND AREA AND 150 M SOUTHEAST OF LAKE STREET AT WEST CONTOUR ROAD.
Ecological: FOUND IN ALKALI SINK PLAYA WITH PLAGIOBOTHRYS LEPTOCLADUS, PHACELIA CILIATA, LASTHENIA GLABRATA COULTERI, RUMEX PERSICARIOIDES, BASSIA HYSSOPIFOLIA, ATRIPLEX ARGENTEA, SPERGULARIA MARINA, MATRICARIA, MONOLEPIS NUTTALLIANA, CRYPSIS, ET AL.
Threat: PREVIOUSLY CULTIVATED FIELD; BARLEY FARMING STILL OCCURS; PRESENTLY UNDER CONSERVATION EASEMENT W/SAN JACINTO WA (CDFG).
General: ABOUT 20,400 PLANTS OBSERVED IN 1992.
Owner/Manager: PVT

Source Codes
BRA92S08, BRA92F07, BRA92F08, BRA92U04

ATRIPLEX CORONATA VAR NOTATIOR (cont.)
SAN JACINTO VALLEY CROWNSCALE — Element Code: PDCHE040C2

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G4T1	CNPS List: 1B
State: None	State: S1.1	R-E-D Code: 3-3-3

Habitat Associations
General: PLAYAS, CHENOPOD SCRUB, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS. ENDEMIC TO RIVERSIDE COUNTY.
Micro: DRY, ALKALINE FLATS IN THE SAN JACINTO RIVER VALLEY. 400-500M.

Occurrence No. 13 — Map Index: 28299
Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1992 (OBS)

Dates Last Seen — Element: 1992-04-29 — Site: 1992-04-29

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: NORTH OF SAN JACINTO WILDLIFE AREA AND NORTHWEST OF QUAIL RANCH GOLF COURSE, ABOUT 0.3 MILE WEST OF HIGHWAY 79.

Lat/Long: 33°53'49" / 117°05'14" — UTM: Zone-11 N3750546 E491928
Mapping Precision: SPECIFIC
Symbol Type: POINT
Radius: 80 meters
Township: 03S — Range: 02W — Section: 21 Qtr NE — Meridian: S — Elevation: 1425 ft

Comments
Distribution: WITHIN SAN JACINTO NUEVO Y POTRERO. SITE IS 823 M WEST OF GILMAN SPRINGS ROAD (HWY 79) AND 460 M SOUTH OF BOLD STYLE ROAD.
Ecological: IN ALKALI PLAYA (SINK SCRUB) WITH CRESSA TRUXILLENSIS, SUAEDA TORREYANA, FRANKENIA GRANDIFOLIA, LASTHENIA GLABRATA SSP COULTERI, BROMUS MOLLIS, HORDEUM LEPORINUM, JUNCUS BUFONIUS, MICROSERIS DOUGLASII, AND ATRIPLEX ARGENTEA.
Threat: SOME ORV ACTIVITY.
General: 47 PLANTS OBSERVED IN 1992. REPORTED TO BE AN EXCELLENT EXAMPLE OF ALKALI PLAYA AND ALKALI GRASSLAND COMMUNITIES. BRAMLET SUGGESTS SITE BE INCLUDED WITHIN THE SAN JACINTO WILDLIFE AREA.
Owner/Manager: UNKNOWN

Source Codes
BRA92F09, BRA92F06, BRA92S07, BRA92U04

DODECAHEMA LEPTOCERAS
SLENDER-HORNED SPINEFLOWER — Element Code: PDPGN0V010

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G1	CNPS List: 1B
State: Endangered	State: S1.1	R-E-D Code: 3-3-3

Habitat Associations
General: CHAPARRAL, COASTAL SCRUB (ALLUVIAL FAN SAGE SCRUB). HIST. FROM LAX, RIV, AND SBD COUNTIES; EXTIRP. FROM MUCH OF RANGE.
Micro: FLOOD DEPOSITED TERRACES AND WASHES; ASSOC INCLUDE ENCELIA, DALEA, LEPIDOSPARTUM, ETC. 200-760M.

Occurrence No. 11 — Map Index: 41053
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Possibly Extirpated
Trend: Unknown
Main Source: LEMMON, J. SN (HERB)

Dates Last Seen — Element: 1923-05-08 — Site: 1983-XX-XX

Quad Summary: YUCAIPA (3411711/106D)*, BEAUMONT (3311688/084B), EL CASCO (3311781/085A), SUNNYMEAD (3311782/085B), FOREST FALLS (3411618/105C), REDLANDS (3411712/106C)
County Summary: RIVERSIDE, SAN BERNARDINO
SNA Summary:

Location: YUCAYPA VALLEY (YUCAIPA VALLEY).

Lat/Long: 34°01'01" / 117°03'58" — UTM: Zone-11 N3763847 E493893
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 5 mile
Township: 02S — Range: 02W — Section: 11 Qtr XX — Meridian: S — Elevation: 2200 ft

Comments
Distribution:
Ecological:
Threat: DEVELOPMENT, FLOOD CONTROL ACTIVITIES HAVE ELIMINATED MOST HABITAT HERE (KRANTZ 1979, 1983).
General: MAIN SOURCE OF INFORMATION FOR THIS SITE IS 1923 COLLECTION BY LEMMON.
Owner/Manager: UNKNOWN

Source Codes
LEMNDS05, LEM23S01, KRA83U04, AN088U03, KRA79U10

CALOCHORTUS PLUMMERAE
PLUMMER'S MARIPOSA LILY — Element Code: PMLIL0D150

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G3	CNPS List: 1B
State: None	State: S3.2	R-E-D Code: 2-2-3

Habitat Associations
General: COASTAL SCRUB, CHAPARRAL, VALLEY AND FOOTHILL GRASSLAND, CISMONTANE WOODLAND, LOWER MONTANE CONIFEROUS FOREST.
Micro: OCCURS ON ROCKY AND SANDY SITES, USUALLY OF GRANITIC OR ALLUVIAL MATERIAL. 90-1610M.

Occurrence No. 5 — Map Index: 26638
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: SANDERS, A. 1992 (PERS)

Dates Last Seen — Element: 1978-06-10 — Site: 1978-06-10

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: CHERRY VALLEY EXIT OFF I-10; ABOUT 2 MILES SOUTH OF CALIMESA.

Lat/Long: 33°58'07" / 117°01'20" — UTM: Zone-11 N3758494 E497953
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1 mile
Township: 02S — Range: 01W — Section: 30 Qtr XX — Meridian: S — Elevation: 2400 ft

Comments
Distribution:
Ecological: ON SOUTH-FACING SLOPE OF GRASSLAND HILLSIDE.
Threat:
General: ONLY SOURCE OF INFORMATION FOR THIS SITE IS 1978 COLLECTION BY L. BATES.
Owner/Manager: UNKNOWN

Source Codes
SAN92U05

CALOCHORTUS PLUMMERAE (cont.)
PLUMMER'S MARIPOSA LILY — Element Code: PMLIL0D150

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G3	CNPS List: 1B
State: None	State: S3.2	R-E-D Code: 2-2-3

Habitat Associations
General: COASTAL SCRUB, CHAPARRAL, VALLEY AND FOOTHILL GRASSLAND, CISMONTANE WOODLAND, LOWER MONTANE CONIFEROUS FOREST.
Micro: OCCURS ON ROCKY AND SANDY SITES, USUALLY OF GRANITIC OR ALLUVIAL MATERIAL. 90-1610M.

Occurrence No. 6 — Map Index: 26639
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Possibly Extirpated
Trend: Unknown
Main Source: WOLF, C. #3696 UC, RSA (HERB)
Dates Last Seen — Element: 1932-05-25 — Site: 1932-05-25

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: BADLANDS SOUTHWEST OF BEAUMONT, 1.5 MILES SOUTHWEST OF THE SUMMIT OF MORENO GRADE.

Lat/Long: 33°55'08" / 117°06'26"
UTM: Zone-11 N3754816 E490083
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1 mile
Township: 03S
Range: 02W
Section: 05 Qtr XX
Meridian: S
Elevation: 1800 ft

Comments
Distribution: MAPPED ALONG HIGHWAY 60, ABOUT 1 MILE EAST OF GILMAN SPRINGS ROAD.
Ecological: UPPER SONORAN. DECOMPOSED GRANITE; IN SUN.
Threat:
General: MAIN SOURCE OF INFORMATION FOR THIS SITE IS 1932 COLLECTION BY WOLF. AREA SEARCHED BETWEEN 1989-1991 BUT NO PLANTS OBSERVED (MCDONALD AND STOKKINK, 1991).
Owner/Manager: UNKNOWN

Source Codes
WOL32S07, MCD91U01

CALOCHORTUS PLUMMERAE (cont.)
PLUMMER'S MARIPOSA LILY — Element Code: PMLIL0D150

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G3	CNPS List: 1B
State: None	State: S3.2	R-E-D Code: 2-2-3

Habitat Associations
General: COASTAL SCRUB, CHAPARRAL, VALLEY AND FOOTHILL GRASSLAND, CISMONTANE WOODLAND, LOWER MONTANE CONIFEROUS FOREST.
Micro: OCCURS ON ROCKY AND SANDY SITES, USUALLY OF GRANITIC OR ALLUVIAL MATERIAL. 90-1610M.

Occurrence No. 56 — Map Index: 27626
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: LOWENS, S. 1982 (PERS)
Dates Last Seen — Element: 1982-06-24 — Site: 1982-06-24

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: EAST SIDE OF JACKRABBIT TRAIL ABOUT 1.2 MILES SOUTH OF HWY 60.

Lat/Long: 33°55'18" / 117°02'48"
UTM: Zone-11 N3753272 E495683
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Area: 22.3 ac
Township: 03S
Range: 02W
Section: 12 Qtr SW
Meridian: S
Elevation: 2200 ft

Comments
Distribution: GROWING ON A BANK ON THE EAST SIDE OF THE ROAD THAT IS EXTREMELY STEEP AND DIFFICULT TO ACCESS. WITHIN THE BADLANDS SOUTHWEST OF BEAUMONT.
Ecological:
Threat:
General: ONLY SOURCE OF INFORMATION IS OBSERVATION BRIEF PROVIDED BY LOWENS.
Owner/Manager: UNKNOWN

Source Codes
LOWS2U01

ATHENE CUNICULARIA (BURROW SITES)
BURROWING OWL — Element Code: ABNSB10010

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T2	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: FOUND IN OPEN, DRY ANNUAL OR PERENIAL GRASSLANDS, DESERTS & SCRUBLANDS CHARACTERIZED BY LOW-GROWING VEGETATION.
Micro: SUBTERRANEAN NESTER, DEPENDENT UPON BURROWING MAMMALS, MOST NOTABLY, THE CALIFORNIA GROUND SQUIRREL.

Occurrence No. 83 — Map Index: 03995
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: CRAIG, A. & N. CRAIG 1982 (PERS)
Dates Last Seen — Element: 1982-XX-XX — Site: 1982-XX-XX

Quad Summary: EL CASCO (3311781/085A)*, LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary: San Jacinto Wildlife Refuge

Location: SAN JACINTO WILDLIFE AREA, 2.6 MILES NORTH OF LAKEVIEW.

Lat/Long: 33°52'33" / 117°06'51"
UTM: Zone-11 N3748187 E489432
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile
Township: 03S
Range: 02W
Section: 29 Qtr SW
Meridian: S
Elevation: 1440 ft

Comments
Distribution:
Ecological:
Threat:
General: ACTIVE BURROW WITH 1-2 BIRDS FROM SEPTEMBER THROUGH EARLY OCTOBER OF 1982.
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
JOH88U01, CRA82U01

ATHENE CUNICULARIA (BURROW SITES) (cont.)
BURROWING OWL — Element Code: ABNSB10010

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T2	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: FOUND IN OPEN, DRY ANNUAL OR PERENIAL GRASSLANDS, DESERTS & SCRUBLANDS CHARACTERIZED BY LOW-GROWING VEGETATION.
Micro: SUBTERRANEAN NESTER, DEPENDENT UPON BURROWING MAMMALS, MOST NOTABLY, THE CALIFORNIA GROUND SQUIRREL.

Occurrence No. 84 — Map Index: 03971
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: CRAIG, A. & N. CRAIG 1982 (PERS)
Dates Last Seen — Element: 1982-07-XX — Site: 1982-07-XX

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary: San Jacinto Wildlife Refuge

Location: SAN JACINTO WILDLIFE AREA, 2.8 MILES NORTH OF LAKEVIEW.

Lat/Long: 33°52'42" / 117°07'10"
UTM: Zone-11 N3748481 E488955
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile
Township: 03S
Range: 02W
Section: 29 Qtr SW
Meridian: S
Elevation: 1480 ft

Comments
Distribution:
Ecological:
Threat:
General: UP TO FOUR BIRDS IN THIS AREA DURING JULY OF 1982.
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
CRA82U02, JOH88U01

VIREO BELLII PUSILLUS (NESTING)
LEAST BELL'S VIREO — Element Code: ABPBW01114

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G5T2	CDFG Status:
State: Endangered	State: S2	

Habitat Associations
General: SUMMER RESIDENT OF SOUTHERN CALIF. INHABITS LOW RIPARIAN GROWTH IN VIC OF WATER OR IN DRY RIVER BOTTOMS; BELOW 2000 FT.
Micro: NESTS PLACED ALONG MARGINS OF BUSHES OR ON TWIGS PROJECTING INTO PATHWAYS, USUALLY WILLOW, BACCHARIS, MESQUITE.

Occurrence No. 11 — Map Index: 04033
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: GOLDWASSER, S. 1978
Dates Last Seen — Element: 1978-07-XX; Site: 1978-07-XX

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN TIMOTEO CANYON; ACROSS FROM FISHERMANS RETREAT RESORT.

Lat/Long: 33°58'23" / 117°06'03"
UTM: Zone-11 N3758978 E490685
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1 mile
Township: 02S
Range: 02W
Section: 28 Qtr XX
Meridian: S
Elevation: 2000 ft

Comments
Distribution:
Ecological: CONTIGUOUS RIPARIAN HABITAT EXTENDS FOR APPROXIMATELY 6 MILES, FROM ABOUT 3 MILES WEST OF I-10 TO REDLANDS BLVD.
Threat: COWBIRDS ABUNDANT. SOME ORV IMPACTS.
General: ONE TERRITORIAL MALE OBSERVED DURING SUMMER OF 1978.
Owner/Manager: UNKNOWN

Source Codes
WIL81U03, GOL78R01, FWS85U02

AGELAIUS TRICOLOR (NESTING COLONY)
TRICOLORED BLACKBIRD — Element Code: ABPBXB0020

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G3	CDFG Status: SC
State: None	State: S3	

Habitat Associations
General: HIGHLY COLONIAL SPECIES, MOST NUMBEROUS IN THE CENTRAL VALLEY & VICINITY. LARGELY ENDEMIC TO CALIFORNIA.
Micro: REQUIRES OPEN WATER, PROTECTED NESTING SUBSTRATE, & FORAGING AREA WITH INSECT PREY WITHIN A FEW KM OF THE COLONY.

* SENSITIVE *
Occurrence No. 219 — Map Index: 21597
Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: DENCER, M. 1992 (OBS)
Dates Last Seen — Element: 1992-04-01; Site: 1992-04-01

Quad Summary: LAKEVIEW (3311771/085D)*, EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary: San Jacinto Wildlife Refuge

Location: *SENSITIVE* Location information suppressed.

* SENSITIVE * Lat/Long: / — UTM: — Mapping Precision: — Symbol Type: — Radius:
Township: — Range: — Section: — Qtr — Meridian: — Elevation:

Comments
Distribution: Please contact the California Natural Diversity Database, California Department of Fish and Game, for more information: (916) 324-3812.
Ecological: NESTING SUBSTRATE IS TYPHA SPP. AND WILLOWS. SURROUNDING LAND USE IS AGRICULTURE.
Threat:
General:
Owner/Manager:

Source Codes
DEN92F03

PEROGNATHUS LONGIMEMBRIS BREVINASUS
LOS ANGELES POCKET MOUSE — Element Code: AMAFD01041

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T1?	CDFG Status: SC
State: None	State: S1?	

Habitat Associations
General: LOWER ELEVATION GRASSLANDS & COASTAL SAGE COMMUNITIES IN THE LOS ANGELES BASIN
Micro: OPEN GROUND WITH FINE SANDY SOILS. MAY NOT DIG EXTENSIVE BURROWS, HIDING UNDER WEEDS & DEAD LEAVES INSTEAD.

Occurrence No. 11 — Map Index: 15995
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: DURHAM, F. 1940 (MUS)
Dates Last Seen — Element: 1940-03-21; Site: 1940-03-21

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: EDEN HOT SPRINGS.

Lat/Long: 33°53'43" / 117°03'15"
UTM: Zone-11 N3750361 E494991
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1 mile
Township: 99X
Range: 99X
Section: XX Qtr XX
Meridian: S
Elevation:

Comments
Distribution:
Ecological:
Threat:
General: MVZ #90713
Owner/Manager: UNKNOWN

Source Codes
DUR40S02

DIPODOMYS STEPHENSI
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 3 — Map Index: 03895
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Stable
Main Source: PRICE, M. 1991 (OBS)
Dates Last Seen — Element: 1991-10-XX; Site: 1991-10-XX

Quad Summary: SUNNYMEAD (3311782/085B)*, LAKEVIEW (3311771/085D), PERRIS (3311772/085C), EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: SURROUNDING PERRIS LAKE; MOST OF THE HABITAT IS LOCATED NORTH AND EAST OF THE LAKE.

Lat/Long: 33°52'15" / 117°10'18"
UTM: Zone-11 N3747661 E484129
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Area: 8,057.7 ac
Township: 03S
Range: 03W
Section: 24 Qtr XX
Meridian: S
Elevation: 1750 ft

Comments
Distribution: PATCHY DISTRIBUTION THROUGHOUT AREA. OBSERVATIONS SINCE 1972 INDICATE TRACE TO MEDIUM ABUNDANCES. THERE IS MUCH DISTRIBUTION DETAIL ON THE SOURCE MAPS. THE EXTREME SE PORTION HAS AN OBSERVATION WHICH RECORDS PRESENCE OF 239 INDIVIDUALS.
Ecological: PREVIOUSLY-CULTIVATED ANNUAL GRASSLAND BASIN SURROUNDED BY RIVERSIDIAN SAGE SCRUB. SOIL: CIENEBA, EXETER, GORGONIO, GREENFIELD, HANFORD, MONSERATE, PACHAPPA, PLACENTIA, RAMONA, VISTA. SLOPE: 0-15%.
Threat: DEVELOPMENT AND AGIRCULTURE ARE THREATS. THE SAN JACINTO PORTION (SE) HAS THE THREAT OF IMMINENT DEVELOPMENT.
General: A LARGE PORTION OF THIS SITE IS THE LAKE PERRIS SRA AND SAN JACINTO WILDLIFE AREA. WEST PORTIONS UNDER STUDY FOR HABITAT ENHANCEMENT. FUTURE STATE PARK PRACTICES NEED TO ADDRESS PROPER MANAGEMENT FOR SKR HABITAT. 13 SOURCE DOCUMENTS.
Owner/Manager: DPR, DFG, PVT

Source Codes
BEH90F02, MCC89F04, PRI91F02, FRI89F07, PRI89F03, PRI91F03, MCC91F03, FRI89F09, BEH90F01, OFA88F51, FRI89F08, MCC90F08, THO73R01, LSA91R02

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 31 — Map Index: 04212
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Decreasing
Main Source: BAXTER, R. 1991 (OBS)
Dates Last Seen — Element: 1991-08-01 — Site: 1991-08-01

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: ABOUT 4-5 MILES NORTHEAST OF PERRIS RESERVOIR. ON THE WESTERN SLOPES OF THE MORENO BADLANDS.

Lat/Long: 33°54'23" / 117°04'34"
UTM: Zone-11 N3751573 E492972
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Area: 2,875.5 ac
Township: 03S
Range: 02W
Section: 22 Qtr XX
Meridian: S
Elevation: 1800 ft

Comments
Distribution: PATCHY BETWEEN LOW AND TRACE DISTRIBUTION. POPULATIONS ARE BEING ISOLATED AND EXTIRPATED BY DEVELOPMENT.
Ecological: NON-NATIVE GRASSLAND; GRAZED GRAIN FIELDS; GOLF COURSE; BORDERS OF RIVERSIDIAN SAGE SCRUB. SOILS: METZ, SAN EMIGDIO.
Threat: DEVELOPMENT AND AGRICULTURE WHICH IS CAUSING HABITAT FRAGMENTATION.
General: SAMPLE TAKEN IN 1938; MVZ #88407. SOME HABITATS NEAR THE BADLANDS COULD BE PRESERVED AS A BUFFER FOR STUDY AREA TO THE NORTH.
Owner/Manager: PVT

Source Codes
BAX91F04, OFA89F09, OFA88F53, OFA88F52, MVZ81S01

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 116 — Map Index: 20486
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: RIGGAN, R. 1989 (OBS)
Dates Last Seen — Element: 1990-03-XX — Site: 1990-03-XX

Quad Summary: EL CASCO (3311781/085A)*, BEAUMONT (3311688/084B)
County Summary: RIVERSIDE
SNA Summary:

Location: 0.3 MI SOUTH OF SAN TIMOTEO CANYON RD. JCT. WITH I-10 AND NORTH OF HWY 60.

Lat/Long: 33°56'15" / 117°00'08"
UTM: Zone-11 N3755020 E499784
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Area: 114.5 ac
Township: 03S
Range: 01W
Section: 05 Qtr E
Meridian: S
Elevation: 2400 ft

Comments
Distribution:
Ecological: HEAVILY GRAZED FIELDS OCCUPIED PRIMARILY BY NON-NATIVE ANNUAL GRASSES AND FORBS WITH OCCASIONAL REINVASIVE ERIOGONUM FASCICULATUM. SHEEP GRAZING SUSTAINS SPARSE VEGETATION.
Threat: INTENSE ORV USE AND DEVELOPMENT.
General: SITE IS ISOLATED BY SR-60 AND I-10 FROM OTHER POPULATIONS.
Owner/Manager: PVT

Source Codes
RIG89F09

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 117 — Map Index: 20485
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: FRIESEN, R. 1989 (OBS)
Dates Last Seen — Element: 1989-12-XX — Site: 1989-12-XX

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: 2.2 MI S OF SAN TIMOTEO CANYON RD JCT. WITH I-10

Lat/Long: 33°54'11" / 117°00'19"
UTM: Zone-11 N3751222 E499510
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Area: 117.3 ac
Township: 03S
Range: 01W
Section: 17 Qtr SE
Meridian: S
Elevation: 2500 ft

Comments
Distribution: LOW ABUNDANCE OVER 110 ACRES.
Ecological: NON-NATIVE GRASSLAND WITH SCATTERED RIVERSIDIAN SAGE SCRUB AT THE SOUTH. SOIL: CIENEBA, RAMONA, SAN TIMOTEO, VISTA. SLOPE: 0-5%.
Threat: DEVELOPMENT, AGRICULTURE, AND GRAZING.
General:
Owner/Manager: PVT

Source Codes
OFA88F54, FRI89F10

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 119 — Map Index: 20484
Occ Rank: Poor
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BEHRENDS, P. 1990 (OBS)
Dates Last Seen — Element: 1990-07-26 — Site: 1993-02-05

Quad Summary: EL CASCO (3311781/085A)*, SUNNYMEAD (3311782/085B)
County Summary: RIVERSIDE
SNA Summary:

Location: 1.5 MILES SOUTH OF HIGHWAY 60 AND GILMAN SPRINGS ROAD, ~2 MILES EAST OF MORENO, NORTH OF THE SAN JACINTO WILDLIFE AREA.

Lat/Long: 33°54'58" / 117°07'02"
UTM: Zone-11 N3752671 E489171
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Area: 156.8 ac
Township: 03S
Range: 02W
Section: 17 Qtr NW
Meridian: S
Elevation: 1560 ft

Comments
Distribution: LOW DENSITY. 1991 NE CORNER SEC 18 PIPELINE SURVEY.
Ecological: ABANDONED DAIRY OPERATION. RUDERAL FIELDS. DISTURBED, WEEDY VEGETATION; DOMINATED BY CHEESEWEED, RUSSIAN-THISTLE, RED BROME, RED-STEMMED FILAREE. SOILS ARE SILTY: SAN EMIGDIO FINE SANDY LOAM. SITE IS FLAT.
Threat: SITE HAS BEEN RECOLONIZED BY SKR USING GROUND SQUIRREL AND GOPHER BURROWS: THREAT--POOR HABITAT AND DEVELOPMENT.
General: THE AREA IS PART OF SAN JACINTO WILDLIFE AREA SKR STUDY AREA. BEING CONSIDERED FOR DEVELOPMENT UNDER SECTION 10(A) PERMIT AND REMOVAL FROM SKR STUDY AREA. 33 BURROWS OBSERVED AT 4 POINTS IN SAMPLE AREA, 1991. NO K-RATS FOUND 1993
Owner/Manager: PVT

Source Codes
BEH90F02, BEH93F01, LSA91R02

DIPODOMYS STEPHENSI (cont.)
STEPHENS' KANGAROO RAT — Element Code: AMAFD03100

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G2	CDFG Status:
State: Threatened	State: S2	

Habitat Associations
General: PRIMARILY ANNUAL & PERENNIAL GRASSLANDS, BUT ALSO OCCURS IN COASTAL SCRUB & SAGEBRUSH WITH SPARSE CANOPY COVER.
Micro: PREFERS BUCKWHEAT, CHAMISE, BROME GRASS & FILAREE. WILL BURROW INTO FIRM SOIL

Occurrence No. 120 — Map Index: 20483
Occ Rank: Fair
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BEHRENDS, P. 1990 (OBS)
Dates Last Seen — Element: 1990-07-26 — Site: 1990-07-26

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: 1 MI NW OF ALESSANDRO BLVD. JCT. WITH GILMAN SPRINGS RD. WESTERN SLOPE OF THE BADLANDS.

Lat/Long: 33°55'40" / 117°07'01"
UTM: Zone-11 N3753968 E489189
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Area: 20.4 ac
Township: 03S
Range: 02W
Section: 08 Qtr NW
Meridian: S
Elevation: 1800 ft

Comments
Distribution: LOW DENSITY.
Ecological: DISTURBED WEEDY VEGETATION; DOMINATED BY CHEESEWEED, RUSSIAN-THISTLE, RED BROME, RED-STEMMED FILAREE. SOIL: SAN EMIDGIO FINE SANDY LOAM.
Threat: DEVELOPMENT
General: NE OF SAN JACINTO WILDLIFE AREA.
Owner/Manager: PVT

Source Codes
BEH90F02

CHAETODIPUS (=PEROGNATHUS) FALLAX FALLAX
NORTHWESTERN SAN DIEGO POCKET MOUSE — Element Code: AMAFD05031

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3?	CDFG Status: SC
State: None	State: S2S3	

Habitat Associations
General: COASTAL SCRUB, CHAPARRAL, GRASSLANDS, SAGEBRUSH, ETC. IN WESTERN SAN DIEGO CO.
Micro: SANDY, HERBACEOUS AREAS, USUALLY IN ASSOCIATION WITH ROCKS OR COARSE GRAVEL.

Occurrence No. 14 — Map Index: 38525
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: MONTGOMERY, S. 1992 (LIT)
Dates Last Seen — Element: 1992-06-26 — Site: 1992-06-26

Quad Summary: SUNNYMEAD (3311782/085B)*, EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: THE BADLANDS, NORTH OF HIGHWAY 60 AND EAST OF REDLANDS BLVD, 6.5 MILES EAST OF SUNNYMEAD.

Lat/Long: 33°57'15" / 117°07'52"
UTM: Zone-11 N3756889 E487876
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Area: 1,860.0 ac
Township: 02S
Range: 02W
Section: 31 Qtr XX
Meridian: S
Elevation: 2100 ft

Comments
Distribution: THE HIGHEST FREQUENCY OF OCCURRENCE OF SDPM IN TRAPLINES WAS IN THE WESTERN AND SOUTHERN AREAS OF THE PROPERTY.
Ecological: SAGE SCRUB IS THE PREDOMINANT VEGETATION COMMUNITY OVER MOST OF THE PROPERTY, OTHERS ARE: SOUTHERN MIXED CHAPARRAL, DISTURBED GRASSLAND, COAST LIVE OAK WOODLAND, CULTIVATED FIELDS, AND LIMITED RIPARIAN SCRUB & WOODLAND HABITATS.
Threat: PROPOSED FOR EXTENSIVE CAR RACEWAY, OTHER USES: COUNTY DUMP, HUNTING RANCH, SPARSE HOUSING.
General: 61 CAPTURED MAY AND JUNE, 1992, TRAPLINES F, H, I, J, K, L,M, N, O, P, Q, T, V.
Owner/Manager: UNKNOWN

Source Codes
MON92F01, MON92R02

PHRYNOSOMA CORONATUM BLAINVILLEI
SAN DIEGO HORNED LIZARD — Element Code: ARACF12021

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3T4	CDFG Status: SC
State: None	State: S2S3	

Habitat Associations
General: INHABITS COASTAL SAGE SCRUB AND CHAPARRAL IN ARID AND SEMI-ARID CLIMATE CONDIT
Micro: PREFERS FRIABLE, ROCKY, OR SHALLOW SANDY SOILS.

Occurrence No. 243 — Map Index: 04203
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRODE, J. 1986 (PERS)
Dates Last Seen — Element: XXXX-XX-XX — Site: XXXX-XX-XX

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: EDEN HOT SPRINGS.

Lat/Long: 33°53'44" / 117°03'15"
UTM: Zone-11 N3750382 E494991
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile
Township: 03S
Range: 02W
Section: 23 Qtr SE
Meridian: S
Elevation: 1500 ft

Comments
Distribution:
Ecological:
Threat:
General: LMK SPECIMEN #27299.
Owner/Manager: UNKNOWN

Source Codes
BRO86U05

CNEMIDOPHORUS HYPERYTHRUS
ORANGE-THROATED WHIPTAIL — Element Code: ARACJ02060

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5	CDFG Status: SC
State: None	State: S2	

Habitat Associations
General: INHABITS LOW-ELEVATION COASTAL SCRUB, CHAPARRAL, AND VALLEY-FOOTHILL HARDWOOD HABITATS.
Micro: PREFERS WASHES & OTHER SANDY AREAS WITH PATCHES OF BRUSH & ROCKS. PERENNIAL PLANTS NECESSARY FOR ITS MAJOR FOOD-TERMITES

Occurrence No. 193 — Map Index: 21134
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRATTSTROM, B. 1991 (LIT)
Dates Last Seen — Element: 1989-08-01 — Site: 1989-08-01

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: ABOUT 1 MILE NORTH OF GILMAN SPRINGS ROAD ON JACKRABBIT TRAIL, ABOUT 0.5 MILES NW OF EDEN HOT SPRINGS, IN THE BADLANDS.

Lat/Long: 33°53'58" / 117°03'46"
UTM: Zone-11 N3750818 E494198
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1/5 mile
Township: 03S
Range: 02W
Section: 23 Qtr NW
Meridian: S
Elevation: 1800 ft

Comments
Distribution: STRONG SLOPE; AVERAGE 75 DEGREES; EAST FACING.
Ecological: MIX OF GRASSLAND, COASTAL SAGE, AND CHAPARRAL. PERENNIALS: SAVIA OPIANA, S. MELLIFERA.
Threat: ROADS
General: 1 PREGNANT FEMALE OBSERVED ON SURVEY, NUMBER 12, 1989.
Owner/Manager: UNKNOWN

Source Codes
BRA91R02, LEA89F16

SOUTHERN COAST LIVE OAK RIPARIAN FOREST
Element Code: CTT61310CA

Status: Federal: None; State: None
NDDB Element Ranks: Global: G4; State: S4
Other Lists:
Habitat Associations: General: ; Micro:

Occurrence No. 163 Map Index: 04283
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Decreasing
Main Source: HOLLAND, R. 1988 (MAP)
Dates Last Seen: Element: 1980-02-13; Site: 1980-02-13

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: UNNAMED TRIBUTARY TO LABORDE CANYON, CONFL ABOUT 1.5 MI U/S OF SAN JACINTO VALLEY.

Lat/Long: 33°53'06" / 117°01'00"
UTM: Zone-11 N3749196 E498458
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 38.0 ac
Township: 03S
Range: 01W
Section: 30 Qtr NE
Meridian: S
Elevation: 1820 ft

Comments
Distribution: EXTANT, 1980, PER INTERPRETATION OF AERIAL PHOTOS BUT BOUNDARY REDUCED D/S BECAUSE COVER IS VERY THIN.
Ecological: MAPPED BY WIESLANDER SURVEY (1935) AS CLOSED CANOPY QUERCUS AGRIFOLIA.
Threat:
General: NEEDS FIELD VERIFICATION OF VEGETATION CONDITION, COMPOSITION. THIS WAS OCC #163 OF CTT61310CA.
Owner/Manager: PVT

Source Codes
HOL88M01, USF35M01

SOUTHERN COTTONWOOD WILLOW RIPARIAN FOREST
Element Code: CTT61330CA

Status: Federal: None; State: None
NDDB Element Ranks: Global: G3; State: S3.2
Other Lists:
Habitat Associations: General: ; Micro:

Occurrence No. 98 Map Index: 04180
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: HOLLAND, R. 1988 (MAP)
Dates Last Seen: Element: 1980-02-01; Site: 1980-02-01

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN TIMENTO CANYON, NEAR HINDA.

Lat/Long: 33°57'18" / 117°03'45"
UTM: Zone-11 N3756964 E494222
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 37.9 ac
Township: 02S
Range: 02W
Section: XX Qtr XX
Meridian: S
Elevation: 2170 ft

Comments
Distribution: MAPPED FROM INTERPRETATION OF 1980 AERIAL PHOTOS.
Ecological: UNABLE TO CONVERT TO FLORISTIC CLASSIFICATION, LACKS SPP. INFO
Threat:
General: NEEDS FIELD VERIFICATION OF VEGETATION CONDITION, COMPOSITION.
Owner/Manager: PVT

Source Codes
HOL88M01

CENTROMADIA PUNGENS SSP LAEVIS
SMOOTH TARPLANT
Element Code: PDAST4R0R4

Status: Federal: None; State: None
NDDB Element Ranks: Global: G5T2; State: S2.1
Other Lists: CNPS List: 1B; R-E-D Code: 2-3-3
Habitat Associations: General: VALLEY AND FOOTHILL GRASSLAND, CHENOPOD SCRUB, MEADOWS, PLAYAS, RIPARIAN WOODLAND.
Micro: ALKALI MEADOW, ALKALI SCRUB; ALSO IN DISTURBED PLACES. 0-480M.

Occurrence No. 15 Map Index: 28231
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1990 (OBS)
Dates Last Seen: Element: 1990-07-20; Site: 1990-07-20

Quad Summary: LAKEVIEW (3311771/085D)*, EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: CDFG SAN JACINTO WILDLIFE AREA, ABOUT 0.6 MILE NORTH OF SUMMIT OF HILL "1981" AND 2.5 MILES NORTH OF LAKEVIEW.

Lat/Long: 33°52'29" / 117°06'44"
UTM: Zone-11 N3748082 E489609
Mapping Precision: SPECIFIC
Symbol Type: POINT
Radius: 80 meters
Township: 03S
Range: 02W
Section: 29 Qtr SW
Meridian: S
Elevation: 1425 ft

Comments
Distribution: JUST WEST OF THE OLD SAN JACINTO RIVER CHANNEL AND EAST OF PEAK 1890, WITHIN THE SE 1/4 OF THE SW 1/4 OF SECTION 29.
Ecological: VALLEY SINK SCRUB W/ATRIPLEX ARGENTEA, A. ROSEA, SUAEDA TORREYANA, SALSOLA IBERICA, SISYMBRIUM IRIO, FRANKENIA GRANDIFOLIA, SALICORNIA SUBTERMINALIS, HORDEUM LEPORINUM, AND MEDICAGO POLYMORPHA. SOIL IS SANDY LOAM AND SILTY CLAY, ALKALINE.
Threat:
General: 1200 PLANTS OBSERVED IN 1990. ALSO GROWING HERE IS THE RARE ATRIPLEX CORONATA VAR. NOTATIOR.
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
BRA90F34

LASTHENIA GLABRATA SSP COULTERI
COULTER'S GOLDFIELDS
Element Code: PDAST5L0A1

Status: Federal: None; State: None
NDDB Element Ranks: Global: G4T3; State: S2.1
Other Lists: CNPS List: 1B; R-E-D Code: 2-3-2
Habitat Associations: General: COASTAL SALT MARSHES, PLAYAS, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS.
Micro: USUALLY FOUND ON ALKALINE SOILS IN PLAYAS, SINKS, AND GRASSLANDS. 1-1400M.

Occurrence No. 8 Map Index: 23773
Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1992 (OBS)
Dates Last Seen: Element: 1992-04-29; Site: 1992-04-29

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN JACINTO VALLEY, NORTHEAST OF DUCK PONDS AND WEST OF THE GOLF COURSE.

Lat/Long: 33°53'48" / 117°05'10"
UTM: Zone-11 N3750516 E492025
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 87.8 ac
Township: 03S
Range: 02W
Section: 21 Qtr E
Meridian: S
Elevation: 1430 ft

Comments
Distribution: ALONG THE NORTHEAST MARGIN OF MYSTIC LAKE. WITHIN THE SE 1/4 OF THE NE 1/4 SECTION 21, NE 1/4 OF THE SE 1/4 OF SECTION 21, AND THE NW 1/4 OF THE SW 1/4 OF SECTION 22.
Ecological: ALKALI PLAYA; GROWING IN WET AREAS WITH DENSE STANDS OF LASTHENIA. ASSOCIATED WITH SUAEDA TORREYANA, SCIRPUS MARITIMUS, POLYPOGON MONSPELIENSIS, BASSIA HYSSOPIFOLIA, JUNCUS BUFONIUS, ATRIPLEX ARGENTEA, FRANKENIA GRANDIFOLIA, MICROSERIS SP.
Threat: URBANIZATION, AGRICULTURE DEVELOPMENT, AND ORV ACTIVITY.
General: DESCRIBED AS AN EXCELLENT EXAMPLE OF ALKALI PLAYA AND ALKALI GRASSLAND COMMUNITIES. RECOMMENDED FOR INCLUSION WITHIN THE SAN JACINTO WILDLIFE AREA. ATRIPLEX CORONATA VAR. NOTATIOR AT THIS SITE ALSO.
Owner/Manager: PVT

Source Codes
BRA92F03, BRA92F05, BRA93U02, FER92U01, MUN22S15

LASTHENIA GLABRATA SSP COULTERI (cont.)
COULTER'S GOLDFIELDS — Element Code: PDAST5L0A1

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: COASTAL SALT MARSHES, PLAYAS, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS.
Micro: USUALLY FOUND ON ALKALINE SOILS IN PLAYAS, SINKS, AND GRASSLANDS. 1-1400M.

Occurrence No. 9 — Map Index: 23774
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1992 (OBS)

Dates Last Seen — Element: 1992-05-06 — Site: 1992-05-06

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN JACINTO VALLEY, ALONG UNNAMED STREAMCOURSE 1.6 KM (1.1 MI) SOUTHWEST OF GOLF COURSE.

Lat/Long: 33°52'55" / 117°05'29"
UTM: Zone-11 N3748890 E491539
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 12.9 ac
Township: 03S
Range: 02W
Section: 28 Qtr N
Meridian: S
Elevation: 1420 ft

Comments
Distribution: ALONG THE NORTHERN DUCK CLUB PONDS, SOUTH OF S. CONTOUR ROAD.
Ecological: GROWING IN ALKALINE SINK PLAYA IN ASSOCIATION WITH ATRIPLEX CORONATA VAR. NOTATIOR, PLAGIOBOTHRYS LEPTOCLADUS, PHACELIA CILIATA, RUMEX PERSICARIOIDES, BASSIA HYSSOPIFOLIA, ATRIPLEX ARGENTEA, SPERGULARIA MARINA, & MATRICARIA MATRICARIOIDES.
Threat: BARLEY FARMING OCCURS NEARBY AND SITE HAS BEEN CULTIVATED IN THE PAST, URBANIZATION IS ALSO A THREAT.
General: SITE IS OWNED BY A LOCAL DUCK CLUB. CURRENTLY THE SAN JACINTO WILDLIFE AREA HAS A CONSERVATION EASEMENT ON THE SITE FOR OPEN SPACE.
Owner/Manager: PVT, DFG-SAN JACINTO WA

Source Codes
FER92U01, BRA92F04

LASTHENIA GLABRATA SSP COULTERI (cont.)
COULTER'S GOLDFIELDS — Element Code: PDAST5L0A1

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: COASTAL SALT MARSHES, PLAYAS, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS.
Micro: USUALLY FOUND ON ALKALINE SOILS IN PLAYAS, SINKS, AND GRASSLANDS. 1-1400M.

Occurrence No. 10 — Map Index: 23775
Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1993 (PERS)

Dates Last Seen — Element: 1992-04-15 — Site: 1992-04-15

Quad Summary: EL CASCO (3311781/085A)*, LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN JACINTO WILDLIFE AREA, EAST OF KNOLL BETWEEN DUCK PONDS AND DAVIS ROAD.

Lat/Long: 33°52'59" / 117°07'02"
UTM: Zone-11 N3748994 E489147
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 57.8 ac
Township: 03S
Range: 02W
Section: 29 Qtr W
Meridian: S
Elevation: 1430 ft

Comments
Distribution: SAN JACINTO WILDLIFE AREA, ABOUT 0.6 MI EAST OF DAVIS ROAD. FROM OLD SAN JACINTO RIVER CHANNEL TO LARGE ALKALINE FLAT NEAR THE HORSE RANCH AND 1ST WILDLIFE POND. MAPPED AS TWO POLYGONS.
Ecological: GROWING ON AN ALKAINE PLAYA.
Threat: URBANIZATION AND AGRICULTURE DEVELOPMENT A THREAT.
General: 500,000 PLANTS SEEN IN 1992. SOURCE OF SITE INFORMATION WAS COLLECTION BY BRAMLET #2235; MAP DETAIL PROVIDED BY J. DICE (1993).
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
BRA93U02, DIC93M01, FER92U01

LASTHENIA GLABRATA SSP COULTERI (cont.)
COULTER'S GOLDFIELDS — Element Code: PDAST5L0A1

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G4T3	CNPS List: 1B
State: None	State: S2.1	R-E-D Code: 2-3-2

Habitat Associations
General: COASTAL SALT MARSHES, PLAYAS, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS.
Micro: USUALLY FOUND ON ALKALINE SOILS IN PLAYAS, SINKS, AND GRASSLANDS. 1-1400M.

Occurrence No. 49 — Map Index: 31523
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: DICE, J. 1993 (MAP)

Dates Last Seen — Element: 199X-XX-XX — Site: 199X-XX-XX

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN JACINTO WILDLIFE AREA, 1.5 MILE SOUTH OF ALLESANDRO BLVD AND 0.7 MILE EAST OF DAVIS RD.

Lat/Long: 33°53'52" / 117°06'59"
UTM: Zone-11 N3750622 E489231
Mapping Precision: SPECIFIC
Symbol Type: POLYGON
Area: 15.6 ac
Township: 03S
Range: 02W
Section: 20 Qtr NW
Meridian: S
Elevation: 1460 ft

Comments
Distribution: MAPPED IN THE S 1/2 OF THE NW 1/4 OF SECTION 20.
Ecological:
Threat:
General: ONLY SOURCE OF INFORMATION FOR THIS SITE IS MAP DETAIL PROVIDED BY J. DICE (1993).
Owner/Manager: UNKNOWN

Source Codes
DIC93M01

TRICHOCORONIS WRIGHTII VAR WRIGHTII
WRIGHT'S TRICHOCORONIS — Element Code: PDAST9F031

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G5T5?	CNPS List: 2
State: None	State: S1.1	R-E-D Code: 3-3-1

Habitat Associations
General: MARSHES AND SWAMPS, RIPARIAN FOREST, MEADOWS AND SEEPS, VERNAL POOLS.
Micro: MUD FLATS OF VERNAL LAKES, DRYING RIVER BEDS, ALKALI MEADOWS. 5-435M.

Occurrence No. 4 — Map Index: 24635
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: SANDERS, A. 1987 (PERS)

Dates Last Seen — Element: 1937-06-07 — Site: 1937-06-07

Quad Summary: EL CASCO (3311781/085A)*, LAKEVIEW (3311771/085D)
County Summary: RIVERSIDE
SNA Summary:

Location: SAN JACINTO LAKE (AKA MYSTIC LAKE), NORTH OF LAKEVIEW.

Lat/Long: 33°53'16" / 117°05'50"
UTM: Zone-11 N3749535 E491004
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1 mile
Township: 03S
Range: 02W
Section: XX Qtr XX
Meridian: S
Elevation: 1420 ft

Comments
Distribution: SAN JACINTO LAKE = VERNAL LAKE IN THE SAN JACINTO VALLEY NORTH OF LAKEVIEW.
Ecological: GROWING IN MUD FLAT OF VERNAL LAKE.
Threat:
General: AREA KNOWN FROM THREE COLLECTIONS, THE MOST RECENT BEING A 1937 COLLECTION BY ROOS (#2505, UCR). AREA SHOULD BE FIELD CHECKED FOR PRESENCE OF SUITABLE HABITAT.
Owner/Manager: UNKNOWN

Source Codes
SAN87U03, PEI22S09, BRA93R01, MUN22S13

ATRIPLEX CORONATA VAR NOTATIOR
SAN JACINTO VALLEY CROWNSCALE — Element Code: PDCHE040C2

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G4T1	CNPS List: 1B
State: None	State: S1.1	R-E-D Code: 3-3-3

Habitat Associations
General: PLAYAS, CHENOPOD SCRUB, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS. ENDEMIC TO RIVERSIDE COUNTY.
Micro: DRY, ALKALINE FLATS IN THE SAN JACINTO RIVER VALLEY. 400-500M.

Occurrence No. 5 — Map Index: 04133
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1990 (OBS)
Dates Last Seen — Element: 1990-07-20 — Site: 1990-07-20

Quad Summary: LAKEVIEW (3311771/085D)*, EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary: San Jacinto Wildlife Refuge

Location: SAN JACINTO WILDLIFE AREA VICINITY, APPROX 4 KM NORTH OF LAKEVIEW.

Lat/Long: 33°52'18" / 117°06'06" — Township: 03S
UTM: Zone-11 N3747724 E490601 — Range: 02W
Mapping Precision: SPECIFIC — Section: 33 Qtr NW
Symbol Type: POLYGON — Meridian: S
Area: 194.5 ac — Elevation: 1420 ft

Comments
Distribution: SEVERAL COLONIES MAPPED WITHIN THE S 1/2 OF SECTION 29, NW 1/4 OF SECTION 31, N 1/2 OF SECTION 32, AND NE 1/4 OF SECTION 33.
Ecological: FOUND AROUND THE DUCK PONDS OR DISTURBED AREAS IN THE VICINITY.
Threat: FORMER PORTIONS OF POPULATION MAY HAVE OCCURRED IN LAKEBED WHICH IS POSSIBLY IN AGRICULTURE NOW.
General: APPROX. 1000 PLANTS SEEN IN 1990. SIGNS OF INUNDATION WERE EVIDENT. SPECIES MAY BENEFIT FROM INUNDATION.
Owner/Manager: DFG-SAN JACINTO WA

Source Codes
BRA90M01, BRA90F17, CRA89U01, BRA90S11, BRA9XU01, WES88R01, BRA90F16, HAL01S05, HAL01S06, BRA92U04, BRA90F15, RUF90S01, BRA90S07

ATRIPLEX CORONATA VAR NOTATIOR (cont.)
SAN JACINTO VALLEY CROWNSCALE — Element Code: PDCHE040C2

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G4T1	CNPS List: 1B
State: None	State: S1.1	R-E-D Code: 3-3-3

Habitat Associations
General: PLAYAS, CHENOPOD SCRUB, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS. ENDEMIC TO RIVERSIDE COUNTY.
Micro: DRY, ALKALINE FLATS IN THE SAN JACINTO RIVER VALLEY. 400-500M.

Occurrence No. 12 — Map Index: 23774
Occ Rank: Good
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1992 (OBS)
Dates Last Seen — Element: 1992-05-06 — Site: 1992-05-06

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: JUST EAST OF THE SAN JACINTO WILDLIFE AREA, NORTHERN DUCK CLUB PONDS.

Lat/Long: 33°52'55" / 117°05'29" — Township: 03S
UTM: Zone-11 N3748890 E491539 — Range: 02W
Mapping Precision: SPECIFIC — Section: 28 Qtr N
Symbol Type: POLYGON — Meridian: S
Area: 12.9 ac — Elevation: 1420 ft

Comments
Distribution: TWO COLONIES: ONE IS 122 M SOUTH OF THE POND THAT IS ON THE EASTERN BOUNDARY OF THE DUCK CLUB AREA; THE SECOND IS 60 M NORTHEAST OF THE MAIN DUCK POND AREA AND 150 M SOUTHEAST OF LAKE STREET AT WEST CONTOUR ROAD.
Ecological: FOUND IN ALKALI SINK PLAYA WITH PLAGIOBOTHRYS LEPTOCLADUS, PHACELIA CILIATA, LASTHENIA GLABRATA COULTERI, RUMEX PERSICARIOIDES, BASSIA HYSSOPIFOLIA, ATRIPLEX ARGENTEA, SPERGULARIA MARINA, MATRICARIA, MONOLEPIS NUTTALLIANA, CRYPSIS, ET AL.
Threat: PREVIOUSLY CULTIVATED FIELD; BARLEY FARMING STILL OCCURS; PRESENTLY UNDER CONSERVATION EASEMENT W/SAN JACINTO WA (CDFG).
General: ABOUT 20,400 PLANTS OBSERVED IN 1992.
Owner/Manager: PVT

Source Codes
BRA92S08, BRA92F07, BRA92F08, BRA92U04

ATRIPLEX CORONATA VAR NOTATIOR (cont.)
SAN JACINTO VALLEY CROWNSCALE — Element Code: PDCHE040C2

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G4T1	CNPS List: 1B
State: None	State: S1.1	R-E-D Code: 3-3-3

Habitat Associations
General: PLAYAS, CHENOPOD SCRUB, VALLEY AND FOOTHILL GRASSLAND, VERNAL POOLS. ENDEMIC TO RIVERSIDE COUNTY.
Micro: DRY, ALKALINE FLATS IN THE SAN JACINTO RIVER VALLEY. 400-500M.

Occurrence No. 13 — Map Index: 28299
Occ Rank: Excellent
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: BRAMLET, D. 1992 (OBS)
Dates Last Seen — Element: 1992-04-29 — Site: 1992-04-29

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: NORTH OF SAN JACINTO WILDLIFE AREA AND NORTHWEST OF QUAIL RANCH GOLF COURSE, ABOUT 0.3 MILE WEST OF HIGHWAY 79.

Lat/Long: 33°53'49" / 117°05'14" — Township: 03S
UTM: Zone-11 N3750546 E491928 — Range: 02W
Mapping Precision: SPECIFIC — Section: 21 Qtr NE
Symbol Type: POINT — Meridian: S
Radius: 80 meters — Elevation: 1425 ft

Comments
Distribution: WITHIN SAN JACINTO NUEVO Y POTRERO. SITE IS 823 M WEST OF GILMAN SPRINGS ROAD (HWY 79) AND 460 M SOUTH OF BOLD STYLE ROAD.
Ecological: IN ALKALI PLAYA (SINK SCRUB) WITH CRESSA TRUXILLENSIS, SUAEDA TORREYANA, FRANKENIA GRANDIFOLIA, LASTHENIA GLABRATA SSP COULTERI, BROMUS MOLLIS, HORDEUM LEPORINUM, JUNCUS BUFONIUS, MICROSERIS DOUGLASII, AND ATRIPLEX ARGENTEA.
Threat: SOME ORV ACTIVITY.
General: 47 PLANTS OBSERVED IN 1992. REPORTED TO BE AN EXCELLENT EXAMPLE OF ALKALI PLAYA AND ALKALI GRASSLAND COMMUNITIES. BRAMLET SUGGESTS SITE BE INCLUDED WITHIN THE SAN JACINTO WILDLIFE AREA.
Owner/Manager: UNKNOWN

Source Codes
BRA92F09, BRA92F06, BRA92S07, BRA92U04

DODECAHEMA LEPTOCERAS
SLENDER-HORNED SPINEFLOWER — Element Code: PDPGN0V010

Status	NDDB Element Ranks	Other Lists
Federal: Endangered	Global: G1	CNPS List: 1B
State: Endangered	State: S1.1	R-E-D Code: 3-3-3

Habitat Associations
General: CHAPARRAL, COASTAL SCRUB (ALLUVIAL FAN SAGE SCRUB). HIST. FROM LAX, RIV, AND SBD COUNTIES; EXTIRP. FROM MUCH OF RANGE.
Micro: FLOOD DEPOSITED TERRACES AND WASHES; ASSOC INCLUDE ENCELIA, DALEA, LEPIDOSPARTUM, ETC. 200-760M.

Occurrence No. 11 — Map Index: 41053
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Possibly Extirpated
Trend: Unknown
Main Source: LEMMON, J. SN (HERB)
Dates Last Seen — Element: 1923-05-08 — Site: 1983-XX-XX

Quad Summary: YUCAIPA (3411711/106D)*, BEAUMONT (3311688/084B), EL CASCO (3311781/085A), SUNNYMEAD (3311782/085B), FOREST FALLS (3411618/105C), REDLANDS (3411712/106C)
County Summary: RIVERSIDE, SAN BERNARDINO
SNA Summary:

Location: YUCAYPA VALLEY (YUCAIPA VALLEY).

Lat/Long: 34°01'01" / 117°03'58" — Township: 02S
UTM: Zone-11 N3763847 E493893 — Range: 02W
Mapping Precision: NON-SPECIFIC — Section: 11 Qtr XX
Symbol Type: POINT — Meridian: S
Radius: 5 mile — Elevation: 2200 ft

Comments
Distribution:
Ecological:
Threat: DEVELOPMENT, FLOOD CONTROL ACTIVITIES HAVE ELIMINATED MOST HABITAT HERE (KRANTZ 1979, 1983).
General: MAIN SOURCE OF INFORMATION FOR THIS SITE IS 1923 COLLECTION BY LEMMON.
Owner/Manager: UNKNOWN

Source Codes
LEMND005, LEM23S01, KRA83U04, AND88U03, KRA79U10

CALOCHORTUS PLUMMERAE
PLUMMER'S MARIPOSA LILY — Element Code: PMLIL0D150

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G3	CNPS List: 1B
State: None	State: S3.2	R-E-D Code: 2-2-3

Habitat Associations
General: COASTAL SCRUB, CHAPARRAL, VALLEY AND FOOTHILL GRASSLAND, CISMONTANE WOODLAND, LOWER MONTANE CONIFEROUS FOREST.
Micro: OCCURS ON ROCKY AND SANDY SITES, USUALLY OF GRANITIC OR ALLUVIAL MATERIAL. 90-1610M.

Occurrence No. 5 — Map Index: 26638
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: SANDERS, A. 1992 (PERS)

Dates Last Seen
Element: 1978-06-10
Site: 1978-06-10

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: CHERRY VALLEY EXIT OFF I-10; ABOUT 2 MILES SOUTH OF CALIMESA.

Lat/Long: 33°58'07" / 117°01'20"
UTM: Zone-11 N3758494 E497953
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1 mile

Township: 02S
Range: 01W
Section: 30 Qtr XX
Meridian: S
Elevation: 2400 ft

Comments
Distribution:
Ecological: ON SOUTH-FACING SLOPE OF GRASSLAND HILLSIDE.
Threat:
General: ONLY SOURCE OF INFORMATION FOR THIS SITE IS 1978 COLLECTION BY L. BATES.
Owner/Manager: UNKNOWN

Source Codes
SAN92U05

CALOCHORTUS PLUMMERAE (cont.)
PLUMMER'S MARIPOSA LILY — Element Code: PMLIL0D150

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G3	CNPS List: 1B
State: None	State: S3.2	R-E-D Code: 2-2-3

Habitat Associations
General: COASTAL SCRUB, CHAPARRAL, VALLEY AND FOOTHILL GRASSLAND, CISMONTANE WOODLAND, LOWER MONTANE CONIFEROUS FOREST.
Micro: OCCURS ON ROCKY AND SANDY SITES, USUALLY OF GRANITIC OR ALLUVIAL MATERIAL. 90-1610M.

Occurrence No. 6 — Map Index: 26639
Occ Rank: None
Origin: Natural/Native occurrence
Presence: Possibly Extirpated
Trend: Unknown
Main Source: WOLF, C. #3696 UC, RSA (HERB)

Dates Last Seen
Element: 1932-05-25
Site: 1932-05-25

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: BADLANDS SOUTHWEST OF BEAUMONT, 1.5 MILES SOUTHWEST OF THE SUMMIT OF MORENO GRADE.

Lat/Long: 33°56'08" / 117°06'26"
UTM: Zone-11 N3754816 E490083
Mapping Precision: NON-SPECIFIC
Symbol Type: POINT
Radius: 1 mile

Township: 03S
Range: 02W
Section: 05 Qtr XX
Meridian: S
Elevation: 1800 ft

Comments
Distribution: MAPPED ALONG HIGHWAY 60, ABOUT 1 MILE EAST OF GILMAN SPRINGS ROAD.
Ecological: UPPER SONORAN. DECOMPOSED GRANITE; IN SUN.
Threat:
General: MAIN SOURCE OF INFORMATION FOR THIS SITE IS 1932 COLLECTION BY WOLF. AREA SEARCHED BETWEEN 1989-1991 BUT NO PLANTS OBSERVED (MCDONALD AND STOKKINK, 1991).
Owner/Manager: UNKNOWN

Source Codes
WOL32S07, MCD91U01

CALOCHORTUS PLUMMERAE (cont.)
PLUMMER'S MARIPOSA LILY — Element Code: PMLIL0D150

Status	NDDB Element Ranks	Other Lists
Federal: None	Global: G3	CNPS List: 1B
State: None	State: S3.2	R-E-D Code: 2-2-3

Habitat Associations
General: COASTAL SCRUB, CHAPARRAL, VALLEY AND FOOTHILL GRASSLAND, CISMONTANE WOODLAND, LOWER MONTANE CONIFEROUS FOREST.
Micro: OCCURS ON ROCKY AND SANDY SITES, USUALLY OF GRANITIC OR ALLUVIAL MATERIAL. 90-1610M.

Occurrence No. 56 — Map Index: 27626
Occ Rank: Unknown
Origin: Natural/Native occurrence
Presence: Presumed Extant
Trend: Unknown
Main Source: LOWENS, S. 1982 (PERS)

Dates Last Seen
Element: 1982-06-24
Site: 1982-06-24

Quad Summary: EL CASCO (3311781/085A)
County Summary: RIVERSIDE
SNA Summary:

Location: EAST SIDE OF JACKRABBIT TRAIL ABOUT 1.2 MILES SOUTH OF HWY 60.

Lat/Long: 33°55'18" / 117°02'48"
UTM: Zone-11 N3753272 E495683
Mapping Precision: NON-SPECIFIC
Symbol Type: POLYGON
Area: 22.3 ac

Township: 03S
Range: 02W
Section: 12 Qtr SW
Meridian: S
Elevation: 2200 ft

Comments
Distribution: GROWING ON A BANK ON THE EAST SIDE OF THE ROAD THAT IS EXTREMELY STEEP AND DIFFICULT TO ACCESS. WITHIN THE BADLANDS SOUTHWEST OF BEAUMONT.
Ecological:
Threat:
General: ONLY SOURCE OF INFORMATION IS OBSERVATION BRIEF PROVIDED BY LOWENS.
Owner/Manager: UNKNOWN

Source Codes
LOW82U01

J-4: USFWS Special-Status Species Report Dated May 25, 2001

United States Department of the Interior
Fish and Wildlife Service
Ecological Services
Carlsbad Fish and Wildlife Office
2730 Loker Avenue West
Carlsbad, California 92008

In Reply Refer To:
FWS-WRIV-1793.1

MAY 2 5 2001

Lenny Malo
Foster Wheeler Environmental Corporation
1940 East Deere, Suite 200
Santa Ana, California 92705

Re: Species List for the Proposed Calpine Corporation Inland Empire Energy Center, Riverside County, California

Dear Mr. Malo:

We have reviewed the information provided by your letter dated April 16, 2001, and received in our office on April 17, 2001, to assess the potential presence of federally listed, threatened, endangered, or proposed species in the proposed project area. We do not have site specific information for your project site. However, to assist you in evaluating whether or not the proposed project may affect listed species, we have attached a list of species that occur within the vicinity of your project site. We recommend that you seek assistance from a biologist familiar with your project site, and with listed species to further assess the potential for direct, indirect, and cumulative effects likely to result from the proposed activity. You should also contact the California Department of Fish and Game for State-listed and sensitive species that may occur within the project area. Please note that State-listed species are protected under the provisions of the California Endangered Species Act.

This area is known to support habitat for the federally endangered Stephens' kangaroo rat (*Dipodomys stephensi*, SKR). The proposed project area occurs within the boundary of the SKR Habitat Conservation Plan for Western Riverside County. Compliance with the regional incidental take permit will be required prior to any ground-disturbing activities.

If it is determined that the proposed project may affect a proposed or listed species, or critical habitat, you should initiate consultation (or conference for proposed species) with us pursuant to section 7 of the Endangered Species Act of 1973, as amended (Act). Informal consultation may be used to exchange information and resolve conflicts with respect to listed species prior to a written request for formal consultation.

In response to your additional information request, the County of Riverside maintains a list of qualified biologists on their website: http://www.tlma.co.riverside.ca.us/plan/envconsults.htm. We are mailing you a copy of the section 7 consultation for the Metropolitan Water District of Southern California's Inland Feeder Project in Western San Bernardino and Riverside Counties

(1-6-99-F-18) as you requested. We will continue to work with you to provide information that addresses specific concerns of your project. Should you have any questions regarding the species listed or your responsibilities under the Act, please call Julie York of my staff at (760) 431-9440.

Sincerely,

for Jeff M. Newman
Acting Assistant Field Supervisor

Enclosure

cc: Mark Durham (Army Corps of Engineers, Los Angeles)
Jeff Drongesen (California Department of Fish and Game, Chino Hills)
Gregory Lamberg (Calpine Corporation, Pleasanton)

Listed Endangered, Threatened, and Proposed Species
that may occur near the proposed Calpine Corporation
Inland Empire Energy Center, Riverside County, California

Common Name	Scientific Name	Status
INVERTEBRATES		
Quino checkerspot butterfly	*Euphydryas editha quino*	E
BIRDS		
bald eagle	*Haliaeetus leucocephalus*	T
coastal California gnatcatcher	*Polioptila californica californica*	T, CH
southwestern willow flycatcher	*Empidonax traillii extimus*	E
MAMMALS		
San Bernardino kangaroo rat	*Dipodomys merriami parvus*	E
Stephens' kangaroo rat	*Dipodomys stephensi*	E
PLANTS		
California orcutt grass	*Orcuttia californica*	E
San Jacinto Valley crownscale	*Atriplex coronata* var. *notatior*	E
slender-horned spineflower	*Dodecahema leptoceras*	T
spreading navarettia	*Navarettia fossalis*	T
thread-leaved brodiaea	*Brodiaea filifolia*	T

E=Endangered
T=Threatened
CH=Critical Habitat

"Yvonne Moore" <YMoore@dfg.ca.gov>

05/17/01 06:54 PM

To: <lmalo@fwenc.com>
cc:
Subject: Calpine Corp project

Lenny,

I wanted to let you know that I have been swamped with work since we last spoke and I have not had a chance to send you any info in regards to your letter dated April 16, 2001. Basically, you need to review the Natural Diversity database (NDDB/Rarefind) for species of concern. The site of the plant itself probably won't be of concern, but the pipelines run through Stephens' kangaroo rat and potentially California gnatcatcher habitat. The San Jacinto Wildlife Area occurs along Davis Road and impacts to this area must be coordinated with the Wildlife Reserve and San Jacinto Flood Control. It looks like the pipelines will cross the San Jacinto River (or are these pipelines already in place?) Impacts to the River are of major concern. I will try to get a letter out to you soon, if you still want one. You should contact Riverside County Planning Department for a list of qualified biologists.

At this time, surveys needed are: rare plants (thread-leaved brodiaea, prostrate navarretia, and others), Stephens' kangaroo rat assessment, maybe San Bernardino kangaroo rat survey, vernal pool assessment and surveys for fairy shrimp if pools present, arroyo toad, California gnatcatcher, western spadefoot, burrowing owl, least Bell's vireo and southwestern willow flycatcher if riparian habitat. You should also note that Swainson's hawks and golden eagles occur in the area. There may be other surveys, but these are the ones off the top of my head. Check the NDDB. Call the US Fish and Wildlife Service, Carlsbad office (760-431-9440) for a list of recent sightings. Kate Kramer from our office can talk plants with you (909-792-5951). Raul Rodriguez can talk herps and fish (909-393-3965). Karin Cleary-Rose at the USFWS (same phone as above) knows this area really well and can tell you about vernal pools and what's happening with the River (big flood control project).

Please let me know if you need more info. I am willing to schedule a site visit if you want. Impacts to the River will require a 1600 agreement.

Sincerely,
Yvonne

****
Yvonne C. Moore, ES III
California Department of Fish and Game
4775 Bird Farm Road
Chino Hills, CA 91709
(909) 606-2413 phone
(909) 597-0067 fax
ymoore@dfg.ca.gov
****

J-5: California Natural Community Field Survey Forms

California Native Species Field Survey Form

Mail to:
Natural Diversity Database
California Department of Fish and Game
1807 13th Street, Suite 202
Sacramento, CA 95814

Date of Field Work: 06 (month) - 10 (day) - 01 (year)

For Office Use Only
Source Code _____ Quad Code _____
Elm Code _____ Occ. No. _____
EO Index No. _____ Map Index No. _____

Scientific Name: SPEOTYTO CUNICULARIA

Common Name: BURROWING OWL

Species Found? ☒ yes ☐ no _____ If not, why?
Total No. Individuals 2 Subsequent Visit? ☒ yes ☐ no
Is this an existing NDDB occurrence? _____ Yes, Occ. # ☒ no ☐ unk.
Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: LENNY MALO
Address: 1940 E. DEERE AVE., STE 200
SANTA ANA CA 92705
E-mail Address: LMALO@FWENG.COM
Phone: (949) 756-7556
805 312-4073

Plant Information
Phenology: _____ % vegetative _____ % flowering _____ % fruiting

Animal Information
Age Structure: 2 # adults _____ # juveniles _____ # unknown
☐ breeding ☐ wintering ☐ burrow site ☐ rookery ☒ nesting ☐ other

Location ***(please also attach or draw map on back)***

County: RIVERSIDE Landowner / Mgr.: UNKNOWN
Quad Name: LAKEVIEW Elevation: _____
T ____ R 2 WEST 1/4 of ____ 1/4 of Section 6 T ____ R ____ ____ 1/4 of ____ 1/4 of Section ____
UTM: Zone: 11 (10, 11) Datum: WGS84 (NAD83,NAD27,WG584, other)
Source: GPS (GPS, map & type, etc.) Point Accuracy: 3 Meters
UTM Coordinates 0488693, 3745027

Habitat Description *(plant communities, dominants, associates, substrates/soils, aspects/slope)* BROMUS sp.; HORDEUM sp. ANNUAL GRASS LAND, BURROW IS IN A DOMINO SERIES SOIL. SILTY LOAM, STRONGLY SALINE-ALKALI

Other rare species?

Site Information Overall site quality: ☐ Excellent ☒ Good ☐ Fair ☐ Poor

Current / surrounding land use: WILDLIFE AREA, AGRICULTURE, SHOOTING RANGE

Visible disturbances / possible threats: AGRICULTURE, ROAD MAINTENANCE, SHOOTING RANGE

Comments:

Determination: *(check one or more, and fill in blanks)*
___ Keyed (cite reference): _____
___ Compared with specimen housed at: _____
X Compared with photo / drawing in: STOKES FIELD GUIDE 1995
X By another person (name): BOB ANDERSON, BIOLOGIST/BOTANIST
___ Other: _____

Photographs: *(check one or more)*

	Slide	Print
Plant / animal	___	X
Habitat	___	___
Diagnostic feature	___	___

May we obtain duplicates at our expense? ☒ yes ☐ no

California Native Species Field Survey Form

Mail to:
Natural Diversity Database
California Department of Fish and Game
1807 13th Street, Suite 202
Sacramento, CA 95814

Date of Field Work: 06 (month) - 04 (day) - 01 (year)

For Office Use Only
Source Code _____ Quad Code _____
Elm Code _____ Occ. No. _____
EO Index No. _____ Map Index No. _____

Scientific Name: Lasthenia glabrata Coulteri
Common Name: Coulter's Goldfield

Species Found? ☑ yes ☐ no _____ If not, why?
Total No. Individuals 10-12 Subsequent Visit? ☐ yes ☑ no
Is this an existing NDDB occurrence? _____ Yes, Occ. # ☐ no ☑ unk.
Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Lenny Malo
Address: 1940 E. Deere Ave Suite 200 Santa Ana CA 92705
E-mail Address: lmalo@FWENC.com
Phone: (949) 756-7556

Plant Information
Phenology: _____ % vegetative 30% % flowering 80% % fruiting

Animal Information
Age Structure: N/A # adults N/A # juveniles N/A # unknown
☐ breeding ☐ wintering ☐ burrow site ☐ rookery ☐ nesting ☐ other

Location ***(please also attach or draw map on back)***

County: Riverside Landowner / Mgr.: _____
Quad Name: Lakeview Elevation: _____
T 3S R 2W _____ 1/4 of _____ 1/4 of Section 31 T _____ R _____ _____ 1/4 of _____ 1/4 of Section _____
UTM: Zone: 11 (10, 11) Datum: WG 584 (NAD83,NAD27,WG584, other)
Source: GPS (GPS, map & type, etc.) Point Accuracy: 3 Meters
UTM Coordinates 0488750 1 / 3747897

Habitat Description *(plant communities, dominants, associates, substrates/soils, aspects/slope)*
Alkali Playa / Grassland

Other rare species? No

Site Information Overall site quality: ☒ Excellent ☐ Good ☐ Fair ☐ Poor
Current / surrounding land use: Wildlife Refuge and agriculture
Visible disturbances / possible threats: none
Comments:

Determination: *(check one or more, and fill in blanks)*
✓ Keyed (cite reference): Hickman, J.C. 1996. The Jepson
___ Compared with specimen housed at: _____
___ Compared with photo / drawing in: _____
✓ By another person (name): Bob Anderson / Botanist
✓ Other: Nina de Leest / Botanist
Manual Higher Plants of California

Photographs: *(check one or more)*

	Slide	Print
Plant / animal	___	✓
Habitat	___	___
Diagnostic feature	___	___

May we obtain duplicates at our expense? ☑ yes ☐ no

California Native Species Field Survey Form

Mail to:
Natural Diversity Database
California Department of Fish and Game
1807 13th Street, Suite 202
Sacramento, CA 95814

Date of Field Work: 06 (month) - 04 (day) - 01 (year)

For Office Use Only
Source Code _____ Quad Code _____
Elm Code _____ Occ. No. _____
EO Index No. _____ Map Index No. _____

Scientific Name: Hemizonia pungens laevis
Common Name: Smooth Tarplant

Species Found? ☑ yes ☐ no _____ If not, why?
Total No. Individuals 5 Subsequent Visit? ☐ yes ☑ no
Is this an existing NDDB occurrence? _____ Yes, Occ. # ☐ no ☑ unk.
Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Lenny Malo
Address: 1940 E. Deere Ave., Suite 200 Santa Ana, CA 92705
E-mail Address: lmalo@FWENC.com
Phone: (949) 756-7556

Plant Information
Phenology: _____ % vegetative 40% % flowering 30% % fruiting

Animal Information
Age Structure: N/A # adults N/A # juveniles N/A # unknown
☐ breeding ☐ wintering ☐ burrow site ☐ rookery ☐ nesting ☐ other

Location ***(please also attach or draw map on back)***

County: Riverside Landowner / Mgr.: _____
Quad Name: Lakeview Elevation: _____
T 3S R 2W _____ 1/4 of _____ 1/4 of Section 31 T _____ R _____ _____ 1/4 of _____ 1/4 of Section _____
UTM: Zone: 11 (10, 11) Datum: WG584 (NAD83,NAD27,WG584, other)
Source: GPS (GPS, map & type, etc.) Point Accuracy: 3 Meters
UTM Coordinates 0488750 / 3747897

Habitat Description *(plant communities, dominants, associates, substrates/soils, aspects/slope)*
Alkali Playa / Grassland

Other rare species? No

Site Information Overall site quality: ☒ Excellent ☐ Good ☐ Fair ☐ Poor
Current / surrounding land use: Wildlife Refuge and Agriculture
Visible disturbances / possible threats: none
Comments:

Determination: *(check one or more, and fill in blanks)*
✓ Keyed (cite reference): Hickman, J.C. 1996. The Jepson
___ Compared with specimen housed at: _____
___ Compared with photo / drawing in: _____
✓ By another person (name): Bob Anderson / Botanist
✓ Other: Nina DeLeest / Botanist
Manual Higher Plants of California

Photographs: *(check one or more)*

	Slide	Print
Plant / animal	___	✓
Habitat	___	___
Diagnostic feature	___	___

May we obtain duplicates at our expense? ☑ yes ☐ no

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California Native Species Field Survey Form

Mail to:
Natural Diversity Database
California Department of Fish and Game
1807 13th Street, Suite 202
Sacramento, CA 95814

Date of Field Work: 06 - 04 - 01 (month - day - year)

For Office Use Only
Source Code _____ Quad Code _____
Elm Code _____ Occ. No. _____
EO Index No. _____ Map Index No. _____

Scientific Name: Hemizonia pungens laevis
Common Name: Smooth Tarplant

Species Found? ☑ yes ☐ no _____ If not, why?
Total No. Individuals 100 or so Subsequent Visit? ☐ yes ☑ no
Is this an existing NDDB occurrence? _____ Yes, Occ. # ☐ no ☑ unk.
Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Lenny Malo
Address: 1440 E. Deere Ave., Suite 200 Santa Ana, CA 92705
E-mail Address: lmalo@FWENC.com
Phone: (949) 756-7556

Plant Information
Phenology: _____ % vegetative 40% % flowering 30% % fruiting

Animal Information
Age Structure: N/A # adults N/A # juveniles N/A # unknown
☐ breeding ☐ wintering ☐ burrow site ☐ rookery ☐ nesting ☐ other

Location ***(please also attach or draw map on back)***

County: Riverside Landowner / Mgr.: _____
Quad Name: Lakeview Elevation: _____
T 3S R 2W _____ 1/4 of _____ 1/4 of Section 31 T _____ R _____ _____ 1/4 of _____ 1/4 of Section _____
UTM: Zone: 11 (10, 11) Datum: WG584 (NAD83,NAD27,WG584, other)
Source: GPS (GPS, map & type, etc.) Point Accuracy: 3 Meters
UTM Coordinates 0488632 / 3747795

Habitat Description *(plant communities, dominants, associates, substrates/soils, aspects/slope)*
Alkali Playa / Grassland

Other rare species?

Site Information Overall site quality: ☒ Excellent ☐ Good ☐ Fair ☐ Poor
Current / surrounding land use: Wildlife Refuge and agriculture
Visible disturbances / possible threats: none

Comments:

Determination: *(check one or more, and fill in blanks)*
✓ Keyed (cite reference): Hickman, J.C. 1996. The Jepson Manual Higher Plants of California
___ Compared with specimen housed at: _____
___ Compared with photo / drawing in: _____
✓ By another person (name): Bob Anderson / Botanist
✓ Other: Mina de Leest / Botanist

Photographs: *(check one or more)*

	Slide	Print
Plant / animal	___	✓
Habitat	___	___
Diagnostic feature	___	___

May we obtain duplicates at our expense? ☑ yes ☐ no

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California Native Species Field Survey Form

Mail to:
Natural Diversity Database
California Department of Fish and Game
1807 13th Street, Suite 202
Sacramento, CA 95814

Date of Field Work: 06 - 04 - 01 (month - day - year)

For Office Use Only
Source Code _____ Quad Code _____
Elm Code _____ Occ. No. _____
EO Index No. _____ Map Index No. _____

Scientific Name: Hemizonia pungens laevis
Common Name: Smooth Tarplant

Species Found? ☒ yes ☐ no _____ If not, why?
Total No. Individuals 18-30 Subsequent Visit? ☐ yes ☒ no
Is this an existing NDDB occurrence? _____ Yes, Occ. # ☐ no ☒ unk.
Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Lenny Malo
Address: 1940 E. Deere Ave, Suite 200 Santa Ana, CA 92705
E-mail Address: lmalo@FWENC.com
Phone: (949) 756-7556

Plant Information
Phenology: _____ % vegetative 40% % flowering 30% % fruiting

Animal Information
Age Structure: N/A # adults N/A # juveniles N/A # unknown
☐ breeding ☐ wintering ☐ burrow site ☐ rookery ☐ nesting ☐ other

***Location* (please also attach or draw map on back)**

County: Riverside Landowner / Mgr.: _____
Quad Name: Lakeview Elevation: _____
T 3S R 2W ____ 1/4 of ____ 1/4 of Section 31 T ____ R ____ ____ 1/4 of ____ 1/4 of Section ____
UTM: Zone: 11 (10, 11) Datum: WG 584 (NAD83,NAD27,WG584, other)
Source: GPS (GPS, map & type, etc.) Point Accuracy: 3 Meters
UTM Coordinates 0488805 / 3747562

Habitat Description *(plant communities, dominants, associates, substrates/soils, aspects/slope)*
Alkali Playa / Grassland

Other rare species? No

Site Information Overall site quality: ☒ Excellent ☐ Good ☐ Fair ☐ Poor
Current / surrounding land use: Wildlife Refuge and agriculture
Visible disturbances / possible threats: none

Comments:

Determination: *(check one or more, and fill in blanks)*
✓ Keyed (cite reference): Hickman, J.C. 1996. The Jepson
___ Compared with specimen housed at: _____
___ Compared with photo / drawing in: _____
✓ By another person (name): Bob Anderson / Botanist
✓ Other: Mona de Leest / Botanist
Manual Higher plants of California

Photographs: *(check one or more)*

	Slide	Print
Plant / animal	___	✓
Habitat	___	___
Diagnostic feature	___	___

May we obtain duplicates at our expense? ☒ yes ☐ no

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California Native Species Field Survey Form

Mail to:
Natural Diversity Database
California Department of Fish and Game
1807 13th Street, Suite 202
Sacramento, CA 95814

Date of Field Work: 06 (month) - 04 (day) - 01 (year)

For Office Use Only

Source Code _____ Quad Code _____
Elm Code _____ Occ. No. _____
EO Index No. _____ Map Index No. _____

Scientific Name: Hemizonia pungens laevis
Common Name: Smooth Tarplant

Species Found? ☑ yes ☐ no _____ If not, why?
Total No. Individuals 5-8 Subsequent Visit? ☐ yes ☑ no
Is this an existing NDDB occurrence? _____ Yes, Occ. # ☐ no ☑ unk.
Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Lenny Malo
Address: 1940 E. Deere Ave., Suite 200 Santa Ana, CA. 92705
E-mail Address: lmalo@FWENC.com
Phone: (949) 756-7556

Plant Information

Phenology: _____ % vegetative 40% % flowering 30% % fruiting

Animal Information

Age Structure: N/A # adults N/A # juveniles N/A # unknown
☐ breeding ☐ wintering ☐ burrow site ☐ rookery ☐ nesting ☐ other

Location ***(please also attach or draw map on back)***

County: Riverside Landowner / Mgr.: _____
Quad Name: Lakeview Elevation: _____
T 3S R 2W 1/4 of ____ 1/4 of Section 31 T ____ R ____ 1/4 of ____ 1/4 of Section ____
UTM: Zone: 11 (10, 11) Datum: WG584 (NAD83,NAD27,WG584, other)
Source: GPS (GPS, map & type, etc.) Point Accuracy: 3 Meters
UTM Coordinates 0488797 / 3745665

Habitat Description *(plant communities, dominants, associates, substrates/soils, aspects/slope)*

Alkali Playa / Grassland

Other rare species? NO

Site Information Overall site quality: ☒ Excellent ☐ Good ☐ Fair ☐ Poor

Current / surrounding land use: Wildlife Refuge and agriculture

Visible disturbances / possible threats: none

Comments:

Determination: *(check one or more, and fill in blanks)*
✓ Keyed (cite reference): Hickman, J.C. 1996. The Jepson
___ Compared with specimen housed at: _____
___ Compared with photo / drawing in: _____
✓ By another person (name): Bob Anderson / Botanist
✓ Other: Mina de Leest / Botanist

Manual Higher Plants of California

Photographs: *(check one or more)*

	Slide	Print
Plant / animal		✓
Habitat		
Diagnostic feature		

May we obtain duplicates at our expense? ☑ yes ☐ no

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Mail to:
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California Department of Fish and Game
1807 13th Street, Suite 202
Sacramento, CA 95814

Date of Field Work: 06 (month) - 04 (day) - 01 (year)

For Office Use Only
Source Code _____ Quad Code _____
Elm Code _____ Occ. No. _____
EO Index No. _____ Map Index No. _____

Scientific Name: Hemizonia pungens laevis
Common Name: Smooth Tarplant

Species Found? ☑ yes ☐ no _____ If not, why?
Total No. Individuals 2100 Subsequent Visit? ☐ yes ☑ no
Is this an existing NDDB occurrence? _____ Yes, Occ. # ☐ no ☑ unk.
Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Lenny Malo
Address: 1940 E. Deere Ave, suite 200
Santa Ana, CA. 92705
E-mail Address: lmalo@FWENC.com
Phone: (949) 756-7556

Plant Information
Phenology: _____ % vegetative 40% % flowering 30% % fruiting

Animal Information
Age Structure: N/A # adults N/A # juveniles N/A # unknown
☐ breeding ☐ wintering ☐ burrow site ☐ rookery ☐ nesting ☐ other

Location ***(please also attach or draw map on back)***

County: Riverside Landowner / Mgr.: _____
Quad Name: Lakeview Elevation: _____
T 3S R 2W _____ 1/4 of _____ 1/4 of Section 31 T _____ R _____ _____ 1/4 of _____ 1/4 of Section _____
UTM: Zone: 11 (10, 11) Datum: WGS84 (NAD83,NAD27,WG584, other)
Source: GPS (GPS, map & type, etc.) Point Accuracy: 3 Meters
UTM Coordinates 0488768 / 3747924

Habitat Description *(plant communities, dominants, associates, substrates/soils, aspects/slope)*
Alkali Playa / Grassland

Other rare species?

Site Information Overall site quality: ☒ Excellent ☐ Good ☐ Fair ☐ Poor
Current / surrounding land use: Wildlife Refuge / agriculture
Visible disturbances / possible threats: none

Comments:

Determination: *(check one or more, and fill in blanks)*
✓ Keyed (cite reference): Hickman, J.C. 1996 The
___ Compared with specimen housed at: _____
___ Compared with photo / drawing in: _____
✓ By another person (name): Bob Anderson / Botanist
✓ Other: Mike Ole Leest / Botanist
Jepson Manual Higher Plants of California

Photographs: *(check one or more)*

	Slide	Print
Plant / animal	___	✓
Habitat	___	___
Diagnostic feature	___	___

May we obtain duplicates at our expense? ☑ yes ☐ no

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California Native Species Field Survey Form

Mail to:
Natural Diversity Database
California Department of Fish and Game
1807 13th Street, Suite 202
Sacramento, CA 95814

Date of Field Work: 96 (month) - 05 (day) - 21 (year)

For Office Use Only
Source Code _____ Quad Code _____
Elm Code _____ Occ. No. _____
EO Index No. _____ Map Index No. _____

Scientific Name: Hemizonia pungens laevis
Common Name: Smooth Tarplant

Species Found? ☒ yes ☐ no _____ If not, why?
Total No. Individuals >65 Subsequent Visit? ☐ yes ☒ no
Is this an existing NDDB occurrence? _____ Yes, Occ. # ☐ no ☒ unk.
Collection? If yes: _____ Number _____ Museum / Herbarium

Reporter: Lenny Malo
Address: 1940 E. Deere Ave, Suite 200 Santa Ana, CA 92705
E-mail Address: lmalo@FWENC.com
Phone: (949) 756-7556

Plant Information
Phenology: _____ % vegetative 40% % flowering 30% % fruiting

Animal Information
Age Structure: N/A # adults N/A # juveniles N/A # unknown
☐ breeding ☐ wintering ☐ burrow site ☐ rookery ☐ nesting ☐ other

Location ***(please also attach or draw map on back)***

County: Riverside Landowner / Mgr.: _____
Quad Name: Lakeview Elevation: _____
T 3S R 2W _____ 1/4 of _____ 1/4 of Section 31 T _____ R _____ _____ 1/4 of _____ 1/4 of Section _____
UTM: Zone: 11 (10, 11) Datum: WG584 (NAD83,NAD27,WG584, other)
Source: GPS (GPS, map & type, etc.) Point Accuracy: 3 Meters
UTM Coordinates 048848 / 3745991

Habitat Description *(plant communities, dominants, associates, substrates/soils, aspects/slope)*
Alkali Playa / Grassland

Other rare species?

Site Information Overall site quality: ☒ Excellent ☐ Good ☐ Fair ☐ Poor
Current / surrounding land use: Wildlife Refuge and agriculture
Visible disturbances / possible threats: none

Comments:

Determination: *(check one or more, and fill in blanks)*
✓ Keyed (cite reference): Hickman, J.C. 1996. The Jepson
___ Compared with specimen housed at: _____
___ Compared with photo / drawing in: _____
✓ By another person (name): Bob Anderson / Botanist
✓ Other: Mona de Leest / Botanist
Manual Higher Plants of California

Photographs: *(check one or more)*

	Slide	Print
Plant / animal	___	✓
Habitat	___	___
Diagnostic feature	___	___

May we obtain duplicates at our expense? ☒ yes ☐ no

FG/WHDAB/1747 Rev.11/99

J-6: Biological Resources Map (Scale 1:6,000)

APPENDIX K

AIR QUALITY AND PUBLIC HEALTH SUPPORT DOCUMENTATION

K-1:	**Quarterly Wind Roses**
K-2:	**Construction Impacts**
K-3:	**Detailed Emissions Calculations**
K-4:	**Modeling Protocol**
K-5:	**Modeling Analysis**
K-6:	**Visibility Impact Analysis**
K-7:	**BACT Analysis**
K-8:	**Cumulative Impacts Analysis Protocol**
K-9:	**Screening Level Risk Assessment – Emissions of Noncriteria Pollutants and HRA Model**
K-10:	**Emissions Reduction Credits (filed under separate cover)**

K-1: Quarterly Wind Roses

Figure K.1-1. 1981 First Quarter Windrose, Riverside

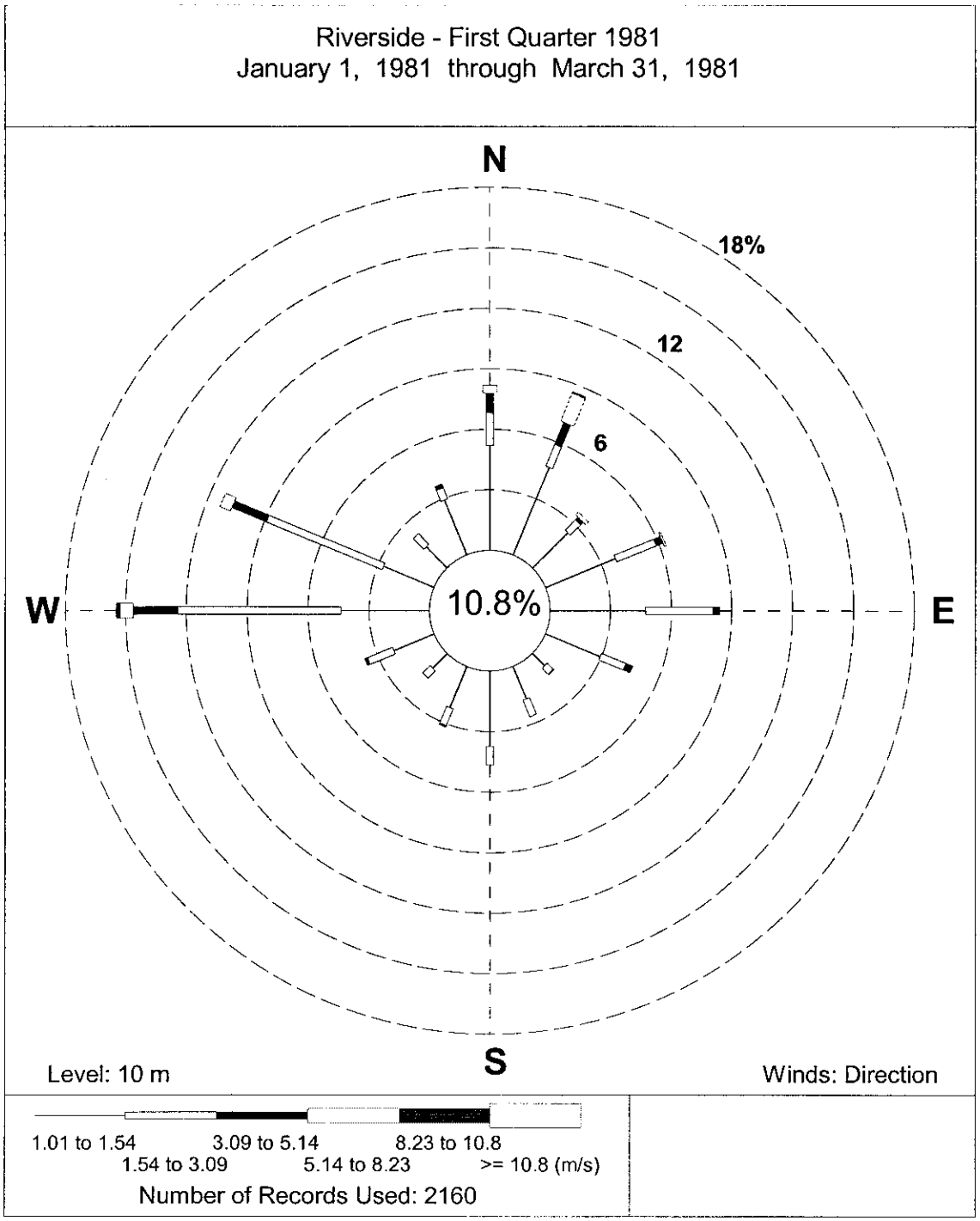


Figure K.1-2. 1981 Second Quarter Windrose, Riverside

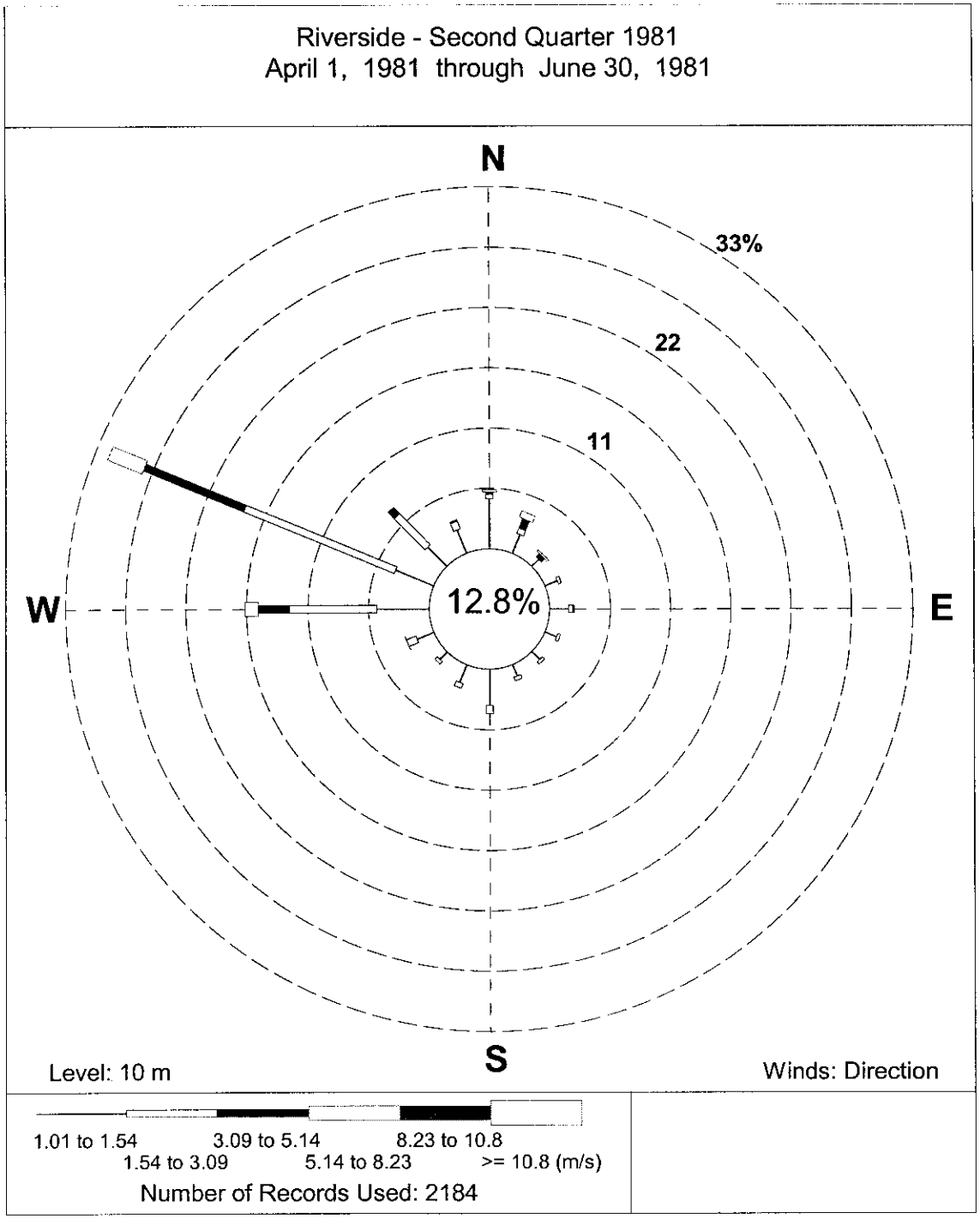


Figure K.1-3. 1981 Third Quarter Windrose, Riverside

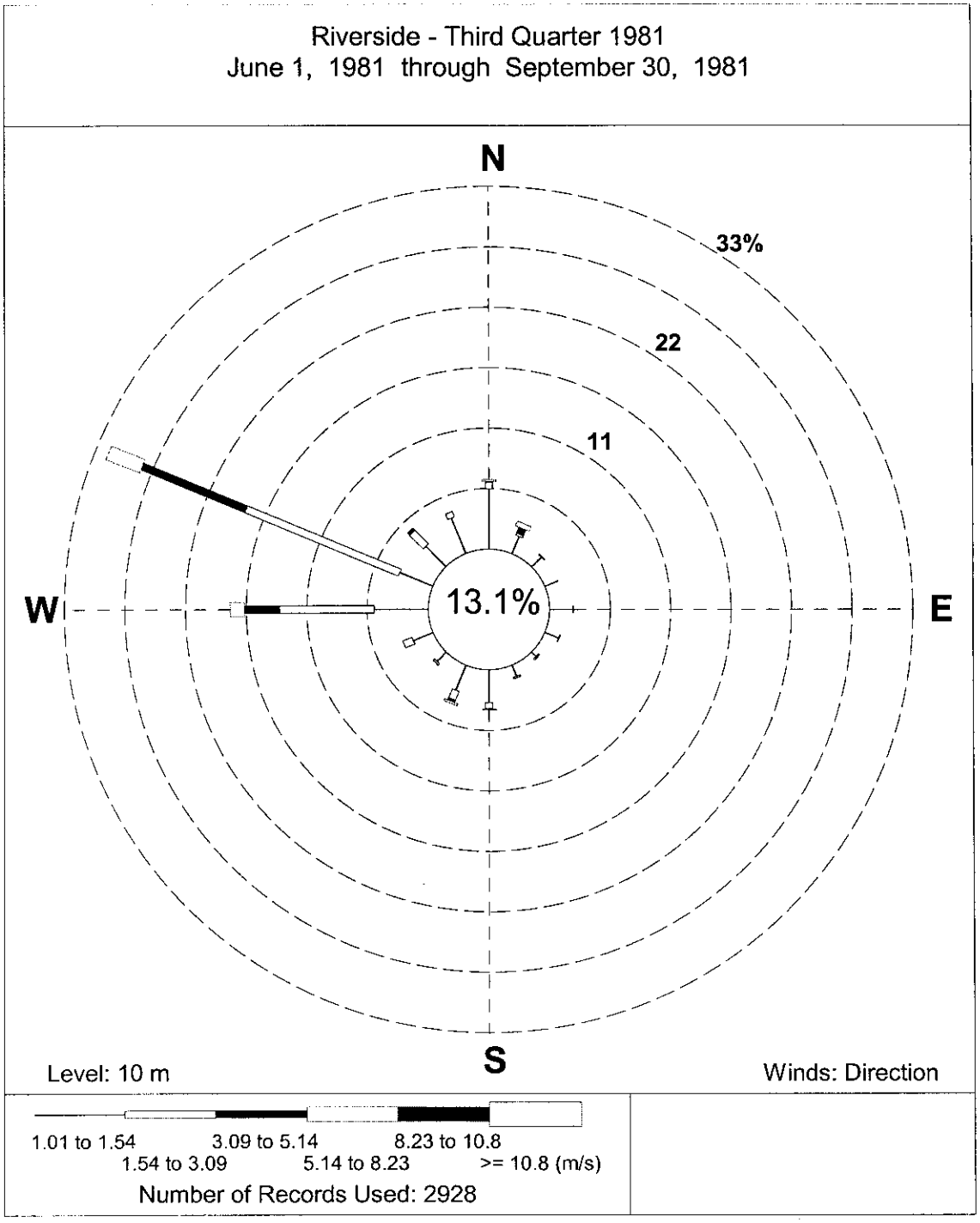
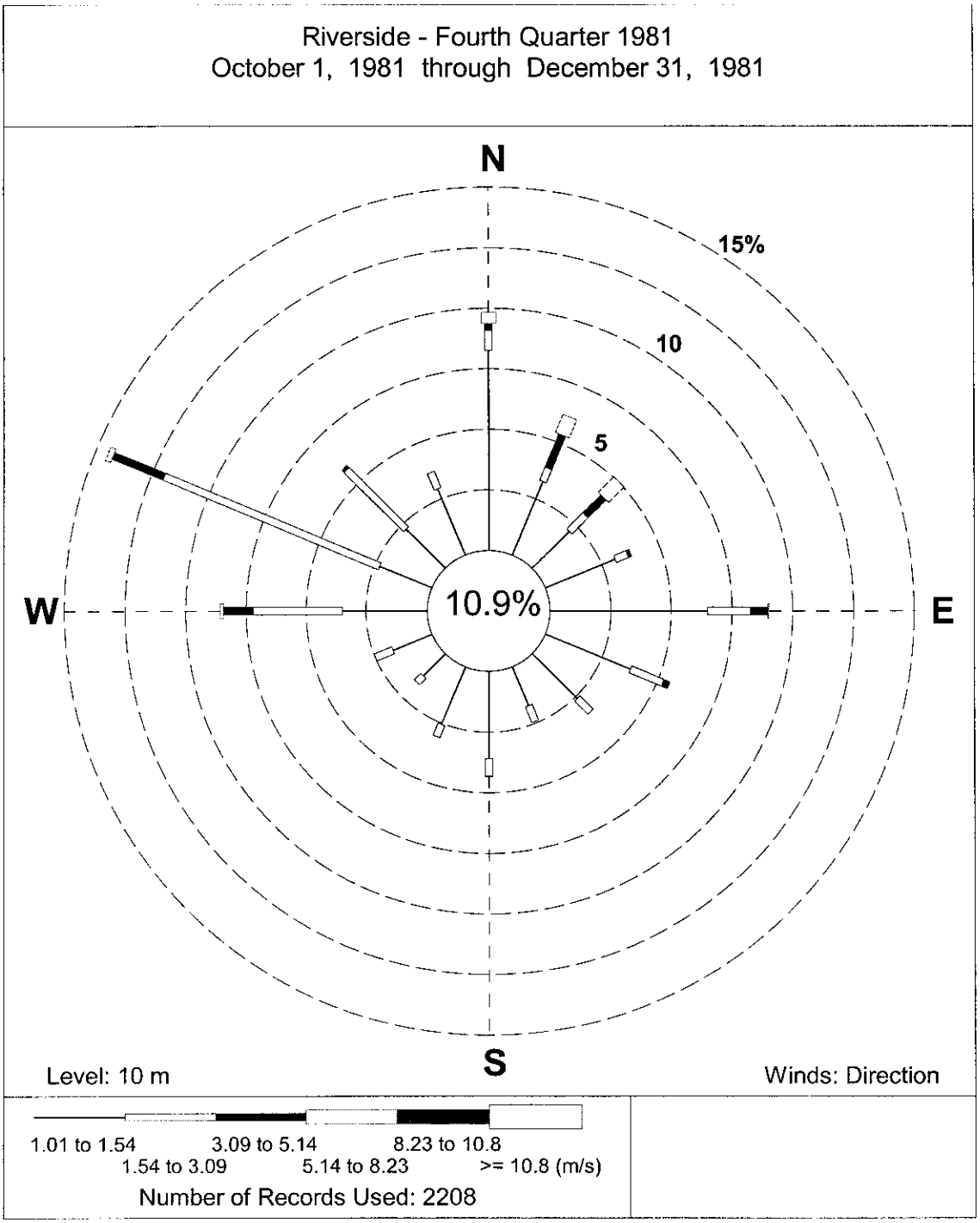


Figure K.1-4. 1981 Fourth Quarter Windrose, Riverside



K-2: Construction Impacts

Construction Phase Impacts

Onsite Construction

Construction of the IEEC project is expected to last 24 months, with the construction occurring in the following five main phases:

- Site preparation;
- Foundation work;
- Installation of major equipment;
- Construction/installation of major structures; and
- Start up and commissioning.

Site preparation includes clearing, grading, excavation of footings and foundations, and backfilling operations. After site preparation is finished, the construction of the foundations and structures is expected to begin. Once the foundations and structures are finished, installation and assembly of the mechanical and electrical equipment are scheduled to commence.

Fugitive dust emissions from the construction of the IEEC project will result from:

- Dust entrained during site preparation and grading/excavation at the construction site;
- Dust entrained during onsite travel on paved and unpaved surfaces;
- Dust entrained during aggregate and soil loading and unloading operations; and
- Wind erosion of areas disturbed during construction activities.

Combustion emissions during construction will result from:

- Exhaust from the diesel construction equipment used for site preparation, grading, excavation, and construction of onsite structures;
- Exhaust from water trucks used to control construction dust emissions;
- Exhaust from diesel-powered welding machines, electric generators, air compressors, water pumps, etc.;
- Exhaust from diesel trucks used to deliver concrete, fuel, and construction supplies to the construction site;
- Exhaust from locomotives used to deliver mechanical equipment to the project area; and

- Exhaust from automobiles and trucks used by workers to commute to the construction site.

To determine the potential worst-case daily construction impacts, exhaust and dust emission rates have been evaluated for each source of emissions. Worst-case daily dust emissions are expected to occur during the first few months of construction when site preparation occurs (i.e., month five of the construction schedule). The worst-case daily exhaust emissions are expected to occur during month fifteen of the construction schedule. Annual emissions are based on the average equipment mix during the 24-month construction period.

Natural Gas/Wastewater Pipelines and Transmission Lines

The installation of the 14.8-mile long natural gas pipeline will generate short-term construction impacts including fugitive dust and construction equipment combustion emissions. For this pipeline route, the excavation, installation of pipe, backfilling, and site cleanup will be performed in approximately 500-foot-long sections over a short duration to minimize fugitive dust and construction equipment combustion emissions.

The installation of a 4.7-mile long wastewater pipeline will also generate short-term construction impacts including fugitive dust and construction equipment combustion emissions.

As with the construction of the natural gas and wastewater pipelines, the proposed project also includes the installation of a 0.9-mile long transmission line interconnect. This construction activity will result in fugitive dust and construction equipment combustion emissions.

Available Mitigation Measures

The following mitigation measures are proposed to control exhaust emissions from the diesel heavy equipment used during construction of the IEEC project:

- Operational measures, such as limiting engine idling time and shutting down equipment when not in use;
- Regular preventive maintenance to prevent emission increases due to engine problems;
- Use of low sulfur and low aromatic fuel meeting California standards for motor vehicle diesel fuel; and

- Use of low-emitting diesel engines meeting federal emissions standards for construction equipment if available.

The following mitigation measures are proposed to control fugitive dust emissions during construction of the project:

- Use either water application or chemical dust suppressant application to control dust emissions from unpaved surface travel and unpaved parking areas;
- Use vacuum sweeping and/or water flushing of paved road surface to remove buildup of loose material to control dust emissions from travel on the paved access road (including adjacent public streets impacted by construction activities) and paved parking areas;
- Cover all trucks hauling soil, sand, and other loose materials, or require all trucks to maintain at least two feet of freeboard;
- Limit traffic speeds on unpaved surfaces to 25 mph;
- Install sandbags or other erosion control measures to prevent silt runoff to roadways;
- Re-plant vegetation in disturbed areas as quickly as possible;
- As needed, use gravel pads along with wheel washers or wash tires of all trucks exiting construction site that carry track-out dirt from unpaved surfaces; and
- Mitigate fugitive dust emissions from wind erosion of areas disturbed from construction activities (including storage piles) by application of either water or chemical dust suppressant and/or use of wind breaks.

Estimation of Emissions with Mitigation Measures

Onsite Construction

Tables K.2-1 through K.2-3 show the estimated maximum daily and annual heavy equipment exhaust and fugitive dust emissions with recommended mitigation measures for onsite construction activities. Detailed emission calculations are included as Attachment K.2-1.

Pipeline/Transmission Line Construction

Table K.2-4 shows the estimated maximum daily heavy equipment exhaust and fugitive dust emissions with recommended mitigation measures for the natural gas pipeline, waste water pipeline, and transmission line upgrade construction activities. The following it is the expected construction period for each pipeline/transmission line route:

- Natural gas pipeline – 6 to 8 months
- Waste water pipeline – 2 to 3 months

- Transmission line interconnect – 1 month

Because of the temporary nature of these construction activities, annual emissions are not shown in the following emission summary tables for these construction activities. Detailed emission calculations are included as Attachment K.2-1.

Table K.2-1
Maximum Daily Emissions During Onsite Construction
(Month 5; Maximum Dust Emissions), Pounds Per Day

	NO_x	CO	VOC	SO_x	PM_{10}
Onsite					
Construction Equipment	116.63	30.18	8.44	3.29	6.38
Fugitive Dust					39.80
Offsite					
Worker Travel, Truck/Rail Deliveries	74.93	107.28	11.34	2.88	4.02
Total Emissions					
Total	191.56	137.46	19.78	6.17	50.20

Table K.2-2
Maximum Daily Emissions During Onsite Construction
(Month 15; Maximum Exhaust Emissions), Pounds Per Day

	NO_x	CO	VOC	SO_x	PM_{10}
Onsite					
Construction Equipment	129.67	35.43	10.01	3.63	7.78
Fugitive Dust					9.82
Offsite					
Worker Travel, Truck/Rail Deliveries	413.99	1,641.2	141.64	13.89	16.11
Total Emissions					
Total	543.66	1,676.63	151.65	17.52	33.72

Table K.2-3
Annual Emissions During Onsite Construction, Tons Per Year

	NO_x	CO	VOC	SO_x	PM_{10}
Onsite					
Construction Equipment	11.05	3.34	0.89	0.32	0.70
Fugitive Dust					3.33
Offsite					
Worker Travel, Truck/Rail Deliveries	14.94	95.90	7.93	0.34	0.52
Total Emissions					
Total	25.99	99.24	8.82	0.65	4.55

Table K.2-4
Maximum Daily Emissions During Pipeline/Transmission Line Upgrade Construction
Pounds Per Day

	NO_x	CO	VOC	SO_x	PM_{10}
Natural Gas Pipeline					
Onsite					
Construction Equipment	55.8	17.9	4.1	1.9	2.8
Fugitive Dust	--	--	--	--	4.7
Offsite					
Truck Deliveries and Worker Travel	18.6	11.6	1.7	0.8	1.0
Total Emissions	74.4	29.5	5.8	2.7	8.5
Wastewater Pipeline					
Onsite					
Construction Equipment	62.0	22.6	4.9	2.2	3.2
Fugitive Dust	--	--	--	--	5.5
Offsite					
Truck Deliveries and Worker Travel	27.8	17.4	2.5	1.2	1.6
Total Emissions	89.8	40.0	7.4	3.4	10.3
Transmission Line Interconnect					
Onsite					
Construction Equipment	76.1	15.6	4.8	2.2	3.5
Fugitive Dust	--	--	--	--	1.1
Offsite					
Truck Deliveries and Worker Travel	46.4	29.0	4.2	1.9	2.6
Total Emissions	122.5	44.6	9.0	4.1	7.2

Analysis of Ambient Impacts from Onsite Construction

Ambient air quality impacts from emissions during construction of the IEEC project were estimated using an air quality dispersion modeling analysis. The modeling analysis considers the construction site location, the surrounding topography, and the sources of emissions during construction, including vehicle and equipment exhaust emissions and fugitive dust.

Existing Ambient Levels

As with the modeling analysis of project operating impacts (Section 5.2.2.4), the Perris, Lake Elsinore, and Riverside monitoring stations were used to establish the ambient background levels for the construction impact modeling analysis. Table K.2-5 shows the maximum concentrations of NO_x, SO_2, CO, and PM_{10} recorded for 1997 through 2000 at those monitoring stations.

Dispersion Model

As in the analysis of project operating impacts, the EPA-approved Industrial Source Complex Short Term (ISCST3) model was used to estimate ambient impacts from construction activities. A detailed discussion of the ISCST3 dispersion model is included in Section 5.2.4.2.2.

The emission sources for the construction site were grouped into two categories: exhaust emissions and dust emissions. An effective emission plume height of 4.6 meters was used for all exhaust emissions. For construction dust emissions, an effective plume height of 2.0 meters was used in the modeling analysis. The exhaust and dust emissions were modeled as a single area source that covered the total area of the construction site. The construction impacts modeling analysis used the same receptor locations as used for the project operating impact analysis. A detailed discussion of the receptor locations is included in Section 5.2.4.2.2.

To determine the construction impacts on short-term ambient standards (24 hours and less), the worst-case daily onsite construction emission levels shown in Tables K.2-1 and K.2-2 were used. For pollutants with annual average ambient standards, the annual onsite emission levels shown in Table K.2-3 were used. As with the project operating impact analysis, the meteorological data set used for the construction emission impacts analysis is data collected at the Riverside monitoring station during 1981.

Modeling Results

Based on the emission rates of NO_x, SO_2, CO, and PM_{10} and the meteorological data, the ISCST3 model calculates hourly and annual ambient impacts for each pollutant. As mentioned above, the modeled 1-hour, 3-hour, 8-hour, and 24-hour ambient impacts are based on the worst-case daily emission rates of NO_x, SO_2, CO, and PM_{10}. The annual impacts are based on the annual emission rates of these pollutants.

The one-hour and annual average concentrations of NO_2 were computed following the revised EPA guidance for computing these concentrations (August 9, 1995 *Federal Register,* 60 FR 40465). The OLM_ISC model was used for the one-hour average NO_2 impacts, with concurrent 1981 ozone data from the Perris station. This results in an overestimate of 1-hour average NO_2 impacts, as ozone levels are presently well below the levels reported for 1981. The annual average NO_2 impact was calculated using the ambient ratio method (ARM) with the EPA default value of 0.75 for the annual average NO_2/NO_x ratio.

The modeling analysis results are shown in Table K.2-5. Also included in the table are the maximum background levels that have occurred in the last four years and the resulting total ambient impacts. As shown in Table K.2-5, construction impacts alone for all modeled pollutants are expected to be below the most stringent state and national standards. However, the state 24-hour and annual average PM_{10} standards are exceeded in the absence of the construction emissions for the IEEC project, and construction PM_{10} impacts will contribute to these pre-existing violations.

Table K.2-5
Modeled Maximum Construction Impacts

Pollutant	Averaging Time	Maximum Construction Impacts ($\mu g/m^3$)	Background ($\mu g/m^3$)	Total Impact ($\mu g/m^3$)	State Standard ($\mu g/m^3$)	Federal Standard ($\mu g/m^3$)
NO_2[a]	1-Hour	217 [a, d]	211	428	470	--
	Annual	6 [a]	36	42	--	100
SO_2	1-Hour	39 [d]	278	317	650	--
	24-Hour	7 [d]	92	99	109	365
	Annual	0.2	5	5	--	80
CO	1-Hour	379 [d]	12,650	13,029	23,000	40,000
	8-Hour	194 [d]	6,302	6,496	10,000	10,000

PM_{10}	24-Hour	121.8 [e]	139	261	50	150
	Annual[b]	5.2	44	49	30	--
	Annual[c]	5.2	50	55	--	50

Notes:
a. OLM_ISC used for 1-hr average impact and ARM applied for annual average, using EPA default ratio of 0.75.
b. Annual Geometric Mean.
c. Annual Arithmetic Mean.
d. Based on maximum daily emissions during Month 15.
e. Based on maximum daily emissions during Month 5.

The ISCST3 model over-predicts PM_{10} construction emission impacts because of the cold plume (i.e., ambient temperature) effect of dust emissions. Most of the plume dispersion characteristics in the ISCST3 model are derived from observations of hot plumes associated with typical smokestacks. The ISCST3 model does compensate for plume temperature; however, for ambient temperature plumes, the model assumes negligible buoyancy and dispersion. Consequently, the ambient concentrations in cold plumes remain high even at significant distances from a source. The IEEC project construction site impacts are not unusual in comparison to most construction sites; construction sites that use good dust suppression techniques and low-emitting vehicles typically do not cause violations of air quality standards. The input and output modeling files are being provided electronically.

Health Risk of Diesel Exhaust

The combustion portion of annual PM_{10} emissions from Table K.2-5 above were determined separately to determine the annual average Diesel PM_{10} exhaust concentration. This was used with the ARB-approved unit risk value of 300 in one million for a 70-year lifetime to determine the potential carcinogenic risk from Diesel exhaust during construction. The exposure was also adjusted by a factor of 2/70, or 0.0286, to correct for the 24-month exposure during the construction period.

The maximum modeled annual average concentration of Diesel exhaust PM_{10} is 0.501 $\mu g/m^3$. Using the unit risk value and adjustment factors described above, the carcinogenic risk due to exposure to Diesel exhaust during construction activities is expected to be approximately 4.3 in one million. This is well below the 10 in one million level considered to be significant under the South Coast AQMD CEQA guidelines[1].

[1] South Coast AQMD CEQA Air Quality Handbook, April 1993.

This analysis is overly conservative for several reasons. First, as discussed above, the modeled PM_{10} concentrations from construction operations are overpredicted by the ISCST3 model. Second, this analysis assumes that all the combustion PM_{10} is emitted by Diesel engines, when in fact some of the engines will be gasoline-fueled and thus will not produce Diesel particulates.

Analysis of Ambient Impacts from Pipeline/Transmission Line Construction

Construction of the natural gas/wastewater pipelines and the transmission line interconnect activities will be of short duration, will require minimal equipment, and will generally occur along public roads and utility right-of-ways covering a large geographical area. Therefore, the potential ambient air quality impacts associated with these construction projects are expected to be minimal.

APPENDIX K.2-1

DETAILED CONSTRUCTION EMISSION CALCULATIONS

Construction Equipment Daily Exhaust Emissions (Month 5)

Equipment	Number of Units	Hrs/Day Per Unit	Gals/Hr Per Unit	Total Fuel Use (Gals/day)	Emission Factors (lbs/1000 gals)(1) NOx	CO	POC	SOx	PM10	Daily Emissions (lbs/day) NOx	CO	POC	SOx	PM10
Crawler Crane- Greater than 300 ton														
Crawler Crane- Greater than 200 ton														
Crane - Mobile 65 ton														
Cranes -Mobile 45 ton														
Cranes - Mobile 35 ton														
Bulldozer D6H	1	5.6	5.50	30.80	270.01	39.13	15.65	7.10	11.74	8.32	1.21	0.48	0.22	0.36
Bulldozer D4C	1	5.6	3.00	16.80	270.01	39.13	15.65	7.10	11.74	4.54	0.66	0.26	0.12	0.20
Excavator- Trencher														
Excavator- Earth Scraper	3	6.4	9.00	172.80	270.01	39.13	15.65	7.10	11.74	46.66	6.76	2.70	1.23	2.03
Excavator-Motor Grader	1	5.6	5.00	28.00	270.01	39.13	15.65	7.10	11.74	7.56	1.10	0.44	0.20	0.33
Excavator- Backhoe/loader														
Excavator - loader	1	5.6	2.50	14.00	270.01	39.13	15.65	7.10	11.74	3.78	0.55	0.22	0.10	0.16
Vibratory Roller	1	5.6	10.00	56.00	270.01	39.13	15.65	7.10	11.74	15.12	2.19	0.88	0.40	0.66
Portable Compaction roller														
Truck- Water	1	5.2	3.13	16.28	170.68	106.79	15.33	7.10	9.59	2.78	1.74	0.25	0.12	0.16
Forklift	1	5.2	2.50	13.00	270.01	39.13	15.65	7.10	11.74	3.51	0.51	0.20	0.09	0.15
Dump Truck	2	6.0	3.13	37.56	170.68	106.79	15.33	7.10	9.59	6.41	4.01	0.58	0.27	0.36
Service Truck- 1 ton														
Truck- Fuel/Lube	1	5.2	3.13	16.28	170.68	106.79	15.33	7.10	9.59	2.78	1.74	0.25	0.12	0.16
Concrete Pumper Truck														
Tractor Truck 5th Wheel														
Trucks- Pickup 3/4 ton	2	6.0	0.78	9.36	74.40	59.47	5.57	7.10	4.83	0.70	0.56	0.05	0.07	0.05
Trucks- 3 ton	1	5.6	1.56	8.74	74.40	59.47	5.57	7.10	4.83	0.65	0.52	0.05	0.06	0.04
Diesel Powered Welder														
Light Plants	2	4.0	1.27	10.16	313.05	195.66	46.96	7.10	39.13	3.18	1.99	0.48	0.07	0.40
Portable Compaction- Vibratory Plate														
Portable Compaction- Vibratory Ram														
Articulating Boom Platforms														
Pumps	3	4.0	1.27	15.24	313.05	195.66	46.96	7.10	39.13	4.77	2.98	0.72	0.11	0.60
Air Compressor 185 CFM	1	6.8	1.27	8.64	313.05	195.66	46.96	7.10	39.13	2.70	1.69	0.41	0.06	0.34
Air Compressor 750 CFM														
Concrete Vibrators														
Concrete Trowel Machine														
Fusion Welder														
Portable Power Generators	2	4.0	1.27	10.16	313.05	195.66	46.96	7.10	39.13	3.18	1.99	0.48	0.07	0.40
Total =										116.63	30.18	8.44	3.29	6.38

Notes:
(1) See notes for combustion emissions.

Construction Equipment Daily Exhaust Emissions (Month 15)

Equipment	Number of Units	Hrs/Day Per Unit	Gals/Hr Per Unit	Total Fuel Use (Gals/day)	Emission Factors (lbs/1000 gals)(1) NOx	CO	POC	SOx	PM10	Daily Emissions (lbs/day) NOx	CO	POC	SOx	PM10
Crawler Crane- Greater than 300 ton	1	6.4	7.50	48.00	270.01	39.13	15.65	7.10	11.74	12.96	1.88	0.75	0.34	0.56
Crawler Crane- Greater than 200 ton	3	6.0	5.00	90.00	270.01	39.13	15.65	7.10	11.74	24.30	3.52	1.41	0.64	1.06
Crane - Mobile 65 ton	2	5.6	4.00	44.80	270.01	39.13	15.65	7.10	11.74	12.10	1.75	0.70	0.32	0.53
Cranes - Mobile 45 ton	1	6.0	4.00	24.00	270.01	39.13	15.65	7.10	11.74	6.48	0.94	0.38	0.17	0.28
Cranes - Mobile 35 ton	2	6.0	4.00	48.00	270.01	39.13	15.65	7.10	11.74	12.96	1.88	0.75	0.34	0.56
Bulldozer D6H														
Bulldozer D4C														
Excavator- Trencher														
Excavator- Earth Scraper														
Excavator-Motor Grader														
Excavator- Backhoe/loader	1	6.0	2.50	15.00	270.01	39.13	15.65	7.10	11.74	4.05	0.59	0.23	0.11	0.18
Excavator - loader														
Vibratory Roller														
Portable Compaction roller	1	5.6	10.00	56.00	270.01	39.13	15.65	7.10	11.74	15.12	2.19	0.88	0.40	0.66
Truck- Water	1	5.2	3.13	16.28	170.68	106.79	15.33	7.10	9.59	2.78	1.74	0.25	0.12	0.16
Forklift	1	5.2	2.50	13.00	270.01	39.13	15.65	7.10	11.74	3.51	0.51	0.20	0.09	0.15
Dump Truck														
Service Truck- 1 ton	1	5.2	1.56	8.11	74.40	59.47	5.57	7.10	4.83	0.60	0.48	0.05	0.06	0.04
Truck- Fuel/Lube	1	5.2	3.13	16.28	170.68	106.79	15.33	7.10	9.59	2.78	1.74	0.25	0.12	0.16
Concrete Pumper Truck														
Tractor Truck 5th Wheel	1	5.6	3.13	17.53	270.01	39.13	15.65	7.10	11.74	4.73	0.69	0.27	0.12	0.21
Trucks- Pickup 3/4 ton	4	6.0	0.78	18.72	74.40	59.47	5.57	7.10	4.83	1.39	1.11	0.10	0.13	0.09
Trucks- 3 ton	2	5.6	1.56	17.47	74.40	59.47	5.57	7.10	4.83	1.30	1.04	0.10	0.12	0.08
Diesel Powered Welder	2	5.2	1.27	13.21	313.05	195.66	46.96	7.10	39.13	4.13	2.58	0.62	0.09	0.52
Light Plants														
Portable Compaction- Vibratory Plate	2	5.6	0.25	2.80	313.05	195.66	46.96	7.10	39.13	0.88	0.55	0.13	0.02	0.11
Portable Compaction- Vibratory Ram	2	5.6	0.25	2.80	313.05	195.66	46.96	7.10	39.13	0.88	0.55	0.13	0.02	0.11
Articulating Boom Platforms	5	6.4	0.25	8.00	313.05	195.66	46.96	7.10	39.13	2.50	1.57	0.38	0.06	0.31
Pumps	2	4.0	1.27	10.16	313.05	195.66	46.96	7.10	39.13	3.18	1.99	0.48	0.07	0.40
Air Compressor 185 CFM	1	6.8	1.27	8.64	313.05	195.66	46.96	7.10	39.13	2.70	1.69	0.41	0.06	0.34
Air Compressor 750 CFM	3	6.8	1.27	25.91	313.05	195.66	46.96	7.10	39.13	8.11	5.07	1.22	0.18	1.01
Concrete Vibrators	2	4.0	0.25	2.00	313.05	195.66	46.96	7.10	39.13	0.63	0.39	0.09	0.01	0.08
Concrete Trowel Machine														
Fusion Welder														
Portable Power Generators	1	4.0	1.27	5.08	313.05	195.66	46.96	7.10	39.13	1.59	0.99	0.24	0.04	0.20
Total =										129.67	35.43	10.01	3.63	7.78

Notes:
(1) See notes for combustion emissions.

Construction Equipment Annual Exhaust Emissions

Equipment	Average Number of Units Per Year(1)	Average Operating Hrs/Day Per Unit	Gals/Hr Per Unit	Average Operating Days per Year	Total Fuel Use (Gals/yr)	Emission Factors (lbs/1000 gals)(2) NOx	CO	POC	SOx	PM10	Annual Emissions (tons/yr) NOx	CO	POC	SOx	PM10
Crawler Crane- Greater than 300 ton	0.25	6.4	7.50	250	3,000	270.01	39.13	15.65	7.10	11.74	0.41	0.06	0.02	0.01	0.02
Crawler Crane- Greater than 200 ton	1.10	6.0	5.00	250	8,250	270.01	39.13	15.65	7.10	11.74	1.11	0.16	0.06	0.03	0.05
Crane - Mobile 65 ton	1.00	5.6	4.00	250	5,600	270.01	39.13	15.65	7.10	11.74	0.76	0.11	0.04	0.02	0.03
Cranes -Mobile 45 ton	0.45	6.0	4.00	250	2,700	270.01	39.13	15.65	7.10	11.74	0.36	0.05	0.02	0.01	0.02
Cranes - Mobile 35 ton	1.10	6.0	4.00	250	6,600	270.01	39.13	15.65	7.10	11.74	0.89	0.13	0.05	0.02	0.04
Bulldozer D6H	0.15	5.6	5.50	250	1,155	270.01	39.13	15.65	7.10	11.74	0.16	0.02	0.01	0.00	0.01
Bulldozer D4C	0.20	5.6	3.00	250	840	270.01	39.13	15.65	7.10	11.74	0.11	0.02	0.01	0.00	0.00
Excavator- Trencher	0.30	6.4	2.00	250	960	270.01	39.13	15.65	7.10	11.74	0.13	0.02	0.01	0.00	0.01
Excavator- Earth Scraper	0.15	6.4	9.00	250	2,160	270.01	39.13	15.65	7.10	11.74	0.29	0.04	0.02	0.01	0.01
Excavator-Motor Grader	0.35	5.6	5.00	250	2,450	270.01	39.13	15.65	7.10	11.74	0.33	0.05	0.02	0.01	0.01
Excavator- Backhoe/loader	0.80	6.0	2.50	250	3,000	270.01	39.13	15.65	7.10	11.74	0.41	0.06	0.02	0.01	0.02
Excavator - loader	0.20	5.6	2.50	250	700	270.01	39.13	15.65	7.10	11.74	0.09	0.01	0.01	0.00	0.00
Vibratory Roller	0.40	5.6	10.00	250	5,600	270.01	39.13	15.65	7.10	11.74	0.76	0.11	0.04	0.02	0.03
Portable Compaction roller	0.40	5.6	10.00	250	5,600	270.01	39.13	15.65	7.10	11.74	0.76	0.11	0.04	0.02	0.03
Truck- Water	0.90	5.2	3.13	250	3,662	170.68	106.79	15.33	7.10	9.59	0.31	0.20	0.03	0.01	0.02
Forklift	1.00	5.2	2.50	250	3,250	270.01	39.13	15.65	7.10	11.74	0.44	0.06	0.03	0.01	0.02
Dump Truck	0.30	6.0	3.13	250	1,409	170.68	106.79	15.33	7.10	9.59	0.12	0.08	0.01	0.01	0.01
Service Truck- 1 ton	0.45	5.2	1.56	250	913	74.40	59.47	5.57	7.10	4.83	0.03	0.03	0.00	0.00	0.00
Truck- Fuel/Lube	0.85	5.2	3.13	250	3,459	170.68	106.79	15.33	7.10	9.59	0.30	0.18	0.03	0.01	0.02
Concrete Pumper Truck	0.25	6.8	3.13	250	1,330	170.68	106.79	15.33	7.10	9.59	0.11	0.07	0.01	0.00	0.01
Tractor Truck 5th Wheel	0.90	5.6	3.13	250	3,944	270.01	39.13	15.65	7.10	11.74	0.53	0.08	0.03	0.01	0.02
Trucks- Pickup 3/4 ton	3.15	6.0	0.78	250	3,686	74.40	59.47	5.57	7.10	4.83	0.14	0.11	0.01	0.01	0.01
Trucks- 3 ton	1.65	5.6	1.56	250	3,604	74.40	59.47	5.57	7.10	4.83	0.13	0.11	0.01	0.01	0.01
Diesel Powered Welder	1.45	5.2	1.27	250	2,394	313.05	195.66	46.96	7.10	39.13	0.37	0.23	0.06	0.01	0.05
Light Plants	0.80	4.0	1.27	250	1,016	313.05	195.66	46.96	7.10	39.13	0.16	0.10	0.02	0.00	0.02
Portable Compaction- Vibratory Plate	1.10	5.6	0.25	250	385	313.05	195.66	46.96	7.10	39.13	0.06	0.04	0.01	0.00	0.01
Portable Compaction- Vibratory Ram	1.10	5.6	0.25	250	385	313.05	195.66	46.96	7.10	39.13	0.06	0.04	0.01	0.00	0.01
Articulating Boom Platforms	2.25	6.4	0.25	250	900	313.05	195.66	46.96	7.10	39.13	0.14	0.09	0.02	0.00	0.02
Pumps	1.80	4.0	1.27	250	2,286	313.05	195.66	46.96	7.10	39.13	0.36	0.22	0.05	0.01	0.04
Air Compressor 185 CFM	0.90	6.8	1.27	250	1,943	313.05	195.66	46.96	7.10	39.13	0.30	0.19	0.05	0.01	0.04
Air Compressor 750 CFM	1.30	6.8	1.27	250	2,807	313.05	195.66	46.96	7.10	39.13	0.44	0.27	0.07	0.01	0.05
Concrete Vibrators	3.20	4.0	0.25	250	800	313.05	195.66	46.96	7.10	39.13	0.13	0.08	0.02	0.00	0.02
Concrete Trowel Machine	0.30	4.0	1.27	250	381	313.05	195.66	46.96	7.10	39.13	0.06	0.04	0.01	0.00	0.01
Fusion Welder	0.30	6.4	1.27	250	610	313.05	195.66	46.96	7.10	39.13	0.10	0.06	0.01	0.00	0.01
Portable Power Generators	0.95	4.0	1.27	250	1,207	313.05	195.66	46.96	7.10	39.13	0.19	0.12	0.03	0.00	0.02
Total =											11.05	3.34	0.89	0.32	0.69

Notes:
(1) Based on average number of units operating over 24-month construction period.
(2) See notes on combustion emissions.

Notes - Combustion Emission Calculations

(1) For Construction Equipment
For heavy Diesel construction equipment, emission factors based on equipment meeting EPA 1996 off-road Diesel standards and use of CARB low-sulfur fuel.
For trucks, depending on size of truck, emissions factors based on MVE17G version 1.0c for heavy-heavy duty or medium duty Diesel trucks, fleet average for calendar year 2000.
For portable equipment, emission factors based on EPA's "Non-road Engine and Vehicle Emission Study Report", 11/91, Table 2-07, for generator sets, welders, pumps, and air compressors less than 50 hp.

(2) For Delivery Trucks
From MVE17G version 1.0c, heavy-heavy duty Diesel trucks, fleet average for calendar year 2000.

(3) For Worker Travel
From MVE17G version 1.0c, average of light duty automobiles and light duty trucks, fleet average for calendar year 2000.

(4) For Rail Deliveries
NOx, CO, POC, and PM10 emission factors from EPA's "Technical Highlights - Emissions Factors for Locomotives", December 1997.
SOx emission factor from Booz-Allen & Hamilton "Locomotive Emission Study", prepared for CARB, January 1991.

Daily Fugitive Dust Emissions (Month 5)

Equipment	Number of Units	Daily Process Rate Per Unit	Total Process Rate	Units	PM10 Emission Factor(1) (lbs/unit)	Control Factor(1) (%)	PM10 Emissions (lbs/day)
Bulldozer D6H	1	5.6	5.6	hours	0.7528		4.22
Bulldozer D4C	1	5.6	5.6	hours	0.7528		4.22
Excavator- Trencher Excavation							
Excavator- Earth Scraper Excavation	3	6.4	19.2	hours	0.7528		14.45
Excavator- Earth Scraper Unpaved Road Travel	3	10.9	32.6	vmt	0.2656	66%	2.92
Excavator-Motor Grader	1	16.8	16.8	vmt	0.2754		4.63
Excavator- Backhoe Excavation							
Excavator - Loader Excavation	1	2,743.0	2,743.0	tons	0.0002		0.58
Excavator - Loader Unpaved Road Travel	1	21.2	21.2	vmt	0.1148	66%	0.82
Water Truck Unpaved Road Travel	1	13.0	13.0	vmt	0.1522	66%	0.67
Forklift Unpaved Road Travel	1	10.4	10.4	vmt	0.0970	66%	0.34
Dump Truck Unpaved Road Travel	2	10.1	20.1	vmt	0.1589	66%	1.08
Dump Truck Unloading	2	1,371.5	2,743.0	tons	0.0002		0.58
Service Truck Unpaved Road Travel							
Fuel/Lube Truck Unpaved Road Travel	1	3.1	3.1	vmt	0.1181	66%	0.12
Concrete Pumper Truck Unpaved Road Travel							
Tractor Truck 5th Wheel Unpaved Road Travel							
Pickup Truck Unpaved Road Travel	2	15.4	30.9	vmt	0.0599	66%	0.62
3 ton Truck Unpaved Road Travel	1	7.7	7.7	vmt	0.0803	66%	0.21
Windblown Dust (active construction area)	N/A	474,213.6	474,213.6	sq.ft.	0.0000	66%	4.04
Worker Paved Road Travel	13	0.5	6.4	vmt	0.0005		0.00
Worker Unpaved Road Travel	13	0.2	2.0	vmt	0.0599	66%	0.04
Delivery Truck Paved Road Travel	15	0.5	7.4	vmt	0.0185		0.14
Delivery Truck Unpaved Road Travel	15	0.2	2.3	vmt	0.1589	66%	0.12
Total =							39.80

Notes:
(1) See notes for fugitive dust emission calculations.

Daily Fugitive Dust Emissions (Month 15)

Equipment	Number of Units	Daily Process Rate Per Unit	Total Process Rate	Units	PM10 Emission Factor(1) (lbs/unit)	Control Factor(1) (%)	PM10 Emissions (lbs/day)
Bulldozer D6H							
Bulldozer D4C							
Excavator- Trencher Excavation							
Excavator- Earth Scraper Excavation							
Excavator- Earth Scraper Unpaved Road Travel							
Excavator-Motor Grader							
Excavator- Backhoe Excavation	1	398.4	398.4	cu. yds.	0.0018		0.73
Excavator - Loader Excavation							
Excavator - Loader Unpaved Road Travel							
Water Truck Unpaved Road Travel	1	13.0	13.0	vmt	0.1522	66%	0.67
Forklift Unpaved Road Travel	1	10.4	10.4	vmt	0.0970	66%	0.34
Dump Truck Unpaved Road Travel							
Dump Truck Unloading							
Service Truck Unpaved Road Travel	1	7.7	7.7	vmt	0.0803	66%	0.21
Fuel/Lube Truck Unpaved Road Travel	1	3.1	3.1	vmt	0.1181	66%	0.12
Concrete Pumper Truck Unpaved Road Travel							
Tractor Truck 5th Wheel Unpaved Road Travel	1	7.7	7.7	vmt	0.0970	66%	0.25
Pickup Truck Unpaved Road Travel	4	15.4	61.7	vmt	0.0599	66%	1.25
3 Ton Truck Unpaved Road Travel	2	7.7	15.4	vmt	0.0803	66%	0.42
Windblown Dust (active construction area)	N/A	474,213.6	474,213.6	sq.ft.	0.0000	66%	4.04
Worker Paved Road Travel	307	0.5	151.2	vmt	0.0005		0.07
Worker Unpaved Road Travel	307	0.2	47.4	vmt	0.0599	66%	0.96
Delivery Truck Paved Road Travel	44	0.5	21.7	vmt	0.0185		0.40
Delivery Truck Unpaved Road Travel	44	0.2	6.8	vmt	0.1589	66%	0.36
Total =							9.82

Notes:
(1) See notes for fugitive dust emission calculations.

Annual Fugitive Dust Emissions			
Activity	Average Daily PM10 Emissions(1) (lbs/day)	Days per Year	Annual PM10 Emissions (tons/yr)
Construction Activities	20.77	250	2.60
Windblown Dust	4.04	365	0.74
Total =			3.33

Notes:
(1) Based on average of daily emissions during Months 5 and 15.

Notes - Fugitive Dust Emission Calculations

(1) Paved road travel emission factors for delivery trucks and worker automobiles are based on AP-42, Section 13.2.1, 10/97.
(2) Wind erosion emission factor for active construction area is based on "Improvement of Specific Emission Factors (BACM Project No. 1), Final Report", prepared for South Coast AQMD by Midwest Research Institute, March 1996.
(3) Finish grading emission factor is based on AP-42, Table 11.9-2, 1/95.
(4) Bulldozer and scraper excavation emission factors are based AP-42, Table 11.9.2, 1/95.
(5) Material unloading emission factors are based on AP-42, p. 13.2.4-3, 1/95.
(6) Loader unpaved road travel emission factor is based on AP-42, Section 13.2.2, 1/95.
(7) Backhoe trenching emission factor is based on AP-42, Table 11.9-2 (dragline operations), 1/95.
(8) Unpaved road travel emission factors for water trucks, fuel trucks, service trucks, dump trucks, scrapers, forklifts, pickup trucks, delivery trucks, 5th wheel tractor trucks, and concrete trucks are based on AP-42, Section 13.2.2, 9/98.
(9) Dust control efficiency for unpaved road travel and active excavation area is based on "Control of Open Fugitive Dust Sources", U.S. EPA, 9/88.

Daily Construction Emissions (Month 5)					
	Daily Emissions (lbs/day)				
	NOx	CO	POC	SOx	PM10
Onsite					
Construction Equipment	116.63	30.18	8.44	3.29	6.38
Fugitive Dust					39.80
Subtotal =	116.63	30.18	8.44	3.29	46.18
Offsite					
Worker Travel	5.33	63.74	5.09	0.00	0.11
Truck Deliveries	69.60	43.54	6.25	2.88	3.91
Rail Deliveries	0.00	0.00	0.00	0.00	0.00
Subtotal =	74.93	107.28	11.34	2.88	4.02
Total =	191.56	137.46	19.78	6.17	50.20

Daily Construction Emissions (Month 15)					
	Daily Emissions (lbs/day)				
	NOx	CO	POC	SOx	PM10
Onsite					
Construction Equipment	129.67	35.43	10.01	3.63	7.78
Fugitive Dust					9.82
Subtotal =	129.67	35.43	10.01	3.63	17.61
Offsite					
Worker Travel	125.91	1505.20	120.20	0.08	2.56
Truck Deliveries	204.15	127.73	18.33	8.44	11.47
Rail Deliveries	83.93	8.27	3.11	5.36	2.08
Subtotal =	413.99	1641.20	141.64	13.89	16.11
Total =	543.66	1676.63	151.65	17.52	33.72

Annual Construction Emissions					
	Annual Emissions (tons/yr)				
	NOx	CO	POC	SOx	PM10
Onsite					
Construction Equipment	11.05	3.34	0.89	0.32	0.70
Fugitive Dust					3.33
Subtotal =	11.05	3.34	0.89	0.32	4.03
Offsite					
Worker Travel	7.71	92.14	7.36	0.01	0.16
Truck Deliveries	5.77	3.61	0.52	0.24	0.32
Rail Deliveries	1.46	0.14	0.05	0.09	0.04
Subtotal =	14.94	95.90	7.93	0.34	0.52
Total =	25.99	99.24	8.82	0.65	4.55

Natural Gas Pipeline Construction Heavy Equipment Daily Emissions

Equipment	Equipment Rating	Units	Load Factor(1)	Number of Units	Hrs/Day Per Unit	Emission Factors (1) NOx	CO	VOC	SOx	PM10	Units	Daily Emissions (lbs/day) NOx	CO	VOC	SOx	PM10
Trencher	150	bhp	0.38	1	10.0	6.9	1.0	0.4	0.2	0.3	gm/bhp-hr	8.7	1.3	0.5	0.2	0.4
Backhoe	100	bhp	0.38	1	10.0	6.9	1.0	0.4	0.2	0.3	gm/bhp-hr	5.8	0.8	0.3	0.2	0.3
Compactor	100	bhp	0.59	1	10.0	6.9	1.0	0.4	0.2	0.3	gm/bhp-hr	9.0	1.3	0.5	0.2	0.4
Paving machine	100	bhp	0.56	1	10.0	6.9	1.0	0.4	0.2	0.3	gm/bhp-hr	8.5	1.2	0.5	0.2	0.4
Grader	100	bhp	0.54	1	10.0	6.9	1.0	0.4	0.2	0.3	gm/bhp-hr	8.2	1.2	0.5	0.2	0.4
Water Truck	150	bhp	0.65	1	10.0	3.4	2.6	0.4	0.2	0.2	gm/bhp-hr	7.2	5.6	0.8	0.4	0.5
Fuel/lube truck	175	bhp	0.65	1	10.0	3.4	2.6	0.4	0.2	0.2	gm/bhp-hr	8.4	6.5	1.0	0.5	0.6
Total =												55.8	17.9	4.1	1.9	2.8

Notes:
(1) See notes for combustion emissions.

Natural Gas Pipeline Construction Delivery Truck Daily Emissions

Number of Deliveries Per Day	Average Round Trip Haul Distance (miles)	Vehicle Miles Traveled Per Day	Emission Factors (lbs/vmt)(1) NOx	CO	VOC	SOx	PM10	Daily Emissions (lbs/day) NOx	CO	VOC	SOx	PM10
4	165.6	662.4	0.0280	0.0175	0.0025	0.0012	0.0016	18.56	11.61	1.67	0.77	1.04

Notes:
(1) See notes for combustion emissions.

Natural Gas Pipeline Construction Daily Fugitive Dust Emissions					
Operation	Daily Process Rate Per Unit	Units	PM10 Emission Factor(1) (lbs/unit)	Control Factor(1) (%)	PM10 Emissions (lbs/day)
Windblown Dust	2,000	sq.ft./day	0.000025	66%	0.02
Excavation	667	cu.yd./day	0.0018	0%	1.20
Back filling	700	tons/day	0.0001	0%	0.07
Grader Operation	10	vmt	0.2754	0	2.75
Water truck unpaved surface travel	10	vmt	0.1522	66%	0.51
Delivery truck unpaved surface travel	2	vmt	0.1589	66%	0.11
Total =					4.66

Notes:
(1) See notes for fugitive dust emission calculations.

Waste Water Pipeline Construction Heavy Equipment Daily Emissions

Equipment	Equipment Rating	Units	Load Factor(1)	Number of Units	Hrs/Day Per Unit	Emission Factors (1) NOx	CO	VOC	SOx	PM10	Units	Daily Emissions (lbs/day) NOx	CO	VOC	SOx	PM10
Trencher	150	bhp	0.38	1	10.0	6.9	1.0	0.4	0.2	0.3	gm/bhp-hr	8.7	1.3	0.5	0.2	0.4
Backhoe	100	bhp	0.38	1	10.0	6.9	1.0	0.4	0.2	0.3	gm/bhp-hr	5.8	0.8	0.3	0.2	0.3
Compactor	100	bhp	0.59	1	10.0	6.9	1.0	0.4	0.2	0.3	gm/bhp-hr	9.0	1.3	0.5	0.2	0.4
Loader	150	bhp	0.38	1	10.0	6.9	1.0	0.4	0.2	0.3	gm/bhp-hr	8.7	1.3	0.5	0.2	0.4
Grader	100	bhp	0.54	1	10.0	6.9	1.0	0.4	0.2	0.3	gm/bhp-hr	8.2	1.2	0.5	0.2	0.4
Water Truck	150	bhp	0.65	1	10.0	3.4	2.6	0.4	0.2	0.2	gm/bhp-hr	7.2	5.6	0.8	0.4	0.5
Dump Truck	300	bhp	0.65	1	10.0	3.4	2.6	0.4	0.2	0.2	gm/bhp-hr	14.4	11.2	1.7	0.8	0.9
Total =												62.0	22.6	4.9	2.2	3.2

Notes:
(1) See notes for combustion emissions.

Waste Water Pipeline Construction Delivery Truck Daily Emissions

Number of Deliveries Per Day	Average Round Trip Haul Distance (miles)	Vehicle Miles Traveled Per Day	Emission Factors (lbs/vmt)(1) NOx	CO	VOC	SOx	PM10	Daily Emissions (lbs/day) NOx	CO	VOC	SOx	PM10
6	165.6	993.6	0.0280	0.0175	0.0025	0.0012	0.0016	27.84	17.42	2.50	1.15	1.56

Notes:
(1) See notes for combustion emissions.

Waste Water Pipeline Construction Daily Fugitive Dust Emissions					
Operation	Daily Process Rate Per Unit	Units	PM10 Emission Factor(1) (lbs/unit)	Control Factor(1) (%)	PM10 Emissions (lbs/day)
Windblown Dust	3,000	sq.ft./day	0.000025	66%	0.03
Excavation	1,500	cu.yd./day	0.0018	0%	2.70
Back filling	900	tons/day	0.0001	0%	0.09
Grader Operation	8	vmt	0.2754	0	2.20
Water truck unpaved surface travel	8	vmt	0.1522	66%	0.39
Delivery truck unpaved surface travel	1	vmt	0.1588799	66%	0.06
Total =					5.47

Notes:
(1) See notes for fugitive dust emission calculations.

Transmission Line Interconnect Construction Heavy Equipment Daily Emissions

Equipment	Equipment Rating	Units	Load Factor(1)	Number of Units	Hrs/Day Per Unit	Emission Factors (1) NOx	CO	VOC	SOx	PM10	Units	Daily Emissions (lbs/day) NOx	CO	VOC	SOx	PM10
Auger	150	bhp	0.75	1	10.0	6.9	1.0	0.4	0.2	0.3	gm/bhp-hr	17.1	2.5	1.0	0.5	0.7
Backhoe	100	bhp	0.38	1	10.0	6.9	1.0	0.4	0.2	0.3	gm/bhp-hr	5.8	0.8	0.3	0.2	0.3
Crane	250	bhp	0.43	1	10.0	6.9	1.0	0.4	0.2	0.3	gm/bhp-hr	16.4	2.4	0.9	0.4	0.7
Crawler Tractor	300	bhp	0.57	1	10.0	6.9	1.0	0.4	0.2	0.3	gm/bhp-hr	26.0	3.8	1.5	0.7	1.1
Water Truck	150	bhp	0.65	1	10.0	3.4	2.6	0.4	0.2	0.2	gm/bhp-hr	7.2	5.6	0.8	0.4	0.5
Air Compressor	50	bhp	0.48	1	10.0	6.9	1.0	0.4	0.2	0.3	gm/bhp-hr	3.7	0.5	0.2	0.1	0.2
Total =												76.1	15.6	4.8	2.2	3.5

Notes:
(1) See notes for combustion emissions.

Transmission Line Interconnect Construction Delivery Truck Daily Emissions

Number of Deliveries Per Day	Average Round Trip Haul Distance (miles)	Vehicle Miles Traveled Per Day	Emission Factors (lbs/vmt)(1) NOx	CO	VOC	SOx	PM10	Daily Emissions (lbs/day) NOx	CO	VOC	SOx	PM10
10	165.6	1656	0.0280	0.0175	0.0025	0.0012	0.0016	46.40	29.03	4.17	1.92	2.61

Notes:
(1) See notes for combustion emissions.

Transmission Line Interconnect Construction Daily Fugitive Dust Emissions					
Operation	Daily Process Rate Per Unit	Units	PM10 Emission Factor(1) (lbs/unit)	Control Factor(1) (%)	PM10 Emissions (lbs/day)
Windblown Dust	1,000	sq.ft./day	0.000025	66%	0.01
Excavation	500	cu.yd./day	0.0018	0%	0.90
Back filling	250	tons/day	0.0001	0%	0.03
Water truck unpaved surface travel	2	vmt	0.1522	66%	0.10
Delivery truck unpaved surface travel	2	vmt	0.1589	66%	0.10
Total =					1.14

Notes:
(1) See notes for fugitive dust emission calculations.

K-3: Detailed Emissions Calculations

APPENDIX K.3

DETAILED EMISSION CALCULATIONS

Table K.3-1

Detailed Calculations for Maximum Hourly, Daily, and Annual Criteria Pollutant Emissions

Equipment	Base Load			Startup			NOx			SOx		CO		VOC		PM10	
							Base Load(1)	Base Load(2)	Startup	Base Load	Startup	Base Load	Startup	Base Load	Startup	Base Load	Startup
	max. hour	hrs/day	hrs/yr	max. hour	hrs/day	hrs/yr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr	lb/hr
Gas Turbine 1, 36F, w/ DB, w/o PA	0	16	5100	0	0	0	22.71	18.18	0	1.77	0	33.23	0	6.34	0	15.97	0
Gas Turbine 2, 36F, w/ DB, w/o PA	1	16	5100	0	0	0	22.71	18.18	0	1.77	0	33.23	0	6.34	0	15.97	0
Gas Turbine 1, 61F, w/o DB, w/o PA	0	4	3260	0	0	0	16.07	12.89	0	1.26	0	23.48	0	2.43	0	11	0
Gas Turbine 2, 61F, w/o DB, w/o PA	0	4	3260	0	0	0	16.07	12.89	0	1.26	0	23.48	0	2.43	0	11	0
Gas Turbine 1, hot startups	0	0	0	0	1	250	0	0	80	0	1.77	0	838	0	16	0	15.97
Gas Turbine 2, hot startups	0	0	0	0	1	250	0	0	80	0	1.77	0	838	0	16	0	15.97
Gas Turbine 1, cold startups	0	0	0	1	3	150	0	0	80	0	1.77	0	902	0	16	0	15.97
Gas Turbine 2, cold startups	0	0	0	0	3	150	0	0	80	0	1.77	0	902	0	16	0	15.97
Cooling Tower	1	24	8760	0	0	0	0	0	0	0	0	0	0	0	0	3.31	3.31
Auxilary Boiler	1	8	3000	0	0	0	1.4	1.4	0	0.09	0	4.9	0	0.6	0	2.7	0
Emergency Generator	1	1	200	0	0	0	4.85	4.85	0	0.01	0	6.47	0	4.85	0	0.52	0
Fire pump engine	0	0	50	0	0	0	4.38	4.38	0	0.13	0	2.64	0	0.74	0	0.19	0

Notes:
(1) Short term average - less than annual average.
(2) Long term average - annual average.

Table K.3-2
Detailed Calculations for Maximum Hourly, Daily, and Annual Criteria Pollutant Emissions

Equipment	NOx			SOx			CO			VOC			PM10		
	Max	Max	Total	Max	Max	Total	Max	Max	Total	Max	Max	Total	Max	Max	Total
	Lb/hr	lb/day	tpy	lb/hr	lb/day	tpy	lb/hr	lb/day	tpy	lb/hr	lb/day	tpy	lb/hr	lb/day	tpy
Gas Turbine 1, 36F, w/ DB, w/o PA	0	363.3	46.4	0	28.4	4.5	0	531.7	84.7	0	101.4	16.2	0	255.5	40.7
Gas Turbine 2, 36F, w/ DB, w/o PA	22.7	363.3	46.4	1.8	28.4	4.5	33.2	531.7	84.7	6.3	101.4	16.2	16	255.5	40.7
Gas Turbine 1, 61 F, w/o DB, w/o PA	0	64.3	21	0	5	2.1	0	93.9	38.3	0	9.7	4	0	44	17.9
Gas Turbine 2, 61 F, w/o DB, w/o PA	0	64.3	21	0	5	2.1	0	93.9	38.3	0	9.7	4	0	44	17.9
Gas Turbine 1, hot startups	0	80	10	0	1.8	0.2	0	838	104.8	0	16	2	0	16	2
Gas Turbine 2, hot startups	0	80	10	0	1.8	0.2	0	838	104.8	0	16	2	0	16	2
Gas Turbine 1, cold startups	80	240	6	1.8	5.3	0.1	902	2,706.00	67.7	16	48	1.2	16	47.9	1.2
Gas Turbine 2, cold startups	0	240	6	0	5.3	0.1	0	2,706.00	67.7	0	48	1.2	0	47.9	1.2
Cooling Tower	0	0	0	0	0	0	0	0	0	0	0	0	3.3	79.6	14.5
Auxilary Boiler	1.4	11.2	2.1	0.1	0.7	0.1	4.9	39.2	7.4	0.6	4.8	0.9	2.7	21.6	4.1
Emergency Generator(1)	4.9	4.9	0.5	0	0	0	6.5	6.5	0.6	4.9	4.9	0.5	0.5	0.5	0.1
Fire pump engine(1)	0	0	0.1	0.1	0.1	0	0	0	0.1	0	0	0	0	0	0
Total	109	1511.3	169.4	3.8	81.8	14	946.6	8,385.00	598.9	27.8	359.9	48.1	38.5	828.5	142.3
	lb/hr	lb/day	tpy	lb/hr	lb/day	tpy	lb/hr	lb/day	tpy	lb/hr	lb/day	Tpy	lb/hr	lb/day	tpy

Notes:
(1) The emergency generator and fire pump engine will not be operated on the same day. The higher of the two engine emission rates is used for the hourly and daily emission estimtes.

Table K.3-3
Summary of Startup Emissions Data - pounds per hour

Project	Notes	VOC	CO	NOx	SOx	PM10
Crockett Cogeneration	Source Tests					
6/96 avg	(Notes 1 and 7)	54	46	59	-	-
6/97 avg		<1	31	41	-	-
min run		<1	27	9	-	-
max run		59	49	95	-	-
Crockett Cogeneration	FDOC (Notes 2 and 7)	170	385	160	-	-
SF Energy	FDOC (Note 7)	299	437	77	-	-
Sutter	From Westinghouse					
Cold Start		-	838	175	-	-
Hot Start		-	902	170	-	-
Sutter	FDOC (Note 3)					
Cold Start		1.1	838	175	2.7	9.0
Hot Start		1.1	902	170	2.7	9.0
Westinghouse	Note 4					
Cold Start		292	1722	183	3	28
Warm Start		296	1625	221	3	25
Hot Start		442	2142	217	4	33
Bechtel - DEC	From Westinghouse Note 5					
Cold Start		437	3317	168	-	7
Hot Start		520	7343	189	-	8
Used for this project	Note 6					
Hot or Cold Start		16	902	80	1.8	15.9

Notes:
1. Minimum and maximum values are based on the six individual runs that comprise the two sets of tests.
2. Permit conditions have not been carried forward into the permit to operate, and are no longer in effect.
3. Values shown are from the engineering analysis; there are no proposed permit conditions for startup emissions limits in the FDOC.
4. Westinghouse provided data for the total plant (3 turbines) on a lbs/start basis. The above lbs/hr values were calculated assuming a 3-hour starting period per turbine for a cold start; 2 hours for a warm start; and 1 hour for a hot start. Data do not reflect the performance of oxidation catalysts or CO catalysts.
5. Bechtel estimates are 140 minutes for cold start for first engine; 40 minutes for cold start for second and third engines; and 30 minutes for hot start for each engine.
6. SOx and PM10 values are equal to full-load emission rate. NOx and CO values are equivalent to test results for Crockett project with a safety margin added.
7. Information for G.E. gas turbines.

Table K.3-4
Summary of Startup Emissions Data – pounds per start per turbine

Project	Notes	VOC	CO	NOx	SOx	PM10
Crockett Cogeneration	Source Tests					
6/96 avg	(Notes 1 and 7)	71	62	79	-	-
6/97 avg		1	41	54	-	-
min run		<1	36	12	-	-
max run		79	66	127	-	-
Crockett Cogeneration	FDOC (Notes 2 and 7)	340	770	320	-	-
SF Energy	FDOC (Notes 3 and 7)	299	437	77	-	-
Sutter	From					
Cold Start	Westinghouse	-	611	2932	-	-
Hot Start		-	339	1804	-	-
Sutter	Proposed FDOC					
Cold Start	(Note 4)	3	2514	525	8	27
Hot Start		1	902	170	3	9
Westinghouse	Note 5					
Cold Start		875	5167	550	8	83
Warm Start		592	3250	442	5	50
Hot Start		442	2142	217	4	33
Bechtel – DEC	From					
Cold Start	Westinghouse	1019	7740	391	-	17
Hot Start		520	3671	189	-	4
Used for this project	Note 6					
Cold Start		48	2,706	240	5.4	47.7

Notes:
1. Data extrapolated from reported hourly values by ratio of 80/60.
2. Values based on maximum two hours per startup.
3. Values based on maximum one hour per startup.
4. Values based on maximum three hours per cold start, one hour per hot start.
5. Westinghouse provided data for the total plant (3 turbines). Data do not reflect the performance of oxidation catalysts or CO catalysts.
6. Based on maximum 3-hours per startup.
7. Information for G.E. gas turbines.

Table K.3-5
Auxilary Boiler

Rating (MMBtu/hr) (HHV) =	129
Fuel =	natural gas
Exhaust Temperature (F) =	325
Stack Height (ft) =	80
Stack Diameter (ft) =	3
Exhaust Velocity (ft/sec) =	99.87
Daily Operation (hrs/day) =	8
Weekly Operation (days/wk) =	7
Annual Operation (hrs/year) =	3000

	NOx	CO	VOC	SOx	PM10	NH3
Exhaust Concentration (ppm @ 3% O2) =	9	50	10			10
Hourly Emissions (lbs/hr) =	1.40	4.90	0.60	0.09	2.70	0.30
Annual Emissions (tons/yr) =	2.10	7.35	0.90	0.14	4.05	0.45

Table K.3-6
Emergency Engines

Emergency Generator Engine

Manufacturer =	Caterpillar				
Model =	G3516 LE				
Rating (bhp) =	1467				
Fuel =	natural gas				
Fuel Consumption (lbs/hr) =	564				
Exhaust Temperature =	886				
Exhaust Diameter (inches) =	9				
Exhaust Height (ft) =	10				
Exhaust velocity (ft/sec) =	328				
Annual Operation (hrs/year) =	200				
	NOx	CO	VOC	SOx	PM10
Emission factors (g/bhp-hr) =	1.5	2	1.5	0.003	0.16
Hourly Emissions (lbs/hr) =	4.85	6.47	4.85	0.01	0.52
Annual Emissions (tons/yr) =	0.49	0.65	0.49	0	0.05

Fire Pump Engine

Manufacturer =	Caterpillar				
Model =	3406B				
Rating (bhp) =	337				
Fuel =	No. 2 Fuel Oil				
Fuel Consumption (gals/hr) =	18.3				
Exhaust Temperature =	1002				
Exhaust Diameter (inches) =	6				
Exhaust Height (ft) =	10				
Exhaust velocity (ft/sec) =	208				
Annual Operation (hrs/year) =	50				
	NOx	CO	VOC	SOx	PM10
Emission factors (g/bhp-hr) =	5.89	3.55	1	0.17	0.25
Hourly Emissions (lbs/hr) =	4.38	2.64	0.74	0.13	0.19
Annual Emissions (tons/yr) =	0.11	0.07	0.02	0	0

Table K.3-7
Cooling Tower

Number of cells =	14
Fan Stack Diameter (ft) =	37.2
Exhaust Temperature (F) =	72
Exhaust Flow per Cell (acfm) =	1,721,000
Water Flow Rate Per Tower (gal/min)	169,847
Drift Rate, %	0.0005
Drift Per Tower (lb water/hr)	424.96
TDS level (ppmw)	7,800
PM10 emissions(lb/hr)	3.31

Table K.3-8
Calculation of RECLAIM Trading Credits

Hourly Emission Rates per Gas Turbine/HRSG

Gas Turbine Operating Mode	NOx Emissions (lbs/hr)
36F, 100%, w DB, w/o PA	18.18
36F, 100%, w/o DB, w/o PA	13.14
Hot Start	80

Operating Mode	NOx Emissions			SOx Emissions		
	Annual Operation(1) (hrs/yr)	Hourly Emission Rate (lbs/hr)	Annual Emissions (lbs/yr)	Annual Operation(1) (hrs/yr)	Hourly Emission Rate (lbs/hr)	Annual Emissions (lbs/yr)
Gas Turbine 1, 36F, 100%, w DB	5,100	18.18	92,705	5,100	1.77	9,040
Gas Turbine 2, 36F, 100%, w DB	5,100	18.18	92,705	5,100	1.77	9,040
Gas Turbine 1, 36F, 100%, w/o DB, w/o PA	3,295	13.14	43,296	3,295	1.28	4,225
Gas Turbine 2, 36F, 100%, w/o DB, w/o PA	3,295	13.14	43,296	3,295	1.28	4,225
Gas Turbine 1 Startups	365	80	29,200	365	1.28	468
Gas Turbine 2 Startups	365	80	29,200	365	1.28	468
Total =			330,403			27,466
Offset Ratio =			1			1
RTCs Required =			330,403			27,466

Notes:
1. Startup emissions based on 1hr of startup per day, 365 days per year. Emissions based on 5100 hours at cold ambient baseload with duct burner, and 3295 hours at cold ambient without duct burner.

Table K.3-9
Calculation of Emission Offset Credits

Hourly Emission Rates Per Gas Turbine/HRSG

Gas Turbine Operating Mode	CO Emissions (lbs/hr)	VOC Emissions (lbs/hr)	PM10 Emissions (lbs/hr)
36F, 100%, w DB, w/o PA	11.08	6.34	15.97
36F, 100%, w/o DB, w/o PA	8	2.53	11
Hot Start	100	16	11

Worst Case Month

Gas Turbine Operating Mode	Hours(1) Per Month	Hourly Emissions			Monthly Emissions		
		CO Emissions (lbs/hr)	VOC Emissions (lbs/hr)	PM10 Emissions (lbs/hr)	CO Emissions (lbs/month)	VOC Emissions (lbs/month)	PM10 Emissions (lbs/month)
Gas Turbine 1, 36F, 100%, w DB, w/o PA	496	11.08	6.34	15.97	5,495	3,144	7,921
Gas Turbine 2, 36F, 100%, w DB, w/o PA	496	11.08	6.34	15.97	5,495	3,144	7,921
Gas Turbine 1, 36F, 100%, w/o DB, w/o PA	217	8	2.53	11	1,736	548	2,387
Gas Turbine 2, 36F, 100%, w/o DB, w/o PA	217	8	2.53	11	1,736	548	2,387
Gas Turbine 1, Hot Starts	31	100	16	11	3,100	496	341
Gas Turbine 2, Hot Starts	31	100	16	11	3,100	496	341
Total =					20,661	8,376	21,298
Average Daily Emissions (lbs/day)(2) =					689	279	710
Offset Ratio(3) =					1.2	1.2	1.2
ERCs Required (lbs/day) =					826	335	852

Notes:
1. Based on 1 hr per day of startup, 16 hrs per day of 100% with duct burner of 100% without duct burner, and 31 days of operation per month.
2. Based on SCAQMD NSR rule requirement to calculate average daily emission based on 30 days per month.
3. Based on SCAQMD NSR rule offset ratio.

K-4: Modeling Protocol

June 18, 2001

Memo To: Yi-Hui Huang
SCAQMD

Joe Loyer
CEC

From: Tom Andrews

Subject: Modeling Protocol for the Calpine Inland Empire Energy Center

The purpose of this memo is to confirm our recent telephone conversations during which the District and CEC approved the modeling protocol for the Calpine Inland Empire Energy Center. The modeling protocol was sent to the District and the CEC for review and approval on May 4, 2001. The District had the following comments on the modeling protocol:

- The District wanted the protocol revised to clarify that plant-wide modeling means modeling the impacts from the gas turbines/HRSGs but not the cooling tower since the cooling tower is exempt from District permitting.
- The District wanted the protocol revised to clarify that the inversion breakup fumigation modeling was a CEC requirement rather than a District modeling requirement.
- The District requested that since a 1981 meteorological set will be used for the modeling analysis, 1981 rather than 1999 ozone data collected at the Perris monitoring station should be used for ozone limiting.

The CEC had the following comments on the modeling protocol:

- The CEC wanted the protocol revised to show that the coarse receptor grid will extend 10 km in all directions around the project site.
- The CEC wanted the protocol revised to include fine grids placed at locations where the coarse grid modeling shows there will be high and 2nd high impacts.
- The CEC wanted the protocol revised to show that in addition to short-term impacts, the construction modeling will include annual impacts.
- The CEC wanted the protocol revised to show that the receptor grid used for the construction modeling would be the same grid that is used to model normal facility operating impacts.

With the exception of the comment from the CEC regarding additional fine receptor grids, all of the above comments have been incorporated into the enclosed revised modeling protocol. Regarding the comment by the CEC regarding additional fine receptor grids, because of the use of the 10 km coarse receptor grid currently required by the CEC and due to the placement of fine receptor grids at maximum impact locations, it is extremely unlikely that maximum impacts are being missed by the

modeling analysis. Rather than help locate new higher modeled impacts, the additional fine receptor grids would only increase the already long modeling run times for power plant projects. Consequently, the requirement for fine receptor grids at the 2nd high locations is not included in the enclosed revised modeling protocol.

As discussed in the May 4, 2001 version of the modeling protocol, a land use analysis was performed to determine whether to use urban or rural dispersion coefficients. The enclosed revised modeling protocol includes this analysis, which concludes that rural dispersion coefficients will be used for the modeling analysis.

If I have not characterized our telephone conversation correctly, please give me a call.

Enclosure

cc:
John Yee, SCAQMD
Tom Chico, SCAQMD
Barbara McBride, Calpine
Neal Pospisil, Calpine
Jenifer Morris, NJR

Protocol for Evaluating Ambient Air Quality Impacts for the Proposed Inland Empire Energy Center (Revised June 18, 2001)

Introduction

Calpine is planning to construct a new power plant in Perris Valley, Riverside County. The proposed new Inland Empire Energy Center (IEEC) will be comprised of two new GE combustion turbines, each rated at 172 megawatts (MW) (nominal) at ISO conditions, and two heat recovery steam generators (HRSG) equipped with duct burners rated at 650 MMBtu/hr (gross). Incidental equipment will include a cooling tower, natural gas-fired auxiliary boiler, Diesel fire pump engine, and a natural gas-fired emergency generator engine. Natural gas will be the only fuel used at the facility, with the exception of the Diesel fuel used by the Diesel fire pump engine.

The applicant will submit an air quality impact analysis to both the South Coast Air Quality Management District (SCAQMD or District) and the California Energy Commission (CEC). The modeling analysis will include pollutants for which emissions exceed the District's NSR rule (Regulation XIII) evaluation thresholds as well as emissions of those pollutants that exceed the District's PSD Rule (Regulation XVII) thresholds (shown in Table 1). Since the cooling tower is exempt from permitting under the District NSR rule, particulate emissions from the cooling tower will not be included in the modeling performed for purposes of the SCAQMD NSR regulation. The purpose of this document is to establish the procedure for meeting the SCAQMD and CEC air quality modeling requirements for the proposed project.

Although the project area is classified as attainment for SO_2 and NO_2, both are considered nonattainment pollutants under the District NSR regulations, as they are precursors to PM_{10}. In addition, NOx is a precursor to ozone. As a result of the above, both the NSR and PSD regulations apply to the SOx and NOx emissions associated with the project. The NSR rule requires best available control technology (BACT), modeling, and emission offsets for subject emission sources. Similar to the NSR program, Regulation XVII (PSD) also requires BACT and modeling, and it requires preconstruction ambient monitoring for facilities that trigger review. The modeling analysis required by the PSD regulation also includes performing an increment consumption analysis.

Table 1 NSR and PSD Threshold Values		
Requirement	**Pollutant**	Threshold
PSD Regulations		
Major Source Threshold	NOx, CO, SOx, PM_{10}, VOC	25 tons/yr*
Significant Emission Increase Threshold	NOx, CO, SOx, VOC	25 tons/yr
	PM_{10}	15 tons/yr
NSR Regulations		
BACT, Offsets, Modeling Thresholds	NOx, CO, SOx, PM_{10}, VOC	Any Net Emissions Increase from New or Modified Source

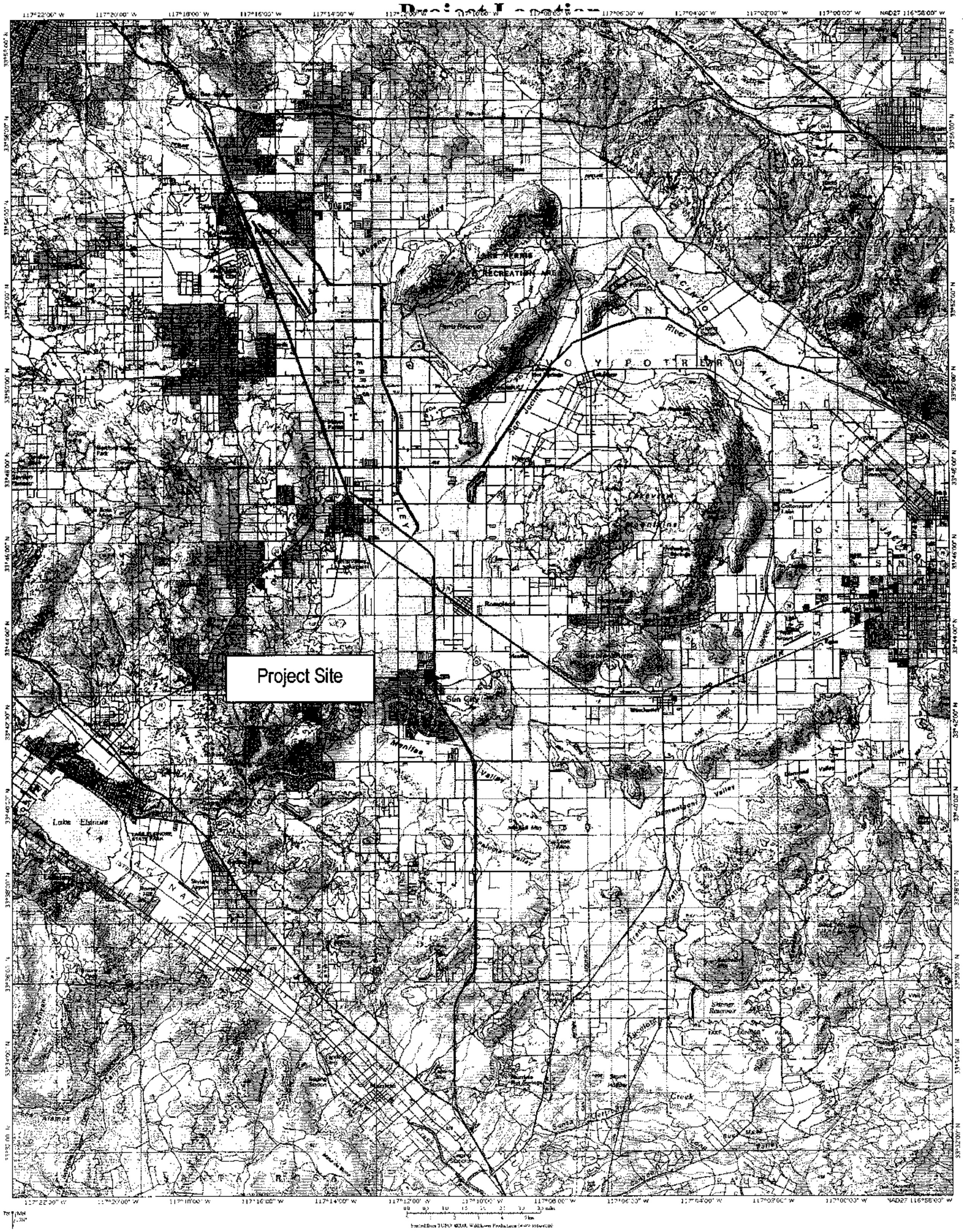
* For those sources included in the 28 source categories specified in SCAQMD Rule 1702, including steam electric generation facilities of more than 250 MMBtu/hr.

The project is expected to result in a net emission increase that will exceed the PSD significance threshold for NOx. In addition, the project is expected to result in emission increases that will trigger review under the District NSR regulations for NOx, CO, PM_{10}, SOx, and VOC. Consequently, for NOx the project will be subject to review under both the PSD and NSR regulations. The project is also expected to require CEC modeling analyses for cumulative impacts and construction impacts. Modeled ambient impacts are expected to be well below the levels at which PSD preconstruction monitoring is required. Consequently, it is not expected that onsite preconstruction monitoring will be required for the project. The results of the modeling analysis will be presented in detail in the CEC application for certification (AFC) and the application for a permit to construct.

Project Location

The proposed project is located at Romoland, a small community in the Perris Valley of Riverside County, about 35 km southeast of Riverside, California. Romoland is about two miles north-northeast of Sun City, which itself sits within a triangle whose vertices are formed by Lakes Elsinore and Perris, and the city of Hemet. The project site lies south of the Burlington Northern and Santa Fe (BNSF) rail line, just southeast of Romoland, where State Highway 74 jogs eastward from Romoland towards the community of Homeland, rather than following the rail line a mile southeast towards the rail siding dubbed Menifee. The southern boundary of the project site is McLaughlin Road. Interstate Highway 215 runs in a north-south direction about one mile west of the site. The UTM coordinates of the site are 3,733.1 kilometers northing, 484.4 kilometers easting (NAD 27, Zone 11), at 33 degrees 44.3 minutes North latitude and 117 degrees 10 minutes West longitude. The nominal site elevation is 1,444 feet above mean sea level.

Figure 1



The project site is flat and level. North-northwest of the site, the Perris Valley extends about 12 miles to the former March Air Force Base, now Southern California International Airport. In all other directions, ranges of hills rise at various distances from the project site. Beginning just 3 miles to the northeast of the site, the Lakeview Mountains achieve a maximum elevation of about 2,600 feet. Three miles east of the project site, the Double Buttes reach 2,575 feet, and about 2 miles south of the site the hills just east of Sun City reach 2,140 feet. About 3 miles southwest of the site, hills reach 2,250 feet, and 8 miles west of the site, Steele Peak reaches about 2,530 feet. The nearest residential area lies within 200 yards of the project site's north boundary, and numerous other residential areas lie within a 3-mile radius of the site.

The overall climate at the project site is dominated by the semi-permanent Pacific High pressure system over the eastern Pacific Ocean. The Pacific High is centered between the 140°W and 150°W meridians, and oscillates seasonally in a north-south direction. Its position governs California's weather. In the summer, the high moves to its northernmost position, which results in a strong subsidence inversion and clear skies inland; along the coast, the weather is dominated by coastal stratus and fog caused by the cooler and more homogeneous ocean surface temperature. Almost no precipitation occurs during summer months, because migrating storm systems are blocked by the Pacific High.

In the fall, the Pacific High weakens and shifts southwestward toward Hawaii, allowing storms originating in the Gulf of Alaska to reach California. The average annual rainfall at the project site is approximately 12 inches; at Lake Elsinore, about 10 miles southwest of the project site, the annual precipitation is 12.5 inches, of which approximately 85% falls between November and March. Between storms, skies are fair, winds are light, and temperatures are moderate. (Climates of the States – California, U.S. Department of Commerce, Weather Bureau, 1959)

Inland areas, where the marine influence is weak or nonexistent, often experience strong ground-based inversions, which inhibit mixing and can result in high pollutant concentrations. Smith, et al (1984), reported that at San Bernardino (the site closest to the project for which data are available) 50th percentile morning mixing heights for the period 1979-80 were 70-90 meters (approximately 230-295 feet) in fall and winter, 255 meters (approximately 835 feet) in spring, and 150 meters (approximately 490 feet) in summer. Such low mixing heights trap pollutants. The 50th percentile afternoon mixing heights, however, were unlimited in all seasons, providing generally favorable conditions for dispersion of pollutants.

Meteorological Data and Site Representation

EPA defines the term "on-site data" to mean data that would be representative of atmospheric dispersion conditions at the source and at locations where the source may have a significant impact on air quality. Specifically, the meteorological data requirement originates in the Clean Air Act at Section 165(e)(1), which requires an analysis "of the

ambient air quality at the proposed site and in areas which may be affected by emissions from such facility for each pollutant subject to regulation under [the Act] which will be emitted from such facility." This requirement and EPA's guidance on the use of on-site monitoring data are also outlined in the On-Site Meteorological Program Guidance for Regulatory Modeling Applications (1987). The representativeness of meteorological data is dependent upon (1) the

proximity of the meteorological monitoring site to the area under consideration; (2) the complexity of the topography of the area; (3) the exposure of the meteorological sensors; and (4) the period of time during which the data are collected. As discussed below, we believe that meteorological data collected at the Riverside site approximately 32 km from the project site would satisfy the definition of on-site data. While there is only one year of South Coast AQMD processed/approved data for the Riverside site, multi-year data sets from the Riverside and other monitoring sites in the area indicate a predominant and consistent east-west wind pattern that is reproduced in the 1981 Riverside data set. Furthermore, as there are no nearby (localized) terrain features that would influence the project site, no site-specific bias exists that would limit the use of the Riverside data set for the proposed IEEC project. The same large-scale topographic features that influence the Riverside meteorological site also influence the proposed project site in the same manner. The dominant wind patterns in the South Coast Air Basin are shown in Figure 2.

There are several meteorological stations where surface wind data (wind speed and wind direction) and upper air data have been collected, which can be used to characterize the general project area. Data for the year 1981 have been made available by SCAQMD at its website (http://www.aqmd.gov/metdata/index.html). The locations of these monitoring sites are shown in Figure 3. The station ID numbers and UTM coordinates for these sites are listed below.

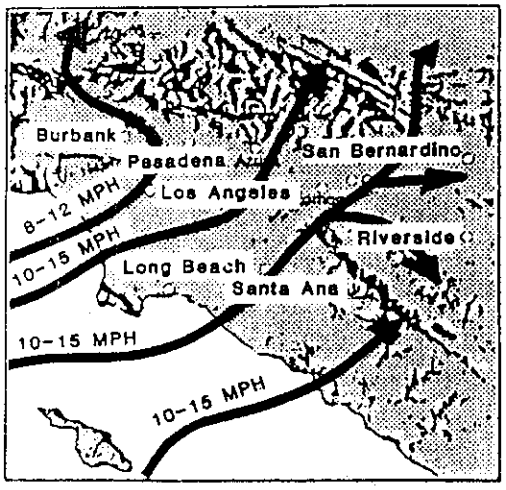
Station Name	ID	UTM Easting (km)	UTM Northing (km)	Distance From Site (km)
Riverside(Surface)	54139	464.8	3758.6	32.2
Banning (Surface)	54144	510.5	3754.5	33.8
Redlands (Surface)	54161	486.2	3769.4	36.4
Norco (Surface)	54167	446.8	3749.0	40.8

The Riverside meteorological monitoring station is the closest station to the proposed project site, at 32 kilometers towards the west-northwest.

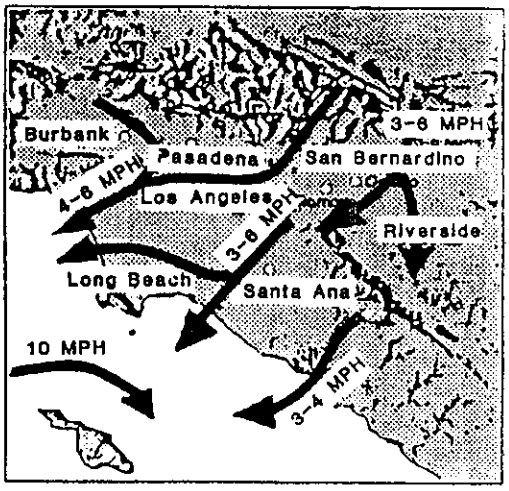
Diurnal wind regimes markedly affect the horizontal transport of air in the project area. Wind patterns in an area are greatly influenced by the large-scale terrain features. Given the lack of nearby large-scale terrain features in the project area, the meteorological data measured at Riverside are considered representative of the general meteorological conditions in the project area, and can correctly characterize the important atmospheric dispersion conditions at the project site.

Figure 2

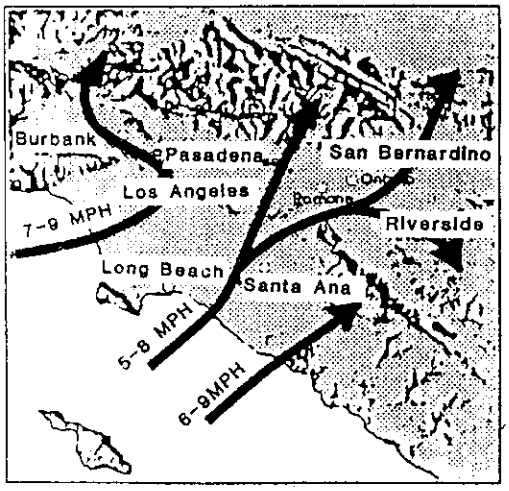
Dominant Wind Patterns in the Basin



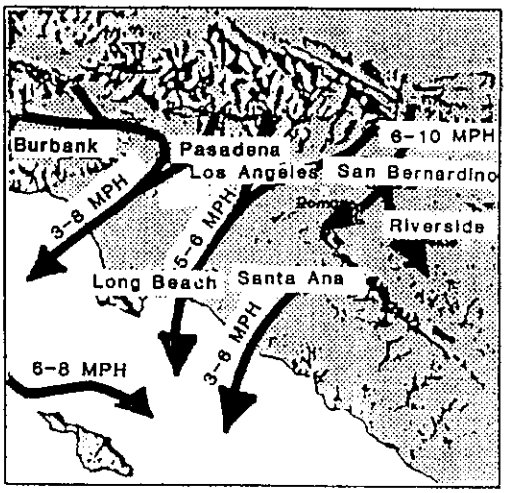
Typical Summer Daytime Ocean Winds
(noon to 7:00 pm)



Typical Summer Night Drainage Winds
(midnight to 5:00 am)



Typical Winter Daytime Ocean Winds
(noon to 5:00 pm)

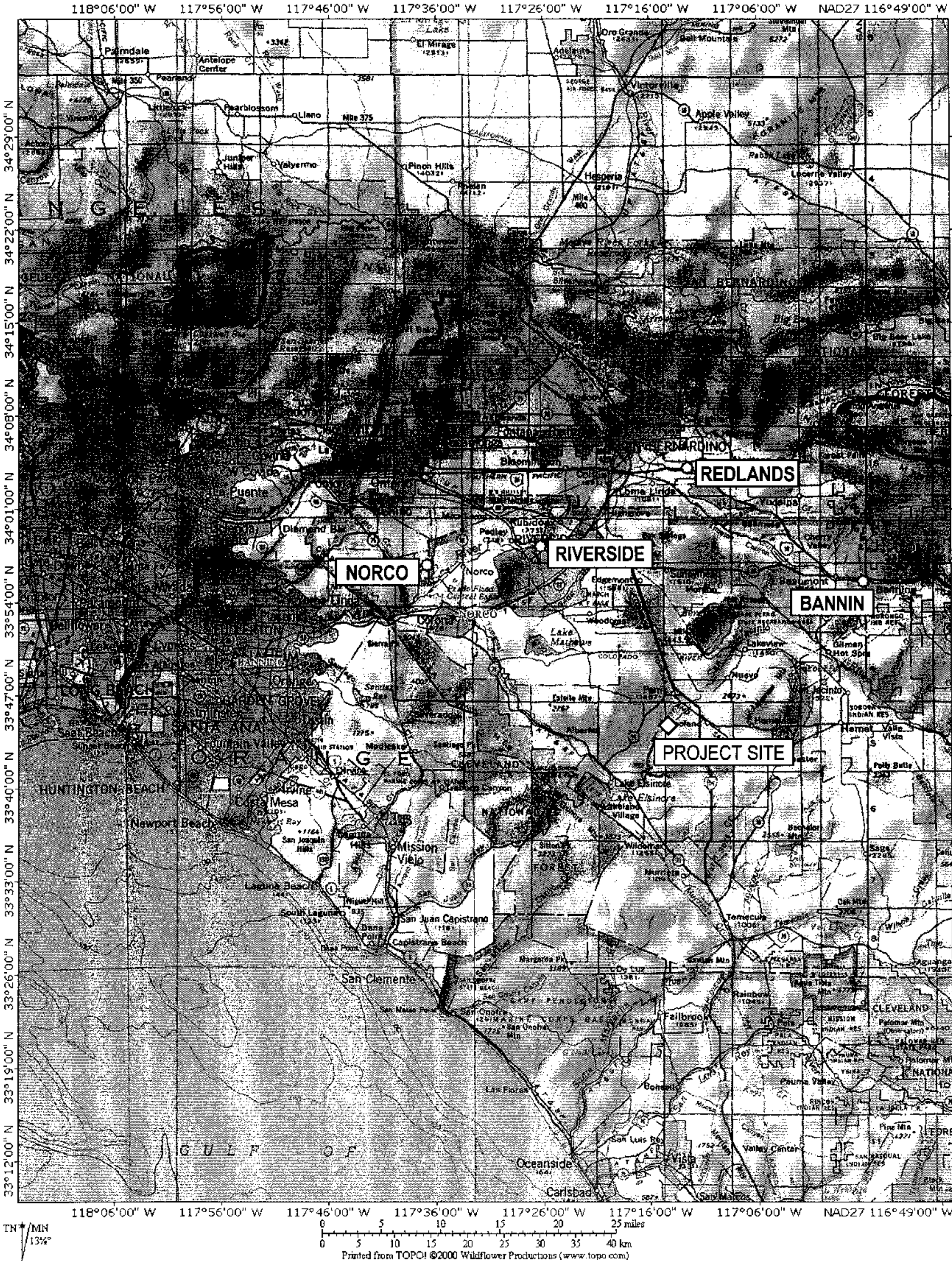


Typical Winter Night Drainage Winds
(midnight to 7:00 am)

Dominant Wind Patterns
in the Basin
(Reference: SCAQMD Final CEQA Air Quality Handbook, April 1993)

DRAWN:	DATE: 11/17/92	PROJECT NUMBER:
APPV'D:	REVISED:	DRAWING NUMBER:

Figure 3
Meteorological Stations in the Vicinity of the Project Location



Representativeness has been defined in the document "Workshop on the Representativeness of Meteorological Observations" (Nappo et. al., 1982) as "the extent to which a set of measurements taken in a space-time domain reflects the actual conditions in the same or different space-time domain taken on a scale appropriate for a specific application." Judgments of representativeness should be made only when sites are climatologically similar, as the Riverside and project site locations clearly are. Representativeness has also been defined in the PSD Monitoring Guideline as data that characterize the air quality for the general area in which the proposed project would be constructed and operated.

In determining the representativeness of the Riverside meteorological data set for use at the project site, the following considerations were addressed:

X *Aspect ratio of terrain, which is the ratio of the height of terrain to the width of the terrain at its base* - The ratio of terrain heights to base widths is constant for the terrain surrounding the project site and the Riverside meteorological site. Any larger-scale upslope/downslope flow from the larger terrain features surrounding the project site would be identified on the Riverside meteorological data set and would be representative of the IEEC project site.

X *Slope of terrain* - The slope of the terrain in the project area is similar to the slope of terrain in the vicinity of the meteorological site. The surface roughness of the terrain in the area is also similar.

X *Ratio of terrain height to stack/plume height* - Final plume height (stack height plus plume rise) was calculated for D stability, 3 meter/second wind speed at 754 feet (estimated 250-foot stack height, 504-foot plume rise) above the stack base. At this final height, terrain effects on plume dispersion would be similar at locations throughout the regional area, and the plume would disperse in an identical manner to the dispersion conditions monitored at the Riverside site.

X *Correlation of terrain features to prevailing meteorological conditions* - The orientation of terrain in the region is identical and correlates well with the prevailing wind field in the Inland Region. Thus, wind flow at the Riverside site would be similar to that at the project site. No local terrain features exist that would distort the local wind field.

It is our assessment that the meteorological data collected at Riverside would be identical to data collected at the project site. No terrain or other steering mechanisms exist that would have an effect on the meteorology at the project site. The surface roughness, height, and length of the large-scale terrain features are consistent throughout the area, and play a large role in the effect on the horizontal and vertical wind patterns. There is no slope or topographical aspect in the vicinity of the site that would reasonably affect the wind direction or speed. The final plume height from the proposed project will impact the highest terrain for most meteorological conditions, regardless of location.

Since the overall purpose of gathering meteorological data is to collect measurements that are representative of the general state of the atmosphere in the area of interest, we believe that the Riverside meteorological data set would satisfy this requirement for the IEEC project site. This data

set would also satisfy the definition of on-site data, as defined in the PSD Monitoring Guidelines (1990) and the On-site Meteorological Program Guidance for Regulatory Modeling Applications (1987).

Preparation of the Meteorological Data Set

Meteorological data collected at Riverside in 1981, approximately 32 km northwest of the project site, are proposed to be used for the modeling of the IEEC project. The SCAQMD has provided the data in a preprocessed form that can be used directly in the Industrial Source Complex—Short-Term, Version 3 (ISCST3) model. As the data have been preprocessed by the SCAQMD, no modifications to this data set are proposed. Mixing heights were provided in the SCAQMD data set. SCAQMD staff also coded any missing data as calm.

Ambient Air Quality Models

The ambient air quality modeling analysis will be performed in several steps. The first step will be to determine which combination of potential turbine operating loads and ambient conditions will produce the highest modeled impacts. This worst-case operating scenario for the turbines will be determined using the ISCST3 model and the 1981 Riverside meteorological data to model ambient impacts of NOx, SOx, PM_{10}, and CO under all of the potential operating cases.

Operating loads will range from minimum load to full load. Ambient conditions for evaluating turbine operations will range from minimum to maximum expected ambient temperatures. The Building Profile Input Program (BPIP) will be used to determine direction-specific building dimensions so that building downwash effects will be evaluated. Based on the above screening analysis, the turbine parameters, operating loads, and ambient temperatures will be selected for the refined modeling analysis. A Good Engineering Practice (GEP) analysis will also be performed for each stack.

The second step of the ambient air quality modeling analysis will be the refined modeling analysis that will evaluate the maximum modeled impacts from the proposed project, including the turbines (operating in the worst-case scenario as described above), the auxiliary boiler, fire pump, and emergency generator engines. Maximum emission rates will be identified for short-term and annual time periods for modeling (including turbine startups and shutdowns, as appropriate).

The SCREEN3 model will be used to evaluate fumigation impacts for all short-term averaging periods (24 hours or less). The methodology in EPA 454/R-92-019 (Screening Procedures for Estimating the Air Quality Impact of Stationary Sources, Revised) will be followed for this analysis.

If maximum impacts are calculated in intermediate or complex terrain, then the CTSCREEN dispersion model may be used to assess these impacts if they violate standards or increments.

All modeling results will be compared to the following:

- PSD significance levels for NOx;
- PSD preconstruction monitoring trigger level for NOx;
- PSD NO_2 increments;

- $ Regulation XIII NSR significance levels for CO and PM_{10} (as discussed below, the Regulation XXX NO_2 significance level does not apply to the proposed project);
- $ State and federal ambient air quality standards.

Receptor Grids

The current plan for both the initial (screening) and final refined modeling analyses, using ISCST3, is to place receptors within 10 km of the project location in all directions. The spacing of the receptors will be 180 meters. A refined grid of receptors spaced at 30 meters will be used in areas where the coarse grid analyses indicate modeled maxima will be located. Receptors will be placed at 25 meters along the facility fenceline. Digital Elevation Model (DEM) data will be used to select the receptor elevations. All receptor grids will be expanded as necessary to obtain the maximum impacts.

Model Options

The ISCST3 model allows the selection of a number of options that affect model output. The regulatory default options will be used, as listed below.

- $ Final plume rise
- $ Buoyancy-induced dispersion
- $ Stack tip downwash
- $ Rural dispersion coefficients (based on results of Auer procedure discussed below)
- $ Calms processing off (no calms)
- $ Default wind profile exponents (based on rural dispersion)
- $ Default vertical temperature gradients

An analysis was performed to determine whether to use rural or urban dispersion parameters for the modeling analysis for the proposed project. This analysis used the procedures of Auer (1976) and includes drawing a 3 km radius around the project site. Within this region, land use is classified as either rural or urban. The rural land use classifications include the following:

- A1 – metropolitan natural (golf courses, campuses, cemeteries, etc.)
- A2 - Agricultural rural
- A3 - Undeveloped, uncultivated wasteland
- A4 - Undeveloped rural
- A5 - water surfaces (rivers, lakes, etc.)
- R1 - Common residential (single family)
- R4 - Estate residential (large homes)

As shown by the land use map included as Attachment 1, over 50 percent of the land use within 3 km of the project site is identified as rural. Therefore, rural dispersion coefficients will be used for the modeling analysis.

Ambient Air Quality Impact Analysis

In evaluating the impacts of the proposed project on ambient air quality, we will model the ambient impacts of the project, add those impacts to background concentrations, and compare the results to the state and federal ambient standards for SO_2, NO_2, PM_{10}, and CO. Ambient concentrations of ozone and PM_{10} are recorded at a monitoring station in Perris, about four to five miles northwest of the project site. Nitrogen dioxide has been recorded since 1994 at Lake Elsinore, about ten miles southwest of the project site. Ambient levels of carbon monoxide are monitored at a station on Magnolia Street in Riverside, about 20 miles northwest of the project site. Sulfur dioxide levels are recorded at a monitoring station on Rubidoux Avenue in Riverside. All of these stations are operated by the District.

The Ozone Limiting Method (OLM), implemented in the ISC3-OLM model, will be used to convert hourly modeled NOx concentrations to NO_2, as appropriate. One year of 1981 ozone data from the Perris monitoring site will be used in conjunction with the 1981 Riverside met data to make the correction. It is likely that ozone concentrations are high enough in this part of the SCAQMD region that virtually complete conversion of NOx to NO_2 will usually occur, at least in the daytime.

Background concentrations of SO_2 and PM_{10} will be the highest values monitored at the SCAQMD's Rubidoux Avenue and Perris monitoring stations, respectively, during the last three years (1997-99). Background concentrations of CO and NO_2 will be the highest values monitored at the SCAQMD's Magnolia Street and Lake Elsinore monitoring stations, respectively, during the last three years (1997-99).

In accordance with EPA guidance (40 CFR part 51, Appendix W, Sections 11.2.3.2 and 11.2.3.3), the highest modeled concentration will be used to demonstrate compliance with annual standards while the highest second-highest modeled concentrations will be used to demonstrate compliance with standards based on averaging periods of 24 hours or less.

Increments Analysis

Increments are the maximum allowable increases in concentration that are allowed to occur above baseline concentrations for each pollutant for which an increment has been established: currently NO_2, SO_2, and PM_{10}. The baseline concentrations are defined for each pollutant and averaging time, and are the ambient concentrations of each pollutant existing at the time that the first complete PSD application affecting the area is submitted. Applicable ambient significance levels and increments for SO_2, NO_2, and PM_{10} are shown in Table 2.

Table 2
PSD Ambient Impact Significance Levels and Increments (ug/m^3)

Pollutant	Averaging Time	Significance Level	Class I Increment	Class II Increment
SO_2	Annual	1	2	20
	24-hour	5	5	1
	3-hour	25	25	512
PM_{10}	Annual	1	5	17
	24-hour	5	0	30
NO_2	Annual	1	2.5	25

Federal and SCAQMD PSD regulations require that an increment analysis be performed only for pollutants with ambient impacts exceeding the significance levels shown in Table 2. In the case of the proposed project, a PSD air quality impact analysis is expected to be required only for NO_2. If preliminary modeling shows that the NO_2 significance level is exceeded, a supplemental protocol will be provided to the District for any required increments analysis.

PSD Preconstruction Monitoring Requirements

Regulation XVII (PSD), Rule 1703, section (a)(D) requires an applicant's air quality analysis to contain preconstruction ambient air quality monitoring data for purposes of establishing background pollutant concentrations in the impact area of the proposed facility. However, according to Rule 1703 (a)(D), an applicant may be exempted from the requirement for preconstruction monitoring and may, at the Executive Officer's discretion, rely on existing continuous air quality monitoring data collected at District-approved monitoring stations to satisfy the requirement for preconstruction monitoring.

As discussed earlier, modeled ambient concentrations of pollutants from the modified facility are expected to be well below the preconstruction monitoring thresholds shown in Table 3.

Table 3 **PSD Preconstruction Monitoring Thresholds**	
Pollutant/Averaging Time	Thresholds (ug/m^3)
CO (8-hour average)	575
PM_{10} (24-hour average)	10
NO_2 (annual average)	14
SO_2 (24-hour average)	13

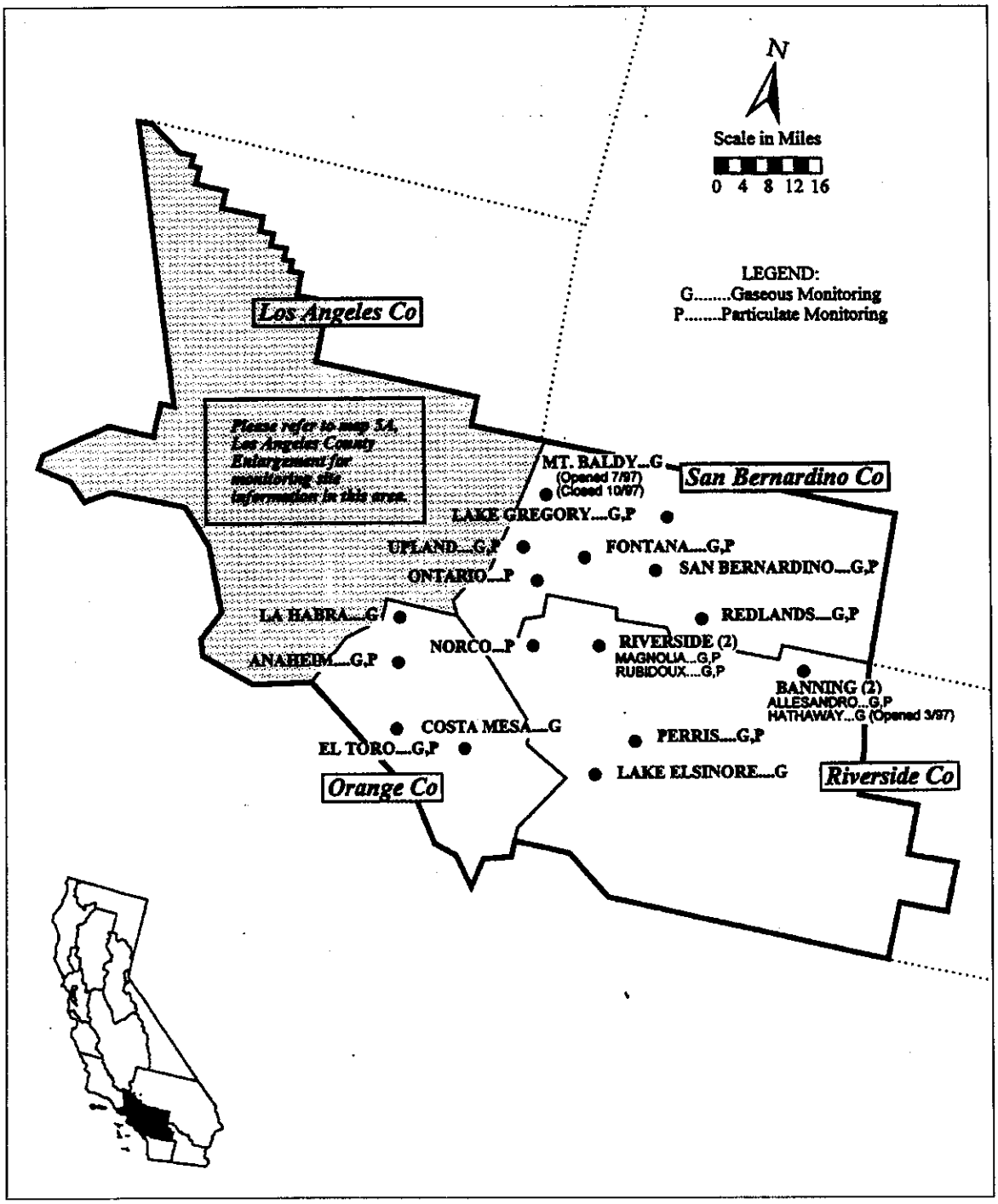
If one or more of these *de minimis* levels is exceeded in the final modeling analysis, the applicant proposes to use data from the following monitoring stations to meet this requirement.

Site ID	CARB#	Pollutants
Lake Elsinore	3300159	NO_2
Perris	3300149	Ozone, PM_{10}
Riverside – Magnolia	3300146	CO
Riverside – Rubidoux	3300144	SO_2

Figure 4 shows the approximate locations of current air quality monitoring sites in the project area.

Figure 4

Air Monitoring Sites



NSR/RECLAIM Ambient Impact Significance Levels

The SCAQMD NSR/RECLAIM regulations require that a modeling analysis be performed to show that emission increases will not have a significant impact on ambient air quality. Table 4 summarizes the SCAQMD NSR/RECLAIM significance levels per Regulation XIII, Rule 1303 and Regulation XX, Rule 2005. On March 20, 2001, the SCAQMD approved rule changes that clarified the modeling requirements under the NSR/RECLAIM regulations. Under the revised regulations, the following significance levels only apply if the project area exceeds a state or national ambient air quality standard for the pollutant in question. Since the IEEC project area is classified as an attainment area for the state and national NO_2 standards, the NO_2 significance levels shown in the following table do not apply to the IEEC project. Because the IEEC project area is classified as a nonattainment area for the national/state PM_{10} standards and the national CO standards, the CO and PM_{10} significance levels in the following table apply to the project. The modeling analysis for the proposed project will compare maximum project impacts with the following PM_{10} and CO NSR significance levels.

Table 4
SCAQMD NSR/RECLAIM Significant Impact Levels

Pollutant	Averaging Time	Significance Levels (ug/m^3)
RECLAIM Regulations		
NO_2	Annual	1
	1-hour	20
NSR Regulations		
CO	8-hour	500
	1-hour	1,100
PM_{10}	Annual*	1
	24-hour	2.5

* geometric mean value

Additional Impacts Analysis

For those pollutants emitted in significant amounts, the applicant will prepare an additional impacts analysis for growth, soils and vegetation, and visibility. Visibility impacts will be evaluated based on the criteria in Regulation XIII, Rule 1303, Appendix B.

Impacts on Class I Areas

As required by Regulations XIII and XVII, the applicant will prepare an analysis to determine whether the proposed project will result in emissions that would have an adverse impact on air quality related values, including visibility and regional haze, in Class I areas. An analysis will be conducted to determine the proposed project's impact on visibility in the following Class I areas that are within 100 km of the project site:

- Aqua Tibia Wilderness Area
- Cucamonga Wilderness Area
- San Jacinto Wilderness Area
- San Gabriel Wilderness Area
- San Gorgonio Wilderness Area
- Joshua Tree National Park

Regulation XVII also requires a demonstration that emissions from a project located within 10 km (6.2 miles) of a Class I area will not cause or contribute to the exceedance of any national ambient air quality standard or any PSD increment there. None of the above Class I areas are within 10 km of the project site.

The appropriate federal land managers (FLMs) will be contacted to obtain information on the procedures required to calculate impacts to Air Quality Related Values (AQRVs) and to determine the appropriate Levels of Acceptable Change (LAC). Impacts to visibility and regional haze at the Class I areas will be determined as well.

Rule 1401 Analysis

A screening level health risk assessment will be performed to determine the expected impact of the toxic air pollutant emissions for the new equipment. The ISCST3 model will be used to determine the maximum toxic air pollutant impacts at each receptor. The same coarse and fine receptors grids discussed above for the criteria pollutant modeling will be used for the toxic air pollutant modeling analysis. After the modeled concentrations are determined, the ARB/OEHHA Health Risk Assessment Program will be used to evaluate the carcinogenic, chronic, and acute health risks through inhalation and non-inhalation pathways. The results of the health risk assessment will be summarized and compared to the Rule 1401 health risk thresholds.

Additional Analyses Required by the CEC

The CEC may also require analyses of inversion breakup fumigation impacts, cumulative air quality impacts, construction impacts, and short-term impacts during turbine startups and during turbine commissioning. The procedures to be used in evaluating construction impacts are discussed below. If required, a separate protocol will be prepared for the cumulative impacts analysis.

Construction Impacts Analysis

The potential ambient impacts from air pollutant emissions during the construction of the IEEC project will be evaluated by air quality modeling that will account for the construction site location and the surrounding topography; the sources of emissions during construction, including vehicle and equipment exhaust emissions; and fugitive dust.

Site Description - The dispersion modeling analysis will include a description of the physical setting of the facility and surrounding terrain. A map showing the plant location, fence lines, and model receptors will be included, as well as a plot plan of the plant site indicating heights of nearby structures above a common reference point.

Types of Emission Sources - Construction of the proposed IEEC project will be divided into three main construction phases: (1) site preparation; (2) construction of foundations; and (3) installation and assembly of mechanical and electrical equipment. The construction impacts analysis will include a schedule for construction operation activities. Site preparation is expected to include site excavation, excavation of footings and foundations, and backfilling operations. After site preparation is finished, the construction of the foundations will begin. Once the foundations are finished, the installation and assembly of the mechanical and electrical equipment will begin.

Fugitive dust emissions from the construction of the project result from (1) dust entrained during excavation and grading at the construction site; (2) dust entrained during onsite travel on paved and unpaved roads and across the unpaved construction site; (3) dust entrained during aggregate and soil loading and unloading operations; (4) dust entrained from raw material transfer to and from material stockpiles; and (5) wind erosion of areas disturbed during construction activities. Heavy equipment exhaust emissions result from (1) the heavy equipment used for excavation, grading, and construction of onsite structures; (2) a water truck used to control construction dust emissions; (3) Diesel welding machines, gasoline-powered generators, air compressors, and water pumps; and (4) gasoline-powered pickup trucks and Diesel flatbed trucks used onsite to transport workers and materials around the construction site. Diesel and gasoline truck exhaust emissions will result from transport of mechanical and electrical equipment to the project site and transport of rubble and debris from the site to an appropriate landfill. Diesel exhaust emissions may also result from transport of raw materials to and from stockpiles.

Emissions from a worst-case day will be calculated for each of the three main construction phases and only the phase with the highest emissions will be used to model short term impacts (24 hours or less). The annual average equipment schedule (equipment mix and operating levels) will be used to calculate annual average emission levels during the construction phase of the project. These annual emissions levels will be used to model annual average construction impacts.

Existing Ambient Levels – The same ambient NO_2, SO_2, CO, and PM_{10} air quality monitoring stations discussed above for the modeling analysis of project operating impacts will also be used in the analysis of project construction impacts.
Model Type - The ISCST3 model will be used to estimate ambient impacts from construction emissions. The modeling options and meteorological data described above will be used for the modeling analysis.

The construction site will be represented as an area source in the modeling analysis. Emissions will be divided into two categories: exhaust emissions and dust emissions. For exhaust emissions, a plume height of 4.6 meters (15 feet) will be used. Plume height refers to the distance measured from ground level to the center line of the emissions plume. For dust emissions, a release height of two meters will be used due to the ambient plume temperatures and negligible plume velocities.

For the construction modeling analysis, the receptor grid discussed above to model normal plant operation will be used for the construction modeling analysis.

K-5: Modeling Analysis

Table K.5-1
Emission Rates and Stack Parameters for Screening Level Modeling (all emissions/operating data for a single new gas turbine/HRSG)

Gas Turbine/HRSG Operating Case	Stack Height (m)	Ambient Temp. (deg. F)	Stack Diam. (m)	Exhaust Temp. (deg. K)	Exhaust Flow (m3/s)	Exhaust Velocity (m/s)	Emission Rates, g/s NOx (short term)	NOx (annual)	SO2	CO	PM10
Case 1 - 97F, 100% load, DB off, PA off	59.44	97	5.639	399.83	464.23	18.59	1.92	1.53	0.15	2.80	1.39
Case 2 - 97F, 100% load, DB on, PA on	59.44	97	5.639	335.94	411.36	16.47	2.74	2.19	0.21	4.00	2.01
Case 3 - 97F, 60% load, DB off, PA off	59.44	97	5.639	338.56	293.71	11.76	1.30	1.04	0.10	1.90	1.39
Case 4 - 36F, 100% load, DB off, PA off	59.44	36	5.639	346.28	438.64	17.56	2.07	1.66	0.16	3.02	1.39
Case 5 - 36F, 100% load, DB on, PA off	59.44	36	5.639	331.00	425.61	17.04	2.86	2.29	0.22	4.19	2.01
Case 6 - 36F, 60% load, DB off, PA off	59.44	36	5.639	338.56	311.91	12.49	1.49	1.19	0.12	2.17	1.39
Case 7 - 61F, 100% load, DB off, PA off	59.44	61	5.639	361.11	443.57	17.76	2.03	1.62	0.16	2.96	1.39

Table K.5-2
Results of Gas Turbine/HRSG Screening Analysis (combined impacts for two gas turbines/HRSGs)

	Modeling Impacts (ug/m3)										
Gas Turbine/HRSG Operating Case	Ambient Temp. (deg. F)	NO2 1-hr	NO2 Annual	SO2 1-hr	SO2 3-hr	SO2 24-hr	SO2 Annual	CO 1-hr	CO 8-hr	PM10 24-hr	PM10 Annual
Case 1 - 97F, 100% load, DB off, PA off	97	16.96	0.718	1.333	1.283	0.421	0.07	24.77	14.67	3.876	0.648
Case 2 - 97F, 100% load, DB on, PA on	97	34.52	1.295	2.692	2.402	0.788	0.126	50.4	27.34	7.423	1.191
Case 3 - 97F, 60% load, DB off, PA off	97	17.88	0.66	1.395	1.281	0.42	0.064	26.1	14.53	5.728	0.877
Case 4 - 36F, 100% load, DB off, PA off	36	22.89	0.93	1.790	1.658	0.543	0.091	33.5	18.96	4.661	0.779
Case 5 - 36F, 100% load, DB on, PA off	36	38.17	1.374	2.979	2.571	0.844	0.134	55.86	29.41	7.607	1.208
Case 6 - 36F, 60% load, DB off, PA off	36	20.16	0.746	1.578	1.421	0.467	0.073	29.49	16.17	5.561	0.867
Case 7 - 61F, 100% load, DB off, PA off	61	20.4	0.865	1.600	1.544	0.505	0.085	29.8	17.57	4.409	0.738

Table K.5-3
Emission Rates and Stack Parameters for Refined Modeling

	Stack Height m	Stack Diam m	Temp, deg K	Exhaust Flow, m3/s	Exhaust Velocity, m/s	Emission Rates, g/s NOx	SO2	CO	PM10	Stack Diam , ft	Exh Temp, Deg F	Exh Flow Rate, ft3/m	Exhaust Velocity, ft/s	Emission Rates, lb/hr NOx	SO2	CO	PM10
Averaging Period: One hour NOx																	
Gas Turbine 1/HRSG	59.44	5.639	331.00	425.61	17.04	2.861	n/a	n/a	n/a	18.50	136	901,811	55.92	22.71	n/a	n/a	n/a
Gas Turbine 2/HRSG	59.44	5.639	331.00	425.61	17.04	2.861	n/a	n/a	n/a	18.50	136	901,811	55.92	22.71	n/a	n/a	n/a
Auxilary Boiler	24.38	0.914	435.78	19.99	30.44	0.176	n/a	n/a	n/a	3.00	325	42,355	99.87	1.40	n/a	n/a	n/a
Emergency Generator	10.67	0.229	747.44	4.10	99.97	0.611	n/a	n/a	n/a	0.75	886	8,694	328.00	4.85	n/a	n/a	n/a
Fire Pump	6.10	0.152	811.89	1.16	63.44	0.000	n/a	n/a	n/a	0.50	1002	2,452	208.13	n/a	n/a	n/a	n/a
Cooling Tower	17.98	11.351	295.22	812.22	8.03	n/a	n/a	n/a	n/a	37.24	72	1,721,000	26.33	n/a	n/a	n/a	n/a
Averaging Period: One hour CO and SOx																	
Gas Turbine 1/HRSG	59.44	5.639	331.00	425.61	17.04	n/a	0.223	4.187	n/a	18.50	136	901,811	55.92	n/a	1.77	33.23	n/a
Gas Turbine 2/HRSG	59.44	5.639	331.00	425.61	17.04	n/a	0.223	4.187	n/a	18.50	136	901,811	55.92	n/a	1.77	33.23	n/a
Auxilary Boiler	24.38	0.914	435.78	19.99	30.44	n/a	0.011	0.617	n/a	3.00	325	42,355	99.87	n/a	0.09	4.900	n/a
Emergency Generator	10.67	0.229	747.44	4.10	99.97	n/a	0.000	0.815	n/a	0.75	886	8,694	328.00	n/a	n/a	6.468	n/a
Fire Pump	6.10	0.152	811.89	1.16	63.44	n/a	0.016	0.000	n/a	0.50	1002	2,452	208.13	n/a	0.126	n/a	n/a
Cooling Tower	17.98	11.351	295.22	812.22	8.03	n/a	n/a	n/a	n/a	37.24	72	1,721,000	26.33	n/a	n/a	n/a	n/a
Averaging Period: Three hours SOx																	
Gas Turbine 1/HRSG	59.44	5.639	331.00	425.61	17.04	n/a	0.223	n/a	n/a	18.50	136	901,811	55.92	n/a	1.77	n/a	n/a
Gas Turbine 2/HRSG	59.44	5.639	331.00	425.61	17.04	n/a	0.223	n/a	n/a	18.50	136	901,811	55.92	n/a	1.77	n/a	n/a
Auxilary Boiler	24.38	0.914	435.78	19.99	30.44	n/a	0.011	n/a	n/a	3.00	325	42,355	99.87	n/a	0.09	n/a	n/a
Emergency Generator	10.67	0.229	747.44	4.10	99.97	n/a	0.000	n/a	n/a	0.75	886	8,694	328.00	n/a	0.00	n/a	n/a
Fire Pump	6.10	0.152	811.89	1.16	63.44	n/a	0.000	n/a	n/a	0.50	1002	2,452	208.13	n/a	n/a	n/a	n/a
Cooling Tower	17.98	11.351	295.22	812.22	8.03	n/a	n/a	n/a	n/a	37.24	72	1,721,000	26.33	n/a	n/a	n/a	n/a

Table K.5-3 (cont.)
Emission Rates and Stack Parameters for Refined Modeling

	Stack Height m	Stack Diam m	Temp, deg K	Exhaust Flow, m3/s	Exhaust Velocity, m/s	Emission Rates, g/s NOx	SO2	CO	PM10	Stack Diam , ft	Exh Temp, Deg F	Exh Flow Rate, ft3/m	Exhaust Velocity, ft/s	Emission Rates, lb/hr NOx	SO2	CO	PM10
Averaging Period: Eight hours CO																	
Gas Turbine 1/HRSG	59.44	5.639	331.00	425.61	17.04	n/a	n/a	58.920	n/a	18.50	136	901,811	55.92	n/a	n/a	467.62	n/a
Gas Turbine 2/HRSG	59.44	5.639	331.00	425.61	17.04	n/a	n/a	58.920	n/a	18.50	136	901,811	55.92	n/a	n/a	467.62	n/a
Auxilary Boiler	24.38	0.914	435.78	19.99	30.44	n/a	n/a	0.617	n/a	3.00	325	42,355	99.87	n/a	n/a	4.900	n/a
Emergency Generator	10.67	0.229	747.44	4.10	99.97	n/a	n/a	0.102	n/a	0.75	886	8,694	328.00	n/a	n/a	0.809	n/a
Fire Pump	6.10	0.152	811.89	1.16	63.44	n/a	n/a	0.000	n/a	0.50	1002	2,452	208.13	n/a	n/a	n/a	n/a
Cooling Tower	17.98	11.351	295.22	812.22	8.03	n/a	n/a	n/a	n/a	37.24	72.00	1,721,000	26.33	n/a	n/a	n/a	n/a
Averaging Period: 24-hour SOx																	
Gas Turbine 1/HRSG	59.44	5.639	331.00	425.61	17.04	n/a	0.223	n/a	n/a	18.50	136	901,811	55.92	n/a	1.77	n/a	n/a
Gas Turbine 2/HRSG	59.44	5.639	331.00	425.61	17.04	n/a	0.223	n/a	n/a	18.50	136	901,811	55.92	n/a	1.77	n/a	n/a
Auxilary Boiler	24.38	0.914	435.78	19.99	30.44	n/a	0.004	n/a	n/a	3.00	325	42,355	99.87	n/a	0.03	n/a	n/a
Emergency Generator	10.67	0.229	747.44	4.10	99.97	n/a	0.000	n/a	n/a	0.75	886	8,694	328.00	n/a	n/a	n/a	n/a
Fire Pump	6.10	0.152	811.89	1.16	63.44	n/a	0.001	n/a	n/a	0.50	1002	2,452	208.13	n/a	0.005	n/a	n/a
Cooling Tower	17.98	11.351	295.22	812.22	8.03	n/a	n/a	n/a	n/a	37.24	72.00	1,721,000	26.33	n/a	n/a	n/a	n/a
Averaging Period: 24-hour PM10																	
Gas Turbine 1/HRSG	59.44	5.639	331.00	425.61	17.04	n/a	n/a	n/a	2.012	18.50	136	901,811	55.92	n/a	n/a	n/a	15.97
Gas Turbine 2/HRSG	59.44	5.639	331.00	425.61	17.04	n/a	n/a	n/a	2.012	18.50	136	901,811	55.92	n/a	n/a	n/a	15.97
Auxilary Boiler	24.38	0.914	435.78	19.99	30.44	n/a	n/a	n/a	0.113	3.00	325	42,355	99.87	n/a	n/a	n/a	0.90
Emergency Generator	10.67	0.229	747.44	4.10	99.97	n/a	n/a	n/a	0.003	0.75	886	8,694	328.00	n/a	n/a	n/a	0.02
Fire Pump	6.10	0.152	811.89	1.16	63.44	n/a	n/a	n/a	0.001	0.50	1002	2,452	208.13	n/a	n/a	n/a	0.01
Cooling Tower	17.98	11.351	295.22	812.22	8.03	n/a	n/a	n/a	0.035	37.24	72.00	1,721,000	26.33	n/a	n/a	n/a	0.28

Table K.5-3 (cont.)
Emission Rates and Stack Parameters for Refined Modeling

	Stack Height m	Stack Diam m	Temp, deg K	Exhaust Flow, m3/s	Exhaust Velocity, m/s	Emission Rates, g/s NOx	SO2	CO	PM10	Stack Diam , ft	Exh Temp, Deg F	Exh Flow Rate, ft3/m	Exhaust Velocity, ft/s	Emission Rates, lb/hr NOx	SO2	CO	PM10
Averaging Period: Annual NOx and SOx																	
Gas Turbine 1/HRSG	59.44	5.639	331.00	425.61	17.04	2.398	0.199	n/a	n/a	18.50	136	901,811	55.92	19.03	1.58	n/a	n/a
Gas Turbine 2/HRSG	59.44	5.639	331.00	425.61	17.04	2.398	0.199	n/a	n/a	18.50	136	901,811	55.92	19.03	1.58	n/a	n/a
Auxilary Boiler	24.38	0.914	435.78	19.99	30.44	0.060	0.004	n/a	n/a	3.00	325	42,355	99.87	0.48	0.03	n/a	n/a
Emergency Generator	10.67	0.229	747.44	4.10	99.97	0.014	0.000	n/a	n/a	0.75	886	8,694	328.00	0.11	0.00	n/a	n/a
Fire Pump	6.10	0.152	811.89	1.16	63.44	0.003	0.000	n/a	n/a	0.50	1002	2,452	208.13	0.025	0.001	n/a	n/a
Cooling Tower	17.98	11.351	295.22	812.22	8.03	n/a	n/a	n/a	n/a	37.24	72	1,721,000	26.33	n/a	n/a	n/a	n/a
Averaging Period: Annual PM10																	
Gas Turbine 1/HRSG	59.44	5.639	331.00	425.61	17.04	n/a	n/a	n/a	1.779	18.50	136	901,811	55.92	n/a	n/a	n/a	14.12
Gas Turbine 2/HRSG	59.44	5.639	331.00	425.61	17.04	n/a	n/a	n/a	1.779	18.50	136	901,811	55.92	n/a	n/a	n/a	14.12
Auxilary Boiler	24.38	0.914	435.78	19.99	30.44	n/a	n/a	n/a	0.117	3.00	325	42,355	99.87	n/a	n/a	n/a	0.92
Emergency Generator	10.67	0.229	747.44	4.10	99.97	n/a	n/a	n/a	0.001	0.75	886	8,694	328.00	n/a	n/a	n/a	0.01
Fire Pump	6.10	0.152	811.89	1.16	63.44	n/a	n/a	n/a	0.000	0.50	1002	2,452	208.13	n/a	n/a	n/a	0.00
Cooling Tower	17.98	11.351	295.22	812.22	8.03	n/a	n/a	n/a	0.035	37.24	72.00	1,721,000	26.33	n/a	n/a	n/a	0.28

Assumptions:
1. The firepump engine and emergency generator engine are assumed not to operate during the same hour or day.

Table K.5-4
Results of SCREEN3 Modeling for Inversion Breakup Fumigation

Receptor Location	Equipment	NO2 1-hr (ug/m3)	SO2 1-hr (ug/m3)	SO2 3-hr(1) (ug/m3)	CO 1-hr (ug/m3)	CO 8-hr(1) (ug/m3)
Maximum Gas Turbine Impacts	Single GasTurbine/HRSG	3.2	0.25	0.2	4.6	3.2
Maximum Gas Turbine Impacts	Two Turbines/HRSGs	6.4	0.5	0.4	9.3	6.4

Notes:
1. Longer-term averages calculated from SCREEN3 modeled 1-hour averages using EPA conversion factors of 0.9 for 3-hour impacts, and 0.7 for 8-hour impacts.

NOTES TO TABLE K.5-4
FUMIGATION IMPACTS ANALYSIS

INVERSION BREAKUP FUMIGATION

Inversion breakup fumigation is generally a short-term phenomenon but was evaluated here as persisting for up to 8 hours. SCREEN3 was used to model one-hour impacts from the gas turbines/HRSGs using the full SCREEN3 meteorological dataset. The inversion breakup fumigation impacts for a two gas turbines/HRSGs and the combined stack were modeled. These maximum results were divided by two to calculate the maximum combined impacts for a single gas turbine/HRSG.

One-hour impacts were adjusted for longer averaging periods using the EPA-recommended persistence factors for the SCREEN3 model, as follows:

- 3-hour average = 0.9 times 1-hour average
- 8-hour average = 0.7 times 1-hour average

Table K.5-5
Summary of Building Dimensions Used For GEP Analysis
(feet)

Building	Length	Width	Height
HRSGs			
Tier 1	117.9	34.1	32.0
Tier 2	89.0	34.1	80.0
GTG Bldgs			
Tier 1	118.2	73.2	32.0
Tier 2	49.6	17.4	65.0
PEECC			
Tier 1	29.6	10.8	20.0
STG Bldg			
Tier 1	100.5	43.0	37.0
Tier 2	43.0	14.4	55.0
Auxiliary Boiler			
Tier 1	44.3	25.0	25.0
Fire Pump			
Tier 1	40.4	29.4	20.0
Emergency Generator			
Tier 1	38.4	12.0	20.0
Switchgear Bldg			
Tier 1	122.1	28.9	13.0
Cooling Tower Bldg			
Tier 1	840.6	66.3	45.0
Water Treatment Bldg			
Tier 1	90.0	72.2	30.0
Administration Bldg			
Tier 1	149.5	86.2	30.0
Demineralized Water Condensate Surge Tanks			
Tier 1	40.0	40.0	25.0
Recycled Water Tank			
Tier 1	107.4	107.4	43.0
Fire Water Tanks			
Tier 1	40.0	40.0	34.0
Ammonia Tanks			
Tier 1	17.7	17.7	40.0

K-6: Visibility Impact Analysis

Class I Area Impact Analysis for Calpine Inland Empire Energy Center

An analysis of air quality impacts in nearby Class I areas was conducted for Calpine's Inland Empire Energy Center (IEEC). Impacts were analyzed for six nearby Class I areas. The six Class I areas, responsible federal land manager (FLM) and closest distance from IEEC are listed in Table K.6-1.

Table K.6-1. Class I Areas Evaluated

Class I Area	FLM	Nearest Distance to Project (km)
Agua Tibia Wilderness	USFS	33.5
San Jacinto Wilderness	USFS	43.0
San Gorgonio Wilderness	USFS	46.0
Cucamonga Wilderness	USFS	64.5
Joshua Tree National Park	NPS	70.5
San Gabriel Wilderness	USFS	86.0

Following the guidance provided in the Federal Land Managers' Air Quality Related Values Workgroup (FLAG) Phase I Report (December 2000), potential changes to visibility and nitrate deposition were analyzed. Two separate models were used to quantify the visibility impacts. VISSCREEN was used to assess plume blight (coherent plume analysis) for near field impacts (i.e., impacts less than 50 km from each Class I area) and CALPUFF was used to quantify regional haze impacts for distant impacts (i.e., impacts greater than 50 km from each Class I area). Deposition was analyzed using CALPUFF for all Class I areas, regardless of distance.

VISCREEN Visibility Analysis

Initially, a Level-1 visual plume impact was assessed with VISCREEN as recommended by the 1988 EPA Visibility Workbook (Revised 1992). A Level-1 visual analysis requires the use of assumed worst-case meteorology, rather than the use of representative on-site meteorology. This includes use of F stability and a 1-meter per second wind that carries the plume very close to a hypothetical observer located in the Class I area.

VISCREEN uses two scattering angles to calculate potential plume visual impacts for cases where plumes are likely to be brightest (10 degrees or the forward scatter case) and darkest (140 degrees or the backward scatter case). The forward scatter case yields very bright plumes because the sun is placed nearly directly in front of the observer, which tends to maximize the light scattered by the plume. This geometry would rarely occur in reality. The backward scatter case yields the darkest possible plumes as the sun is directly behind the observer.

For terrain viewing backgrounds, the terrain is assumed to be black and located as close to the observer and the plume as possible. This assumption yields the darkest possible background against which the particulate plumes are likely to be most visible. In reality,

terrain-viewing backgrounds in the project area would be considerably less dark and would be located farther from the observer.

No adverse impact is produced when the total color contrast (Delta-E) is 2.0 or less and the plume contrast (C) is 0.05 or less. For background visual range, a value of 249 km (15.7 Mm-1) was used, as provided in the Federal Land Mangers' Air Quality Related Values Workgroup (FLAG) Phase I Report (December 2000).

Results of the Level-1 analysis demonstrated that for the 10 degree forward scatter with terrain or sky as background Delta-E and C would exceed the screening level of 2.0 and 0.05, respectively for all three Class I areas within 50 kilometers. Delta-E and C would also exceed their respective screening levels for 140 degree backward scatter with sky background. Delta-E and C screening criteria would not be exceeded for 140 degree backward scatter with terrain background.

A Level-2 screening analysis was then performed for Agua Tibia, San Jacinto, and San Gorgonio Wilderness areas. The objective of a Level-2 screening analysis is identical to that of Level-1 except that the meteorology and topography representative of the source area and Class I area are used instead. A series of joint frequency distribution (JFDs) were prepared based upon time-of-day, stability, wind-speed, and wind-direction using the Riverside meteorological data set, the same meteorological data as used in the near-field NAAQS analysis. Four JFDs were prepared (i.e., 0-6, 6-12, 12-18, and 18-24).

The purpose of the Level-2 analysis is to determine worst-case meteorological condition that would occur in the direction each Class I area within 50 km for the project site.

Agua Tibia Wilderness is located 33.5 km south-southeast of IEEC and only transects the south-southeast sector. (Each sector is defined by a 22.5° arc, centered upon the sixteen cardinal directions; e.g., N, NNE, NE, etc.).

To obtain the worst-case meteorological condition(s), it is necessary to determine the worst-case dispersion condition for the SSE sector as defined by the smallest product of $\sigma y \sigma z u$, with a cumulative probability of at least one percent. This one-percent dispersion condition is assumed to be indicative of worst day plume visual impacts when the probability of worst-case meteorological conditions is coupled with the probability of other factors that would maximize plume visual impacts. As prescribed in the workbook, the following combination of Pasquill-Gifford stability categories and wind speeds were analyzed:

Pasquill-Gifford Stability Category	Wind Speed (m/s)
F	1,2,3
E	1,2,3,4,5
D	1,2,3,4,5,6,7,8

The results of this analysis are presented in Table K.6-2. The table presents the product of

$\sigma y \sigma z u$ for each stability-wind speed category, the transport time for the plume to reach the Wilderness boundary, the frequency of occurrence (f) expressed as a decimal equivalent (based upon the JFD results), and the cumulative frequency (cf), as quantified for each time period (e.g., 1-6, 7-12, etc.). Plume transport times are based upon the mean wind speed for each category. For example, the 1 m/s wind speed category designated in column 1 refers to winds ranging from 0 to 1 m/s. Therefore a 0.5 m/s wind speed is used to calculate the time required for the plume to travel from the source to the nearest Wilderness area boundary within the sector. Additionally, a cumulative frequency greater than or equal to 0.01 represents a worst-case meteorological condition that occurs more with at least one percent frequency (out of a possible 8760 hours per year).

Table K.6-2 presents the results of this analysis for the south-southeastern sector. As shown in the last row of the table, the cumulative frequencies for two of the periods exceed one percent (0.01 decimal equivalent): 1 – 6 and 18-24.). The worst-case meteorological condition associated with plume transport to this sector is defined by the smallest product of $\sigma y \sigma z u$, which is presented in order of ascending value down the column. The worst-case meteorological condition is PG Stability category F with a wind speed of 1 m/s. However, since the nearest Park boundary to the north of the project is located in complex terrain 500 feet (152.4 meters) above the project site, and continues to rise another 1500 feet as one looks into the wilderness from the boundary, according to the workbook, the worst-case stability class should be shifted one category less stable. Therefore, E1 is the dispersion condition used to evaluate the worst-case visual impacts for the Level-2 screening analysis. However, since the transport time associated with a 1 m/s wind speed to the nearest distance to the nearest Wilderness Area boundary (33.5 km) is greater than 12 hours, it is unlikely that steady-state plume conditions will persist for more than 12 hours. Thus, this worst-case dispersion condition is dismissed from the analysis and the next worst-case condition (E2) is the worst-case meteorological condition for this sector

Therefore, VISCREEN was used to model plume blight, but using non-default options. Table K.6-3 presents the input and summarized model output for the Level 2 visibility analysis for impacts in the Agua Tibia Wilderness. The non-default options employed in this analysis are as follows. The plume particle mass median diameter of 1.5 um and density of 1 were used since the plume is generated from the combustion of natural gas, as opposed to coal, which was used to develop the default plume parameters in the EPA workbook. Additionally, the worst-case meteorology is assumed to be PG-stability category E with a wind speed of 2.0 m/s, as opposed to the default F 1m/s worst-case meteorology.

The results of the Level 2 analysis for Agua Tibia Wilderness show that no exceedance are predicted for plume contrast or color within the Class I area. Hence, no further analysis is required.

Table K.6-2 Worst Case Meteorological Conditions for Plume Visual Impact Calculations for the Agua Tibia Wilderness (South-Southeastern Sector)

Calpine Inland Empire Energy Center Plume Blight Analysis for Agua Tibia Wilderness										
Distance to nearest boundary			33.5	km						
Dispersion										
Condition		Transport	1-6		7-12		13-18		19-24	
(stab,ws)	Sig Y*Sig z*u	time (hrs)	f	cf	f	cf	f	cf	f	cf
F,1	5.83E+04	18.6	0.01735	0.01735	0.00034	0.00034	0.00023	0.00023	0.01564	0.01564
F,2	1.17E+05	6.2	0.00069	0.01804	0.00000	0.00034	0.00023	0.00046	0.00183	0.01747
E,1	1.66E+05	18.6	0.00091	0.01895	0.00080	0.00114	0.00057	0.00103	0.00080	0.01827
F,3	3.50E+05	3.7	0.00000	0.01895	0.00000	0.00114	0.00000	0.00103	0.00000	0.01827
E,2	7.00E+05	6.2	0.00034	0.01929	0.00000	0.00114	0.00034	0.00137	0.00011	0.01838
D,1	4.54E+05	18.6	0.00228	0.02157	0.00206	0.00320	0.00080	0.00217	0.00046	0.01884
E,3	2.10E+06	3.7	0.00023	0.0218	0.00000	0.00320	0.00011	0.00228	0.00000	0.01884
E,4	1.40E+06	2.7	0.00000	0.0218	0.00000	0.00320	0.00000	0.00228	0.00000	0.01884
E,5	1.75E+06	1.7	0.00000	0.0218	0.00000	0.00320	0.00000	0.00228	0.00000	0.01884
D,2	4.20E+06	6.2	0.00011	0.02191	0.00034	0.00354	0.00034	0.00262	0.00011	0.01895
D,3	6.30E+06	18.6	0.00000	0.02191	0.00000	0.00354	0.00046	0.00308	0.00000	0.01895
D,4	8.40E+06	2.7	0.00000	0.02191	0.00000	0.00354	0.00011	0.00319	0.00000	0.01895
D,5	1.05E+07	1.7	0.00000	0.02191	0.00000	0.00354	0.00023	0.00342	0.00000	0.01895
D,6	1.26E+07	1.7	0.00000	0.02191	0.00000	0.00354	0.00000	0.00342	0.00000	0.01895
D,7	1.47E+07	1.4	0.00000	0.02191	0.00000	0.00354	0.00000	0.00342	0.00000	0.01895
D,8	1.68E+07	1.2	0.00000	0.02191	0.00000	0.00354	0.00000	0.00342	0.00000	0.01895

Table K.6-3: VISCREEN LEVEL-2 SUMMARY OUTPUT FOR AGUA TIBIA WILDERNESS

Visual Effects Screening Analysis for
Source: Calpine Inland Empire En
Class I Area: Agua Tibia Wilderness
*** User-selected Screening Scenario Results ***

Input Emissions for

Particulates	4.63	G /S
NOx (as NO2)	7.93	G /S
Primary NO2	0.00	G /S
Soot	0.00	G /S
Primary SO4	0.00	G /S

PARTICLE CHARACTERISTICS

	Density	Diameter
Primary Part.	1.5	1
Soot	2.0	1
Sulfate	1.5	4

Transport Scenario Specifications:

Background Ozone:	.04 ppm
Background Visual Range:	249.00 km
Source-Observer Distance:	33.50 km
Min. Source-Class I Distance:	33.50 km
Max. Source-Class I Distance:	44.75 km
Plume-Source-Observer Angle:	11.25 degrees
Stability:	5
Wind Speed:	2.00 m/s

R E S U L T S

Asterisks (*) indicate plume impacts that exceed screening criteria
Maximum Visual Impacts INSIDE Class I Area
Screening Criteria ARE NOT Exceeded

					Delta E		Contrast	
Backgrnd	Theta	Azi	Distance	Alpha	Crit	Plume	Crit	Plume
SKY	10.	140.	44.8	29.	2.00	.333	.05	-.000
SKY	140.	140.	44.8	29.	2.00	.674	.05	-.009
TERRAIN	10.	84.	33.5	84.	2.00	1.220	.05	.008
TERRAIN	140.	84.	33.5	84.	2.00	.312	.05	.003

The Level–2 plume blight analysis for the San Jacinto Wilderness and San Gorgonio Wilderness areas are similar to the results for the Agua Tibia Wilderness area. The primary difference is that these two Wilderness areas are located farther away from IEEC than Agua Tibia and both have higher terrain. The San Jacinto Wilderness is located 43 km from IEEC and transects two sectors: east-northeast and east. The San Gorgonio Wilderness is located 46 km from IEEC and also transects two sectors: north-northeast and northeast. The cumulative frequency by sector analyses showed the wind blows toward these Wilderness areas at least 1% of the time. Worst-case meteorology used in VISCREEN was also PG-stability class E with a 2 m/s wind speed for the same reasons as for Agua Tibia. Hence, the VISCREEN results presented in Table K.6-3 are also valid for San Jacinto and San Gorgonio, i.e., plume blight is not predicted to exceed the Class I screening criteria for contrast or color within each Class I area. Hence, no further analysis is required.

Calpuff Visibility Analysis

CALPUFF was used in a screening mode to assess regional haze impacts within the Cucamonga and San Gabriel Wilderness areas, and Joshua Tree National Park. The modeling followed screening guidance as provided by the Interagency Workgroup on Air Quality Modeling (IWAQM) Phase 2 Summary Report. The modeling procedures also incorporate comments provided by the Federal Land Managers' Air Quality Related Values workgroup (FLAG) Final Phase I report (December 2000).

The screening mode of the CALPUFF modeling system requires hourly, single station meteorological data as input, both surface and upper air. Based on the guidance contained in the IWAQM Phase 2 Summary Report, CALPUFF was used in a screening mode, which required five years of single station meteorology. Five years of surface data from Daggett/San Bernardino International Airport (1986-1990) were used in combination with representative upper air data interpreted from seasonal morning and afternoon mixing height data (Holzworth 1974). The surface data was in SAMSON format.

Table K.6-4 presents the seasonal morning and afternoon mixing heights for the modeling domain as obtained from Holzworth.

Table K.6-4. Seasonal Mixing Heights

Season	AM Mixing Ht (m)	PM Mixing Ht (m)
Winter	480	1000
Spring	750	1200
Summer	450	800
Autumn	500	1000

The PCRAMMET meteorological preprocessor, as recommended by the IWAQM Phase 2 Report, was used to process the surface and upper air data. PCRAMMET requires complete data sets of the following variables: wind speed, wind direction, temperature, ceiling height, opaque cloud cover or total cloud cover, surface pressure, relative humidity, and precipitation type. The five years of upper air data includes twice-daily mixing heights.

PCRAMMET was run with the dry deposition options, as there is no precipitation data from the Daggett/San Bernadino station. As such, the following domain averaged variables are required and were based on values expected in the modeling region:

Minimum Monin Obukhov length during stable conditions = 2.5 meters

Roughness length = 0.25 meters

Noon time albedo = 0.33

Bowen ratio (moist) = 2.5

Anthropogenic heat flux = 60 w/m^2

Fraction of net radiation absorbed by ground = 0.20

Five years of data was preprocessed with PCRAMMET, which was then used as input into CALPUFF.

CALPUFF also requires domain averaged background ozone (O_3) and ammonia (NH_3) concentrations for the Mesopuff II chemistry algorithm. For O_3, a domain-averaged value of 34.57 ppb was used, which was based on background O_3 data collected in the project region. For NH_3, a domain average value of 3.0 ppb was selected and was based on guidance in the IWAQM Phase 2 Report for arid regions.

The following model options were employed in CALPUFF. The meteorological and computational grids were based upon a 225 km radius grid. Since a homogeneous wind field is assumed, the minimum number of grid cells were used, which decreases the amount of computational time needed to run the model. Other model options are briefly listed below:

- Number of X grid cells = 7
- Number of Y grid cells = 7
- Number of vertical layers = 2
- Grid spacing = 100 km
- Cell face heights = 0 and 5000 meters
- Minimum mixing height = 50 meters
- Maximum mixing height = 5000 meters (based on observational data)
- Minimum wind speed allowed for non-calm conditions = 0.5 m/s
- Vertical distribution used in the near field = Gaussian

- Terrain adjustment method = partial plume path adjustment
- No puff splitting allowed
- Chemical mechanism = Mesopuff II
- Wet and dry removal modeled
- Dispersion coefficients = PG dispersion coefficients
- PG sigma-y and z not adjusted for roughness
- Partial plume penetration of elevated inversion allowed
- Lateral turbulence not used

The computational grid extended 50 kilometers beyond the furthest receptor point.

Three receptor rings were created for each of these areas, one ring representing the nearest, middle, and farthest distances from the project location. Each receptor ring consists of 360 equally spaced receptors per ring at an elevation equal to that mean elevation of the transecting arc in the Class I area. Table K.6-5 presents the distances and elevations of the receptor rings for each Class I area.

Table K.6-5. Receptor Rings Used in the Calpuff Modeling

Class I Area	Distance to Receptor Ring (km)	Elevation of Receptor Ring (ft)
Cucamonga Wilderness	64.5 68.25 72.0	6000 6500 6000
Joshua Tree National Park	70.5 121.0 171.5	2500 2500 2500
San Gabriel Wilderness	86.0 93.0 100.0	2250 3000 5000

Following the IWAQM screening method, the maximum concentration for each pollutant, for each distance averaging time modeled was selected for comparison with the appropriate AQRV.

The maximum model-predicted light extinction (B_{ext}), background light extinction, and percent change in light extinction at each of the three distant Class I areas are presented in Table K.6-6. The background values are those calculated by Calpuff/Calpost, as opposed to those reported in the Flag Phase I report (December 2000). In all cases, the maximum predicted change in light extinction is less than 5%. Therefore, no further analysis is required.

Table K.6-6. Model-Predicted Change in Light Extinction

Class I Area	Model-Predicted B_{ext}	Background B_{ext}	% Change in B_{ext}
Cucamonga Wilderness	0.538	15.940	3.374
Joshua Tree National Park	0.491	15.880	3.093
San Gabriel Wilderness	0.478	15.940	3.002

Total Nitrogen Deposition Results

Estimates of atmospheric deposition were obtained by having CALPUFF/CALPOST calculate the dry fluxes of NO_x, HNO_3, and NO_3 from the proposed project. The modeled deposition flux of each of the oxides of nitrogen from CALPUFF was adjusted for the difference of the molecular weight of their oxides and expressed in units of kg/ha-yr, using the appropriate entries in the CALPOST graphic user's interface (GUI). Nitrogen deposition attributed to each of these three nitrogen containing species was then summed to yield total dry deposition. In the absence of precipitation data, wet deposition was conservatively assumed to be equal to dry deposition. Total depositional impacts were then calculated by adding the background deposition to the modeled impact.

Background wet and dry deposition rates of nitrogen containing species were obtained following the Federal Land Managers' Air Quality Related Values Workgroup (FLAG) Draft Phase I Report (October 1999). Dry deposition rates for Joshua Tree National Park monitoring site JOT403 were obtained from the Clean Air Status and Trends Network (CASTNet) website at http://www.epa.gove/castnet . Data were available from 1995 through 1998 for three nitrogen containing species: ammonium (NH4), nitrate(NO3), and nitric acid (HNO3). Nitrogen deposition from these species was determined by correcting the deposition rate of each stoichiometrically. In the absence of dry deposition monitoring data for each of the Class I Wilderness Area, the data from Joshua Tree National Park was assumed to be representative and used as background.

Wet deposition rates were not monitored at any of the Class I Areas (while NADP lists Joshua Tree National Park as a monitoring site, no data was available for this location on NADP's website http://nadp.sws.uiuc.edu). Therefore, the background nitrogen wet deposition flux was conservatively assumed to be equal the background dry deposition flux.

Table K.6-7 presents the maximum model-predicted nitrogen deposition plus annual average background nitrogen flux for each Class I Area analyzed. The deposition rate of species is shown along with the total deposition rate. Wet deposition rates are not shown as wet deposition is conservatively assumed to be equal to the dry deposition rate.

Of the six Class I areas analyzed, the maximum modeled annual nitrogen deposition rate is 3.46×10^{-2} kg/ha-yr at Agua Tibia. Since the background nitrogen deposition flux is 7.55 kg/ha-yr, this represents a 0.46% increase in nitrogen deposition. The nitrogen deposition is less at all other Class I areas analyzed.

Table K.6-7. Nitrogen Deposition Rates

Class I Area	HNO_3 Normalized to N (kg/ha-yr)	NO_3 Normalized to N (kg/ha-yr)	NOx Normalized to N (kg/ha-yr)	Total Dry N (kg/ha-yr)	Total N Deposition (kg/ha-yr)[c]
Agua Tibia	1.5931E-03	4.0814E-05	1.5670E-02	1.7304E-02	3.4608E-02
San Jacinto	1.4152E-03	4.0548E-05	1.2089E-02	1.3545E-02	2.7089E-02
San Gorgonio	1.3670E-03	4.0465E-05	1.1176E-02	1.2583E-02	2.5167E-02
Cucamonga	1.1669E-03	3.8696E-05	7.3169E-03	8.5225E-03	1.7045E-02
Joshua Tree	1.0980E-03	3.6850E-05	6.3637E-03	7.4986E-03	1.4997E-02
San Gabriel	1.0068E-03	3.3699E-05	4.6603E-03	5.7008E-03	1.1402E-02
Background[a]	3.3661E+00	1.7052E-01	2.3880E-01[b]	3.7754E+00	7.5507E+00

[a] Background obtained from Joshua Tree N.P. for 1995 -1998 - dry deposition only.
No wet deposition numbers were available.
[b] No NOx dry deposition background numbers available. Value is NH4 dry deposition normalized to N
[c] Total deposition is conservatively assumed equal to twice the dry deposition rate (i.e., wet=dry)

K-7: BACT Analysis

EVALUATION OF BEST AVAILABLE CONTROL TECHNOLOGY

To evaluate BACT for the proposed gas turbines, the SCAQMD BACT guideline for large gas turbines (equipment rating greater than 3 MW) was reviewed. The relevant BACT determinations for this analysis are shown in Table K.7-1.

TABLE K.7-1
SCAQMD BACT GUIDELINE FOR LARGE GAS TURBINES

POLLUTANT	BACT
Nitrogen Oxides	(2.5 ppmv @ 15% O2) x (% efficiency/34%)
Sulfur Dioxide	No BACT level listed
Carbon Monoxide	10 ppmv @ 15% O2
VOC	No BACT level listed
NH_3	10 ppmv @ 15% O2 (1-hour average)
PM10	No BACT level listed

The EPA RACT-BACT-LAER Clearinghouse (RBLC) was also consulted to review recent EPA BACT decisions for gas-fired gas turbines. These recent BACT decisions are summarized in Table K.7-2 below. NOx levels shown in these BACT determinations are very high, although EPA has recently stated that the SCONOx technology has demonstrated that 2.5 ppm is achievable in practice. CO levels in this listing are also relatively high, and do not indicate that oxidations catalysts have been considered BACT for CO or VOCs.

The ARB's BACT Clearinghouse Database was also reviewed for recent BACT decisions regarding large gas turbine projects in California. Relevant BACT decisions are summarized in Table K.7-3. NOx levels shown in these determinations range from 5 to 2.5 ppm.

Finally, the ARB's Guidance for Power Plant Sitting and Best Available Control Technology was also reviewed. The relevant BACT levels recommended in the ARB power plant guidance document are summarized in Table K.7-4.

The Project proposes to use dry low-NOx combustors with selective catalytic reduction technology that will achieve a NOx exhaust concentration of 2.5 ppmv or less (1-hr average), 2.0 ppmv (annual

average), a CO exhaust concentration of 6 ppmv. The gas turbines will be fueled with natural gas to minimize SO_2 and PM_{10} emissions. VOC levels are inherently very low for the turbines (i.e., 2 ppmv) and no further reductions are not needed to comply with BACT. The control systems will also achieve an ammonia slip of 10 ppmv (1-hour average). These pollutant levels will achieve emission reductions consistent with the SCAQMD BACT guideline and the ARB BACT guideline for power plants. A more detailed top down analysis for BACT for NOx and ammonia emissions is included as Attachment K.7-1.

TABLE K.7-2
GAS TURBINE BACT DETERMINATIONS FOR EPA RBLC CLEARINGHOUSE

FACILITY/LOCATION	DATE PERMIT ISSUED	EQUIPMENT/RATING	NOX LIMIT/CONTROL TECHNOLOGY	CO LIMIT/CONTROL TECHNOLOGY
Alabama Power Company McIntosh, AL	7/10/97	100 MW combustion turbine w/ duct burner	15 ppm (dry low-NOx burners)	n/a
Lordsburg L.P. Lordsburg, NM	6/18/97	100 MW combustion turbine	15 ppm (dry low-NOx technology)	50 ppm (dry low-NOx technology)
Mead Coated Board, Inc. Phenix City, AL	3/12/97	25 MW combustion turbine w/ fired HRSG	25 ppm (dry low-NOx combustor)	28 ppm (proper design and good combustion practices)
Northern California Power Agency Lodi, CA	10/02/97	GE Frame 5 gas turbine	25 ppm	n/a
Portside Energy Corp. Portage, IN	5/13/96	63 MW gas turbine w/ unfired HRSG	n/a	10 ppm (good combustion)
Southwestern Public Service Hobbs, NM	2/15/97	Gas turbine	15 ppm w/o power augmentation 25 ppm w/ augmentation	good combustion practices

TABLE K.7-3
SUMMARY OF BACT DETERMINATIONS FROM ARB BACT CLEARINGHOUSE

FACILITY/DISTRICT	PERMIT NO.	EQUIPMENT/RATING	NOX LIMIT/CONTROL TECHNOLOGY	VOC/HC LIMIT/CONTROL TECHNOLOGY
Sacramento Cogeneration Authority Sacramento Metropolitan AQMD	A330-849-98 A330-850-98 A330-851-98	GE LM6000 combined-cycle gas turbine w/ supplemental firing (42 MW each)	5 ppm (dry low-NOx combustion and SCR)	oxidation catalyst (10% destruction efficiency)
Sacramento Power Authority Sacramento Metropolitan AQMD	A330-852-98	Siemens V84.2 combined-cycle gas turbine w/ supplemental firing (103 MW)	3 ppm (water injection and SCR)	oxidation catalyst (5% destruction efficiency)
Carson Energy Sacramento Metropolitan AQMD	A330-854-98	GE LM6000 combined-cycle gas turbine w/ supplemental firing (42 MW)	5 ppm (water injection and SCR)	oxidation catalyst (10% destruction efficiency)
SEPCO	A330-855-98	GE Frame 7EA gas turbine w/ supplemental firing (82 MW)	5 ppm (dry low-NOx combustion and SCR)[1]	oxidation catalyst (5% destruction efficiency)
La Paloma Generating Company, LLC	S-3412-1	ABB Model GT-24 gas turbine w/o supplemental firing (262 MW each)	2.5 ppm (dry low-NOx combustion and SCR)	
Sutter Power Plant	A330-882-99	Westinghouse 501F gas turbine w/ supplemental firing (250MW each)	2.5 ppm (dry low-NOx combustion and SCR)	
Crockett Cogeneration	A330-859-98	GE Frame 7FA gas turbine w/ supplemental firing (240MW)	5 ppm (dry low-NOx combustion and SCR)	

Note: 1. District indicates that applicant proposed 2.6 ppm to lower offset liability.

TABLE K.7-4
ARB BACT GUIDANCE FOR POWER PLANTS

POLLUTANT	BACT
Nitrogen Oxides	2.5 ppmv @ 15% O2 (1-hour average) 2.0 ppmv @ 15% O2 (3-hour average)
Sulfur Dioxide	Fuel sulfur limit of 1.0 grains/100 scf
Carbon Monoxide	Nonattainment areas: 6 ppmv @ 15% O2 (3-hour average) Attainment areas: District discretion
VOC	2 ppmv @ 15% O2 (3-hour average)
NH_3	5 ppmv @ 15% O2 (3-hour average)
PM10	Fuel sulfur limit of 1.0 grains/100 scf

To evaluate BACT for the proposed auxiliary boiler, the SCAQMD BACT guideline for natural gas fired boilers was reviewed. The relevant BACT determinations for this analysis are shown in Table K.7-5.

TABLE K.7-5
SCAQMD BACT GUIDANCE FOR NATURAL GAS FIRED BOILERS

POLLUTANT	BACT
NOx	12 ppm @ 3% O2
SOx	None
CO	50 ppm @ 3% O2
VOC	None
PM10	None

The auxiliary boiler will meet the BACT limits shown on Table K.7-5 with the use of SCR and proper combustion..

To evaluate BACT for the proposed fire pump engine, the SCAQMD BACT guideline for emergency compression ignition engines was reviewed. The relevant BACT determinations for this analysis are shown in Table K.7-6.

TABLE K.7-6
SCAQMD BACT GUIDANCE FOR EMERGENCY COMPRESSION IGNITION ENGINES

POLLUTANT	BACT
NOx	6.9 g/bhp-hr
SOx	Fuel sulfur content of 0.05% wt. or less
CO	8.5 g/bhp-hr
VOC	1.0 g/bhp-hr
PM10	0.38 g/bh-hr

The fire pump engine will meet the BACT limits shown on Table K.7-6 with the use of low sulfur content fuel and low emission engine designs.

To evaluate BACT for the proposed emergency generator engine, the SCAQMD BACT guideline for emergency spark ignition engines was reviewed. The relevant BACT determinations for this analysis are shown in Table K.7-7.

TABLE K.7-7
SCAQMD BACT GUIDANCE FOR EMERGENCY SPARK IGNITION ENGINES

POLLUTANT	BACT
NOx	1.5 g/bhp-hr
SOx	None
CO	2.0 g/bhp-hr
VOC	1.5 g/bhp-hr
PM10	None

The emergency generator engine will meet the BACT limits shown on Table K.7-7 with the use of natural gas and low emission engine design.

Attachment K.7-1

Top Down Analysis for BACT for NOx and Ammonia Emissions

Top Down Analysis for BACT for NOx and Ammonia Emissions
Inland Empire Energy Center

BACT is defined in SCAQMD Rule 1302 as:

"the most stringent emission limitation or control technique which:

(1) has been achieved in practice for such category or class of source; or

(2) is contained in any state implementation plan (SIP) approved by the United States Environmental Protection Agency (EPA) for such category or class of source. A specific limitation or control technique shall not apply if the owner or operator of the proposed source demonstrates to the satisfaction of the Executive Officer or designee that such limitation or control technique is not presently achievable; or

(3) is any other emission limitation or control technique, found by the Executive Officer or designee to be technologically feasible for such class or category of sources or for a specific source, and cost-effective as compared to measures as listed in the Air Quality Management Plan (AQMD) or rules adopted by the District Governing Board."

Of these three "prongs" of the BACT definition, the first and third are generally controlling. This analysis will follow EPA's guidance for the preparation of "top down" BACT analyses focusing specifically on identifying emission limitations or control techniques that are achieved in practice and technically feasible.

A "top-down" analysis format, consistent with guidance provided in EPA's October 1990 Draft New Source Review Workshop Manual, has been used for the BACT analysis. That guidance lays out five steps for a top-down BACT analysis, as follows:

1. Identify all control technologies
2. Eliminate technically infeasible options
3. Rank remaining control technologies by control effectiveness
4. Evaluate most effective controls and document results
5. Select BACT

This procedure is followed for each of the two pollutants evaluated in this analysis.

1. Control of Nitrogen Oxides

a. Identify All Control Technologies

The maximum NOx emission rate for this analysis is considered to be 75 ppmvd @ 15% O_2, based on the governing new source performance standard (40 CFR 60 Subpart GG). This maximum emissions rate provides the frame of reference for the evaluation of control effectiveness and feasibility. The maximum degree of control, resulting in the minimum emission rate, is a combination of dry low-NOx combustors and either selective catalytic reduction or SCONOx to achieve a long term NOx limit of approximately 1 ppmvd. Intermediate levels of control are also evaluated.

There are three basic means of controlling NOx emissions from combustion turbines: wet combustion controls, dry combustion controls, and post-combustion controls. Wet and dry combustion controls act to reduce the formation of NOx during the combustion process, while post-combustion controls remove NOx from the exhaust stream. Potential NOx control technologies for combustion gas turbines include the following:

Wet combustion controls

$ Water injection
$ Steam injection

Dry combustion controls

$ Dry low-NOx combustor design
$ Catalytic combustors (e.g., XONON)
$ Other combustion modifications

Post-combustion controls

- Selective non-catalytic reduction (SNCR)
- Non-selective catalytic reduction (NSCR)
- Selective catalytic reduction (SCR)
- SCONOx

b. Eliminate Technically Infeasible Options

The performance and technical feasibility of available NOx control technologies are discussed in more detail below.

Combustion Modifications

(i) Wet Combustion Controls

Steam or water injection directly into the turbine combustor is one of the most common NOx control techniques for combustion turbines. These wet injection techniques lower the flame temperature in the combustor and thereby reduce thermal NOx formation. The water or steam-to-fuel injection ratio is the most significant factor affecting the performance of wet controls. Steam injection techniques can reduce NOx emissions in gas-fired gas turbines to between 15 and 25 ppmv at 15% O_2; the practical limit of water injection has been demonstrated at approximately 25-42 ppmv @ 15% O_2 before combustor damage becomes significant. Higher diluent:fuel ratios (especially with steam) result in greater NOx reductions, but also increase emissions of CO and hydrocarbons, reduce turbine efficiency, and may increase turbine maintenance requirements. The principal NOx control mechanisms are identical for water and steam injection. Water or steam is injected into the primary combustion chamber to act as a heat sink, lowering the peak flame temperature of combustion and thus lowering the quantity of thermal NOx formed. The injected water or steam exits the turbine as part of the exhaust.

Since steam has a higher temperature/enthalpy than water, more steam is required to achieve the same quenching effect. Typical steam injection ratios are 0.5 to 2.0 pounds steam per pound fuel; water injection ratios are generally below 1.0 pound water per pound fuel. Because water has a higher heat absorbing capacity than steam (due to the temperature and to the latent heat of vaporization associated with water), it takes more steam than water to achieve an equivalent level of NOx control.

Although the lower peak flame temperature has a beneficial effect on NOx emissions, it can also reduce combustion efficiency and prevent complete combustion. As a result, CO and VOC emissions increase as water/steam-to-fuel ratios increase. Thus, the higher steam-to-fuel ratio required for NOx

control will tend to cause higher CO and VOC emissions from steam-injected turbines than from water-injected turbines, due to the kinetic effect of the water molecules interfering with the combustion process. However, steam injection can reduce the heat rate of the turbine, so that equivalent power output can be achieved with reduced fuel consumption and reduced SO_2 emission rates.

Water and steam injection have been in use on both oil- and gas-fired turbines in all size ranges for many years so these NOx control technologies are clearly technologically feasible and widely available.

(ii) Dry Combustion Controls

Combustion modifications that lower NOx emissions without wet injection include lean combustion, reduced combustor residence time, lean premixed combustion and two-stage rich/lean combustion. Lean combustion uses excess air (greater than stoichiometric air-to-fuel ratio) in the combustor primary combustion zone to cool the flame, thereby reducing the rate of thermal NOx formation. Reduced combustor residence times are achieved by introducing dilution air between the combustor and the turbine sooner than with standard combustors. The combustion gases are at high temperatures for a shorter time, which also has the effect of reducing the rate of thermal NOx formation.

The most advanced combination of combustion controls for NOx is referred to as dry low-NOx (DLN) combustors. DLN technology uses lean, premixed combustion to keep peak combustion temperatures low, thus reducing the formation of thermal NOx. This technology is effective in achieving NOx emission levels comparable to levels achieved using wet injection without the need for large volumes of purified water and without the increases in CO and VOC emissions that result from wet injection. Several turbine vendors have developed this technology for their engines, including the engine proposed for this project. This control technique is technically feasible.

Catalytic combustors use a catalytic reactor bed mounted within the combustor to burn a very lean fuel-air mixture. This technology has been commercially demonstrated under the trade name XONON in a 1.5 MW natural gas-fired turbine in California and commercial availability of the technology for a 200 MW GE Frame 7G natural gas-fired turbine has been announced for one

project. The combustor used in the demonstration engine is generally comparable in size to that used in GE Frame 7F engines; however, the technology has not been announced commercially for the, Frame 7F engines proposed for this project. General Electric has indicated the technology is not yet commercially available. XONON is reported to be commercially available for 10 MW turbines manufactured by GE as well. No turbine vendor, other than General Electric, has indicated the commercial availability of catalytic combustion systems at the present time; therefore, catalytic combustion controls are not available for this specific application and are not discussed further.

(iii)Post-Combustion Controls

SCR is a post-combustion technique that controls both thermal and fuel NOx emissions by reducing NOx with a reagent (generally ammonia or urea) in the presence of a catalyst to form water and nitrogen. NOx conversion is sensitive to exhaust gas temperature, and performance can be limited by contaminants in the exhaust gas that may mask the catalyst (sulfur compounds, particulates, heavy metals, and silica). SCR is used in numerous gas turbine installations throughout the United States, almost exclusively in conjunction with other wet or dry NOx combustion controls. SCR requires the consumption of a reagent (ammonia or urea), and requires periodic catalyst replacement. Estimated levels of NOx control are in excess of 90%.

Selective non-catalytic reduction (SNCR) involves injection of ammonia or urea with proprietary conditioners into the exhaust gas stream without a catalyst. SNCR technology requires gas temperatures in the range of 1200° to 2000° F and is most commonly used in boilers. The exhaust temperature for the proposed gas turbine ranges from 1087° to 1200° F, well below the minimum SNCR operating temperature. Some method of exhaust gas reheat, such as additional fuel combustion, would be required to achieve exhaust temperatures compatible with SNCR operations, and this requirement makes SNCR technologically infeasible for this application. Even when technically feasible, SNCR is unlikely to achieve NOx reductions in excess of 80%-85%.

Nonselective catalytic reduction (NSCR) uses a catalyst without injected reagents to reduce NOx emissions in an exhaust gas stream. NSCR is typically used in automobile exhaust and rich-burn stationary IC engines, and employs a platinum/rhodium catalyst. NSCR is effective only in a stoichiometric or fuel-rich environment where the combustion gas is nearly depleted of oxygen, and

this condition does not occur in turbine exhaust where the oxygen concentrations are typically between 14 and 16 percent. For this reason, NSCR is not technologically feasible for this application.

SCONOx is a proprietary catalytic oxidation and absorption technology that uses a single catalyst for the removal of NOx, CO, and VOC. The catalyst simultaneously oxidizes NO, CO, and VOCs and adsorbs NO_2 onto the catalyst surface where they are stored as nitrates and nitrites. The catalyst is a monolith design, made from a ceramic substrate, with a platinum-based catalyst and a potassium carbonate coating. The SCONOx catalyst has a limited adsorption capability, and requires regeneration on a cycle of approximately 12-15 minutes.[2] Regeneration occurs by dividing the SCONOx catalyst system in a series of sealable compartments. At any point in time, approximately 20% of the compartments in a SCONOx system would be in regeneration mode, and the remaining 80% of the compartments would be in oxidation/absorption mode.[3]

Regeneration of the SCONOx catalyst must occur in an oxygen-free environment. Consequently, each SCONOx compartment is equipped with front and rear seals to isolate the compartment from the exhaust gas stream during regeneration operation.

Regeneration is accomplished by passing a gas mixture (regeneration gases) containing methane, carbon dioxide and hydrogen over the catalyst beds.[4] Regeneration gases are created using a separate, external reformer. Initial attempts to create regeneration gases from natural gas and steam within the SCONOx catalyst bed (internal autothermal regeneration) failed to produce consistent results; this technology is not being proposed by ABB Environmental at the present time.[5]

The SCONOx catalyst bed, as designed for F-class gas turbines, includes a SCOSOx catalyst (or guard bed) followed by two or more SCONOx catalysts in series. The SCOSOx catalyst is intended to remove trace quantities of sulfur-bearing compounds from the exhaust gas stream, so as to avoid poisoning of the SCONOx catalyst. Like the SCONOx catalyst, the SCOSOx catalyst is regenerated. The regeneration for the two catalyst types occurs at the same time, with the same regeneration gas supply provided to both. Regeneration gases for the SCOSOx catalyst exit the module separately

[2] Personal communication, ABB Environmental, 1/18/00.
[3] Stone & Webster, "Independent Technical Review – SCONOx Technology and Design Review", February 2000.
[4] Stone & Webster, op cit
[5] ABB Environmental, op cit

from the SCONOx regeneration gases; however, both regeneration gases are returned to the gas turbine exhaust stream downstream of the SCONOx module.[6]

The external reformer used to create the regeneration gases is supplied with steam and natural gas. For one F-class turbine, an estimated 15,000 to 20,000 lbs/hr of 600°F steam is required, along with approximately 100 pounds per hour (2.2 MMbtu/hr) of natural gas.[7] To avoid poisoning the reformer catalyst, the natural gas supplied to the reformer passes through an activated carbon filter to remove sulfur-bearing compounds.[8]

To properly treat the exhaust gas without undue backpressure, an estimated 40-60 catalyst modules would be required for an F-class machine.[9] (These modules are assembled, four to a shelf, to create 10-15 shelves.) The pressure drop associated with a NOx removal efficiency of 90% is approximately 5" of water.[10] The estimated space velocity for such a system is 22,000/hour.[11]

The regeneration cycle time is expected to be controlled using a feedback system based on NOx emission rates.[12] That is, the higher the NOx emissions are relative to the design level, the shorter the absorption cycle, and regeneration cycles will occur more frequently. This is analogous to the use of feedback systems for controlling reagent (ammonia or urea) flow rates in an SCR system.

Maintenance requirements for SCONOx systems are expected to include periodic replacement of the reformer fuel sulfur carbon unit, periodic replacement of the reformer catalyst, periodic washings of the SCOSOx and SCONOx catalyst beds, and periodic replacement of the SCOSOx and SCONOx catalyst beds. The replacement frequency for the reformer sulfur carbon unit and reformer catalyst are unknown to IEEC at present. The SCOSOx catalyst is expected to require washing once per year. The lead SCONOx catalyst bed is expected to require washing once per year, while the trailing SCONOx catalyst bed(s) are expected to require washing once every three years. The annual catalyst washing process is expected to take approximately three days for an F-class machine, with an estimated

[6] ABB Environmental, op cit
[7] Ibid
[8] Stone & Webster, op cit
[9] ABB Environmental, op cit
[10] Ibid
[11] Ibid
[12] Ibid

annual cost of $200,000.[13] The estimated catalyst life is reported to be 7 washings[14]; the guaranteed catalyst life is 3 years[15]

The absorption operating range for the SCONOx system is 300°F to 700°F, with an optimal temperature of approximately 600°F.[16] However, regeneration cycles are not initiated unless the catalyst bed temperature is above 450°F to avoid the creation of hydrogen sulfide during the regeneration of the SCOSOx catalyst.[17]

Estimates of control system efficiency vary. ABB Environmental has indicated that the SCONOx system is capable of achieving a 90% reduction in NOx, a 90% reduction in CO to a level of 2 ppm, and an 80%-85% reduction in VOC emissions.[18] (This VOC reduction is not likely to be achieved with low VOC inlet concentrations, in the 1 – 2 ppm range.[19]) Commercially quoted NOx emission rates for the SCONOx system range from 2.0 ppm on a 3-hour average basis, representing a 78% reduction[20], to 1.0 ppm with no averaging period specified (96% reduction)[21]. The SCONOx system does not control or reduce emissions of sulfur oxides or particulate matter from the combustion device.[22]

The SCONOx system has been applied at the Sunlaw Federal Cogeneration Plant in Vernon California since December 1996, and at the Genetics Institute Facility in Massachusetts. The Sunlaw facility uses an LM-2500 gas turbine, rated at a nominal 23 MWe, and the Genetics Institute facility has a 5 MWe Solar gas turbine. The SCONOx system was proposed for use by PG&E Generating Company at its La Paloma facility; however, PG&E Generating no longer plans to use the SCONOx system at that site.[23] In addition, the technology's co-developer, Sunlaw, has proposed to use the technology in conjunction with ABB gas turbines at the Nueva Azalea site in Southern California;

[13] Ibid
[14] Ibid
[15] Letter from ABB Alstom Power to Bibb & Associates dated May 5, 2000. (ABB Three Mountain Power or ABB TMP)
[16] Ibid
[17] ABB Environmental, op cit. Stone & Webster, op cit
[18] ABB Environmental, op cit
[19] Ibid
[20] ABB TMP, op cit
[21] Letter from ABB Alstom Power to Sunlaw Energy Corporation dated February 11, 2000. (ABB Sunlaw)
[22] ABB Environmental, op cit
[23] Ibid

however, that project has been suspended by the project developer. Finally, SCONOx is proposed for use at a 43 MW gas turbine under construction in Redding, California.

Based on the discussions above, the following NOx control technologies are available and potentially technologically feasible for the proposed project:

- Water injection
- Steam injection
- Dry Low-NOx Combustors
- Selective Catalytic Reduction
- SCONOx

c. Rank Remaining Control Technologies by Control Effectiveness

The remaining technically feasible control technologies are ranked by NOx control effectiveness in Table K.7.1-1.

Table K.7.1-1
NOx Control Alternatives

NOx Control Alternative	Available?	Technically Feasible?	NOx Emissions (@ 15% O_2)	Environmental Impact	Energy Impacts
Water Injection	Yes	Yes	25-42 ppm	Increased CO/VOC	Decreased Efficiency
Steam Injection	Yes	Yes	15 – 25 ppm	Increased CO/VOC	Increased Efficiency
Dry Low-NOx Combustors	Yes	Yes	9-25 ppm	Reduced CO/VOC	Increased Efficiency
Selective Catalytic Reduction	Yes	Yes	>90% reduction 1 – 2.5 ppm	Ammonia slip	Decreased efficiency
SCONOx	Yes[1]	Yes[2]	>90% reduction 1 – 2.5 ppm	Reduced CO; potential reduction in VOC	Decreased efficiency

Notes:
1. There are no standard, commercial guarantees for utility-scale projects for this technology available in the public domain.
2. Technology has been used on small (5 MW and 22 MW) gas turbines for a limited period of time. Has not been used on utility-scale gas turbines.

d. Evaluate Most Effective Controls and Document Results

Water and steam injection are control technologies that, for large gas turbines, have been largely superseded by dry low-NOx combustors, due to the superior emission control performance, additional CO and VOC benefits, and increased efficiency of this technology. Since the project proposes to use dry low NOx combustors, no further discussion of water injection, steam injection, or dry low NOx combustors is necessary.

The potential performance of SCR and SCONOx, insofar as NOx emission levels are concerned, are essentially equivalent. Both technologies have the potential to reduce NOx emissions by at least 90%, and differences between low NOx levels (1 ppm vs 2 ppm vs 2.5 ppm) appear, in the case of each technology, to be largely a function of catalyst size, turbine outlet NOx concentration, and compliance terms (e.g., averaging period). The principal differences between the two technologies are associated with whether the low emission levels proposed have been achieved in practice using these technologies, their cost-effectiveness in achieving these levels, and secondary environmental impacts.

Achieved in Practice Evaluation:

The SCAQMD has established formal criteria for determining when emission control technologies should be considered achieved in practice (AIP) for the purposes of BACT determinations. The criteria include the following elements:

Commercial Availability: At least one vendor must offer this equipment for regular or full-scale operation in the United States. A performance warranty or guaranty must be available with the purchase of the control technology, as well as parts and service.

Reliability: All control technologies must have been installed and operated reliably for at least six months. If the operator did not require the basic equipment to operate daily, then the equipment must have at least 183 cumulative days of operation. During this period, the basic equipment must have operated (1) at a minimum of 50% design capacity; or (2) in a manner that

is typical of the equipment in order to provide an expectation of continued reliability of the control technology.

Effectiveness: The control technology must be verified to perform effectively over the range of operation expected for that type of equipment. If the control technology will be allowed to operate at lesser effectiveness during certain modes of operation, then those modes of operation must be identified. The verification shall be based on a performance test or tests, when possible, or other performance data.

Technology Transfer: BACT is based on what is AIP for a category or class of source. However, USEPA guidelines require that technology that is determined to be AIP for one category of source be considered for transfer to other source categories. There are two types of potentially transferable control technologies: (1) exhaust stream controls, and (2) process controls and modifications. For the first type, technology transfer must be considered between source categories that produce similar exhaust streams. For the second type, technology transfer must be considered between source categories with similar processes.

Discussion of SCR-Based Limits – Achieved in Practice Criteria

SCR has been achieved in practice at numerous gas turbine installations throughout the world. Although there are a large number of gas turbines equipped with SCR systems, there are relatively fewer systems in operation that are designed to meet low NOx permit limits of 2.5 ppm or less.

Available CEMS data from the SMUD/SPAC Campbell Soup plant in Sacramento, California, indicate NOx control levels on a continuous basis that are in compliance with a 3.0 ppm limit. Actual NOx levels from that facility, which is equipped with a 120 MW (nominal) Siemens V84.2 turbine, are comfortably below that limit, at approximately 2.5 ppm. This facility has experienced a limited number of events above the permit limit; in each case, the excursion has been associated with a trip of the gas turbine from pre-mix, or low-NOx, mode into diffusion mode. The permit for the facility has since been modified to accommodate up to ten hours per year of excursions above the 3 ppm permit limit under specified conditions.

The extrapolation of SCR experience gained at higher NOx concentrations (3-5 ppm), where there are more sites in operation, to lower NOx permit limits depends on controlling turbine exhaust (SCR inlet) NOx concentrations, increasing catalyst size, improving feed-forward and feed-back control system design to ensure better process control, and ensuring good distribution of reagent to match the distribution of NOx levels. The experience at the SMUD/SPAC site, however, indicates that the ability of the SCR system to track NOx emissions changes upstream of the catalyst is further challenged at progressively lower concentrations.

A further exacerbating factor is related to measurement uncertainty. The South Coast AQMD has indicated that current NOx measurement methods for stationary sources are accurate to ±1 ppm,[24] which becomes problematic at NOx permit levels of 5 ppm and lower.

The following paragraphs evaluate the proposed AIP criteria as applied to the achievement of extremely low NOx levels (2.5 ppm and lower) using SCR technology.

Commercial availability: SCR technology is available with standard commercial guarantees for NOx levels at least as low as 1 ppm. Consequently, this criterion is satisfied.

Reliability: SCR technology has been shown to be capable of achieving NOx levels consistent with a 3 ppm permit limit during extended, routine operations of the SMUD/SPAC facility. There are no reported adverse effects of operation of the SCR system at these levels on overall plant operation or reliability.

Effectiveness: SCR technology has been demonstrated to achieve NOx levels below 3 ppm. At the SMUD/SPAC site, short-term excursions have resulted in NOx concentrations above 3 ppm; however, these excursions have not been associated with diminished effectiveness of the SCR system. Rather, these excursions have been associated with SCR inlet NOx levels in excess of those for which the SCR system was designed. As a consequence, the application of SCR technology to achieve extremely low NOx levels should reflect the potential for infrequent NOx excursions, under specified conditions. Permits have been issued for at least two utility-scale projects that limit NOx emissions to not more than 2.0 ppm on a 1-hour average basis. However, neither of these facilities

[24] See, e.g., South Coast AQMD Protocol for Rule 2012

has commenced operation, and no assessment can be made of their ability to meet a 2.0 ppm, 1-hour average limit on a consistent basis.

Conclusion: SCR technology capable of achieving NOx levels below 3 ppm is considered to be achieved in practice. The proposed permit limits for the Inland Empire Energy Center includes a NOx limit of 2.5 ppm on a 1-hour average basis. This proposed limit is consistent with the available data. The achievement of NOx concentrations below this level, on either a short term or long term basis, is not demonstrated in practice.

Discussion of SCONOx-Based Limits – Achieved in Practice Criteria

SCONOx has been demonstrated in service in two applications: The Federal Cogeneration Facility in Vernon, California, and the Genetics Institute Facility in Massachusetts. Because these turbines are much smaller than those proposed for the Inland Empire Energy Center, issues related to the application of SCONOx technology to the Inland Empire project need to be evaluated, in addition to a review of other criteria.

Continuous emissions monitoring (CEMS) data from the Federal Vernon facility have been evaluated in stages, as the data have been made public. The results of these evaluations are presented below.

Available CEMS data from the Federal Vernon facility were obtained from EPA, covering the period July through December 1997. EPA had indicated that this time period reflected the improved performance of the SCONOx system, and led to EPA's March 23, 1998 letter regarding BACT and LAER requirements for combined cycle gas turbines.

A review of the available SCONOx data for the last half of 1997 indicates that, at the Federal site, up to 12 exceedances per year could be expected above a 3.0 ppm, 3-hour average limit, even when exceedances related to startups and shutdowns were excluded.[25]

[25] For the purposes of the reviews of SCONOx presented in this report, a startup for the LM-2500 gas turbine at the Federal Vernon facility was defined as a period not to exceed 120 minutes; a shutdown was defined as a period not to exceed 60 minutes. These definitions are conservative in that aeroderivative gas turbines, such as those in use at the Vernon facility, are generally capable of completing a startup, with all emission control systems active, within 30 minutes, and are capable of completing a shutdown within 15 minutes. Permits for many LM-2500 combined cycle facilities expressly limit startups to not more than 30 or 60 minutes.

EPA and the California Air Resources Board have recommended BACT/LAER levels for combined cycle gas turbines of either 2.0 ppm on a 3-hour average basis, or 2.5 ppm on a 1-hour average basis. Under the BACT/LAER levels recommended by these agencies, the 1997 SCONOx data from the Federal site indicate that a 3-hour average limit of 2.0 ppm would be exceeded 44 times per year, and a 1-hour average limit of 2.5 ppm would be exceeded 24 times per year. Again, these data exclude exceedances associated with startups and shutdowns, as described above.

The data supporting these conclusions are shown in Table K.7.1-2.

The first part of this table shows, by month and quarter, the number of all 1-hour and 3-hour exceedances of various NOx emissions levels associated with operation of the SCONOx system during the period that resulted in EPA's March 1998 letter. The second part of the table shows exceedances that were not due to turbine startups or shutdowns.

Table K.7.1-2

SCONOx Performance – Summary Prepared by Sierra Research

July 1, 1997 to December 31, 1997

SCONOx Excursions Review

All excursions:

Month	No. of Valid CEMS Hrs	CEMS Avail, %	No. of 1-hr periods exceeding 2.0 ppmc	2.5 ppmc	3.0 ppmc	No. of 3-hr periods exceeding 2.0 ppmc	2.5 ppmc	3.0 ppmc	Highest reading 1-hr avg	3-hr avg
Jul	739.00	99.33	3	3	2	1	0	0	4.2	2.3
Aug	741.00	99.60	4	3	2	5	0	0	4.4	2.2
Sept	715.00	99.31	3	2	2	3	2	2	5.0	3.7
Quarter	**2195.00**	**99.41**	**10**	**8**	**6**	**9**	**2**	**2**	**5.0**	**3.7**
Oct	731.00	98.25	9	5	5	10	9	8	10.9	7.5
Nov	716.00	99.44	18	16	14	29	19	14	9.6	6.3
Dec	723.00	97.18	6	4	2	7	4	1	5.4	3.2
Quarter	**2170.00**	**98.28**	**33**	**25**	**21**	**46**	**32**	**23**	**10.9**	**7.5**

Excursions not due to startups or shutdowns:

Month	No. of Valid CEMS Hrs	CEMS Avail, %	No. of 1-hr periods exceeding 2.0 ppmc	2.5 ppmc	3.0 ppmc	No. of 3-hr periods exceeding 2.0 ppmc	2.5 ppmc	3.0 ppmc	Highest reading 1-hr avg	3-hr avg
Jul	739.00	99.33	1	1	0	0	0	0	2.6	1.8
Aug	741.00	99.60	3	2	1	4	0	0	3.5	2.2
Sept	715.00	99.31	1	0	0	0	0	0	2.2	2.0
Quarter	**2195.00**	**99.41**	**5**	**3**	**1**	**4**	**0**	**0**	**3.5**	**2.2**
Oct	731.00	98.25	5	3	3	5	5	5	10.9	7.5
Nov	716.00	99.44	5	4	3	8	2	1	8.6	3.8
Dec	723.00	97.18	4	2	1	5	2	0	4.0	2.8
Quarter	**2170.00**	**98.28**	**14**	**9**	**7**	**18**	**9**	**6**	**10.9**	**7.5**

Note: All NOx readings corrected to 15% oxygen.

In this analysis, no more than 2 hours of NOx emissions following a startup were treated as part of the startup. For the 3-hour averages, any average that included a startup hour was attributed to the startup. This is in contrast with the approach taken by Goal Line Environmental Technologies (GLET) in its comments accompanying the data reports, in which it is clear that startup periods were considered to extend as much as 6 hours. (This is particularly inappropriate for aeroderivative turbines such as those used at the Federal facility, which are known for their ability to start within tens of minutes.) NOx emissions greater than 2 ppm occurring during these long startup periods were reported by GLET, but were not considered to be exceedances.

In summary, using a 2-hour startup period for aeroderivative gas turbines, the data reported by GLET to EPA for 1997 do not support a BACT determination below 3 ppm. Based solely on the SCONOx data presented to EPA, even a NOx limit at 3.0 ppm would have to provide for excursions, other than

startups and shutdowns, above that limit. The number of excursions needed would depend upon the NOx limit selected and the emission control technology employed.

Additional data have been generated at the Federal site, and were provided to EPA Region IX by CURE.[26] These data were for the period April 1, 1999 through December 31, 1999, and were provided to Sierra Research by EPA Region IX.[27] The more recent data are consistent with the earlier data, and are summarized in Table K.7.1-3.

The 1999 CEMS data from the Federal facility indicated that the turbine equipped with SCONOx was operated fewer than 2,600 hours during the nine-month period for which data were provided. During this period, the turbine was started 149 times. The CEMS data for CO, in particular, are suspect; more than 60% of the CO values reported were less than zero, indicating that the CO analyzer was not properly calibrated on a daily basis. For this reason, the CO data for this period were not analyzed further.

The NOx emissions data for this period were analyzed to evaluate compliance with five hypothetical emission limits (3.0, 2.5, 2.0, 1.5, and 1.3 ppm) and three compliance averaging periods (15 minute, 1 hour, 3 hour). Valid data periods were considered to be those that excluded startups, shutdowns, and initiation of fuel flow to the engine, and lasting until the NOx emission limit under evaluation was met, but not exceeding a period of two hours. Shutdown periods were defined to be periods ending with the cessation of documented CEMS maintenance. Startups were defined to be periods commencing with the fuel flow to the engine and starting when the NOx emission limit under evaluation was no longer met, but not exceeding a period of 30 minutes. A valid 1-hour average period was defined to require at least two valid 15-minute periods; a valid 3-hour average period was defined to require at least two valid 1-hour average periods. All of the above definitions are typical for utility-scale gas turbine CEMS systems.

Table K.7.1-3

[26] Letter dated March 14, 2000, from Katherine Poole, Adams Broadwell Joseph & Cardozo, to Steve Branoff, EPA Region IX.

[27] Letter dated June 28, 2000 from Duong Nguyen, EPA Region IX, to Nancy Matthews, Sierra Research.

SCONOx Performance – Summary Prepared by Sierra Research

April 1, 1999 to December 31, 1999

Plant Statistics

Total Hours in Review Period	6,400	
Number of Operating Hours	2,583	
Number of Turbine Starts	149	
Number of CEM Data Periods with Turbine Operating	10,331	
Number of negative CEM values		
NOx:	0	0%
CO:	6,494	63%

Valid Data Periods (Excludes Startup/Shutdown, CEM Maintenance)

NOx Limit (ppm) -> Averaging Period	3.0	2.5	2.0	1.5	1.3
15 min	9,861	9,813	9,742	9,649	9,607
1 hour	2,501	2,491	2,470	2,445	2,434
3 hour	2,498	2,488	2,468	2,445	2,434

Exceedance Periods (Excludes Startup/Shutdown, CEM Maintenance)

NOx Limit (ppm) -> Averaging Period	3.0	2.5	2.0	1.5	1.3
15 min	71	77	92	111	124
1 hour	18	21	24	29	32
3 hour	20	22	26	32	36

The data indicated that there were 9,600 to 9,900 valid 15-minute periods, excluding startups, shutdowns, and CEMS maintenance, depending on the NOx limit being evaluated. There were numerous exceedances of the hypothetical NOx limits during these periods, ranging from 71 periods in which NOx emissions exceeded 3.0 ppm to 124 periods in which NOx emissions exceeded 1.3 ppm.

There were approximately 2,500 valid 1-hour average periods in the data set, excluding startups, shutdowns, and CEMS maintenance. For 1-hour average limits, the data again showed numerous exceedances, ranging from 18 exceedances of a 3.0 ppm NOx limit to 32 exceedances of a 1.3 ppm limit. Finally, during the approximately 2,500 valid 3-hour average periods in the data set, there were 20 exceedances of a 3.0 ppm limit and 36 exceedances of a 1.3 ppm NOx limit.

In summary, this more recent data fail to support the conclusion that the SCONOx system at the Federal facility is capable of consistently maintaining low NOx levels of 3.0 ppm or less. Depending on the NOx limit evaluated, the periods of non-compliance over a nine-month period ranged from 18

to 32 hours, excluding periods of turbine startup, shutdown, and CEMS maintenance. While each of the exceedances was accompanied in the data file with an explanation, these explanations do not eliminate the exceedances. In fact, of the 24 exceedances of a 3.0 ppm NOx limit on a 1-hour average basis observed in the 1999 data, 14 were explicitly attributed to problems with the SCONOx system in the file presenting the CEMS data.

More recently, Goal Line Environmental has made available CEMS data from a five month period in 2000. The 2000 CEMS data from the Federal facility indicated that the turbine equipped with SCONOx was operated for approximately 2,000 hours during this five-month period. During this period, the turbine was started 135 times. The CEMS data for CO remain suspect; approximately 28% of the CO values reported were less than zero, indicating that the CO analyzer was not properly calibrated on a daily basis. For this reason, the CO data for this period were not analyzed further.

As with the 1999 data, the NOx emissions data for this period were analyzed to evaluate compliance with five hypothetical emission limits (3.0, 2.5, 2.0, 1.5, and 1.3 ppm) and three compliance averaging periods (15 minute, 1 hour, 3 hour). The same criteria used for the 1999 data for determining valid data periods, startup periods, and shutdown periods were used for the 2000 CEMS data. The data for 2000 are shown in Table K.7.1-4.

Table K.7.1-4

Sunlaw Cogeneration Partners
SCONOx Performance - Summary Prepared by Sierra Research
April 1, 2000 to August 31, 2000

Plant Statistics

Total Hours in Review Period	3,672	
Number of Operating Hours	2,021	
Number of Turbine Starts	135	
Number of CEM Data Periods with Turbine Operating	18,995	
Number of negative CEM values		
NOx:	0	0%
CO:	5,330	28%

Valid Data Periods (Excludes Startup/Shutdown, CEM Maintenance)

NOx Limit (ppm) -> Averaging Period	3.0	2.5	2.0	1.5	1.3
15 min	7,690	7,615	7,532	7,422	7,371
1 hour	2,003	1,994	1,967	1,931	1,913
3 hour	2,001	1,992	1,963	1,927	1,908

Exceedance Periods (Excludes Startup/Shutdown, CEM Maintenance)

NOx Limit (ppm) -> Averaging Period	3.0	2.5	2.0	1.5	1.3
15 min	45	50	59	74	84
1 hour	15	18	20	22	27
3 hour	16	19	21	25	29
Annualized Basis Averaging Period					
15 min	108	120	142	178	202
1 hour	36	43	48	53	65
3 hour	38	46	50	60	70

The data indicated that there were 7,300 to 7,700 valid 15-minute periods, excluding startups, shutdowns, and CEMS maintenance, depending on the NOx limit being evaluated. There were numerous exceedances of the hypothetical NOx limits during these periods, ranging from 108 periods in which NOx emissions exceeded 3.0 ppm to 202 periods in which NOx emissions exceeded 1.3 ppm.

There were approximately 2,000 valid 1-hour average periods in the data set, excluding startups, shutdowns, and CEMS maintenance. For 1-hour average limits, the data again showed numerous exceedances, ranging from 36 exceedances of a 3.0 ppm NOx limit to 65 exceedances of a 1.3 ppm

limit. Finally, during the approximately 2,000 valid 3-hour average periods in the data set, there were 38 exceedances of a 3.0 ppm limit and 70 exceedances of a 1.3 ppm NOx limit.

As was the case with the 1999 CEMS data, the 2000 CEMS data fail to demonstrate that the SCONOx system is capable of achieving NOx levels considered to represent BACT on a consistent basis.

Table K.7.1-5 compares the results of the analyses of the 1997, 1999 and 2000 data, with all three data sets normalized to predict exceedances over a 12-month period.

The more recent data do not indicate improved performance as compared with the 1997 CEMS data.

Table K.7.1-5
Comparison of 1997, 1999 and 2000 SCONOx CEMS Data
Exceedances of Hypothetical Permit Limits – Annualized Basis
(Excluding startups/shutdowns/CEMS maintenance)

Data Set	1-hour average			3-hour average		
	3.0 ppm limit	2.5 ppm limit	2.0 ppm limit	3.0 ppm limit	2.5 ppm limit	2.0 ppm limit
1997	16	24	38	12	18	44
1999	24	28	32	26	29	34
2000	36	43	48	38	46	50

In addition to performance-related issues regarding SCONOx, there are concerns regarding the demonstration of durability of the regeneration gas and damper/sealing systems, and the ability of the SCONOx system to respond to transient conditions that result in changes in turbine-exhaust NOx levels.

With respect to the damper/sealing system, there have been three different designs discussed in technical literature regarding SCONOx. Table K.7.1-6 summarizes these designs.

Table K.7.1-6
Summary of SCONOx Installations

	Federal Cogeneration[1]	Genetics Institute[1]	Proposed Future (F-class turbine)
Regeneration Gas System			
Regeneration system type	Direct hydrogen injection	External reformer	External reformer
Regen Gas Flow Rate	1520 acfm	1050 acfm	
SCOSOx (Guard Bed) Catalyst System			
Cell Density	Not installed (periodic water washing of catalyst is performed instead)		
Substrate			
Catalyst Volume		26.25 cu ft	
Space Velocity - Absorption - Regeneration		 116,630 6,000	 114,000 4,000
Cycle Times - Absorption - Regeneration		 12 min 3 min	
SCONOx Catalyst System			
Cell Density	230	230	
Substrate	Ceramic	Ceramic	
Catalyst Volume	294 cu ft	157.5 cu ft	
Space Velocity - Absorption - Regeneration	 11,100 275	 19,440 1,000	 22,000 750
Cycle Times - Absorption - Regeneration	 12 min 4 min	 12 min 3 min	
Damper/Seal Systems			
Number of Modules	4	5	40-60[2]
Number of Dampers	12	10	80-120[2]
Damper Type	Louver, flap type	Louver, flap type	Louver, flap type
Damper Support	End supported	Center supported	Center supported
Misc			
Seal Material/Type	316 SS, 'S' type	Fiberglass/stainless steel wool tadpole design	
Actuator Type	Electrical	Electrical	

Notes:
1. Stone & Webster, op cit
2. Modules are joined, four together, to form linked "shelves."

Stone and Webster reported that the initial operation of the SCONOx system at the Genetics Institute facility resulted in a rapid loss of performance due to a lack of regeneration. This problem was traced to mechanical deficiencies, including seal and gasket leakage. Corrective actions taken included replacement of the flexible metal damper seals with tadpole seals, installation of a manual throttling valve in the gas return line, re-gasketing and re-sealing of the heat exchanger flanges, and adjustment of the damper actuators. Further changes to the overall system included adding an external reformer, adding a sulfur filter to remove sulfur from the gas that feeds the external reformer, and modifying the damper/seal system.

Although the damper/sealing system was subjected to a 101,000 cycle test (equivalent to approximately 25,000 operating hours based on 15-minute cycle times), Stone & Webster reported that a number of damper/seal design changes have been proposed by ABB based on those test results. These changes include a modification to the tadpole design to avoid excessive stress at the location where the damper blade rests on the seal, and modifications to the shaft design to preclude leaks associated with fabric failure near the shaft-seal interface.

As of the date of their report (February 22, 2000), Stone & Webster indicated that full-scale testing of the new seal design had not been performed. In particular, Stone & Webster noted that "the use of fiberglass in the temperature range of 600°F to 700°F with frequent flexing and relaxing, over the expected design period of three years, is yet to be demonstrated." Although ABB has issued a subsequent letter report addressing the concerns raised by Stone & Webster, there is not a supplemental, independent engineering review in the public domain to confirm ABB's conclusions.

Based on this information, the following paragraphs evaluate the proposed AIP criteria as applied to the achievement of extremely low NOx levels (2.5 ppm and lower) using SCONOx technology.

Commercial availability: It is not clear whether SCONOx technology is presently available with standard commercial guarantees for NOx levels at least as low as 2.5 ppm. A request for a copy of the guarantee for SCONOx performance from the developers of the Otay Mesa Generating Project was rejected. An excerpt of the guarantee from the system vendor to Sunlaw Energy, a co-developer of the SCONOx system, was included as an appendix to the Application for Certification for the Nueva Azalea project. However, this guarantee is between two parties with a common financial interest in

the demonstration and sale of the SCONOx system, and thus is not necessarily representative of a standard commercial guarantee. Public statements by ABB Environmental, the exclusive licensee of the SCONOx system for gas turbines with a capacity greater than 100 MW, indicate that standard commercial performance guarantees will be provided for this system upon request. It is unclear, however, whether this guarantee will be passed on by the HRSG vendors and/or EPC contractors, as is standard in the industry. In fact, a potential supplier of an HRSG system for a power plant project in California has indicated, in writing, that the supplier would not back up ABB's performance guarantees or warranty claims because the supplier was "not comfortable with the scale up from the existing size of the current technology."[28] Thus, it is possible that this criterion is satisfied but, as yet, there is no publicly available documentation to support such a conclusion. The only publicly available documentation indicates that SCONOx is not commercially available for F-class turbines with standard commercial performance guarantees.

Reliability: To date, there have been no unqualified demonstrations of the ability of the SCONOx system to meet NOx levels of 3 ppm or lower over extended periods of time. The demonstrations at the Federal Cogeneration facility have indicated numerous circumstances under which a 3 ppm level would be exceeded (excluding startup and shutdown conditions), with data from as recently as 2000 having been evaluated. Furthermore, the SCONOx system at the Federal facility uses a different scheme for catalyst regeneration, sulfur protection, and dampers/sealing than that proposed for use in a full-scale, commercial project. The catalyst regeneration system used at the Federal facility involved direct hydrogen injection to the catalyst bed; this system appears to have been rejected for use by ABB Environmental for larger, utility-scale applications. The current sulfur protection system for the SCONOx catalyst-the SCOSOx guard bed system-was not used at the Federal facility, and the sulfur protection system used at the Federal facility (periodic water washing of catalyst elements) appears to have been rejected by ABB Environmental for larger, utility-scale applications. Finally, the end-supported damper system with metal seals used at the Federal facility appears to have been rejected by ABB Environmental for larger, utility-scale applications. Consequently, the Federal facility is not indicative of the reliability of the SCONOx system for utility-scale applications.

The SCONOx installation at the Genetics Institute facility currently uses the new designs for catalyst regeneration, sulfur protection, and dampers/sealing. However, problems associated with that

[28] Telefax message dated June 15, 2000 from Aalborg Industries to Duke/Fluor-Daniel.

facility's ability to consistently meet NOx levels lower than 2.5 ppm were reported as recently as January 2001.[29] As a result of these problems, the Genetics Institute has sought and received a permit modification that extends the SCONOx demonstration period through April 2002. The current NOx permit limit applicable to the Genetics Institute SCONOx facility is 25 ppm. Consequently, the Genetics Institute facility does not yet constitute a demonstration that the SCONOx system can reliably meet NOx levels of less than 2.5 ppm.

Furthermore, the revised damper/seal system in use at the Genetics Institute facility has not been fully tested in field service, as noted by Stone & Webster. The next-prior version of the damper/seal system, which was tested for ABB Environmental in a test facility, exhibited failures of various kinds after approximately 60,000 cycles. Improvements to the damper/seal system to address those failures have not been similarly tested (or, at least, the reports of any such tests have not been presented publicly). Since an F-class gas turbine is expected to require the use of 40-60 modules, with 40-60 pairs of dampers/seals, 40-60 shaft actuators, and approximately 2.7 million damper-cycles per turbine per year,[30] it is unclear that the performance tests conducted to date demonstrate the ability of this portion of the system to ensure compliance with sub-3 ppm NOx levels on a continuous basis.

Effectiveness: As discussed above, the Federal facility uses different catalyst regeneration, sulfur protection, and sealer/damper systems than those being offered for F-class turbines by ABB Environmental. Thus, it is not clear that the Federal installation can be used to demonstrate the effectiveness of the systems being proposed for larger, utility-scale projects. The SCONOx configuration at the Genetics Institute facility is more similar to that proposed for larger turbines; however, that facility "has met or exceeded the performance requirement of 2.5 ppm [NOx] for approximately 330 hours, out of the total hours of operation of approximately 410 hours for which valid data is available."[31] This means that the 2.5 ppm NOx performance target was <u>not</u> met during approximately 20% of the hours within this period. As noted above, many of the exceedances of the 2.5 ppm NOx level at the Genetics Institute site were attributable to operation of the gas turbine's transient pilot. More recent data from the Genetics Institute site indicate that the NOx permit limit of

[29] Letter dated January 15, 2001 from Genetics Institute to EPA Region I indicating that NOx emissions in excess of 2.5 ppm were experienced during 13.7% of the plant's operating time in the fourth quarter of 2000 due to control equipment problems.
[30] Calculated as 40 pairs of dampers per turbine, 2 dampers per pair, 4 cycles per damper per hour, 8400 operating hours per year: 40 x 2 x 4 x 8400 = 2,688,000 damper cycles per year per turbine.
[31] Stone & Webster, op cit

2.5 ppm was exceeded during 14% of operating hours in the fourth quarter of 2000 due to control equipment problems. Consequently, the available data from that site are not sufficient to conclude that NOx levels of 2.5 ppm or less can be achieved using the SCONOx system on a consistent basis, nor are the available data from the Federal site suitable for reaching such a conclusion. At a minimum, if SCONOx technology were used to achieve extremely low NOx levels, permit conditions would need to reflect the potential for frequent NOx excursions under specified conditions.

Conclusion: SCONOx technology has been found to be capable of achieving NOx levels below 2.5 ppm by the South Coast AQMD and EPA. However, the presently available technical information does not support a conclusion that this technology is achieved in practice based on South Coast AQMD guidelines.

e. Select BACT

Based on the above analysis, both SCR and SCONOx-based systems are considered, in general, to be technologically capable of achieving NOx levels below 2.5 ppm, given appropriate consideration to turbine outlet NOx levels, catalyst volume (space velocity) and control system design. For both types of systems, some provision will be necessary to accommodate short-term excursions above permit limits, and for both types of systems, particular attention to CEMS design will be necessary to ensure that low permit limits can be monitored on a continuous and accurate basis.

Based on this information, BACT for NOx is considered to be the use of either SCR or SCONOx systems to achieve NOx levels not higher than 2.5 ppm on a 1-hour average basis, or 2.0 ppm on a 3-hour average basis. The IEEC project proposes to use SCR technology to meet a NOx level of 2.5 ppm on a 1-hour average basis, and 2.0 ppm on an annual average basis. Consequently, the IEEC project is consistent with BACT requirements.

2. Control of Ammonia Emissions

a. Identify all control technologies

Ammonia emissions result from the use of ammonia-based NOx control technologies. Consequently, only an abbreviated discussion of these technologies is restated here.

There are three basic means of controlling NOx emissions from combustion turbines: wet combustion controls, dry combustion controls, and post-combustion controls. These technologies were discussed above.

Water and steam injection are control technologies that, for large gas turbines, have been largely superseded by dry low-NOx combustors, due to the superior emission control performance, additional CO and VOC benefits, and increased efficiency of this technology. Since the project proposes to use dry low NOx combustors, no further discussion of water injection, steam injection, or dry low NOx combustors is necessary.

b. Eliminate technically infeasible options

The performance of SCR and SCONOx, insofar as NOx emission levels are concerned, has been discussed above.

c. Rank remaining control technologies by control effectiveness

SCONOx results in no emissions of ammonia, while SCR results in ammonia slip levels of up to 10 ppm. The following discussion evaluates potential ammonia slip limits of 10 ppm, 5 ppm, 2 ppm, and 0 ppm. The latter limit would be achievable, at the present time, only through the use of SCONOx technology.

d. Evaluate most effective controls and document results

SCR has been achieved in practice at numerous gas turbine installations throughout the world. Although there are a large number of gas turbines equipped with SCR systems, there are relatively fewer operating systems that are designed to meet low NOx permit limits of 3.0 ppm or less. Ammonia slip associated with SCR system operation results from a gradual decline in catalyst activity over time, necessitating the use of increasing amounts of ammonia injection to maintain NOx concentrations at or below the design rate.

The parameters of NOx concentration, ammonia slip limit, and catalyst life are integrally related. That is, catalyst performance is generally specified as being a particular NOx concentration (e.g., 2.5 ppm), guaranteed for N years (e.g., 3 years), with a maximum ammonia slip level of X ppm (e.g., 5 ppm). Such a specification indicates that catalyst performance will degrade over time such that at the end of three years, ammonia slip will increase to not more than 5 ppm while maintaining NOx concentrations at or below 2.5 ppm. During the early period of performance, ammonia slip from an oxidation catalyst is typically less than 1-2 ppm, and will approach the guarantee level only towards the end of the catalyst life.

Early SCR installations, as well as some later installations, have been associated with ammonia slip levels of 10 ppm. In August 1999, the California Air Resources Board adopted a BACT guideline for large gas turbines that proposed to limit ammonia slip to not more than 5 ppm.
Ammonia slip levels of 2 ppm have been required in several permits issued in the eastern United States. However, these permits have typically been associated with higher NOx levels than are proposed here. In particular, the 2 ppm ammonia slip limits have been proposed in conjunction with NOx levels that range between 2.0 and 3.5 ppm, depending on operating mode. Although IEEC is proposing a 1-hour average NOx limit of 2.5 ppm, the facility is also proposing an annual average goal of 2.0 ppm.

Finally, SCONOx has the potential to achieve this low a NOx level without any ammonia slip.

Consequently, the following discussion compares the use of SCR with a 10 ppm ammonia slip level with SCONOx to meet comparable NOx levels, but without any ammonia slip.

SCR technology is available with standard commercial guarantees with ammonia slip levels of 10, 5, and 2 ppm, in conjunction with NOx levels at least as low as 2 ppm. However, we are unaware of any commercial guarantees for NOx levels of 1 ppm and ammonia slip levels of 2 ppm.

SCR technology has been shown to be capable of achieving ammonia slip levels below 5 ppm over at least a three year catalyst life period. There are no reported adverse effects of operation of the SCR system at these levels on overall plant operation or reliability.

The SCAQMD's web site lists three SCR-based BACT determinations for ammonia slip.

The earliest SCR-based BACT determination for ammonia slip listed on the SCAQMD's web site is for the Sutter Power Project, which was approved by the Feather River AQMD in April 1999. This project is required to meet an ammonia slip limit of 10 ppm on a 3-hour average basis, in conjunction with a 2.5 ppm NOx limit on a 1-hour average basis.

The next SCR-based BACT determination for ammonia slip listed on the SCAQMD's web site is for the La Paloma Generating project, which was approved by the San Joaquin Unified APCD in October 1999. This project is required to meet a 10 ppm ammonia slip limit on a 24-hour average basis in conjunction with a 2.5 ppm NOx limit on a 1-hour average basis.

The third SCR-based BACT determination for ammonia slip listed on the SCAQMD's web site is for the Sithe Energy Mystic facility, which was approved by the Massachusetts Department of Environmental Protection (Mass DEP) in January 2000. This project is required to comply with a 2 ppm ammonia slip limit on a 1-hour average basis in conjunction with a 2 ppm NOx limit, 1-hour average basis. The Sithe Mystic facility is also required to evaluate the availability, reliability, and cost of technologies that eliminate ammonia slip emissions, in accordance with the terms of a Memorandum of Understanding between the project operator and Mass DEP.

These permits indicate that, as recently as one year ago, ammonia slip limits of 10 ppm were considered best available control technology. The rapid changes during the last year is indicative of increasing confidence of SCR system vendors in sustaining low ammonia slip rates in conjunction with low NOx emission rates. However, given the lack of any real-world demonstration of these low

NOx and ammonia slip levels at the present time, BACT for ammonia slip using SCR-based controls is considered to be 10 ppm for this project. An additional reason supporting the 10 ppm ammonia slip level is the proposed use of GE Frame 7FB gas turbines for this project. Because this is a new gas turbine design, GE will only guarantee a NOx emission level of 25 ppm. This gas turbine NOx emission guarantee makes the simultaneous achievement of ultra-low NOx and ammonia slip levels problematic.

Consequently, if an SCR-based control system is selected, BACT for ammonia slip should be an emission limit of 10 ppm.

Since SCONOx technology to eliminate ammonia slip may be technologically feasible, a further evaluation of the cost/effectiveness of this technology was performed. In this analysis, the cost of a SCONOx system was compared with the cost of an SCR and oxidation catalyst system, with the incremental cost assigned to the benefit of eliminating ammonia slip emissions. (It is appropriate to make such an assignment because the performance of the SCR and oxidation catalyst systems are comparable to that proposed for SCONOx with respect to NOx and CO emission levels for this project.)

As shown in Tables K.7.1-7A through 7D, the results of this analysis indicate that the incremental cost/effectiveness of the SCONOx system for the purpose of reducing ammonia emissions is nearly $50,000 per ton.

The South Coast AQMD no longer publishes cost/effectiveness criteria for use in performing BACT analyses. In the absence of SCAQMD-specific criteria, the following values are presented to provide a reference for the calculated cost/effectiveness of SCONOx as an ammonia control device. Since ammonia is regulated as a precursor to PM_{10}, the values shown below represent the BACT cost/effectiveness thresholds for PM_{10}:

Bay Area AQMD -	$5,300 /ton
San Joaquin Valley Unified APCD -	$5,700 /ton

While these values are not, by themselves, determinative, they indicate that the cost/effectiveness of using SCONOx to eliminate ammonia emissions is well in excess of costs that are normally required for the control of PM_{10} in BACT determinations in areas of California that exceed the state and/or federal PM_{10} air quality standards.

e. Select BACT

Based on the above information, BACT for ammonia is considered to be an ammonia slip limit of 10 ppm. SCONOx has the potential to eliminate ammonia emissions; however, this candidate technology was rejected for the reasons discussed above.

The IEEC project proposes to use SCR technology to meet an ammonia slip limit of 10 ppm in conjunction with NOx levels of 2.5 ppm on a 1-hour average basis and 2.0 ppm on an annual average basis. Consequently, IEEC's proposal is consistent with BACT requirements for ammonia emissions.

Table K.7.1-7A

SCR Costs (per gas turbine/HRSG)

Description of Cost				Cost Factor	Cost ($)	Notes
Direct Capital Costs (DC):						
Purchased Equip. Cost (PE):						
Basic Equipment:						
Auxiliary Equipment: HRSG tube/fin modifications						
Instrumentation: SCR controls						
Ammonia storage system:						
Taxes and freight:						
PE Total:					$1,620,000	1
Direct Install. Costs (DI):						
Foundation & supports:				0.08 PE	$129,600	2
Handling and erection (included in PE cost):					$0	1
Electrical (included in PE cost):					$0	1
Piping (included in PE cost):					$0	1
Insulation (included in PE cost):					$0	1
Painting (included in PE cost):					$0	1
DI Total:					$129,600	
Site preparation for ammonia tanks					$10,000	1
DC Total (PE+DI):					$1,759,600	
Indirect Costs (IC):						
Engineering:				0.10 PE	$162,000	2
Construction and field expenses:				0.05 PE	$81,000	2
Contractor fees:				0.10 PE	$162,000	2
Start-up:				0.02 PE	$32,400	2
Performance testing:				0.01 PE	$16,200	2
Contingencies:				0.05 PE	$81,000	1
IC Total:					$534,600	
Less: Capital cost of initial catalyst charge					-$975,000	
Total Capital Investment (TCI = DC + IC):					$1,319,200	
Direct Annual Costs (DAC): 0.5 hr/SCR per shift				hr/yr: 4,380		
Operating Costs (O): sched. (hr/day 24			day/week: 7	wk/yr: 52		
Operator:	hr/shift:	1.0	operator pay ($/hr):	39.20	$42,806	2
Supervisor:	15% of operator				$6,421	2
Maintenance Costs (M): 0.5 hr/SCR per shift						
Labor:	hr/shift:	1.0	labor pay ($/hr):	39.2	$42,806	2
Material:	% of labor cos	100%			$42,806	2
Utility Costs:						
Perf. loss:	(kwh/unit):	347.6				1
Electricity cost	($/kwh):	0.0336	Performance loss cost penalty:		$102,311	5
Ammonia	based on 153 lbs/hr of 24.5% wt aqueous ammonia, $0.05/lb				$73,883	1, 4
Catalyst replace:	based on 3 year catalyst life				$325,000	1
Catalyst dispose:	based on 2,750 ft³ catalyst, $15/ft³, 3 yr. Life				$13,750	1
Total DAC:					$649,784	
Indirect Annual Costs (IAC):						
Overhead:	60% of O&M				$80,904	2
Administrative:				0.02 TCI	$26,384	2
Insurance:				0.01 TCI	$13,192	2
Property tax:				0.01 TCI	$13,192	2
Total IAC:					$133,672	
Total Annual Cost (DAC + IAC):					$783,456	
Capital Recovery (CR):						
Capital recovery:	interest rate (%)	10				
	period (years):	15		0.1315	$173,440	2
Total Annualized Costs					$956,897	

Table K.7.1-7B

Oxidation Catalyst Costs (per gas turbine/HRSG)

Description of Cost	Cost Factor	Cost ($)	Notes
Direct Capital Costs (DC):			
Purchased Equip. Cost (PE):			
Basic Equipment:			
Auxiliary Equipment: HRSG tube/fin modifications			
Instrumentation: oxidation cat. Controls			
Taxes and freight:			
PE Total:		$725,000	1
Direct Install. Costs (DI):			
Foundation & supports:	0.08 PE	$58,000	2
Handling and erection (included in PE cost):		$0	1
Electrical (included in PE cost):		$0	1
Piping (included in PE cost):		$0	1
Insulation (included in PE cost):		$0	1
Painting (included in PE cost):		$0	1
DI Total:		$58,000	
DC Total (PE+DI):		$783,000	
Indirect Costs (IC):			
Engineering:	0.10 PE	$72,500	2
Construction and field expenses:	0.05 PE	$36,250	2
Contractor fees:	0.10 PE	$72,500	2
Start-up:	0.02 PE	$14,500	2
Performance testing:	0.01 PE	$7,250	2
Contingencies:	0.05 PE	$36,250	1
IC Total:		$239,250	
Less: Capital cost of initial catalyst charge		-$350,000	
Total Capital Investment (TCI = DC + IC):		$672,250	
Direct Annual Costs (DAC):	hr/yr: 4,380		
Operating Costs (O): sched. (hr/day 24	day/week: 7 wk/yr: 52		
Operator: hr/shift: 0.0	operator pay ($/hr): 39.20	$0	2
Supervisor: 15% of operator		$0	2
Maintenance Costs (M): 0.5 hr/oxidation cat. per shift			
Labor: hr/shift: 0.0	labor pay ($/hr): 39.2	$0	2
Material: % of labor cos 100%		$0	2
Utility Costs:			
Perf. loss: (kwh/unit): 172.5			1
Electricity cost ($/kwh): 0.0336	Performance loss cost penalty:	$50,773	5
Catalyst replace: based on 3 yr. Life		$116,667	1
Catalyst dispose: based on 240 ft^3 catalyst, $15/$ft^3$, 3 yr. Life		$1,200	1
Total DAC:		$168,640	
Indirect Annual Costs (IAC):			
Overhead: 60% of O&M		$0	2
Administrative:	0.02 TCI	$13,445	2
Insurance:	0.01 TCI	$6,723	2
Property tax:	0.01 TCI	$6,723	2
Total IAC:		$26,890	
Total Annual Cost (DAC + IAC):		$195,530	
Capital Recovery (CR):			
Capital recovery factor (CRF): interest rate (%): 10			
period (years): 15	0.1315	$88,383	2
Total Annualized Costs		$283,913	

Table K.7.1-7C

SCONOx Cost and Cost/Effectiveness (per gas turbine/HRSG)

Description of Cost		Cost ($)	Notes
Direct Capital Costs			
	Capital (less cost of initial catalyst charge)	$3,900,000	3, 7
	Installation	$1,700,000	3
Indirect Capital Costs			
	Engineering	$200,000	3
	Contingency	$250,000	3
	Other	-	
Total Capital Investment		$6,050,000	
Direct Annual Costs			
	Maintenance	$250,000	3
	Ammonia	-	3
	Steam/Natural Gas	$400,000	3
	Pressure Drop	$226,000	3
	Catalyst Replacement (based on 3-yr catalyst life)	$3,033,333	7, 8
	Catalyst Disposal	$0	
Total Direct Annual Costs		$3,909,333	
Indirect Annual Costs			
	Overhead	-	3
	Administrative, Tax & Insurance	$225,000	3
Total Indirect Annual Costs		$225,000	
TOTAL ANNUAL COST		$4,134,333	
Capital Recovery Factor		0.1315	2
Capital Recovery		$795,416	
TOTAL ANNUALIZED COSTS		$4,929,750	

SCONOx Ammonia Cost Effectiveness (per gas turbine/HRSG)

Description of Cost		Cost ($)	Notes
SCONOx Annualized Costs		$4,929,750	
SCR Annualized Costs		$956,897	
Oxidation Cat. Annualized Costs		$283,913	
SCR/Oxidation Cat. Annualized Costs		$1,240,809	
Incremental Annualized Costs		$3,688,940	
Annual Ammonia Emissions with SCR (tons/yr)		74.02	6
Annual Ammonia Emissions with SCONOx (tons/yr)		0	
Reduction in Ammonia Emissions (tons/yr)		74.02	
SCONOx COST EFFECTIVENESS ($/ton removed)		$49,836	

Table K.7.1-7D

Notes: SCONOx Ammonia Cost Effectiveness Analysis

Note No.	Source
1	Based on information from Duke/Fluor Daniel.
2	From EPA/OAQPS Control Cost Manual. EPA-450/3-90-006. January 1990.
3	From April 12, 2000 letter from ABB Alstom Power to Matt Haber EPA Region IX (SCONOx capital cost of $13,000,000).
4	Based on anhydrous ammonia cost of $450/ton.
5	Based on current average price of power in the project area.
6	Based on G.E. 7FA Gas Turbine/HRSG operating at 100% load, 43 deg. F ambient, duct burner on, ammonia slip of 5 ppm @ 15% O2, operating 24 hours per day, 365 days per year.
7	Based on information from May 8, 2000 "Testimony of J. Phyllis Fox, Ph.D. on Behalf of the California Unions for Reliable Energy on Air Quality Impacts of the Elk Hills Power Project", cost of replacement catalyst for SCONOx is 70% of initial capital investment.
8	Based on information from May 5, 2000 letter from ABB Alstom Power to Bibb and Associates indicating that SCONOx catalyst life is guaranteed for a 3-year period.

K-8: Cumulative Impacts Analysis Protocol

CUMULATIVE IMPACTS ANALYSIS PROTOCOL

Potential cumulative air quality impacts that might be expected to occur, resulting from the Project and other reasonably foreseeable projects, are both regional and localized in nature. These cumulative impacts will be evaluated as follows.

Regional Impacts

Regional air quality impacts are possible for pollutants such as ozone, which involve photochemical processes that can take hours to occur. The Project will be required to provide emissions offsets (mitigation) for ozone precursors at a 1.2 to 1.0 ratio for VOC emissions and a 1.0 to 1.0 ratio for NOx emissions.

Although the relative importance of VOC and NOx emissions in ozone formation differs from region to region, and from day to day, most air pollution control plans in California require roughly equivalent controls (on a ton-per-year basis) for these two pollutants. The change in emissions of the sum of these pollutants, equally weighted, will be able to provide a rough estimate of the impact of the project on ozone levels. The net change in emissions of ozone precursors from the project will be compared with emissions from all sources within Riverside County and the South Coast Air Basin as a whole.

Air quality impacts of fine particulate, or PM_{10}, have the potential to be either regional or localized in nature. On a regional basis, an analysis similar to that presented above for ozone will be performed, looking at the three pollutants that can form PM_{10} in the atmosphere, VOC, SOx, and NOx, as well as at directly emitted particulate matter. SCAQMD regulations will require offsets to be provided for PM_{10} emissions from the project at a ratio of 1.2 to 1.0.

As in the case of ozone precursors, emissions of PM_{10} precursors are expected to have approximately equivalent ambient impacts in forming PM_{10} per ton of emissions on a regional basis. A table will be provided that compares the net change in emissions of PM_{10} precursors from the project with emissions from all sources within Riverside County and the South Coast Air Basin as a whole.

Localized Impacts

Localized impacts from the Project could result from emissions of carbon monoxide, oxides of nitrogen, sulfur oxides, and directly emitted PM_{10}. A dispersion modeling analysis of potential cumulative air quality impacts will be performed for all four of these pollutants.

In evaluating the potential cumulative localized impacts of the Project in conjunction with the impacts of existing facilities and facilities not yet in operation but that are reasonably foreseeable, a potential impact area in which cumulative localized impacts could occur will first be identified. In order to ensure that other projects that might have significant cumulative impacts in conjunction with the project are identified, a search area with a radius of 10 km from the project site will be used for the cumulative impacts analysis.

Within this search area, three categories of projects with combustion sources will be used as criteria for identification:

- Projects that are existing and have been in operation since at least 1999.
- Projects for which air pollution permits to construct have been issued and that began operation after 1999.
- Projects for which air pollution permits to construct have not been issued, but that are reasonably foreseeable.

Projects that are existing and have been in operation since at least 1999 will be reflected in the ambient air quality data that are being used to represent background concentrations; consequently, no further analysis of the emissions from this category of facilities will be performed. The cumulative impacts analysis adds the modeled impacts of selected facilities to the maximum measured background air quality levels, thus ensuring that these existing projects are accounted for.

Projects for which air pollution permits to construct have been issued but that were not operational by 1999 will be identified through a request of permit records from SCAQMD. The search will be requested for new or modified emission sources located within 10 km of the project site that have net emission increases greater than 10 lbs/day for CO, NOx, SOx, or PM_{10}. Projects that satisfy this criteria and that had a permit to construct issued after January 1, 1999, will be included in the cumulative air quality impacts analysis. The January 1, 1999 date was selected based on the typical

length of time a permit to construct is valid and typical project construction times to ensure that projects that are not reflected in the 1999 ambient air quality data are included in the analysis.

A list of projects within the area for which air pollution permits to construct have not yet been issued, but that are reasonably foreseeable, will also be requested from the SCAQMD staff.

Given the potentially wide geographic area over which the dispersion modeling analysis is to be performed, the ISCST3 model will be used to evaluate cumulative localized air quality impacts. The detailed modeling procedures, ISCST3 options, and meteorological data used in the cumulative impacts dispersion analysis will be the same as those used in the ambient air quality impacts analyses for the Project. The receptor grid will be spaced at 180 meters and will cover the area in which the detailed modeling analysis performed for the Project indicates the project will have impacts that exceed the PSD significance levels.

Cumulative Impacts Dispersion Modeling

The dispersion modeling analysis of cumulative localized air quality impacts for the proposed project will be evaluated in combination with other reasonably foreseeable projects and air quality levels attributable to existing emission sources, and the impacts will be compared to state or federal air quality standards for significant impact. As discussed above, the highest second-highest modeled concentrations will be used to demonstrate compliance with standards based on short-term averaging periods (24 hours or less).

Supporting information will be provided, including the following:

- 1997 emissions inventory for Riverside County and the South Coast Air Basin;
- List of projects resulting from the screening analysis of permit files by the SCAQMD;
- Map showing locations of sources included in the cumulative air quality impacts dispersion modeling analysis;
- Stack parameters for sources included in the cumulative air quality impacts dispersion modeling analysis; and
- Output files for the dispersion modeling analysis

K-9: Screening Level Risk Assessment – Emissions of Noncriteria Pollutants and HRA Model

APPENDIX K-9 SCREENING HEALTH RISK ASSESSMENT
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Attachments

A. Acute Inhalation Exposure Report
B. Chronic Inhalation Exposure Report
C. Chronic Non-Inhalation Exposure Report
D. Individual Cancer Risk Report

1.0 INTRODUCTION

A screening health risk assessment (SHRA) was conducted to determine expected impacts on public health of the toxic pollutant emissions from the proposed Project. The SHRA was conducted in accordance with the California Air Pollution Control Officers Association (CAPCOA) Air Toxics "Hot Spots" Program Revised 1992, Risk Assessment Guidelines. The SHRA estimated the offsite cancer risk to the maximally exposed individual (MEI), as well as indicated any adverse effects of non-carcinogenic compound emissions. The California Air Resources Board (CARB)/Office of Environmental Health and Hazard Assessment (OEHHA) computer program was used to evaluate multipathway exposure to toxic substances. Because of the conservatism (overprediction) built into the established risk analysis methodology, the actual risks will be lower than those estimated.

A health risk assessment requires the following information:

- Unit risk factors (or carcinogenic potency values) for any carcinogenic substances that may be emitted;
- Noncancer Reference Exposure levels (RELs) for determining non-carcinogenic health impacts;
- One-hour and annual average emission rates for each substance of concern; and
- The modeled maximum offsite concentration of each of the pollutants emitted.

Pollutant-specific unit risk factors are the estimated probability of a person contracting cancer as a result of constant exposure to an ambient concentration of 1 $\mu g/m^3$ over a 70-year lifetime. The SHRA uses unit risk factors specified by the OEHHA. The cancer risk for each pollutant emitted is the product of the unit risk factor and the modeled concentration. All of the pollutant cancer risks are assumed to be additive.

An evaluation of the potential noncancer health effects from long-term (chronic) and short-term (acute) exposures has also been included in the SHRA. Many of the carcinogenic compounds are also associated with noncancer health effects and are therefore included in the determination of both cancer and noncancer effects. RELs are used as indicators of potential adverse health effects. RELs are generally based on the most sensitive adverse health effect reported and are designed to protect the most sensitive individuals. However, exceeding the REL does not automatically indicate a health impact. The OEHHA reference exposure levels were used to determine any adverse health effects from noncarcinogenic compounds. A hazard index for each noncancer pollutant is then determined by the ratio of the pollutant annual average concentration to its respective REL for a chronic evaluation. The individual indices are summed to determine the overall hazard index for the project. Because noncancer compounds do not target the same system or organ, this sum is considered conservative. The same procedure is used for the acute evaluation.

SHRA results are compared with the established risk management procedures for the determination of acceptability. The established risk management criteria include those listed below.

- If the potential increased cancer risk is less than one in a million, the facility risk is considered not significant.
- If the potential increased cancer risk is greater than one in a million but less than ten in a million and Toxics-Best Available Control Technology (TBACT) has been applied to reduce risks, the facility risk is considered acceptable.
- If the potential increased cancer risk is greater than ten in a million and there are mitigating circumstances that, in the judgment of a regulatory agency, outweigh the risk, the risk is considered acceptable.
- For noncancer effects, total hazard indices of one or less are considered not significant.
- For a hazard index greater than one, OEHHA and the reviewing agency conduct a more refined review of the analysis and determine whether the impact is acceptable.

2.0 HAZARD IDENTIFICATION

The toxic air pollutant emissions for the new gas turbines/heat recovery generators (HRSG) summarized on Table K-9-1 were calculated using the natural gas-fired steam gas turbine AP-42 emission factors with the exception of formaldehyde and polynuclear aromatic hydrocarbons (PAH) factors. According to the principal technical author of this section of AP-42, none of the AP-42 emissions factors for toxic air pollutants are based on tests of gas turbines equipped with the types of combustors proposed for use at the Inland Empire Energy Center (IEEC) facility. For formaldehyde in particular, there is a more representative source test available. Consequently, for this analysis the emission factor for formaldehyde is based on source tests performed on an F-class gas turbine at Calpine's Pasadena, TX power plant. For PAH, the AP-42 emission factor only shows total PAHs and does not break the factor down into separate factors for each individual PAH compound. Since some compounds of PAH are carcinogenic and some are not, rather than using the total PAH AP-42 emission factor, the SHRA was performed using the individual CATEF PAH emission factors. Also, since the AP-42 emission factors do not include factors for hexane or propylene, this analysis was performed using the CATEF emission factors for these two compounds.

For the auxiliary boiler, the emissions summarized on Table K-9-2 are based on factors from the Ventura County Air Pollution Control District (APCD) AB2588 emission factor summary document (Ventura County APCD AB2588 Combustion Emission Factors, August 2000). The toxic emissions for the cooling tower summarized on Table K-9-3 are based on the maximum metal concentrations expected for the cooling water and the expected cooling tower drift rate of 0.0005%. The toxic emissions for the fire pump engine summarized in Table K-9-4 are based on vendor data.

Table K-9-1 Toxic Air Emissions for Gas Turbines (per gas turbine)

Compound	Emission Factor, lb/MMscf	Emissions, lb/hr	Emissions, Tons/year
Acetaldehyde(1)	4.08E-002	0.1015	0.39
Acrolein(1)	3.69E-003	0.0092	0.03
Ammonia	-	33.68	147.54
Benzene(1)	3.33E-003	0.0083	0.03
1,3-Butadiene(1)	4.39E-004	0.0011	0.00
Ethylbenzene(1)	3.26E-002	0.0811	0.31
Formaldehyde(1)	1.65E-001	0.4106	1.56
Hexane(1)	2.59E-001	0.6446	2.45
Naphthalene(1)	1.33E-003	0.0033	0.01
PAH-Anthracene	3.38E-005	0.0001	0.00
PAH-Benzo(a)anthracene	2.26E-005	0.0001	0.00
PAH-Benzo(a)pyrene	1.39E-005	0.0000	0.00
PAH-Benzo(b)flouranthrene	1.13E-005	0.0000	0.00
PAH-Benzo(k)fluoranthrene	1.10E-005	0.0000	0.00
PAH-Chrysene	2.52E-005	0.0001	0.00
PAH-Dibenz(a,h)anthracene	2.35E-005	0.0001	0.00
PAH-Indeno(1,2,3-cd)-pyrene	2.35E-005	0.0001	0.00
Propylene	7.71E-001	1.9187	7.30
Propylene Oxide(1)	2.96E-002	0.0737	0.28
Toluene(1)	1.33E-001	0.3310	1.26
Xylene(1)	6.53E-002	0.1625	0.62

Notes:
(1) Indicates Hazardous Air Pollutant (HAP).

Table K-9-2 Toxic Air Pollutant Emissions for Auxiliary Boiler

Compound	Emission Factor, lb/MMscf	Emissions, lb/hr	Annual Average, tons/yr[2]
Acetaldehyde(1)	9.00E-004	1.15E-004	0.00
Acrolein (1)	8.00E-004	1.02E-004	0.00
Ammonia	-	3.00E-001	0.45
Benzene(1)	1.70E-003	2.17E-004	0.00
1,3-Butadiene(1)	-	0.00E+000	0.00
Ethylbenzene(1)	2.00E-003	2.56E-004	0.00
Formaldehyde(1)	3.60E-003	4.60E-004	0.00
Hexane(1)	1.30E-003	1.66E-004	0.00
Naphthalene(1)	3.00E-004	3.84E-005	0.00
PAHs	1.00E-004	1.28E-005	0.00
Propylene	1.55E-002	1.99E-003	0.00
Propylene Oxide(1)	-	0.00E+000	0.00
Toluene(1)	7.80E-003	9.98E-004	0.00
Xylene(1)	5.80E-003	7.42E-004	0.00

Notes:

(1) Indicates Hazardous Air Pollutant (HAP).

(2) Based on 3000 hours of operation per year.

Table K-9-3 Toxic Air Pollutant Emissions for Cooling Tower

Compound	Emissions, lb/hr	Annual Average, tons/yr
Arsenic(1)	7.73E-005	3.39E-004
Beryllium (1)	1.66E-005	7.26E-005
Cadmium	1.66E-005	7.26E-005
Chromium III	2.76E-005	1.21E-004
Copper(1)	3.87E-005	1.69E-004
Lead(1)	8.29E-005	3.63E-004
Manganese	5.52E-005	2.42E-004
Mercury	2.76E-006	1.21E-005
Nickel	1.10E-004	4.84E-004
Zinc	4.47E-004	1.96E-003

Notes:

(1) Indicates Hazardous Air Pollutant (HAP).

Table K-9-4 Toxic Air Pollutant Emissions for Fire Pump Engine

Compound	Max. Hourly, lb/hr(1)	Annual, tons/year(2)
Diesel exhaust particulate	1.86E-001	0.00

Notes:
(1) Based on a 30-minute engine test at 50% load.
(2) Based on 200 hours per year of operation.

3.0 EXPOSURE ASSESSMENT

The receptor grid described in Section 5.2 for criteria pollutant modeling was used for the SHRA. Receptors were also placed at each sensitive receptor identified on Figure K-9-1. The maximum modeled acute and chronic impacts are shown in Table K-9-5

The SHRA results for the IEEC project are presented in Table K-9-6, and the detailed calculations are provided at the end of this appendix.

4.0 RISK CHARACTERIZATION

The screening HRA results indicate that the acute and chronic hazard indices are well below 1.0 for the proposed project, so are not significant. In addition, the maximum chronic noninhalation exposure is well below the REL so is also considered insignificant. The cancer risk to a maximally exposed individual is 0.28 in one million, well below the 1 in one million level. The screening HRA results indicate that, overall, the proposed project will not pose a significant health risk. Figure K-9-2 shows the locations of the first, second, and third highest acute, chronic, and individual cancer impacts.

A risk screening analysis was also performed to demonstrate that the diesel fire pump engine would not cause a significant carcinogenic risk at any nearby residence. The maximum modeled cancer risk from the fire pump engine is 0.1 in one million, well below the 1 in one million significance level.

The cancer burden analysis is an estimate of the increased number of potential excess cancer cases in a population resulting from exposure to the emitted substances. Cancer burden is calculated by multiplying the total cancer risk (all pathways) by the number of persons in the exposed population. Based on the adjusted 2000 census data, the total exposed population within the 6 mile radius area is approximately 69910 individuals (17708 workers). Worker exposure factor is 0.14 based upon CARB and South Coast AQMD guidance. The total cancer risk is 0.28 per million. The resultant cancer burden is therefore 0.0196.

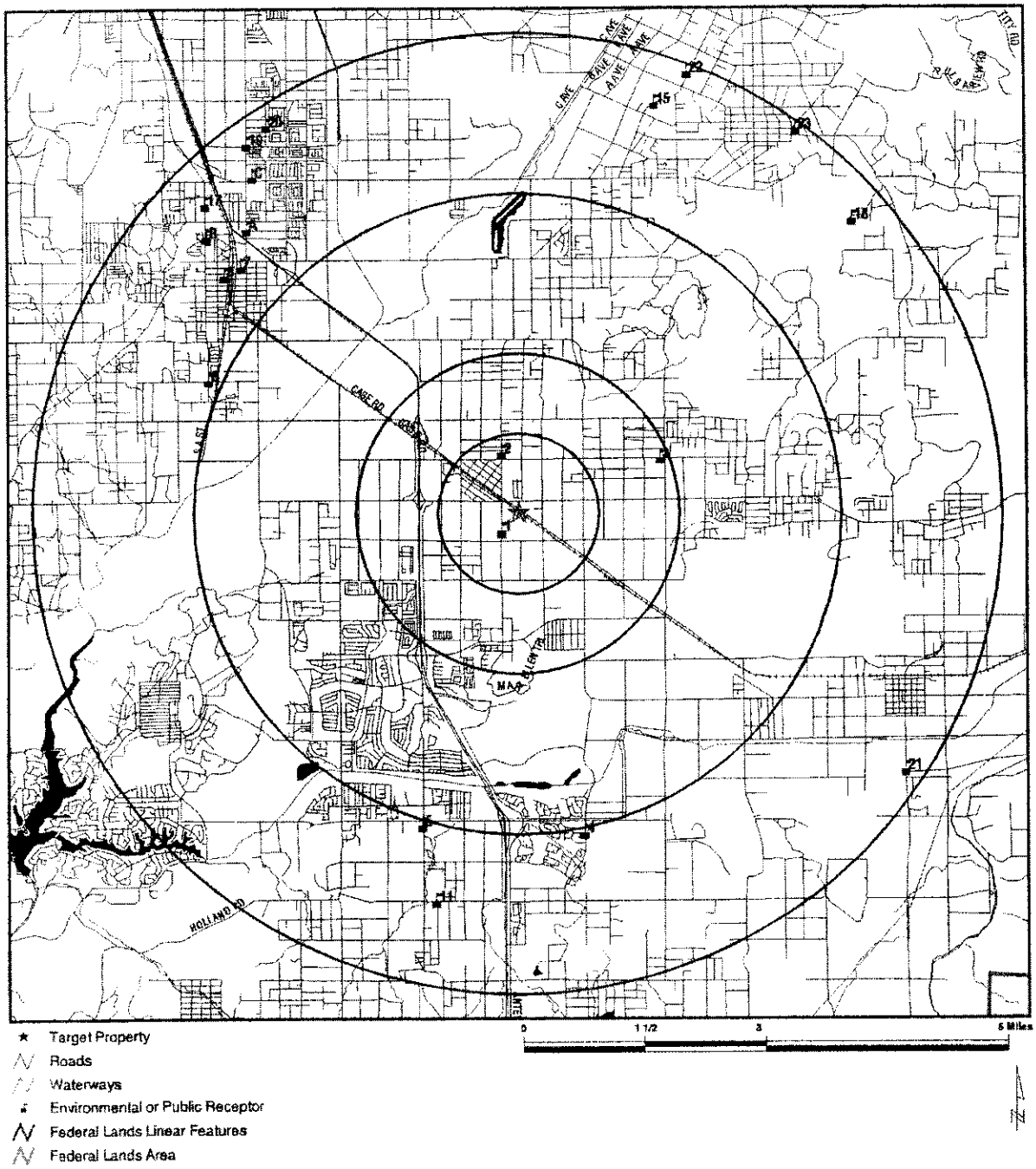

Figure K-9-1 Sensitive Receptor Map

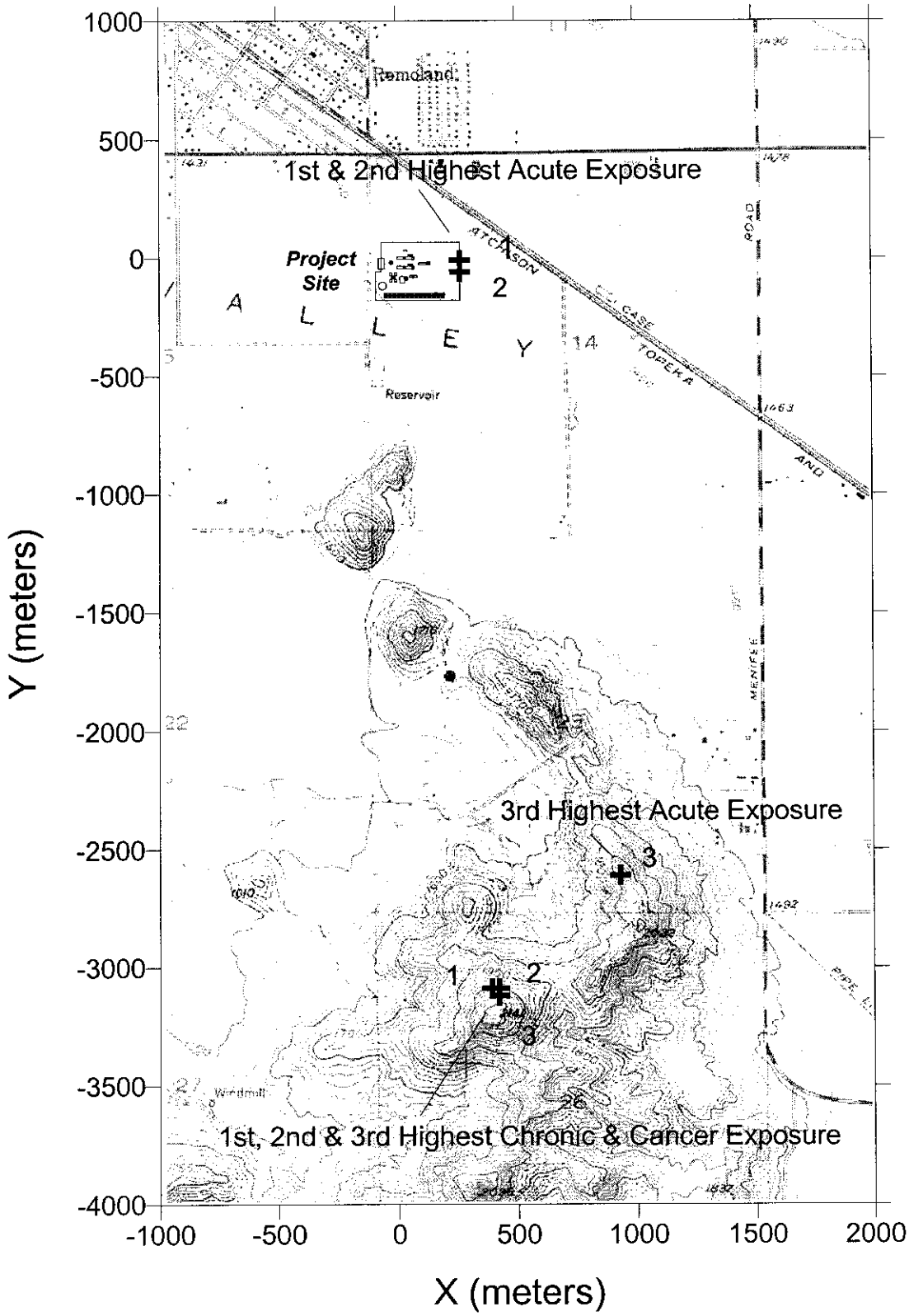

Figure K-9-2 Locations of Acute, Chronic, and Cancer Impacts

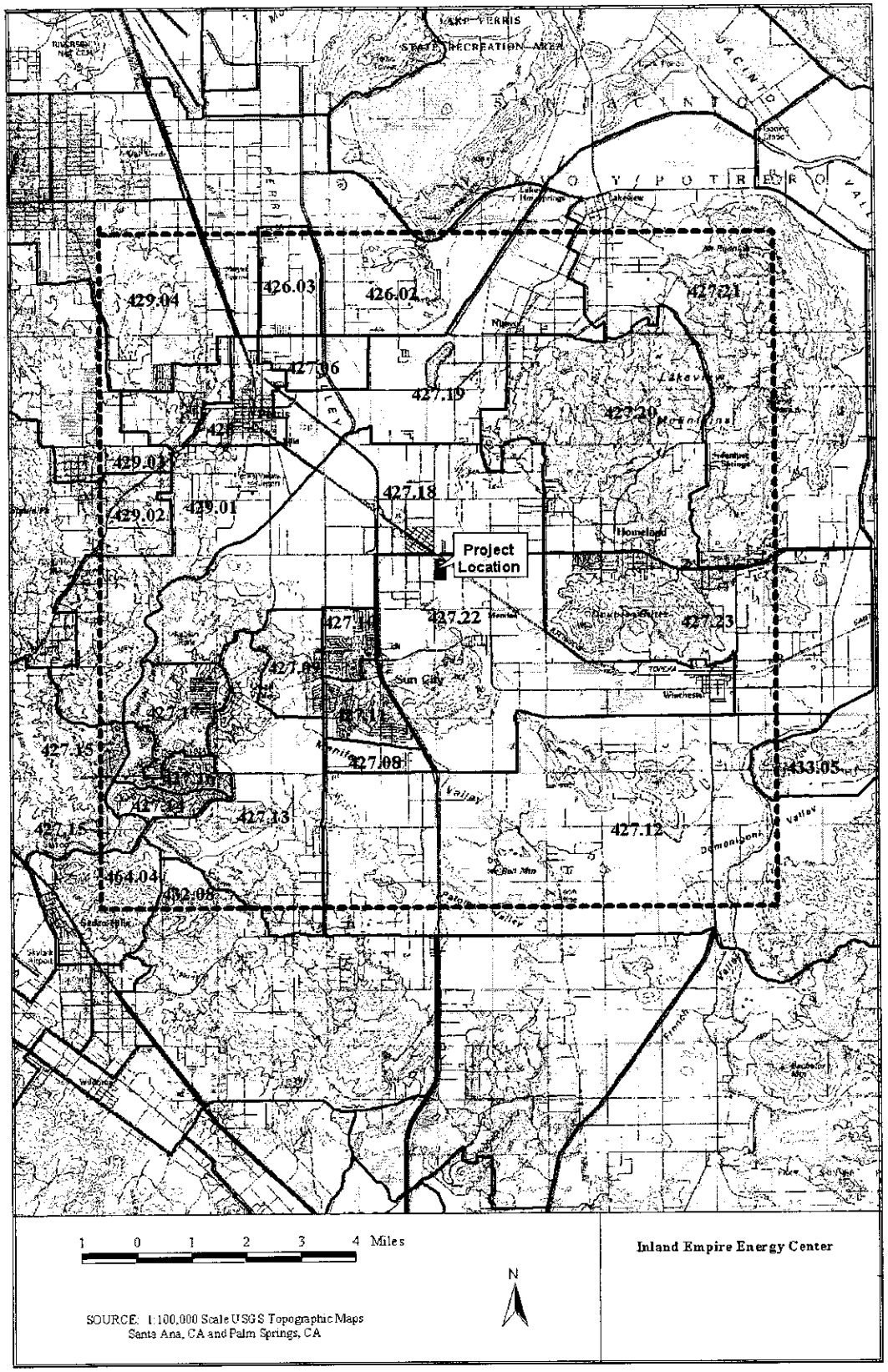

Figure K-9-3 Census Tracts Within 6 Miles of the IEEC Site

Table K-9-5 Maximum Modeled Concentrations for Toxic Air Pollutants

Compound	Modeled Concentration, $\mu g/m^3$	
	One-hour Average	Annual Average
Acetaldehyde	--	3.34E-3
Acrolein	9.1E-3	3.08E-4
Ammonia	3.0E+1	1.3E-0
Arsenic	3.4E-4	1.2E-5
Benzene	1.9E-2	2.9E-4
Beryllium	--	2.5E-6
1,3-Butadiene	--	3.6E-5
Cadmium	--	2.5E-6
Copper	1.7E-4	5.9E-6
Diesel exhaust particulate	--	4.3E-4
Ethylbenzene	--	2.7E-3
Formaldehyde	3.5E-1	1.4E-2
Hexane	--	2.1E-2
Lead	--	1.3E-5
Manganese	--	8.4E-6
Mercury	1.2E-5	4.2E-7
Naphthalene	--	1.1E-4
Nickel	4.8E-4	1.7E-5
PAH: Benz(a)anthracene	--	1.8E-6
PAH: Benzo(a)pyrene	--	1.4E-5
PAH: Benzo(b)fluoranthene	--	9.2E-7
PAH: Benzo(k)fluoranthrene	--	9.0E-7
PAH: Chrysene	--	2.1E-6
PAH: Dibenz(a,h)anthracene	--	1.9E-6
PAH: Indeno(1,2,3-c,d)pyrene	--	1.9E-6
Propylene	--	6.3E-2
Propylene Oxide	6.2E-2	2.4E-3
Selenium	--	1.8E-5
Toluene	2.8E-1	1.1E-2
Xylene	1.4E-1	5.4E-3
Zinc	--	6.8E-5

Table K-9-6 Screening Health Risk Assessment Results

Proposed Project	
Cancer Risk to Maximally Exposed Individual	0.28 in one million
Cancer Burden	0.0196
Acute Inhalation Hazard Index	0.06
Chronic Inhalation Hazard Index	0.048

Appendix K-9 also presents additional support data for the SHRA as follows:

- Census tract locations and physical data for all tracts within the affected 6 mile radius area (Table K-9-7).
- Census tract population data for all affected tracts within the 6 mile radius area. All data is adjusted for year 2000 (Table K-9-8).
- Sensitive receptor identification and location data (Table K-9-9).

Table K-9-7 Census Tract Data for 6 Mile Radius Area

Tract Number	1990 Population	2000 Population(1)	2000 Population(2)
426.01	16,722	22,073	5,591
426.02	1,946	2,569	651
427.05	13,004	17,165	4,348
429.00	16,216	21,405	5,422
426.03	7,243	9,561	2,422
427.06	2,536	3,348	848
428.00	6,260	8,263	2,093
427.07	9,117	12,034	3,048
427.02	14,506	19,148	4,850
427.03	17,518	23,124	5,857

Notes:

(1) 2000 population based on a 32% increase from 1990 population data applied to all affected tracts uniformly.

(2) Worker population data is the total of non-farm employment and government employment compared to total population for 2000applied uniformly to all affected tracts.

Table K-9-8 Census Tract Support Data for 6 Mile Radius Area

Tract Number	1990 Population in Radius	2000 Population in Radius		Tract Area square miles	Area in Radius square miles
		General	Worker		
426.01	8	11	3	50.67	0.02
426.02	655	865	219	15.16	5.1
427.05	8,054	10,631	2,693	67.82	42
429.00	2,845	3,755	951	53.99	9.47
426.03	4,189	5,529	1,401	2.21	1.28
427.06	2,536	3,348	848	1.78	1.78
428.00	6,260	8,263	2,093	2.12	2.12
427.07	7,138	9,422	2,387	27.9	21.84
427.02	14,506	19,148	4,850	6.09	6.09
427.03	6,771	8,938	2,264	59.03	22.81
6 Mile Radius Totals		**69,910**	**17,708**		**112.51**

Table K-9-9 Sensitive Receptor Data for 6 Mile Radius Area

Map ID Number	Name	Type of Receptor	Direction from Site	Approximately Distance from site (miles)
1	Romoland Head Start	Daycare	SW	0.34
2	Romoland Elementary School	School	NNW	0.73
3	Harvest Valley Elementary School	School	ENE	1.84
4	Kirkpatrick elementary school	School	SSE	4.1
5	Menifee School	School	SSW	4.42
6	Pinacate Middle School	School	WNW	4.2
7	Sanders Elementary School	School	NW	4.59
8	Saint James School	School	NW	4.71
A9	Redeemer Lutheran Daycare	Daycare	NW	4.93
A10	Redeemer Lutheran School	School	NW	4.93
11	Little Steps Child Development Center	Daycare	SSW	5.01`
B12	Perris High School	School	NW	5.19
B13	Perris Valley Jr. High	School	NW	5.19
C14	Perris Union High School	School	NW	5.36
15	Nuview Elementary School	School	NNE	5.4
C16	NAACP Head Start/Preschool	Daycare	NW	5.36
17	Choice 2000 On-Line	School	NW	5.44
18	Bar V Ranch School	School	NE	5.57
19	Medical Art Convalescent Hospital	Nursing Home	NW	5.7
20	Valley Plaza Doctors Hospital	Hospital	NNW	5.79
21	Winchester Elementary School	School	SE	5.83
22	Nuview School	School	NNE	5.897
23	Valley View Elementary School	School	NE	5.91
NA	BLM Lands	Federal Land	SE	8-10

ATTACHMENTS
(Model Reports)

A. **Acute Inhalation Exposure Report**

B. **Chronic Inhalation Exposure Report**

C. **Chronic Non-Inhalation Exposure Report**

D. **Individual Cancer Risk Report**

Table K.9-1
Calculation of Noncriteria Pollutant Emissions for Gas Turbines/HRSGs

Compound	(each gas turbine) Emission Factor, lb/MMscf (1)	Max Hourly Emissions, lb/hr (2)	Annual Emissions, ton/yr (3)	Emission Rates for Modeling (each gas turbine) One-hour Em Rates, g/s	Annual Em Rates, g/s
Acetaldehyde	4.08E-02	0.1015	0.39	1.28E-02	1.11E-02
Acrolein	3.69E-03	0.0092	0.03	1.16E-03	1.01E-03
Ammonia	(4), (5)	33.6841	147.54	4.24E+00	4.24E+00
Benzene	3.33E-03	0.0083	0.03	1.04E-03	9.07E-04
1,3-Butadiene	4.39E-04	0.0011	0.00	1.38E-04	1.20E-04
Ethylbenzene	3.26E-02	0.0811	0.31	1.02E-02	8.88E-03
Formaldehyde	1.65E-01	0.4106	1.56	5.17E-02	4.50E-02
Hexane	2.59E-01	0.6446	2.45	8.12E-02	7.06E-02
Naphthalene	1.33E-03	0.0033	0.01	4.17E-04	3.62E-04
PAH - Anthracene	3.38E-05	0.0001	0.00	1.06E-05	9.21E-06
PAH - Benzo(a)anthracene	2.26E-05	0.0001	0.00	7.09E-06	6.16E-06
PAH - Benzo(a)pyrene	1.39E-05	0.0000	0.00	4.36E-06	3.79E-06
PAH - Benzo(b)fluoranthrene	1.13E-05	0.0000	0.00	3.54E-06	3.08E-06
PAH - Benzo(k)fluoranthrene	1.10E-05	0.0000	0.00	3.45E-06	3.00E-06
PAH - Chrysene	2.52E-05	0.0001	0.00	7.90E-06	6.87E-06
PAH - Dibenz(a,h)anthracene	2.35E-05	0.0001	0.00	7.37E-06	6.40E-06
PAH - Indeno(1,2,3-cd)pyrene	2.35E-05	0.0001	0.00	7.37E-06	6.40E-06
Propylene	7.71E-01	1.9187	7.30	2.42E-01	2.10E-01
Propylene oxide	2.96E-02	0.0737	0.28	9.28E-03	8.07E-03
Toluene	1.33E-01	0.3310	1.26	4.17E-02	3.62E-02
Xylene	6.53E-02	0.1625	0.62	2.05E-02	1.78E-02

Notes:
(1) All factors from AP-42 except hexane, PAHs and propylene (from CATEF database) and formaldehyde (from source test of comparable turbine equipped with dry low-NOx combustor.
(2) Based on maximum hourly gas turbine fuel use of: 2.49 MMscf/hr
(3) Based on maximum annual gas turbine fuel use of: 18,943.35 MMscf/yr
(4) Maximum lbs/hr NH3 emissions based on 10 ppm @ 15% O2 ammonia slip from SCR system, 100% load, 36 F operating case, w/ duct burner.
(5) Maximum annual NH3 emissions based on maximum hourly NH3 emission rate and maximum expected hours per year of gas turbine operation, including startup periods.

Table K.9-2
Calculation of Noncriteria Pollutant Emissions for Auxilary Boiler

Compound	Emission Factor, lb/MMscf (1)	Max Hourly Emissions, lb/hr (2)	Annual Emissions, ton/yr (4)
Acetaldehyde	9.00E-04	1.15E-04	0.00
Acrolein	8.00E-04	1.02E-04	0.00
Ammonia	(4)	3.00E-01	0.45
Benzene	1.70E-03	2.17E-04	0.00
1,3-Butadiene	-	0.00E+00	0.00
Ethylbenzene	2.00E-03	2.56E-04	0.00
Formaldehyde	3.60E-03	4.60E-04	0.00
Hexane	1.30E-03	1.66E-04	0.00
Naphthalene	3.00E-04	3.84E-05	0.00
PAHs	1.00E-04	1.28E-05	0.00
Propylene	1.55E-02	1.99E-03	0.00
Propylene oxide	-	0.00E+00	0.00
Toluene	7.80E-03	9.98E-04	0.00
Xylene	5.80E-03	7.42E-04	0.00

Notes: (1) From Ventura County APCD and CATEF databases.
(2) Based on maximum hourly natural gas fuel use of: 0.13 MMscf/hr
(3) Based on maximum annual natural gas fuel use of: 383.66 MMscf/year
(4) Maximum lbs/hr NH3 emissions based on 10 ppm @ 3% O2 ammonia slip from SCR system.

Table K.9-3
Calculation of Noncriteria Pollutant Emissions for Fire Pump Engine

Compound	Max Hourly Emissions, lb/hr (1)	Annual Emissions, ton/yr (2)	Emission Rates for Modeling: One-hour Em Rates, g/s	Emission Rates for Modeling: Annual Em Rates, g/s
Diesel Particulates	1.86E-01	0.00	2.34E-02	1.34E-04

Notes:
(1) Based on a 1-hour engine test at 100% engine load.
(2) Ton per year emission calculation based on 50 hours per year of operation.

Table K.9-4
Cooling Tower - Noncriteria Pollutant Emission Calculations

Constituent	Concentration in Cooling Tower(1) Recirculation Wate	Units	Drift Rate Per Tower (lbs of water/hr)	Hourly Emissions Per Tower (lbs/hr)	Daily Emissions Per Tower (lbs/day)	Annual Emissions Per Tower (tons/yr)	Emissions For Modeling 1-Hour Impact (g/s) per cell	Annual Impact (g/s) per cell
Ammonia	2.6000	ppmw	424.96	1.10E-03	2.65E-02	4.84E-03	9.95E-06	9.95E-06
Arsenic	0.1820	ppmw	424.96	7.73E-05	1.86E-03	3.39E-04	6.97E-07	6.97E-07
Beryllium	0.0390	ppmw	424.96	1.66E-05	3.98E-04	7.26E-05	1.49E-07	1.49E-07
Cadmium	0.0390	ppmw	424.96	1.66E-05	3.98E-04	7.26E-05	1.49E-07	1.49E-07
Chromium (III)	0.0650	ppmw	424.96	2.76E-05	6.63E-04	1.21E-04	2.49E-07	2.49E-07
Copper	0.0910	ppmw	424.96	3.87E-05	9.28E-04	1.69E-04	3.48E-07	3.48E-07
Cyanide	0.0001	ppmw	424.96	5.52E-08	1.33E-06	2.42E-07	4.98E-10	4.98E-10
Lead	0.1950	ppmw	424.96	8.29E-05	1.99E-03	3.63E-04	7.46E-07	7.46E-07
Manganese	0.1300	ppmw	424.96	5.52E-05	1.33E-03	2.42E-04	4.98E-07	4.98E-07
Mercury	0.0065	ppmw	424.96	2.76E-06	6.63E-05	1.21E-05	2.49E-08	2.49E-08
Nickel	0.2600	ppmw	424.96	1.10E-04	2.65E-03	4.84E-04	9.95E-07	9.95E-07
Selenium	0.2730	ppmw	424.96	1.16E-04	2.78E-03	5.08E-04	1.05E-06	1.05E-06
Zinc	1.0530	ppmw	424.96	4.47E-04	1.07E-02	1.96E-03	4.03E-06	4.03E-06

Notes:
1. Based on system design.

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Version 2.0e

ACUTE INHALATION EXPOSURE REPORT

Run Made By

Sierra Research

Project : IEEC

Aug. 3, 2001

Pollutant Database Date : Oct. 5, 2000
Database Reference..... : CAPCOA Risk Assessment Guidelines

DILUTION FACTOR FOR POINT UNDER EVALUATION

X/Q (ug/m3)/(g/s) : 1.00E+00

MAX. 1-HR EMISSION RATE INFORMATION

File: ONEHOUR.M96

Pollutant Name	Emission Rate (g/s)
ACROLEIN	9.100E-03
AMMONIA	2.945E+01
ARSENIC AND COMPOUNDS (INOR	3.390E-04
BENZENE	1.934E-02
COPPER AND COMPOUNDS	1.695E-04
FORMALDEHYDE	3.468E-01
MERCURY AND COMPOUNDS (INOR	1.211E-05
NICKEL AND COMPOUNDS	4.843E-04
PROPYLENE OXIDE	6.191E-02
TOLUENE	2.820E-01
XYLENES	1.394E-01

ACUTE INHALATION HAZARD INDEX

Pollutant	Resp	CV/BL	CNS	Eye	Repro	Kidn	GI/LV	Immun
ACROLEIN	0.0479	--	--	0.0479	--	--	--	--
AMMONIA	0.0092	--	--	0.0092	--	--	--	--
ARSENIC AND COM	--	--	--	--	0.0018	--	--	--
BENZENE	--	<.0001	--	--	<.0001	--	--	<.0001
COPPER AND COMP	<.0001	--	--	--	--	--	--	--
FORMALDEHYDE	0.0037	--	--	0.0037	--	--	--	0.0037
MERCURY AND COM	--	--	--	--	<.0001	--	--	--
NICKEL AND COMP	<.0001	--	--	--	--	--	--	<.0001
PROPYLENE OXIDE	<.0001	--	--	<.0001	<.0001	--	--	--
TOLUENE	<.0001	--	<.0001	<.0001	<.0001	--	--	--
XYLENES	<.0001	--	--	<.0001	--	--	--	--
Total Acute	0.0609	<.0001	<.0001	0.0608	0.0018	--	--	0.0038

A Zero Background Concentration file was used to perform this analysis, therefore, there is no contribution from background pollutants.

California Air Resources Board

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Office of Environmental Health Hazard Assessment

Health Risk Assessment Program

Version 2.0e

CHRONIC INHALATION EXPOSURE REPORT

Run Made By

Sierra Research

Project : IEEC

Aug. 3, 2001

Pollutant Database Date : Oct. 5, 2000
Database Reference..... : CAPCOA Risk Assessment Guidelines

DILUTION FACTOR FOR POINT UNDER EVALUATION

X/Q (ug/m3)/(g/s) : 1.00E+00

ANNUAL AVERAGE EMISSION RATE INFORMATION

File: ANNAVG.E96

Pollutant Name	Emission Rate (g/s)
1,3-BUTADIENE	3.589E-05
ACETALDEHYDE	3.343E-03
ACROLEIN	3.082E-04
AMMONIA	1.293E+00
ARSENIC AND COMPOUNDS (INOR	1.170E-05
BENZENE	2.861E-04
BERYLLIUM	2.507E-06
CADMIUM AND COMPOUNDS	2.507E-06
COPPER AND COMPOUNDS	5.850E-06
ETHYL BENZENE	2.682E-03
FORMALDEHYDE	1.352E-02
LEAD AND COMPOUNDS	1.254E-05
MANGANESE AND COMPOUNDS	8.357E-06
MERCURY AND COMPOUNDS (INOR	4.178E-07
N-HEXANE	2.119E-02
NAPHTHALENE	1.112E-04
NICKEL AND COMPOUNDS	1.671E-05
PAH:BENZ(A)ANTHRACENE	1.848E-06
PAH:BENZO(A)PYRENE	1.392E-05
PAH:BENZO(B)FLUORANTHENE	9.238E-07
PAH:BENZO(K)FLUORANTHENE	8.993E-07
PAH:CHRYSENE	2.060E-06
PAH:DIBENZ(A,H)ANTHRACENE	1.921E-06
PAH:INDENO(1,2,3-C,D)PYRENE	1.921E-06
PROPYLENE (PROPENE)	6.316E-02
PROPYLENE OXIDE	2.420E-03
SELENIUM AND COMPOUNDS	1.755E-05
TOLUENE	1.094E-02
XYLENES	5.386E-03
ZINC COMPOUNDS	6.769E-05

CHRONIC INHALATION HAZARD INDEX

Pollutant	Resp	CV/BL	CNS	Skin	Repro	Kidn	GI/LV	Immun
ACETALDEHYDE	0.0004	--	--	--	--	--	--	--
ACROLEIN	0.0154	--	--	0.0154	--	--	--	--
AMMONIA	0.0065	--	--	--	--	--	--	--
ARSENIC AND COM	<.0001	--	<.0001	<.0001	--	--	--	--
BENZENE	--	<.0001	<.0001	--	<.0001	--	--	--
BERYLLIUM	0.0005	--	--	--	--	--	--	--
CADMIUM AND COM	<.0001	--	--	--	--	<.0001	--	--
COPPER AND COMP	<.0001	--	--	--	--	--	--	--
ETHYL BENZENE	--	--	--	--	<.0001	<.0001	<.0001	--
FORMALDEHYDE	0.0045	--	--	0.0045	--	--	--	--
MANGANESE AND C	--	--	<.0001	--	--	--	--	--
MERCURY AND COM	--	--	<.0001	--	--	--	--	--
N-HEXANE	--	--	<.0001	--	--	--	--	--
NAPHTHALENE	<.0001	--	--	--	--	--	--	--
NICKEL AND COMP	0.0003	0.0003	--	--	--	--	--	--
PROPYLENE (PROP	<.0001	--	--	--	--	--	--	--
PROPYLENE OXIDE	<.0001	--	--	--	--	--	--	--
SELENIUM AND CO	<.0001	--	--	--	--	--	--	--
TOLUENE	<.0001	--	<.0001	--	<.0001	--	--	--
XYLENES	<.0001	--	<.0001	--	--	--	--	--
ZINC COMPOUNDS	<.0001	<.0001	--	--	--	--	--	--
Total Chronic	0.0278	0.0003	0.0001	0.0199	<.0001	<.0001	<.0001	--

A Zero Background Concentration file was used to perform this analysis, therefore, there is no contribution from background pollutants.

California Air Resources Board

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Office of Environmental Health Hazard Assessment

Health Risk Assessment Program

Version 2.0e

CHRONIC NONINHALATION EXPOSURE REPORT

Run Made By

Sierra Research

Project : IEEC

Aug. 3, 2001

Pollutant Database Date : Oct. 5, 2000
Database Reference..... : CAPCOA Risk Assessment Guidelines

DILUTION FACTOR FOR POINT UNDER EVALUATION

X/Q (ug/m3)/(g/s) : 1.00E+00

ANNUAL AVERAGE EMISSION RATE INFORMATION

File: ANNAVG.E96

Pollutant Name	Emission Rate (g/s)
1,3-BUTADIENE	3.589E-05
ACETALDEHYDE	3.343E-03
ACROLEIN	3.082E-04
AMMONIA	1.293E+00
ARSENIC AND COMPOUNDS (INOR	1.170E-05
BENZENE	2.861E-04
BERYLLIUM	2.507E-06
CADMIUM AND COMPOUNDS	2.507E-06
COPPER AND COMPOUNDS	5.850E-06
ETHYL BENZENE	2.682E-03
FORMALDEHYDE	1.352E-02
LEAD AND COMPOUNDS	1.254E-05
MANGANESE AND COMPOUNDS	8.357E-06
MERCURY AND COMPOUNDS (INOR	4.178E-07
N-HEXANE	2.119E-02
NAPHTHALENE	1.112E-04
NICKEL AND COMPOUNDS	1.671E-05
PAH:BENZ(A)ANTHRACENE	1.848E-06
PAH:BENZO(A)PYRENE	1.392E-05
PAH:BENZO(B)FLUORANTHENE	9.238E-07
PAH:BENZO(K)FLUORANTHENE	8.993E-07
PAH:CHRYSENE	2.060E-06
PAH:DIBENZ(A,H)ANTHRACENE	1.921E-06
PAH:INDENO(1,2,3-C,D)PYRENE	1.921E-06
PROPYLENE (PROPENE)	6.316E-02
PROPYLENE OXIDE	2.420E-03
SELENIUM AND COMPOUNDS	1.755E-05
TOLUENE	1.094E-02
XYLENES	5.386E-03
ZINC COMPOUNDS	6.769E-05

EXPOSURE ROUTE INFORMATION

File: EXPOSURE.I96

Deposition Velocity (m/s) .....: 0.020

Fraction of Homegrown Produce .: 0.000

Dilution Factor for Farm/Ranch X/Q (ug/m3)/(g/s) ....: 0.0000
Fraction of Animals' Diet From Grazing .....: 0.0000
Fraction of Animals' Diet From Impacted Feed .....: 0.0000

Fraction of Animals' Water Impacted by Deposition ...: 0.0000

Surface Area (m2) ....: 0.000E+00
Volume (liters) .....: 0.000E+00
Volume Changes .....: 0.000E+00

Fraction of Meat in Diet Impacted ..: 0.0000

Beef .....: 0.0000
Pork .....: 0.0000
Lamb/Goat .....: 0.0000
Chicken .....: 0.0000

Fraction of Milk in Diet Impacted ..: 0.0000

Goat Milk Fraction ..: 0.0000

Fraction of Eggs in Diet Impacted ..: 0.0000

Fraction of Impacted Drinking Water : 0.0000

X/Q at water source ..: 0.0000
Surface Area (m2) ....: 0.000E+00
Volume (liters) .....: 0.000E+00
Volume changes .....: 0.000E+00

Fraction of Fish from Impacted Water: 0.0000

X/Q at Fish Source ...: 0.0000
Surface Area (m2) ....: 0.000E+00
Volume (liters) .....: 0.000E+00
Volume changes .....: 0.000E+00

CHRONIC NONINHALATION EXPOSURE

Pollutant	Avg. Dose (mg/kg-d)	REL (mg/kg-d)	Avg Dose/REL
1,3-BUTADIENE	---	---	---
ACETALDEHYDE	---	---	---
ACROLEIN	---	---	---
AMMONIA	---	---	---
ARSENIC AND COMPOUNDS (I	3.11E-08	3.00E-04	1.04E-04
BENZENE	---	---	---
BERYLLIUM	6.66E-09	2.00E-03	3.33E-06
CADMIUM AND COMPOUNDS	6.80E-09	1.00E-03	6.80E-06
COPPER AND COMPOUNDS	---	---	---
ETHYL BENZENE	---	---	---
FORMALDEHYDE	---	---	---
LEAD AND COMPOUNDS	3.33E-08	---	---
MANGANESE AND COMPOUNDS	---	---	---
MERCURY AND COMPOUNDS (I	1.32E-09	3.00E-04	4.39E-06
N-HEXANE	---	---	---
NAPHTHALENE	4.76E-08	---	---
NICKEL AND COMPOUNDS	---	5.00E-02	---
PAH:BENZ(A)ANTHRACENE	4.15E-10	---	---
PAH:BENZO(A)PYRENE	3.12E-09	---	---
PAH:BENZO(B)FLUORANTHENE	2.07E-10	---	---
PAH:BENZO(K)FLUORANTHENE	2.02E-10	---	---
PAH:CHRYSENE	4.62E-10	---	---
PAH:DIBENZ(A,H)ANTHRACEN	4.31E-10	---	---
PAH:INDENO(1,2,3-C,D)PYR	4.31E-10	---	---
PROPYLENE (PROPENE)	---	---	---
PROPYLENE OXIDE	---	---	---
SELENIUM AND COMPOUNDS	---	---	---
TOLUENE	---	---	---
XYLENES	---	---	---
ZINC COMPOUNDS	---	---	---

California Air Resources Board

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INDIVIDUAL CANCER RISK REPORT

Run Made By

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Project : IEEC

Aug. 3, 2001

Pollutant Database Date : Oct. 5, 2000
Database Reference..... : CAPCOA Risk Assessment Guidelines

DILUTION FACTOR FOR POINT UNDER EVALUATION

X/Q (ug/m3)/(g/s) : 1.00E+00

ANNUAL AVERAGE EMISSION RATE INFORMATION

File: ANNAVG.E96

Pollutant Name	Emission Rate (g/s)
1,3-BUTADIENE	3.589E-05
ACETALDEHYDE	3.343E-03
ACROLEIN	3.082E-04
AMMONIA	1.293E+00
ARSENIC AND COMPOUNDS (INOR	1.170E-05
BENZENE	2.861E-04
BERYLLIUM	2.507E-06
CADMIUM AND COMPOUNDS	2.507E-06
COPPER AND COMPOUNDS	5.850E-06
ETHYL BENZENE	2.682E-03
FORMALDEHYDE	1.352E-02
LEAD AND COMPOUNDS	1.254E-05
MANGANESE AND COMPOUNDS	8.357E-06
MERCURY AND COMPOUNDS (INOR	4.178E-07
N-HEXANE	2.119E-02
NAPHTHALENE	1.112E-04
NICKEL AND COMPOUNDS	1.671E-05
PAH:BENZ(A)ANTHRACENE	1.848E-06
PAH:BENZO(A)PYRENE	1.392E-05
PAH:BENZO(B)FLUORANTHENE	9.238E-07
PAH:BENZO(K)FLUORANTHENE	8.993E-07
PAH:CHRYSENE	2.060E-06
PAH:DIBENZ(A,H)ANTHRACENE	1.921E-06
PAH:INDENO(1,2,3-C,D)PYRENE	1.921E-06
PROPYLENE (PROPENE)	6.316E-02
PROPYLENE OXIDE	2.420E-03
SELENIUM AND COMPOUNDS	1.755E-05
TOLUENE	1.094E-02
XYLENES	5.386E-03
ZINC COMPOUNDS	6.769E-05

EXPOSURE ROUTE INFORMATION

File: EXPOSURE.I96

Deposition Velocity (m/s) .....: 0.020

Fraction of Homegrown Produce .: 0.000

Dilution Factor for Farm/Ranch X/Q (ug/m3)/(g/s) ....: 0.0000
Fraction of Animals' Diet From Grazing .....: 0.0000
Fraction of Animals' Diet From Impacted Feed .....: 0.0000

Fraction of Animals' Water Impacted by Deposition ...: 0.0000

Surface Area (m2) ....: 0.000E+00
Volume (liters) .....: 0.000E+00
Volume Changes .....: 0.000E+00

Fraction of Meat in Diet Impacted ..: 0.0000

Beef .....: 0.0000
Pork .....: 0.0000
Lamb/Goat .....: 0.0000
Chicken .....: 0.0000

Fraction of Milk in Diet Impacted ..: 0.0000

Goat Milk Fraction ..: 0.0000

Fraction of Eggs in Diet Impacted ..: 0.0000

Fraction of Impacted Drinking Water : 0.0000

X/Q at water source ..: 0.0000
Surface Area (m2) ....: 0.000E+00
Volume (liters) .....: 0.000E+00
Volume changes .....: 0.000E+00

Fraction of Fish from Impacted Water: 0.0000

X/Q at Fish Source ...: 0.0000
Surface Area (m2) ....: 0.000E+00
Volume (liters) .....: 0.000E+00
Volume changes .....: 0.000E+00

---

44 YEAR
INDIVIDUAL CANCER RISK BY POLLUTANT AND ROUTE

Pollutant	Air	Soil	Skin	Garden	MMilk	Other
1,3-BUTADIENE	3.84E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ACETALDEHYDE	5.67E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ARSENIC AND COM	2.43E-08	3.94E-08	8.33E-10	0.00E+00	0.00E+00	0.00E+00
BENZENE	5.22E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BERYLLIUM	3.78E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CADMIUM AND COM	6.62E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FORMALDEHYDE	5.10E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
LEAD AND COMPOU	9.46E-11	2.39E-10	5.06E-12	0.00E+00	0.00E+00	0.00E+00
NICKEL AND COMP	2.73E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PAH:BENZ(A)ANTH	1.28E-10	1.97E-10	1.25E-10	0.00E+00	5.04E-10	0.00E+00
PAH:BENZO(A)PYR	9.62E-09	1.48E-08	9.41E-09	0.00E+00	3.79E-08	0.00E+00
PAH:BENZO(B)FLU	6.39E-11	9.83E-11	6.24E-11	0.00E+00	2.52E-10	0.00E+00
PAH:BENZO(K)FLU	6.22E-11	9.57E-11	6.08E-11	0.00E+00	2.45E-10	0.00E+00
PAH:CHRYSENE	1.42E-11	2.19E-11	1.39E-11	0.00E+00	5.61E-11	0.00E+00
PAH:DIBENZ(A,H)	1.45E-09	6.99E-10	4.43E-10	0.00E+00	1.79E-09	0.00E+00
PAH:INDENO(1,2,	1.33E-10	2.04E-10	1.30E-10	0.00E+00	5.24E-10	0.00E+00
PROPYLENE OXIDE	5.63E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Route Total	1.20E-07	5.57E-08	1.11E-08	0.00E+00	4.13E-08	0.00E+00

TOTAL RISK: 2.28E-07

70 YEAR
INDIVIDUAL CANCER RISK BY POLLUTANT AND ROUTE

Pollutant	Air	Soil	Skin	Garden	MMilk	Other
1,3-BUTADIENE	6.10E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ACETALDEHYDE	9.03E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ARSENIC AND COM	3.86E-08	4.57E-08	9.67E-10	0.00E+00	0.00E+00	0.00E+00
BENZENE	8.30E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BERYLLIUM	6.02E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CADMIUM AND COM	1.05E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FORMALDEHYDE	8.11E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
LEAD AND COMPOU	1.50E-10	2.77E-10	5.87E-12	0.00E+00	0.00E+00	0.00E+00
NICKEL AND COMP	4.34E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PAH:BENZ(A)ANTH	2.03E-10	3.04E-10	1.93E-10	0.00E+00	0.00E+00	0.00E+00
PAH:BENZO(A)PYR	1.53E-08	2.29E-08	1.46E-08	0.00E+00	0.00E+00	0.00E+00
PAH:BENZO(B)FLU	1.02E-10	1.52E-10	9.66E-11	0.00E+00	0.00E+00	0.00E+00
PAH:BENZO(K)FLU	9.89E-11	1.48E-10	9.41E-11	0.00E+00	0.00E+00	0.00E+00
PAH:CHRYSENE	2.27E-11	3.39E-11	2.15E-11	0.00E+00	0.00E+00	0.00E+00
PAH:DIBENZ(A,H)	2.31E-09	1.08E-09	6.86E-10	0.00E+00	0.00E+00	0.00E+00
PAH:INDENO(1,2,	2.11E-10	3.16E-10	2.01E-10	0.00E+00	0.00E+00	0.00E+00
PROPYLENE OXIDE	8.95E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Route Total	1.91E-07	7.09E-08	1.68E-08	0.00E+00	0.00E+00	0.00E+00

TOTAL RISK: 2.79E-07

K-10: Emissions Reduction Credits
(CONFIDENTIAL)

APPENDIX L

CULTURAL RESOURCES TECHNICAL REPORT

L-1: Confidential Report (filed under separate cover)

L-2: Letter to Native American Heritage Commission

L-1: Confidential Report

(FILED UNDER SEPARATE COVER)

L-2: Letter to Native American Heritage Commission

FOSTER WHEELER
FOSTER WHEELER ENVIRONMENTAL CORPORATION

June 8, 2001

Ms. Debbie Pilas-Treadway
Native American Heritage Commission
915 Capital Mall, Room 364
Sacramento, California 95814

Subject: REQUEST FOR NATIVE AMERICAN REFERRALS AND SACRED LANDS FILE REVIEW FOR THE CALPINE INLAND EMPIRE ENERGY CENTER AND ASSOCIATED GAS PIPELINE, WATERLINE AND POWER TRANSMISSION LINE

Dear Ms. Pilas-Treadway:

Foster Wheeler Environmental Corporation has contracted with Calpine to perform a cultural resource investigation for the above-referenced power plant and the gas, water, and electric lines needed to tie the plant into the existing gas pipeline and power grid. (See attached maps). Foster Wheeler is preparing an environmental assessment for this project, which will be located in a rural area of Riverside County, north of the town of Sun City. The Inland Empire Energy Center site will require grading and excavation, and the gas pipeline and water routes will require trenching below ground surface. The power transmission line is previously existing, but will require substantial reconstruction. The USGS Quad maps the project is located on are listed below, and a map of the complete project is attached.

Midway Energy Center, Gas Pipeline, Wastewater, and Transmission line
USGS Romoland 7.5 Quad:
USGS Perris 7.5 Quad
USGS Sunnymeade 7.5 Quad

We are requesting that you provide us with the names and addresses of potentially affected and interested Native American individuals and organizations to include in a mailing list for information on the project. Please also notify us in writing if there are any locations that are included in your Sacred Lands Inventory along the proposed project route. Please reference the "Inland Empire Energy Center" in your correspondence. Please send this information to the address or FAX number at the bottom of this page. You can contact me at (425) 241-0713 if you have any questions. We greatly appreciate your help.

Sincerely,

Andrew Gorman
Cultural Resources Scientist
Foster Wheeler Environmental

3927 LENNANE DRIVE, SUITE 200, SACRAMENTO, CALIFORNIA 95834-1957
TEL: 916-928-0202 FAX: 916-928-0594

STATE OF CALIFORNIA Gray Davis, Governor

NATIVE AMERICAN HERITAGE COMMISSION
915 CAPITOL MALL, ROOM 364
SACRAMENTO, CA 95814
(916) 653-4082
Fax (916) 657-5390
Web Site www.nahc.ca.gov

June 27, 2001

INLAND EMPIRE

Andrew Gorman
Foster Wheeler Environmental Corporation
3927 Lennane Drive, Suite 200
Sacramento, CA 95834

RE: Midway Energy Center, Gas Pipeline, Wastewater, Transmission Line Project - Riverside County

Sent By Fax: (916) 928-0594
Pages Sent: 4

Dear Mr. Gorman:

A record search of the sacred lands file has failed to indicate the presence of Native American cultural resources in the immediate project area. The absence of specific site information in the sacred lands file does not indicate the absence of cultural resources in any project area. Other sources of cultural resources should also be contacted for information regarding known and recorded sites.

Enclosed is a list of Native Americans individuals/organizations who may have knowledge of cultural resources in the project area. The Commission makes no recommendation or preference of a single individual, or group over another. This list should provide a starting place in locating areas of potential adverse impact within the proposed project area. I suggest you contact all of those indicated, if they cannot supply information, they might recommend other with specific knowledge. A minimum of two weeks must be allowed for responses after notification.

If you receive notification of change of addresses and phone numbers from any these individuals or groups, please notify me. With your assistance we are able to assure that our lists contain current information. If you have any questions or need additional information, please contact me at (916) 653-4040.

Sincerely,

Rob Wood
Associate Governmental Program Analyst

NATIVE AMERICAN CONTACTS
Riverside County
June 28, 2001

Agua Caliente Band of Cahuilla Indians
Richard Milanovich, Chairperson
960 E. Tahquitz Way, #106 Cahuilla
Palm Springs, CA 92262
(619) 325-5673
(619) 325-0593 Fax

Pala Band of Mission Indians
Robert Smith, Chairperson
P.O. Box 49 Luiseno
Pala, CA 92059 Cupeno
(760) 742-3784
(760) 742-1411 Fax

La Jolla Band of Mission Indians
Jack Musick, Chairperson
22000 Highway 76 Luiseno
Pauma Valley, CA 92061
(760) 742-3771/72

Pauma & Yuima
Chrisobel C. Devers, Chairperson
P.O. Box 369 Luiseno
Pauma Valley, CA 92061
(760) 742-1289
(760) 742-3422 Fax

Cabazon Band of Mission Indians
John A. James, Chairperson
84-245 Indio Springs Drive Cahuilla
Indio, CA 92201
(760) 342-2593
(760) 347-7880 Fax

Pechanga Band of Mission Indians
Mark Macarro, Chairperson
P.O. Box 1477 Luiseno
Temecula, CA 92593
(909) 676-2768
(909) 699-6983 Fax

Cahuilla Band of Mission Indians
Michelle Salgado, Spokesperson
P.O. Box 391760 Cahuilla
Anza, CA 92539
(909) 763-5549
(909) 763-2808 Fax

Ramona Band of Mission Indians
Joseph Hamilton, Representative
P.O. Box 391670 Cahuilla
Anza, CA 92539
(909) 487-0822

Morongo Band of Mission Indians
Mary Ann Andreas, Chairperson
11581 Potrero Rd. Cahuilla
Banning, CA 92220
(909) 849-4697/98
(909) 849-4425 Fax

Rincon Band of Mission Indians
John Currier, Chairperson
P.O. Box 68 Luiseno
Valley Center, CA 92082
(760) 749-1051
(760) 749-8901 Fax

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regards to the cultural assessment for the proposed Calpine Inland Empire Energy Center and Associated Gas Pipeline, Sun City, Riverside County.

NATIVE AMERICAN CONTACTS
Riverside County
June 28, 2001

Soboba Band of Mission Indians
Carl Lopez, Chairperson
P.O. Box 487 Luiseno
San Jacinto, CA 92581
(909) 654-2765
Fax: (909) 654-4155

Torres-Martinez Desert Cahuilla Indians
Ernest Morreo
PO Box 1160 Cahuilla
Thermal, CA 92274
(760) 397-0300
(760) 397-8146 Fax

Torres-Martinez Desert Cahuilla Indians
Art Lopez, Chairperson
PO Box 1160 Cahuilla
Thermal, CA 92274
(760) 397-0300
(760) 397-8146 Fax

Anthony J. Andreas, Jr.
3022 W. Nicolet Street Cahuilla
Banning, 92220
CA
(909) 849-3844

Twenty-Nine Palms Band of Mission Indians
Dean Mike, Chairperson
46-200 Harrison Place Luiseno
Coachilla, CA 92236 Chemehuevi
(760) 775-5566
(760) 775-4639 - Fax

Santa Rosa Band of Mission Indians
Anthony Largo, Spokesman
325 N. Western Avenue Cahuilla
Hemet, CA 92343

Alvino Siva
2034 W. Westward Cahuilla
Banning, 92220
CA
(909) 849-3450

San Luis Rey Band of Mission Indians
Henry Contreras, Cultural Resources Representative
1763 Chapulin Lane Luiseno
Fallbrook, CA 92028 Cupeno
(760) 728-6722 - Home
(760) 207-3813 - Cell

Katherine Saubel
P.O. Box 373 Cahuilla
Banning, 92220
CA
(909) 849-8304

San Luis Rey Band of Mission Indians
Russell Romo, Captain
2302 Carriage Circle Luiseno
Oceanside, CA 92056 Cupeno
(760) 724-8505
(760) 757-6749 - Fax

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regards to the cultural assessment for the proposed Calpine Inland Empire Energy Center and Associated Gas Pipeline, Sun City, Riverside County.

NATIVE AMERICAN CONTACTS
Riverside County
June 28, 2001

Augustine Band of Mission Indians
Maryann Martin, Chairperson
84481 Avenue 54 Cahuilla
Coachella, CA 92236
(760) 398-4722
(760) 398-4922 Fax

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.

This list is only applicable for contacting local Native Americans with regards to the cultural assessment for the proposed Calpine Inland Empire Energy Center and Associated Gas Pipeline, Sun City, Riverside County.

FOSTER WHEELER
FOSTER WHEELER ENVIRONMENTAL CORPORATION

July 3,.2001

ADDRESS PROVIDED BY NAHC

Dear:

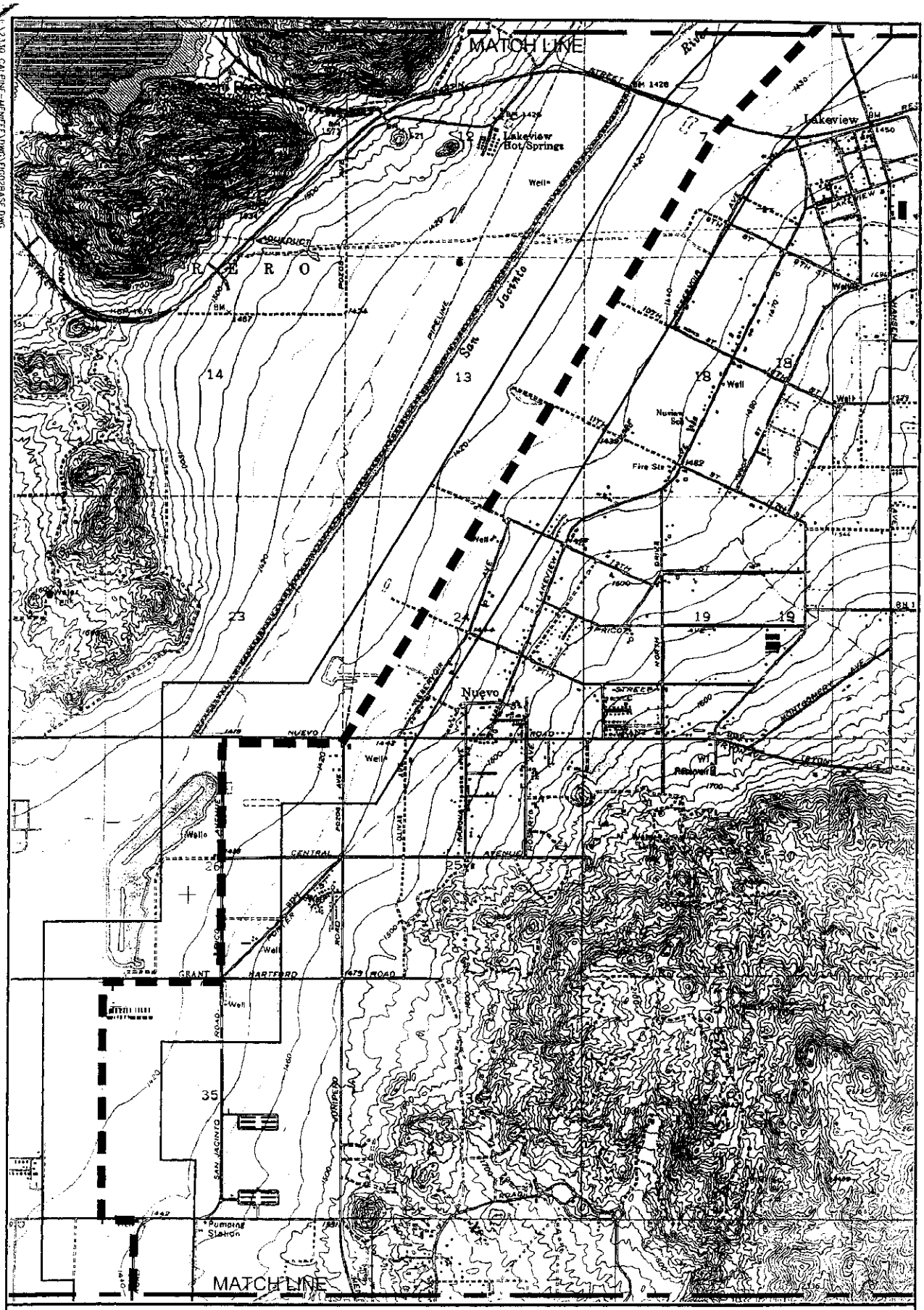
The Calpine Corporation, an operator of electric power generating facilities will be constructing a new powerplant in a rural area near Romoland, California. This project, which will require the construction of the plant itself, construction of a gas pipeline, and an electric power transmission line, is known as the Inland Empire Energy Center. The attached map shows the location of the proposed project components. The Native American Heritage Commission provided Calpine with your name and address as someone who may have knowledge of heritage lands or other resources of interest that the project would potentially affect. If you have any questions or comments regarding the proposed Russell City Energy Center project, please contact me directly at:

Andrew Gorman
Foster Wheeler Environmental
3947 Lenane Drive, Suite 200
Sacramento,CA 95834-1957
425-241-0713

Sincerely,

Andrew Gorman
Cultural Resource Scientist
Foster Wheeler Environmental

c: Doug Davy, Foster Wheeler Environmental
Project File



LEGEND

NATURAL GAS PIPELINE

WASTE WATER PIPELINE

TRANSMISSION LINE UPGRADE

0 1000 2000 4000

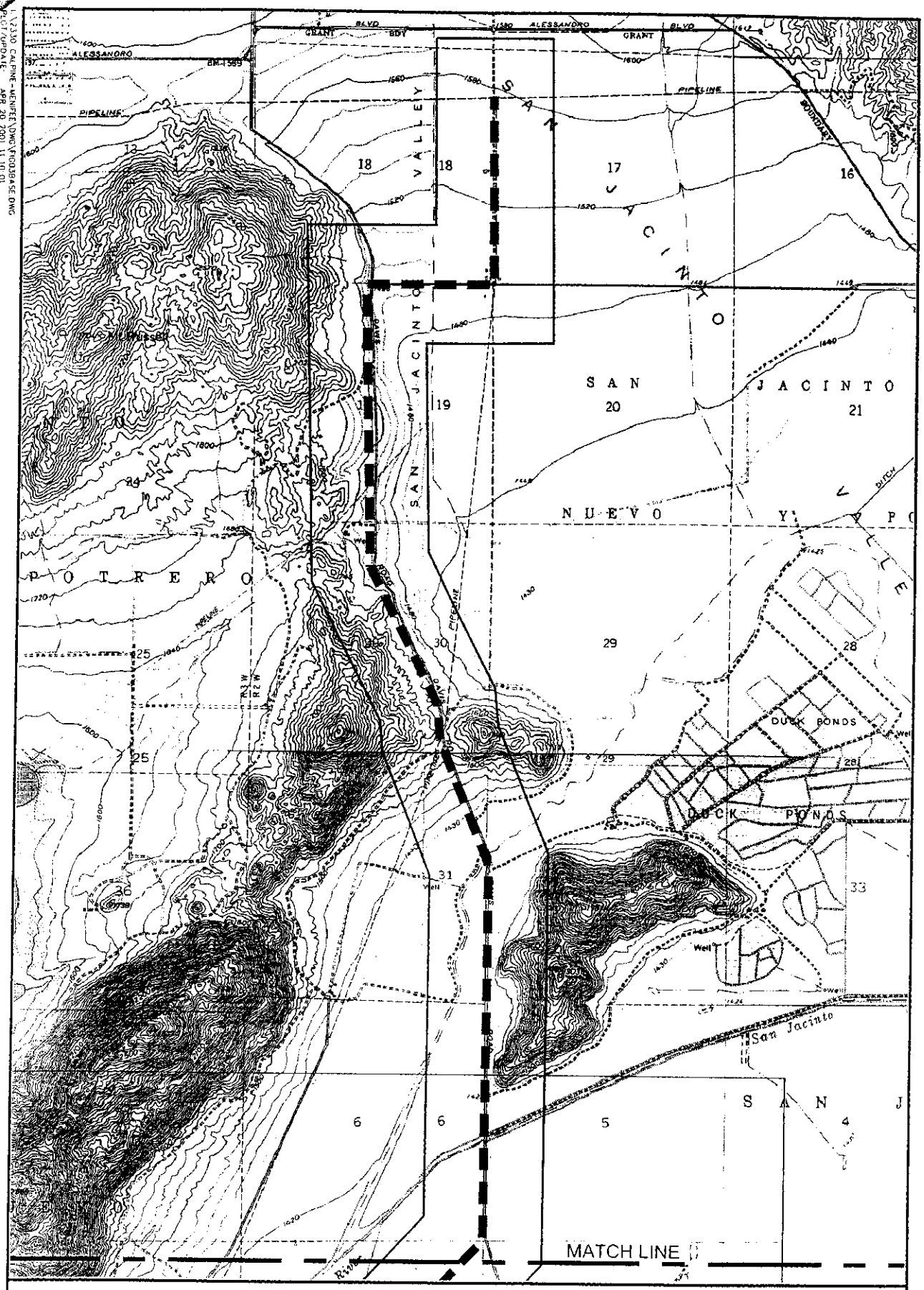
APPROXIMATE GRAPHIC SCALE IN FEET

Base map from USGS 7.5 Romoland, Perris, Sunnymead, Lakeview and El Casco - Quads (Scale 1:24,000).

INLAND EMPIRE ENERGY CENTER
CALPINE CORPORATION

FIGURE B

–



LEGEND

- NATURAL GAS PIPELINE
- WASTE WATER PIPELINE
- TRANSMISSION LINE UPGRADE

Base map from USGS 7.5 Romoland, Perris, Sunnymead, Lakeview and El Casco - Quads (Scale 1:24,000).

0 1000 2000 4000

INLAND EMPIRE ENERGY CENTER
CALPINE CORPORATION

FIGURE C

APPENDIX M

WATER DISTRICT LETTER

EASTERN MUNICIPAL WATER DISTRICT

Board of Directors

President
Rodger D. Siems

Vice President
Richard R. Hall

Marion V. Ashley
Randy A. Record
David J. Slawson

Board Secretary
Mary C. White

General Manager
John B. Brudin

Director of the Metropolitan Water District of So. Calif.
Marion V. Ashley

Treasurer
Joseph J. Kuebler, CPA

Legal Counsel
Redwine and Sherrill

July 12, 2001

Mr. Gregory Lamberg
Director of Business Development
Calpine Corporation
Western Region Office
6700 Koll Center Parkway, Suite 200
Pleasanton, California 94566

Dear Mr. Lamberg:

RE: Water and Sewer Will Serve, APN 331-180-008
Inland Empire Energy Center

EMWD is willing and able to provide water and sewer service to the proposed Inland Empire Energy Center (IEEC). As we understand your service requirements, the IEEC will require approximately 5,000 acre-feet/year of water for cooling (peak demands approximately 5,200 gallons per minute), process makeup and a nominal domestic use. We understand your daily domestic demands to be approximately two gallons per minute. Furthermore, the project would generate non-reclaimable wastewater (brine) peak daily flow of approximately 1.2 MGD and peak sanitary sewer flows of approximately 20 gallons per minute. Service for your process and cooling needs would be provided from EMWD's recycled water system.

These estimated service requirements can be satisfied from EMWD's currently available water supplies but additional facilities will have to be constructed to extend service to the proposed site located between Antelope Road and San Jacinto Avenue, north of McLaughlin Road. Potable water service would be provided for domestic needs and fire protection. We anticipate providing a one-inch service connection and meter for domestic uses and an 8-inch unmetered connection with backflow prevention for fire flow from existing service mains. Recycled water service will require construction of a service main extension to the site, new pumping equipment on the recycled water system and a new pump station to enable raw water to be served into the recycled water system to supplement existing sources of recycled water.

Mailing Address: Post Office Box 8300 Perris, CA 92572-8300 Telephone: (909) 928-3777 Fax: (909) 928-6177
Location: 2270 Trumble Road Perris, CA 92570 Internet: www.emwd.org

Similarly, EMWD has the capacity to provide wastewater services to the site but additional facilities must be constructed to extend those services to the project site. Most notable will be, the non-reclaimable waste line from its terminus at the Sun City RWRF to the project site in order to accommodate the industrial discharges from IEEC. Sanitary sewage will be accommodated by existing sanitary sewer pipeline adjacent to the site.

The provisions of these services are contingent upon the completion of the necessary arrangements in accordance with EMWD rules and regulations and the payment of fees, rates, and charges. These fees, rates, and charges would include charges for major facilities described above plus delivery charges for water actually used at the site and use charges for wastewater actually discharged. Delivery charges would include all costs of obtaining supplemental raw water for the reclaimed water system as needed to sustain demands of the IEEC. We anticipate that the terms and conditions for the provision of water and sewer service to IEEC will be further clarified in a detailed service agreement.

EMWD looks forward to working with and serving the IEEC water and sewer requirements.

Sincerely,

Warren A. Back
Senior Civil Engineer
New Business Development Department

APPENDIX N

LIST OF SURROUNDING PROPERTY OWNERS

APN	Owner	Address	City, State	Zip
331-190-017	40 Ac Industrial Rail Ltd	846 Williamston St 105	Vista Ca	92084-5247
331-190-041	40 Ac Industrial Rail Ltd	846 Williamston St 105	Vista Ca	92084-5247
331-190-047	40 Ac Industrial Rail Ltd	846 Williamston St 105	Vista Ca	92084-5247
331-190-048	40 Ac Industrial Rail Ltd	846 Williamston St 105	Vista Ca	92084-5247
331-340-022	Aaron P Melland	26530 Trumble Rd	Sun City Ca	92585-9239
329-360-023	Abdel & Ramzie Chehade	PO Box 3894	South Pasadena C	91031-6894
329-360-022	Abdel H & Ramzie Chehade	PO Box 3894	South Pasadena C	91031-6894
338-301-024	Abner U & Karri Riera	26082 Crestmont Cir	Sun City Ca	92586-5811
335-440-024	Acquiport Amsdell I Ltd Part	6745 Engle Rd 300	Cleveland Oh	44130-7993
335-440-025	Acquiport Amsdell I Ltd Part	6745 Engle Rd 300	Cleveland Oh	44130-7993
309-360-020	Aden H & Catherine Ting	3630 Holmes Cir	Hacienda Heights	91745-6176
309-380-004	Aden H & Catherine Ting	3630 Holmes Cir	Hacienda Heights	91745-6176
309-380-006	Aden H & Catherine Ting	3630 Holmes Cir	Hacienda Heights	91745-6176
331-080-003	Adnan M Nabulsi	12022 Atlantic Ave	Lynwood Ca	90262-4531
337-131-005	Adolph A Tabor	28785 Amersfoot Way	Sun City Ca	92586-2756
327-071-033	Adrin A & Ramona Lopez	28188 Patti Ln	Sun City Ca	92585-9018
337-410-020	Agnes V Keeter	26071 Bonita Vista Ct	Sun City Ca	92586-2409
309-360-026	Akbar & Valerie Khoobbagha	28368 Roan Ranch Rd	Romoland Ca	92585-9085
339-133-037	Albert E & Nancy Warren	28780 Wee Burn Way	Sun City Ca	92586-2677
335-132-002	Albert G & Agnpina Martinez	26021 Lancaster Dr	Sun City Ca	92586-1932
337-112-017	Albert R & Stella Campbell	26260 Burlington Way	Sun City Ca	92586-2716
335-426-002	Albert W & Patricia Neumann	27129 Rangewood St	Sun City Ca	92586-3743
331-340-023	Alex C & Syliva Romero	26520 Trumble Rd	Sun City Ca	92585-9239
338-092-001	Alex W & Barbara Guzy	29232 Murrieta Rd	Sun City Ca	92586-2871
338-092-015	Alex W Guzy	2627 W Florida Ave 200	Hemet Ca	92545-3662
335-262-013	Alfonsas & Vida Vilkas	26054 Albany Dr	Sun City Ca	92586-2156
339-053-013	Alfred & Doris Speranza	25917 Sandy Lodge Rd	Sun City Ca	92586-5306
339-051-029	Alfred J & Ruth Spizzy	PO Box 616	Sun City Ca	92586-0616

APN	Owner	Address	City, State	Zip
335-426-003	Alfred W & Cynthia Muehlebac	27137 Rangewood St	Sun City Ca	92586-3743
338-091-037	Alice Velez	29208 Murrieta Rd	Sun City Ca	92586-5823
337-410-033	Alice A Myhre	26063 Verde Grande Ct	Sun City Ca	92586-3562
335-092-009	Alice B Overfelt	25871 Lancaster Dr	Sun City Ca	92586-2356
330-291-020	Alice M Knapp	26903 Via Valdez	Sun City Ca	92585-8822
309-360-022	Allen & Jane Lam	8748 E Valley Blvd N P	Rosemead Ca	91770
331-340-020	Allen C & Paula Sharp	27799 Cannon Dr	Sun City Ca	92585-8909
339-102-005	Allen J Francis	5184 Karen Cir	Culver City Ca	90230-4906
339-102-003	Allene J Feely	25871 Plum Hollow Dr	Sun City Ca	92586-2651
335-262-014	Alpha & Mary Moses	27590 Decatur Way	Sun City Ca	92586-2147
309-360-016	Alvin E & Joann Bryant	28340 Ellis Ave	Romoland Ca	92585-9009
337-090-028	Alvin R Heard	4118 Hooper Ave	Los Angeles Ca	90011-3222
339-200-072	American Realty	2533 N Carson St 2988	Carson City Nv	89706-0147
339-061-008	Amos L & Doris Greenamyre	28225 Murrieta Rd	Sun City Ca	92586-2428
426-020-009	Amway Corp	5600 Beach Blvd	Buena Park Ca	90621-2007
426-030-004	Amway Corp	5600 Beach Blvd	Buena Park Ca	90621-2007
426-030-011	Amway Corp	5600 Beach Blvd	Buena Park Ca	90621-2007
426-030-012	Amway Corp	5600 Beach Blvd	Buena Park Ca	90621-2007
426-040-001	Amway Corp	5600 Beach Blvd	Buena Park Ca	90621-2007
339-141-008	Amy L Bullockus	28951 W Worcester Rd	Sun City Ca	92586-2629
338-091-087	Anden Group	685 Copenhagen St	Hemet Ca	92545-2308
335-274-011	Anderson	27740 Provo Ct	Sun City Ca	92586-2119
329-070-016	Andrew F & Bobbie Finney	PO Box 1412	Romoland Ca	92585-0412
330-291-014	Andrew J & Patricia Rogers	105 N Cawston Ave	Hemet Ca	92545-5276
337-112-029	Andy E Lovas	28595 Amersfoot Way	Sun City Ca	92586-2711
309-360-021	Angel A Chiao	3630 Holmes Cir	Hacienda Heights	91745-6176
339-102-001	Angela Miller	25891 Plum Hollow Dr	Sun City Ca	92586-2651
335-424-040	Angelina Guzman	27106 Rangewood St	Sun City Ca	92586-3745

APN	Owner	Address	City, State	Zip
335-261-007	Angelo Aiello	PO Box 273	Sun City Ca	92586-0273
339-103-016	Anita L Barkelew	13423 Caminito Carmel	Del Mar Ca	92014-3848
337-022-002	Ann C Brierf	26081 Pine Valley Rd	Sun City Ca	92586-2476
339-103-019	Ann M Morgan	25887 Coombe Hill Dr	Sun City Ca	92586-2606
338-092-010	Ann M Pettite	29316 Murrieta Rd	Sun City Ca	92586-5824
337-133-004	Anna Koran	26131 Kitt Ansett Dr	Sun City Ca	92586-2781
339-133-005	Anna Toma	28839 Murrieta Rd	Sun City Ca	92586-2751
339-053-012	Anna G Mayer	25897 Sandy Lodge Rd	Sun City Ca	92586-2397
330-280-072	Anna J Smith	26661 Calle Emiliano	Sun City Ca	92585-8834
339-132-022	Anna M Gordon	25850 Morgantown Way	Sun City Ca	92586-2643
338-091-039	Anne Anderson	29204 Murrieta Rd	Sun City Ca	92586-5823
339-102-028	Annette Bass	25890 Coombe Hill Dr	Sun City Ca	92586-2636
337-102-025	Annette Rich	26114 Fountain Bleu D	Sun City Ca	92586-2774
337-102-025	Annette Rich	26114 Fountain Bleu Dr	Sun City Ca	92586-2774
331-210-025	Annette H Paquette	2722 S Hill Rd 64	Gladstone Mi	49837-2160
339-063-008	Annie C Pender	25875 Warwick Rd	Sun City Ca	92586-2480
331-120-033	Anstalt Sulco	170 Wilkerson Ave B	Perris Ca	92570-2200
331-120-045	Anstalt Sulco	170 Wilkerson Ave N B	Perris Ca	92570
335-424-037	Anthony & Virginia Occhino	27130 Rangewood St	Sun City Ca	92586-3745
335-424-024	Anthony Scaduto	27075 Stagewood St	Sun City Ca	92586-3756
337-124-002	Anthony A & Olga Toscano	26091 Fresh Meadow Dr	Sun City Ca	92586-2719
335-141-010	Archer H & Esther Munger	27831 Covington Way	Sun City Ca	92586-1902
335-144-005	Arend & Ruth Jekel	26121 Germantown Dr	Sun City Ca	92586-1921
338-091-082	Arlyne M & Arlyn Labair	29346 Murrieta Rd 82	Sun City Ca	92586-2875
337-114-028	Armand G & Dena Sierras	PO Box 737	Sun City Ca	92586-0737
330-280-062	Armando & Francesca Ricci	26571 Calle Emiliano	Sun City Ca	92585-8833
331-350-001	Arnold G & Laurie Nutter	26510 Sherman Rd	Sun City Ca	92585-9229
335-092-026	Arthur & Alycia Iarussi	25940 Mccall Blvd	Sun City Ca	92586-2357

APN	Owner	Address	City, State	Zip
330-280-071	Arthur Tuokkola	26653 Calle Emiliano	Sun City Ca	92585-8834
339-092-031	Arthur A & Joan Vanorden	25911 Cherry Hills Bl	Sun City Ca	92586-2467
339-092-031	Arthur A & Joan Vanorden	25911 Cherry Hills Blv	Sun City Ca	92586-2467
337-090-007	Arthur C & Bonnie Dworak	26075 Cherry Hills Bl	Sun City Ca	92586-2468
337-090-007	Arthur C & Bonnie Dworak	26075 Cherry Hills Blv	Sun City Ca	92586-2468
339-101-009	Arthur E & Gail Huckaby	28230 W Worcester Rd	Sun City Ca	92586-2616
338-091-065	Arthur F & Margaret Helberg	29216 Murrieta Rd	Sun City Ca	92586-2871
339-061-016	Arthur J & Janet Rhodes	25930 Roanoke Rd	Sun City Ca	92586-2329
339-111-014	Arthur L & Rosario Corona	28590 Middlebury Way	Sun City Ca	92586-2642
339-142-010	Arthur R & Olga Eastwood	25890 Ridgemoor Rd	Sun City Ca	92586-2692
335-132-048	Arthur S & Marjorie Kitzerow	26116 Mccall Blvd	Sun City Ca	92586-1930
335-132-006	Arthur W Pratt	1732 Trolleystone Ct	Cary Nc	27513-8700
327-330-038	Arturo & Maria Pulido	25350 Santiago Dr 7	Moreno Valley Ca	92551-4626
337-021-036	Arturo G Chavez	26071 Saint Marys St	Sun City Ca	92586-2433
331-100-017	Ashby Financial Co Inc	7072 Garfield Ave	Huntington Beach	92648-1517
331-120-003	Ashby Financial Co Inc	7072 Garfield Ave	Huntington Beach	92648-1517
331-120-028	Ashby Financial Co Inc	7072 Garfield Ave	Huntington Beach	92648-1517
335-426-014	Audrey F Ellis	26073 Bluebell St	Sun City Ca	92586-3754
329-320-006	Audrey M Haug	28590 Watson Rd	Sun City Ca	92585-9311
309-050-006	Aurora Campbell	22881 Porter St	Nuevo Ca	92567-9640
309-370-003	B C Dage Inc	3629 4Th Ave A	San Diego Ca	92103-4114
309-370-005	B C Dage Inc	3629 4Th Ave A	San Diego Ca	92103-4114
309-370-006	B C Dage Inc	3629 4Th Ave A	San Diego Ca	92103-4114
309-370-007	B C Dage Inc	3629 4Th Ave A	San Diego Ca	92103-4114
337-021-013	Ballard	26045 Mccall Blvd	Sun City Ca	92586-1917
339-142-013	Bank Of Commerce	28670 Amersfoot Way	Sun City Ca	92586-2754
335-141-009	Barbara Bickerstaff	27813 Covington Way	Sun City Ca	92586-1902
339-101-035	Barbara E Kingsbury	735 S Park Pl	El Cajon Ca	92021-4359

APN	Owner	Address	City, State	Zip
330-280-021	Barbara J Jolley	104 Capricorn Ave	Oakland Ca	94611-1943
339-030-006	Barbara J Mcgrnnis	PO Box G	Sun City Ca	92586-0993
339-102-025	Barbara K Horacek	40681 Vera Ct	Hemet Ca	92544-6254
329-261-009	Barbara M Curran	2416 Antigua Ct	Hemet Ca	92545-2511
339-062-016	Barbara R Chambers	25870 Warwick Rd	Sun City Ca	92586-2432
329-120-017	Barr Robinson Enterprises	5066 San Joaquin Dr	San Diego Ca	92109-1512
329-120-018	Barr Robinson Enterprises	5066 San Joaquin Dr	San Diego Ca	92109-1512
338-091-047	Barry W & Evron Domer	29364 Murrieta Rd	Sun City Ca	92586-2876
330-280-064	Bayard D & Gladys March	26589 Calle Emiliano	Sun City Ca	92585-8833
337-021-039	Beatrice L Johnson	28600 Hoylake Ct	Sun City Ca	92586-2604
335-440-009	Belmudes	5045 Madison Ave	Chino Ca	91710-2576
331-350-009	Ben H & Belinda Bates	26645 Dawson Rd	Sun City Ca	92585-9732
337-122-001	Ben J & Margaret Nelson	28620 Amersfoot Way	Sun City Ca	92586-2754
338-301-004	Benjamin P & Annette Roberts	26063 Ridgemoor Rd	Sun City Ca	92586-2788
339-133-035	Benjamin S & Catalina Knox	1025 Sunwest Dr 220	Hemet Ca	92545-1665
327-080-044	Benn Thad	13381 Ontario Dr	Garden Grove Ca	92844-2322
337-410-027	Bennie E Britt	26034 Verde Grande Ct	Sun City Ca	92586-2422
309-360-027	Bernard E & Karen Taber	28265 Santa Rosa Ave	Romoland Ca	92585-9510
330-280-050	Bernard J Schara	26626 Calle Emiliano	Sun City Ca	92585-8829
337-131-025	Bernard L & Evangelin Feders	28778 Murrieta Rd	Sun City Ca	92586-2757
335-141-007	Bert J Upson	27800 Murrieta Rd	Sun City Ca	92586-2321
337-140-010	Bert R & Stella Alexander	28964 E Worcester Rd	Sun City Ca	92586-2787
330-291-008	Bertha Lopez	26746 Calle Gregorio	Sun City Ca	92585-8825
337-021-002	Bette J Godwin	28120 Murrieta Rd	Sun City Ca	92586-2418
339-133-009	Betty Thackeray	28970 W Worcester Rd	Sun City Ca	92586-2630
335-092-025	Betty A Fogle	25950 Mccall Blvd	Sun City Ca	92586-2357
327-080-055	Betty B Johnston	24155 Pico Ave	Sun City Ca	92585-9533
339-061-014	Betty C Burnett	25940 Roanoke Rd	Sun City Ca	92586-2329

APN	Owner	Address	City, State	Zip
337-090-003	Betty J Coover	26035 Cherry Hills Bl	Sun City Ca	92586-2468
337-090-003	Betty J Coover	26035 Cherry Hills Blv	Sun City Ca	92586-2468
339-125-014	Betty J Fosdick	28722 Wee Burn Way	Sun City Ca	92586-2676
335-144-002	Betty J Mccloskey	26071 Germantown Dr	Sun City Ca	92586-1922
338-091-079	Betty L Fernberg	29308 Murrieta Rd 85	Sun City Ca	92586-5824
337-090-001	Betty L Lewis	26015 Cherry Hills Bl	Sun City Ca	92586-2468
337-090-001	Betty L Lewis	26015 Cherry Hills Blv	Sun City Ca	92586-2468
335-274-001	Betty L Ray	27615 Decatur Way	Sun City Ca	92586-2110
335-423-019	Betty L Tinsley	26090 Shadywood St	Sun City Ca	92586-3733
338-091-059	Betty R Wright	29192 Murrieta Rd	Sun City Ca	92586-2870
335-143-003	Beverly Heath	26097 Brandywine Dr	Sun City Ca	92586-1914
338-091-054	Beverly Mckinnon	PO Box 771	Sun City Ca	92586
330-292-002	Beverly Schmidt	26770 Calle Emiliano	Sun City Ca	92585-8832
309-050-007	Beverly E Motley	28678 Cloverleaf Pl	Castaic Ca	91384-4310
335-424-041	Beverly L Haney	27098 Rangewood St	Sun City Ca	92586-3745
330-280-056	Beverly P Woodworth	26572 Calle Emiliano	Sun City Ca	92585-8828
330-292-007	Beverly W Bosak	2940 Belden Dr	Hollywood Ca	90068-1904
337-104-010	Bill A Planchon	26151 Falsterbor Dr	Sun City Ca	92586-2769
339-132-002	Billee H Worthy	25871 Musselburgh Dr	Sun City Ca	92586-2645
339-132-001	Billy G Kemp	25881 Musselburgh Dr	Sun City Ca	92586-4614
331-190-039	Block Graphics Inc	PO Box 13530	Portland Or	97213-0530
335-423-023	Bob E & Mildred Salo	26083 Goldenwood St	Sun City Ca	92586-3747
337-022-014	Boyanne P Fox	26110 Saint Marys St	Sun City Ca	92586-2464
335-100-002	Brian & Alma Jackson	Salford M68Np	Manchester Engla	
337-410-001	Brian & Norm Smith	3817 Huron Ave	Culver City Ca	90232-3801
338-091-016	Brian L & Susan Howlett	1257 Ameluxen Ave	Hacienda Heights	91745-1904
338-091-017	Brian L & Susan Howlett	1257 Ameluxen Ave	Hacienda Heights	91745-1904
338-091-019	Brian L & Susan Howlett	1257 Ameluxen Ave	Hacienda Heights	91745-1904

APN	Owner	Address	City, State	Zip
338-091-024	Brian L & Susan Howlett	1257 Ameluxen Ave	Hacienda Heights	91745-1904
338-091-029	Brian L & Susan Howlett	1257 Ameluxen Ave	Hacienda Heights	91745-1904
338-091-031	Brian L & Susan Howlett	1257 Ameluxen Ave	Hacienda Heights	91745-1904
338-091-032	Brian L & Susan Howlett	1257 Ameluxen Ave	Hacienda Heights	91745-1904
331-120-032	Brigitte Demeter	43500 Ridge Park Dr 10	Temecula Ca	92590-3691
335-426-016	Bruce & Grace Weber	26091 Bluebell St	Sun City Ca	92586-3754
327-340-020	Bruce Knight	20003 Meadows Ct	Cerritos Ca	90703-7831
338-091-068	Bruce K & Bonnie Teevan	29222 Murrieta Rd 96	Sun City Ca	92586-2871
335-092-029	Bruce L & Geraldine Cabocel	25900 Mccall Blvd	Sun City Ca	92586-2357
337-410-006	Burton A & Alora Bobzien	26071 Birkdale Rd	Sun City Ca	92586-2423
337-410-037	Busch	28242 Buena Mesa Dr	Sun City Ca	92586-2410
338-092-005	Byron B & Doris Bean	2714 Garfield Ave	Ontario Ca	91761-6820
331-060-008	Byron P & Patricia Sansom	31307 Santiago Rd	Temecula Ca	92592-3113
309-370-001	Byron S Owen Estate	8001 Irvine Center 900	Irvine Ca	92618
309-370-002	Byron S Owen Estate	8001 Irvine Center 900	Irvine Ca	92618
335-413-005	Byron S Vafiadi	26044 Sunnywood St	Sun City Ca	92586-3746
309-370-008	Byron W Ferguson	PO Box 118	Forest Falls Ca	92339-0118
338-091-040	C D Edwards	28372 Harvest View Ln	Trabuco Canyon C	92679-1196
337-104-014	C L Small	26111 Falsterbor Dr	Sun City Ca	92586-2769
339-051-028	C R & Eileen Lagrange	25920 Whitman Rd	Sun City Ca	92586-5302
339-112-017	Carl A & Anne Freeman	13137 Parise Dr	La Mirada Ca	90638-1825
309-360-015	Carl D & Linda Thompson	28310 Ellis Ave	Romoland Ca	92585-9009
329-262-014	Carl E & Thora Bonstrom	25964 Northwinds Dr	Sun City Ca	92585-9713
330-280-069	Carl J Peterson	26635 Calle Emiliano	Sun City Ca	92585-8834
331-210-009	Carl L Myers	1126 E Buffalo Ave	Santa Ana Ca	92705-7003
329-070-053	Carl O & Maria Jensen	25020 Happy Acres Dr	Sun City Ca	92585-9423
337-103-015	Carl W & Janie Lollis	26150 Falsterbor Dr	Sun City Ca	92586-2709
327-080-053	Carlos & Consuelo Zermeno	4256 Descanso Ave	Chino Hills Ca	91709-3087

APN	Owner	Address	City, State	Zip
335-440-027	Carlos & Marie Estrada	25920 Chambers Ave	Sun City Ca	92586-2340
309-360-025	Carlos P & Lugarda Hernandez	28352 Roan Ranch Rd	Romoland Ca	92585-9085
338-301-022	Carmen J & Ana Alvarez	26118 Crestmont Cir	Sun City Ca	92586-5813
330-280-066	Carncross	5285 Havenwood Ln	Salt Lake City U	84117-8834
337-104-019	Carol Shepard	1491 S Orange Ave	El Cajon Ca	92020-7417
338-301-023	Carol A Towner	26100 Crestmont Cir	Sun City Ca	92586-5813
337-122-002	Carol R Thornber	26091 Sun City Blvd	Sun City Ca	92586-2772
330-280-020	Carole Jackson	25950 Camino Juarez	Sun City Ca	92585-8818
335-141-008	Carole F Mizer	27801 Covington Way	Sun City Ca	92586-1902
337-090-030	Carolyn J Dodd	22693 Canyon Lake Dr	Canyon Lake Ca	92587
337-090-008	Carolyn K Snyder	26085 Cherry Hills Bl	Sun City Ca	92586-2468
337-090-008	Carolyn K Snyder	26085 Cherry Hills Blv	Sun City Ca	92586-2468
337-132-002	Carolyn M Kistler	26091 Port Rush Dr	Sun City Ca	92586-2765
337-124-012	Carpenter	26280 Ridgemoor Rd	Sun City Ca	92586-2728
330-292-018	Casa Murietta Estates Homeow	343 Richmar Ave	San Marcos Ca	92069-1620
330-280-046	Casa Murrieta Estates Homeow	26681 Calle Gregorio	Sun City Ca	92585-8827
330-280-047	Casa Murrieta Estates Homeow	26681 Calle Gregorio	Sun City Ca	92585-8827
337-112-018	Catherine A Sunderman	26250 Burlington Way	Sun City Ca	92586-2716
337-410-007	Cecelia L & Neal Oneill	26081 Birkdale Rd	Sun City Ca	92586-2423
329-264-011	Cecilia D Ortega	4718 W C St	Greeley Co	80634-4337
339-112-016	Cecilia M Brooks	28635 Hoylake Ct	Sun City Ca	92586-2604
331-220-002	Chaim & Batya Weiss	PO Box 3056	Herzlia 'B' Isr	
338-091-081	Charles & Janet Requa	29312 Murrieta Rd 83	Sun City Ca	92586-5824
337-121-002	Charles & Juanita Cauthen	28641 Amersfoot Way	Sun City Ca	92586-2713
338-301-040	Charles & Rita Bennett	26042 Westridge Ave	Sun City Ca	92586-5815
338-092-006	Charles A & Clara Traylor	6880 Archibald Ave 12	Alta Loma Ca	91701-5040
335-142-008	Charles A & Dorothy Akers	26114 Brandywine Dr	Sun City Ca	92586-1910
330-280-007	Charles B & Miriam Evans	49305 State Highway 74	Palm Desert Ca	92260-6210

APN	Owner	Address	City, State	Zip
337-114-004	Charles C & Claudia Timmer	26271 Burlington Way	Sun City Ca	92586-2715
338-302-003	Charles D Johnston	26047 Westridge Ave	Sun City Ca	92586-5815
337-410-041	Charles F & Lillian Diefendo	PO Box 999	Sun City Ca	92586-0999
339-125-018	Charles H & Marjorie Phillip	28672 Wee Burn Way	Sun City Ca	92586-2613
335-271-012	Charles J Girotti	26111 Albany Dr	Sun City Ca	92586-2107
330-291-009	Charles K & Delores Mullings	395 W Crestview St	Corona Ca	92882-4821
338-091-084	Charles L & Martha Collier	29350 Murrieta Rd 80	Sun City Ca	92586-2875
331-040-038	Charles M & Edmund Bussey	25875 Coombe Hill Dr	Sun City Ca	92586-2606
335-271-009	Charles R & Joyce Ingram	27540 Boston Dr	Sun City Ca	92586-2106
335-274-002	Charles R & Rita Fest	27625 Decatur Way	Sun City Ca	92586-2110
339-123-002	Charles S & Rose Nash	25881 Baltrustrol Dr	Sun City Ca	92586-2634
338-091-077	Charles S Stockwell	29304 Murrieta Rd 87	Sun City Ca	92586-5824
337-022-003	Charles W & Carol Laylander	26091 Pine Valley Rd	Sun City Ca	92586-2476
330-291-002	Charles W & S Swailes	26692 Calle Gregorio	Sun City Ca	92585-8824
337-090-025	Charlotte A & Charles Johnso	28306 Murrieta Rd	Sun City Ca	92586-2746
335-143-002	Charlotte A Eccles	26071 Brandywine Dr	Sun City Ca	92586-1914
337-022-016	Charlotte A Eccles	26071 Brandywine Dr	Sun City Ca	92586-1914
337-150-004	Cherry Hills Golf Club Inc	PO Box G	Sun City Ca	92586-0993
339-030-005	Cherry Hills Golf Club Inc	PO Box G	Sun City Ca	92586-0993
337-104-005	Chester Dent	28450 Murrieta Rd	Sun City Ca	92586-2743
309-360-024	Chester F Ralston	28346 Roan Ranch Rd	Romoland Ca	92585-9085
335-092-018	China Elliott	25971 Lancaster Dr	Sun City Ca	92586-2305
337-131-020	Christian P Lund	28850 Murrieta Rd	Sun City Ca	92586-2734
335-091-002	Christine J Gesselman	6135 Golden West Ave	Temple City Ca	91780-1754
331-040-030	Christopher R & Angela Harri	26229 Melaughlin Rd	Sun City Ca	92585-9601
338-091-057	Clara Meyers	29384 Murrieta Rd	Sun City Ca	92586-2876
335-274-005	Clarence D & Phyllis Jacobso	27705 Decatur Way	Sun City Ca	92586-2143
327-340-013	Clarence J & Arthenne Brownl	28130 Mapes Rd	Sun City Ca	92585-9723

APN	Owner	Address	City, State	Zip
337-112-021	Clarence P & Patsy Forsberg	26220 Burlington Way	Sun City Ca	92586-2716
339-125-011	Clarence W & Gelela Owen	28890 Snead Dr	Sun City Ca	92586-3189
335-132-007	Clarence W & Virginia Dukes	26097 Lancaster Dr	Sun City Ca	92586-1932
337-410-018	Clarice F Eliassen	26051 Bonita Vista Ct	Sun City Ca	92586-2409
329-070-008	Clarke Robey	PO Box 1606	Sun City Ca	92585-1606
331-150-030	Clarke A & Hilda Robey	PO Box 1606	Sun City Ca	92585-1606
331-150-029	Clarke A Robey	PO Box 1606	Romoland Ca	92585-1606
330-291-021	Claude E & Billie Bealer	26893 Via Valdez	Sun City Ca	92585-8822
329-070-056	Claudia Jauregui	28415 Eller Way	Sun City Ca	92585-9220
339-051-021	Cleatus T & Ellen Slaven	28055 Murrieta Rd	Sun City Ca	92586-2427
330-292-013	Clement E & Albertina Lawren	26924 Corte Adelita	Sun City Ca	92585-8820
331-200-012	Cleto & Cleotilde Bustamant	212 S Brand Blvd	San Fernando Ca	91340-3609
335-262-012	Clifford D & Joyce Misamore	26068 Albany Dr	Sun City Ca	92586-2156
335-424-021	Clifford J & Mary Neufeld	26054 Goldenwood St	Sun City Ca	92586-3750
339-141-006	Clifton J & Elizabet Bourbon	28971 W Worcester Rd	Sun City Ca	92586-2629
339-133-003	Clifton W Bowen	10509 Plunkett St	Bellflower Ca	90706-7135
335-142-007	Clinton Lumpkin	26096 Brandywine Dr	Sun City Ca	92586-1950
338-091-066	Clinton K & Hope Pierson	29218 Murrieta Rd 98	Sun City Ca	92586-2871
337-131-023	Clinton R & Elizabeth Lillar	28810 Murrieta Rd	Sun City Ca	92586-2734
339-103-010	Clyde K & Jackie Collier	25991 Coombe Hill Dr	Sun City Ca	92586-2610
335-274-009	Clyde N & Catharine Moore	27749 Provo Ct	Sun City Ca	92586-2119
309-380-002	Communities I Trimark	5299 Dtc Blvd 800	Englewood Co	80111-3329
339-062-012	Conchita F Johnson	25925 Roanoke Rd	Sun City Ca	92586-2328
339-112-022	Conrad L & Judai Melton	28620 Hoylake Ct	Sun City Ca	92586-2604
338-091-046	Coralyn M Baxter	29362 Murrieta Rd	Sun City Ca	92586-2876
338-091-058	Coralyn M Baxter	2540 1St Ave	San Diego Ca	92103-6505
337-133-003	Corinne C Scheltens	26111 Kitt Ansett Dr	Sun City Ca	92586-2781
337-112-022	Costi & Grace Borza	28515 Amersfoot Way	Sun City Ca	92586-2711

APN	Owner	Address	City, State	Zip
425-040-016	County Of Riverside	3133 7Th St	Riverside Ca	92507-4138
337-021-030	Cox M Antoine	26050 Pine Valley Rd	Sun City Ca	92586-2462
337-112-024	Craig Carter	28535 Amersfoot Way	Sun City Ca	92586-2711
329-320-005	Craig S & Vicki Trommler	28530 Watson Rd	Sun City Ca	92585-9311
327-360-002	Cuadros	5235 Warren St	Riverside Ca	92503-2501
327-360-003	Cuadros	5235 Warren St	Riverside Ca	92503-2501
339-122-023	Dale L & Judith Brinneman	25870 Baltrustrol Dr	Sun City Ca	92586-2633
337-021-038	Dale W & Patsy Rolph	26091 Saint Marys St	Sun City Ca	92586-2433
309-380-005	Daniel & Elizabeth Chan	15532 La Subida Dr	Hacienda Heights	91745-4521
309-050-017	Daniel A Fox	733 Clearwater Dr	Perris Ca	92571-3803
338-251-011	Daniel D & Debbie Reddick	29511 Mount Bachelor W	Sun City Ca	92586-3482
331-210-024	Daniel D & Ronald Makabe	1645 Arroyo Sierra Cir	Santa Rosa Ca	95405-7704
338-091-015	Daniel G Stinson	3471 Genevieve St	San Bernardino C	92405-2517
338-091-030	Daniel G Stinson	3464 Genevieve St	San Bernardino C	92405-2518
338-091-034	Daniel G Stinson	3471 Genevieve St	San Bernardino C	92405-2517
327-080-056	Daniel I & Tawnya Patton	24175 Pico Ave	Sun City Ca	92585-9533
339-103-002	Daniel R & Finetta Chastain	28391 Murrieta Rd	Sun City Ca	92586-2739
331-180-002	Datatronics Inc	28151 Highway 74	Sun City Ca	92585-8915
331-180-012	Datatronics Inc	28151 Us Highway 74	Sun City Ca	92585-8915
331-210-019	David & Lilian Liu	2340 Joan Dr	Hacienda Heights	91745-4518
331-210-020	David & Lilian Liu	2340 Joan Dr	Hacienda Heights	91745-4518
331-210-021	David & Lilian Liu	2340 Joan Dr	Hacienda Heights	91745-4518
331-210-022	David & Lilian Liu	2340 Joan Dr	Hacienda Heights	91745-4518
327-360-004	David & Lorraine Rivera	5225 Warren St	Riverside Ca	92503-2501
339-125-009	David & Robin Guckert	225 Ohio St	Lake Elsinore	92530-1819
339-125-009	David & Robin Guckert	225 Ohio St	Lake Elsinore Ca	92530-1819
338-091-004	David Lamarr	29340 Murrieta Rd	Sun City Ca	92586-2875
331-350-008	David Mueller	PO Box 858	Sun City Ca	92586-0858

APN	Owner	Address	City, State	Zip
337-410-042	David A & Joan Ring	14011 Norwich Ln	Orland Park Il	60467-8673
309-050-019	David A & Susan Adams	22871 Porter St	Nuevo Ca	92567-9640
339-133-036	David A Jung	28804 Wee Burn Way	Sun City Ca	92586-2678
338-301-028	David C & Martha Saldana	26010 Crestmont Cir	Sun City Ca	92586-5811
337-132-010	David C Bushatz	31942 Paseo De Elena	San Juan Capis	92675-3915
337-132-010	David C Bushatz	31942 Paseo De Elena	San Juan Capistr	92675-3915
331-140-019	David K & Gail Patton	PO Box 430	Winchester Ca	92596-0430
338-091-025	David L & Mary Flake	33500 Daily Rd	Sun City Ca	92584-9119
338-091-026	David L & Mary Flake	33500 Daily Rd	Sun City Ca	92584-9119
329-261-010	David M & Joyce Adams	25941 Northwinds Dr	Sun City Ca	92585-9447
330-292-008	David R & Martha Horvath	2115 Brigden Rd	Pasadena Ca	91104-3302
337-140-012	David S & Betty Pool	28912 Murrieta Rd	Sun City Ca	92586-2700
337-122-016	Dean & Jean Bates	28670 Troon Ct	Sun City Ca	92586-2738
338-251-012	Dean & Robbin Krakauer	26020 Baldy Peak Dr	Sun City Ca	92586-3449
330-280-008	Dean A Coleman	29248 Cool Creek Dr	Sun City Ca	92586-2819
335-261-038	Deborah L Boone	5161 E Canton St	Long Beach Ca	90815-1029
329-070-051	Delbert & Cindy Anthony	25175 Palomar Rd	Sun City Ca	92585-9024
335-141-004	Dennis D Stinson	27844 Murrieta Rd	Sun City Ca	92586-2321
331-340-021	Dennis J & Mary Cooke	26540 Trumble Rd	Sun City Ca	92585-9239
338-302-001	Dennis M & Noelle Harmer	26011 Westridge Ave	Sun City Ca	92586-5815
337-114-029	Dennis O & Patricia Tobin	28550 Amersfoot Way	Sun City Ca	92586-2712
331-150-005	Dessie E Clark	27861 Ethanac Rd	Sun City Ca	92585-9780
331-150-013	Dessie E Clark	27861 Ethanac Rd	Romoland Ca	92585-9780
337-124-011	Dewel Hamilton	26110 Port Rush Dr	Sun City Ca	92586-2782
337-102-004	Diane Gritton	28259 E Worcester Rd	Sun City Ca	92586-2744
337-133-009	Dominic J & Martha Di Cato	28860 Amersfoot Way	Sun City Ca	92586-2714
339-101-033	Don T Johnson	PO Box 506	Rancho Mirage	92270-0506
339-101-033	Don T Johnson	PO Box 506	Rancho Mirage Ca	92270-0506

APN	Owner	Address	City, State	Zip
339-102-004	Don T Johnson	PO Box 506	Rancho Mirage	92270-0506
339-102-004	Don T Johnson	PO Box 506	Rancho Mirage Ca	92270-0506
303-210-005	Donald Bean	PO Box 135	Sun City Ca	92586-0135
337-133-012	Donald Frederick	28838 Amersfoot Way	Sun City Ca	92586-2714
335-131-009	Donald Reed	26119 Fairlane Dr	Sun City Ca	92586-1925
335-413-006	Donald A & Dorothy Behling	26052 Sunnywood St	Sun City Ca	92586-3746
337-021-008	Donald A Benefield	28040 Murrieta Rd	Sun City Ca	92586-2419
335-412-025	Donald E & Catherine Smith	26029 Sunnywood St	Sun City Ca	92586-3702
338-301-025	Donald E & Ruth Swanson	26064 Crestmont Cir	Sun City Ca	92586-5811
339-112-002	Donald G & Doris Finley	25871 Middlebury Way	Sun City Ca	92586-2665
330-280-009	Donald G & Karen Meyer	26602 Calle Gregorio	Sun City Ca	92585-8823
335-273-029	Donald J & Helen Utley	27545 Boston Dr	Sun City Ca	92586-2105
335-440-003	Donald J Terschluse	22250 Village Way Dr	Canyon Lake Ca	92587-7587
335-440-004	Donald J Terschluse	22250 Village Way Dr	Canyon Lake Ca	92587-7587
335-440-005	Donald J Terschluse	22250 Village Way Dr	Canyon Lake Ca	92587-7587
335-440-006	Donald J Terschluse	22250 Village Way Dr	Canyon Lake Ca	92587-7587
337-021-017	Donald K & Bobbie Murrell	30244 Marne Way	Menifee Ca	92584-8156
307-210-017	Donald K & Marilyn Bean	PO Box 135	Nuevo Ca	92567-0135
337-021-029	Donald M & Lillian Herman	26070 Pine Valley Rd	Sun City Ca	92586-2462
339-123-023	Donald P & Alice Kroeplin	25870 Interlochen Dr	Sun City Ca	92586-2637
337-132-001	Donald R & Dorothy Mcalliste	26071 Port Rush Dr	Sun City Ca	92586-2765
337-112-036	Donald R & Macelle Sallman	30041 Pebble Beach Dr	Sun City Ca	92586-5212
329-070-047	Donald R & Norma Abraham	25265 Palomar Rd	Sun City Ca	92585
335-413-009	Donald R Finch	26080 Sunnywood St	Sun City Ca	92586-3746
337-133-002	Donald S Goodrich	26091 Kitt Ansett Dr	Sun City Ca	92586-2762
339-102-029	Donald W & June Eckroad	25900 Coombe Hill Dr	Sun City Ca	92586-2661
335-131-003	Donald W & Orma Hawkins	27907 Covington Way	Sun City Ca	92586-1913
331-040-039	Donna Caplan	26153 Mclaughlin Rd	Sun City Ca	92585-9665

APN	Owner	Address	City, State	Zip
329-263-016	Donna J Baxter	PO Box 1261	Sun City Ca	92585-0261
338-091-006	Donna M Barclay	29344 Murrieta Rd	Sun City Ca	92586-2875
330-291-007	Doris E Brandtner	26736 Calle Gregorio	Sun City Ca	92585-8825
330-280-053	Doris E Soucy	26600 Calle Emiliano	Sun City Ca	92585-8828
310-240-001	Dorithy L May	10738 W Pico Blvd 3	Los Angeles Ca	90064-2215
330-280-043	Dorothy Gogatz	8717 Millsboro Dr	Las Vegas Nv	89134-8607
337-410-013	Dorothy A Bowman	26030 Bonita Vista Ct	Sun City Ca	92586-2406
337-410-040	Dorothy E Gray	28212 Buena Mesa Dr	Sun City Ca	92586-2410
330-280-055	Dorothy E Schultz	26582 Calle Emiliano	Sun City Ca	92585-8828
335-413-010	Dorothy J Degarmo	29248 Cool Creek Dr	Sun City Ca	92586-2819
337-122-003	Dorothy L Ingram	26111 Sun City Blvd	Sun City Ca	92586-2785
330-292-009	Dorothy L Paquin	26955 Corte Adelita	Sun City Ca	92585-8820
338-091-085	Dorothy M & James Lake	29352 Murrieta Rd 79	Sun City Ca	92586-2875
335-426-008	Doug J & Karen Malewicki	26019 Bluebell St	Sun City Ca	92586-3754
335-261-008	Douglas J & Susan Beeck	815 Raeburn Ct	San Jose Ca	95136-1848
338-091-075	Duane A Petrowski	29300 Murrieta Rd 89	Sun City Ca	92586-5824
331-150-016	Duane L & Sandra Waltson	PO Box 264	Hemet Ca	92546-0264
337-090-032	Duffield C & Patsy Myers	28226 E Worcester Rd	Sun City Ca	92586-2722
335-425-005	Dumas J Duplesis	27081 Rangewood St	Sun City Ca	92586-3742
339-125-008	Durel G Tucker	28739 Murrieta Rd	Sun City Ca	92586-2750
337-410-028	Dwight A & Shirley Bergquist	2419 Ginger Ct	West Covina Ca	91792-2147
335-273-023	Dwight H & Theresa Avery	27509 Boston Dr	Sun City Ca	92586-2105
338-301-006	Earl & Equilla Williams	26091 Ridgemoor Rd	Sun City Ca	92586-2788
339-051-009	Earl D & Janette Bryant	25871 Mccall Blvd	Sun City Ca	92586-2395
335-425-003	Earl F & Marilyn Sparks	27065 Rangewood St	Sun City Ca	92586-3742
337-090-033	Earl L & Winifred Melcum	28242 E Worcester Rd	Sun City Ca	92586-2722
335-092-013	Earl T Small	25921 Lancaster Dr	Sun City Ca	92586-2305
310-210-011	East West Prop	969 3Rd Ave	New York Ny	10022-2065

APN	Owner	Address	City, State	Zip
310-210-012	East West Prop	969 3Rd Ave	New York Ny	10022-2065
303-210-006	Eastern Municipal Water Dist	PO Box 8300	San Jacinto Ca	92581-8300
309-020-043	Eastern Municipal Water Dist	PO Box 8300	San Jacinto Ca	92581-8300
327-080-008	Eastern Municipal Water Dist	PO Box 8300	San Jacinto Ca	92581-8300
329-141-005	Eastern Municipal Water Dist	PO Box 8300	San Jacinto Ca	92581-8300
339-200-018	Eastern Municipal Water Dist	PO Box 8300	San Jacinto Ca	92581-8300
339-200-073	Eastern Municipal Water Dist	PO Box 8300	San Jacinto Ca	92581-8300
331-190-046	Eco Farms Corp Retirement Pl	28790 Las Haciendas St	Temecula Ca	92590-2614
331-150-004	Eddie & Pearl Roussell	1521 Haute Chataignier	Ville Platte La	70586-6833
335-091-003	Edith E Bernath	27920 Niagara Ct	Sun City Ca	92586-2322
339-102-027	Edith M Brown	25880 Coombe Hill Dr	Sun City Ca	92586-2636
339-103-017	Edith M Chapin	25921 Coombe Hill Dr	Sun City Ca	92586-2609
338-302-002	Edmund C & Yoshiko Adame	26029 Westridge Ave	Sun City Ca	92586-5815
335-412-022	Edna V Rundt	26057 Sunnywood St	Sun City Ca	92586-3702
337-112-023	Eduardo & Maria Sanchez	28525 Amersfoot Way	Sun City Ca	92586-2711
338-301-030	Eduardo & Sandra Terrazas	27727 Jefferson Ave 10	Temecula Ca	92590-5811
329-070-072	Edward & Debra Johnson	28447 Moreland Rd	Sun City Ca	92585-9099
330-280-023	Edward B & Sylvia Freeman	25920 Camino Juarez	Sun City Ca	92585-8818
331-040-033	Edward D & Elizabeth Stilgeb	26055 Nova Ln	Sun City Ca	92585-9483
330-280-040	Edward F & Barbara Fedorczyk	26591 Calle Gregorio	Sun City Ca	92585-8826
335-261-040	Edward F & Nancy Macarthur	27605 Decatur Way	Sun City Ca	92586-2110
338-091-035	Edward G Nasraway	1175 Athena Ct	Riverside Ca	92507-2845
330-280-041	Edward J & Marian Kostelny	26601 Calle Gregorio	Sun City Ca	92585-8826
339-112-003	Edward J & Marjorie Zuboski	25861 Middlebury Way	Sun City Ca	92586-2665
337-121-014	Edward M & Beverly Williams	28640 Murrieta Rd	Sun City Ca	92586-2755
337-410-004	Edward M & Guadalupe Gross	26051 Birkdale Rd	Sun City Ca	92586-2423
335-143-024	Edward R & Lois Athey	26122 Germantown Dr	Sun City Ca	92586-1920
335-261-004	Edward T & Shirley Duffield	26051 Chambers Ave	Sun City Ca	92586-2122

APN	Owner	Address	City, State	Zip
335-144-004	Edward W & D Hart	26107 Germantown Dr	Sun City Ca	92586-1921
337-112-032	Edwin L & Ruth Kingsley	28604 Murrieta Rd	Sun City Ca	92586-2730
331-040-037	Edwina L Ballard	25066 Avenida Madrid	Homeland Ca	92548-9750
335-092-010	Edythe G Dorrance	25881 Lancaster Dr	Sun City Ca	92586-2356
339-101-031	Eileen J Mcgehee	25850 Plum Hollow Dr	Sun City Ca	92586-2652
335-424-027	Eleanor R Garat	27099 Stagewood St	Sun City Ca	92586-3756
338-091-043	Eleanor T Tyler	29356 Murrieta Rd	Sun City Ca	92586-2876
338-091-074	Elida M Franco	28592 Milky Way	Sun City Ca	92586-2874
339-142-015	Elizabeth Bentley	28333 Valley Blvd 307	Sun City Ca	92586-2407
339-142-015	Elizabeth Bentley	28333 Valley Blvd 3071	Sun City Ca	92586-2407
339-125-007	Elizabeth Mazanowski	28721 Murrieta Rd	Sun City Ca	92586-2750
339-125-012	Elizabeth Zakrzewski	28756 Wee Burn Way	Sun City Ca	92586-2677
331-340-027	Elizabeth A Hakes	PO Box 474	Sun City Ca	92586-0474
335-261-033	Elizabeth E Orlaski	27530 Emory Ct	Sun City Ca	92586-2112
339-051-015	Elizabeth M Cagney	26624 Mehaffey St	Sun City Ca	92586-2028
339-051-016	Elizabeth M Cagney	26624 Mehaffey St	Sun City Ca	92586-2028
339-111-013	Elizabeth M Cagney	26624 Mehaffey St	Sun City Ca	92586-2028
337-133-011	Elizabeth M Ruffin	28840 Amersfoot Way	Sun City Ca	92586-2714
331-340-016	Ellen M & Eystratios Koumpar	14250 Howe Pl	Beaumont Ca	92223-2832
327-061-008	Elmer & Florence Henderson	6423 El Selinda Ave	Bell Gardens Ca	90201-3019
335-273-020	Elmer C & Mildred Westphal	27640 Decatur Way	Sun City Ca	92586-2183
335-132-001	Elmer J Rankin	26011 Lancaster Dr	Sun City Ca	92586-1932
339-124-025	Elmer L & Bonnie Mcdaniel	31087 Bunker Dr	Temecula Ca	92591-3904
327-061-013	Elmer L & Carol Meek	27970 Patti Ln	Sun City Ca	92585-9730
339-061-012	Elmer L & Lucille Brueshaber	25960 Roanoke Rd	Sun City Ca	92586-2329
337-124-003	Elsie M Kile	26198 Lancaster Dr	Sun City Ca	92586-1926
337-112-039	Elwain R Shull	28506 Murrieta Rd	Sun City Ca	92586-2742
335-143-028	Elwyn E Hoffmann	26050 Germantown Dr	Sun City Ca	92586-1919

APN	Owner	Address	City, State	Zip
339-142-016	Emma Z Rodd	25978 Ridgemoor Rd	Sun City Ca	92586-2693
338-091-067	Ennis V & John Caloia	30985 Sentinel Ln	Cottage Grove Or	97424-9728
329-264-014	Enrique A & Dina Zayas	799 E Johnston Ave	Hemet Ca	92543-7116
331-040-042	Episcopal Diocese Of San Dic	2728 6Th Ave	San Diego Ca	92103-6301
309-050-052	Eric M & Tessa Bannholzer	22747 Westport Ln	Nuevo Ca	92567-9321
309-370-009	Eric T Wang	17873 Crimson Crest Dr	Rowland Heights	91748-4371
330-280-054	Erica A Melvin	26590 Calle Emiliano	Sun City Ca	92585-8828
337-104-009	Ernest O Rhea	28490 Murrieta Rd	Sun City Ca	92586-2743
337-121-009	Eugene & Ellen Mckinley	28710 Murrieta Rd	Sun City Ca	92586-2757
327-340-017	Eugene & Marian Gabrych	2006 Old Highway 395	Fallbrook Ca	92028-8816
327-340-018	Eugene & Marian Gabrych	2006 Old Highway 395	Fallbrook Ca	92028-8816
337-112-038	Eugene A & Frances Tuomi	28520 Murrieta Rd	Sun City Ca	92586-2742
337-112-019	Eugene M Gilmore	26240 Burlington Way	Sun City Ca	92586-2716
335-144-025	Eugene N & Grace Kincaid	26070 Fairlane Dr	Sun City Ca	92586-1924
339-051-014	Eunice J & Roger Jackson	25931 Mccall Blvd	Sun City Ca	92586-2312
338-091-080	Evaristo F & Sabrina Duran	29310 Murrieta Rd 84	Sun City Ca	92586-5824
337-410-039	Evelyn Telson	31730 11Th St	Nuevo Ca	92567-9787
329-110-016	Evelyn E & John Motte	30161 12Th St	Nuevo Ca	92567-9648
337-104-007	Evelyn G Kehe	28464 Murrieta Rd	Sun City Ca	92586-2743
331-080-001	Fawwaz M Nabulsi	10043 Karmont Ave	South Gate Ca	90280-5416
337-132-008	Fay Fox	26150 Kitt Ansett Dr	Sun City Ca	92586-2780
329-070-064	Fernando & Cecilia Munoz	28309 Mapes Rd	Romoland Ca	92585-9032
327-330-037	Fidel Franco	28150 Mahogany Ln	Sun City Ca	92585-9506
339-200-022	First Baptist Church Of Sun	PO Box 984	Sun City Ca	92586-0984
339-200-024	First Baptist Church Of Sun	PO Box 984	Sun City Ca	92586-0984
330-250-033	First Church Of Religious Sc	26805 Murrieta Rd	Sun City Ca	92585-9135
338-301-037	Flint A Bloedow	26096 Westridge Ave	Sun City Ca	92586-5815
329-320-004	Florence C Wells	28526 Watson Rd	Sun City Ca	92585-9311

APN	Owner	Address	City, State	Zip
338-091-033	Florence H Amador	29196 Murrieta Rd	Sun City Ca	92586-2870
335-261-003	Florence S Whalen	26039 Chambers Ave	Sun City Ca	92586-2122
335-424-022	Flynn	26046 Goldenwood St	Sun City Ca	92586-3750
337-131-002	Foster C & Mary Slyh	28761 Amersfoot Way	Sun City Ca	92586-2756
335-424-026	Frances E Tiddy	27091 Stagewood St	Sun City Ca	92586-3756
335-131-031	Frances M Koontz	26070 Lancaster Dr	Sun City Ca	92586-1927
337-410-030	Frances M Sell-Herbold	26033 Verde Grande Ct	Sun City Ca	92586-2425
337-121-001	Francis & Mary Schiller	28621 Amersfoot Way	Sun City Ca	92586-2713
337-121-004	Francisco S & Emma Amezcua	28691 Amersfoot Way	Sun City Ca	92586-2713
339-103-001	Francisco V & Maria Ramos	25870 Calle Agua	Moreno Valley	92551-2011
339-103-001	Francisco V & Maria Ramos	25870 Calle Agua	Moreno Valley Ca	92551-2011
426-180-004	Frank & Ethel Ybarrola	29520 11Th St	Nuevo Ca	92567-9454
335-092-033	Frank & Kathleen Oldfield	25870 Mccall Blvd	Sun City Ca	92586-2391
337-112-031	Frank & Susan Donnelly	8416 La Sierra Ave	Whittier Ca	90605-1222
339-092-004	Frank & Susan Donnelly	8416 La Sierra Ave	Whittier Ca	90605-1222
335-132-049	Frank A & Leonora Gross	26120 Mccall Blvd	Sun City Ca	92586-1930
339-061-019	Frank D & Jacqueline Bean	25620 Warwick Rd	Sun City Ca	92586-2472
329-070-015	Frank D & Mary Flood	25080 Tradewinds Dr	Sun City Ca	92585-9481
330-210-012	Frank E & Patricia Porter	25981 Elm St	Sun City Ca	92585-9535
339-052-014	Frank G & Tillie Hallas	25874 Sandy Lodge Rd	Sun City Ca	92586-2352
335-424-032	Frank H Stell	27139 Stagewood St	Sun City Ca	92586-3756
307-210-010	Frank J Lauda	12534 Harlow Ave	Riverside Ca	92503-4705
307-220-010	Frank J Lauda	12534 Harlow Ave	Riverside Ca	92503-4705
307-220-012	Frank J Lauda	12534 Harlow Ave	Riverside Ca	92503-4705
426-180-002	Frank J Lauda	12534 Harlow Ave	Riverside Ca	92503-4705
426-180-003	Frank J Lauda	12534 Harlow Ave	Riverside Ca	92503-4705
426-430-005	Frank J Lauda	12534 Harlow Ave	Riverside Ca	92503-4705
426-440-001	Frank J Lauda	12534 Harlow Ave	Riverside Ca	92503-4705

APN	Owner	Address	City, State	Zip
339-112-028	Frank J Sumoski	28573 Middlebury Way	Sun City Ca	92586-2605
338-091-013	Frank L Adams	29282 Murrieta Rd	Sun City Ca	92586-2873
338-091-053	Frank L Pangborn	29376 Murrieta Rd	Sun City Ca	92586-2876
329-070-078	Frank M & Geraldine Pendleto	2170 Loveland Dr	Riverside Ca	92509-1631
335-273-028	Frank R & Evangelina Nevared	27535 Boston Dr	Sun City Ca	92586-2105
331-340-006	Frank S Alvarez	1080 W 22Nd St	Upland Ca	91784-1230
339-051-017	Frank V & Dolores Acevedo	25961 Mccall Blvd	Sun City Ca	92586-2312
337-104-015	Franklin D Rogers	26101 Falsterbo Dr	Sun City Ca	92586-2769
339-092-030	Fred & Herminia Schick	25901 Cherry Hills Bl	Sun City Ca	92586-2467
339-092-030	Fred & Herminia Schick	25901 Cherry Hills Blv	Sun City Ca	92586-2467
337-131-027	Fred & Shirley Vanallen	28750 Murrieta Rd	Sun City Ca	92586-2757
309-050-009	Freddie H & Patsy Reynolds	919 3Rd St	Norco Ca	92860-2774
330-280-025	Freddie M Richardson	25900 Camino Juarez	Sun City Ca	92585-8818
335-261-036	Frederick & Linda Darling	27515 Emory Ct	Sun City Ca	92586-2112
338-301-036	Frederick C & Lillian Grange	26114 Westridge Ave	Sun City Ca	92586-5817
339-111-012	Frederick W & Linda Elliott	28622 Middlebury Way	Sun City Ca	92586-2670
337-114-002	Fredrick D & Joyce Davolt	26241 Burlington Way	Sun City Ca	92586-2715
337-103-002	Friederike Kilian	26091 Fountain Bleu D	Sun City Ca	92586-2760
337-103-002	Friederike Kilian	26091 Fountain Bleu Dr	Sun City Ca	92586-2760
337-121-007	Gano D & Cordelia Douglas	28733 Amersfoot Way	Sun City Ca	92586-2756
335-141-006	Garvey Wholesale Electric Co	PO Box 3331	South Pasadena C	91031-6331
329-120-026	Gary & Patricia Allen	1070 Serene Dr	Corona Ca	92880-1353
339-132-024	Gary A & Patsy Hutcheraft	25870 Morgantown Way	Sun City Ca	92586-2643
339-125-002	Gary A Faught	29015 Waverly Dr	Sun City Ca	92586-2882
329-070-050	Gary J & Laura Ruddy	28450 Moreland Rd	Sun City Ca	92585-9002
335-080-015	Gary L Larkins	PO Box 815	Palos Verdes Est	90274-0815
335-080-016	Gary L Larkins	PO Box 815	Palos Verdes Pen	90274-0815
339-063-007	Gayle F Ward	25865 Warwick Rd	Sun City Ca	92586-2480

APN	Owner	Address	City, State	Zip
339-051-013	Gene F & Mary Johnson	25921 Mccall Blvd	Sun City Ca	92586-2312
338-301-019	Gene J & Elin Saldana	26079 Barrington Ct	Sun City Ca	92586-5807
335-080-009	Genevieve Abbey	10920 Myrtle St 101	Downey Ca	90241-3634
339-122-002	Genevieve S Riley	25881 Sun City Blvd	Sun City Ca	92586-2662
338-301-039	George & Mary Brady	26060 Westridge Ave	Sun City Ca	92586-5815
338-301-035	George & Stephanie Mcquade	26111 Crestmont Cir	Sun City Ca	92586-5813
335-274-015	George A & Marjorie Drescher	26087 Allentown Dr	Sun City Ca	92586-2136
330-250-020	George D & Marjorie Reish	3378 Punta Alta B	Laguna Woods Ca	92653-0206
331-080-018	George D Harley	26226 Cherry Hills Blv	Sun City Ca	92586-2444
329-360-020	George H Jepson	PO Box 21139	Riverside Ca	92516-1139
339-132-021	George J & A Stoe	25840 Morgantown Way	Sun City Ca	92586-2643
337-124-013	George M & Patricia Lakatos	26070 Port Rush Dr	Sun City Ca	92586-2766
337-133-005	George P & Catherine Grunenw	26151 Kitt Ansett Dr	Sun City Ca	92586-2781
339-133-008	George V Newman	28980 W Worcester Rd	Sun City Ca	92586-2630
338-092-007	Georgette J Earl	29248 Murrieta Rd	Sun City Ca	92586-2872
335-274-006	Gerald A Floridi	27715 Decatur Way	Sun City Ca	92586-2143
337-140-011	Gerald J & Carla Ringer	28891 Del Monte Dr	Sun City Ca	92586-5803
426-030-005	Gerald M Garat	PO Box 45	Winchester Ca	92596-0045
426-030-006	Gerald M Garat	PO Box 45	Winchester Ca	92596-0045
426-030-009	Gerald M Garat	7955 Magnolia Ave N 29	Riverside Ca	92504
426-030-010	Gerald M Garat	PO Box 295	Winchester Ca	92596-0295
339-112-019	Gerald W & Kathleen Pickett	28601 Hoylake Ct	Sun City Ca	92586-2604
339-122-022	Geraldine A Walker	25860 Baltrustrol Dr	Sun City Ca	92586-2633
330-280-031	Gertrude Loinger	10639 Caminito Chucco	San Diego Ca	92126
307-210-013	Gilbert & Eva Shue	12774 Cloverdale Rd	Corona Ca	92880-9617
307-210-014	Gilbert & Eva Shue	12774 Cloverdale Rd	Corona Ca	92880-9617
307-210-015	Gilbert & Eva Shue	12774 Cloverdale Rd	Corona Ca	92880-9617
307-210-016	Gilbert & Eva Shue	12774 Cloverdale Rd	Corona Ca	92880-9617

APN	Owner	Address	City, State	Zip
329-261-008	Gilbert E & Kristen Vela	25981 Northwinds Dr	Sun City Ca	92585-9447
339-125-005	Ginni E Felling	28699 Murrieta Rd	Sun City Ca	92586-2733
338-092-004	Gisela Blake	29238 Murrieta Rd	Sun City Ca	92586-2871
339-052-008	Gladys F Connell	25869 Whitman Rd	Sun City Ca	92586-2333
339-051-031	Gladys V Hamilton	25876 Whitman Rd	Sun City Ca	92586-2334
338-091-027	Glen & Elizabeth Craft	29252 Murrieta Rd	Sun City Ca	92586-2872
337-131-010	Glen A & Marilyn Whitford	28831 Amersfoot Way	Sun City Ca	92586-2701
337-140-006	Glenn T & Dorothy Poteet	PO Box 677	Sun City Ca	92586-0677
339-092-038	Gloria Giugno	25981 Cherry Hills Bl	Sun City Ca	92586-2467
339-092-038	Gloria Giugno	25981 Cherry Hills Blv	Sun City Ca	92586-2467
337-112-037	Gloria Tillis	28536 Murrieta Rd	Sun City Ca	92586-2742
339-103-011	Gloria G Pieper	25981 Coombe Hill Dr	Sun City Ca	92586-2610
337-410-025	Gloria J Moore	22640 Ellis Ave	Perris Ca	92570-8588
337-121-013	Goerge E Morrissey	28656 Murrieta Rd	Sun City Ca	92586-2758
339-053-015	Gordon M Bond	212 Kenwood Dr E	Saint Paul Mn	55117-2508
337-121-005	Gordon W Hop	28711 Amersfoot Way	Sun City Ca	92586-2756
338-091-014	Grace Bica	29284 Murrieta Rd	Sun City Ca	92586-2873
335-142-004	Grace Pearson	145 Masters Ave	Riverside Ca	92507-4854
335-413-011	Grace A Alden	26098 Sunnywood St	Sun City Ca	92586-3746
339-111-023	Grace A Pankiewicz	25860 Middlebury Way	Sun City Ca	92586-2668
309-020-005	Grand San Jacinto Inv	1301 E Artesia Blvd	Long Beach Ca	90805-1616
309-020-036	Grand San Jacinto Inv	1301 E Artesia Blvd	Long Beach Ca	90805-1616
309-020-037	Grand San Jacinto Inv	1301 E Artesia Blvd	Long Beach Ca	90805-1616
309-020-038	Grand San Jacinto Inv	1301 E Artesia Blvd	Long Beach Ca	90805-1616
309-020-039	Grand San Jacinto Inv	1301 E Artesia Blvd	Long Beach Ca	90805-1616
338-301-009	Greg L & Sherry Geurin	26094 Barrington Ct	Sun City Ca	92586-5807
330-292-003	Gregory August	26780 Calle Emiliano	Sun City Ca	92585-8832
426-060-001	Gregory J Buchanan	PO Box 3369	Manhattan Beach	90266-1369

APN	Owner	Address	City, State	Zip
309-350-001	Gregory P Lansing	291 S La Cienega Blvd	Beverly Hills Ca	90211-3310
309-380-001	Gregory P Lansing	291 S La Cienega Blvd	Beverly Hills Ca	90211-3310
339-132-023	Grob	25860 Morgantown Way	Sun City Ca	92586-2643
335-440-026	Gte Calif Inc	1 Gte Rc3520S Pl	Thousand Oaks Ca	91362
331-030-007	Gustavo Espinosa	1101 California Ave	Corona Ca	92881-1523
335-274-012	Guy A Cummings	27730 Provo Ct	Sun City Ca	92586-2119
339-051-023	Guy J & Elsie Maletta	28085 Murrieta Rd	Sun City Ca	92586-2427
337-140-008	Gwendolyn Armstrong	28928 E Worcester Rd	Sun City Ca	92586-2787
335-143-004	Hamm	21720 Como St	Wildomar Ca	92595-1915
426-060-019	Hammerschmidt	12774 Cloverdale Rd	Corona Ca	92880-9617
331-150-033	Hancock Prop	28924 Front St 202	Temecula Ca	92590
335-413-013	Hanna D Haake	27017 Rangewood St	Sun City Ca	92586-3742
335-092-032	Hans & Marie Neubert	25880 Mccall Blvd	Sun City Ca	92586-2391
335-092-017	Hansen C Duhn	1610 E 1St St 3	Santa Ana Ca	92701-6317
307-210-005	Harada	12774 Cloverdale Rd	Corona Ca	92880-9617
307-210-006	Harada	12774 Cloverdale Rd	Corona Ca	92880-9617
307-210-007	Harada	12774 Cloverdale Rd	Corona Ca	92880-9617
307-210-008	Harada	12774 Cloverdale Rd	Corona Ca	92880-9617
307-210-009	Harada	12774 Cloverdale Rd	Corona Ca	92880-9617
307-210-011	Harada	12774 Cloverdale Rd	Corona Ca	92880-9617
307-210-012	Harada	12774 Cloverdale Rd	Corona Ca	92880-9617
331-350-006	Harley Ingold	26590 Sherman Rd	Sun City Ca	92585-9229
339-062-009	Harlo R & Janet Quinby	25875 Roanoke Rd	Los Angeles Ca	90089-0001
335-271-010	Harold & Nancy Allen	27530 Boston Dr	Sun City Ca	92586-2106
338-091-078	Harold C & Barbara Gilbert	29306 Murrieta Rd 86	Sun City Ca	92586-5824
339-141-002	Harold D & Wilma Arriaga	PO Box 635	Sun City Ca	92586-0635
335-412-021	Harold R & Ethel Bernadickt	26067 Sunnywood St	Sun City Ca	92586-3704
337-131-014	Harold E & Evelyn Costello	28901 E Worcester Rd	Sun City Ca	92586-2752

APN	Owner	Address	City, State	Zip
338-301-018	Harold E & Mary Schmidt	26061 Barrington Ct	Sun City Ca	92586-5807
335-132-047	Harold H & V Maddock	26098 Mccall Blvd	Sun City Ca	92586-1934
335-274-013	Harold H Burris	41808 Nordal Ave	Hemet Ca	92544-6458
337-102-027	Harold J & Eleanor Holkestad	26080 Fountain Bleu D	Sun City Ca	92586-2759
337-102-027	Harold J & Eleanor Holkestad	26080 Fountain Bleu Dr	Sun City Ca	92586-2759
335-261-037	Harold W & Ivy Hill	27525 Emory Ct	Sun City Ca	92586-2112
330-280-067	Harold W & Margery Nott	26617 Calle Emiliano	Sun City Ca	92585-8834
331-080-019	Harry & Aly Eden	5368 Pinehurst Dr	Riverside Ca	92504-1348
331-080-020	Harry & Aly Eden	5368 Pinehurst Dr	Riverside Ca	92504-1348
331-080-021	Harry & Aly Eden	5368 Pinehurst Dr	Riverside Ca	92504-1348
339-092-029	Harry E & Millie Johnson	25891 Cherry Hills Bl	Sun City Ca	92586-2477
339-092-029	Harry E & Millie Johnson	25891 Cherry Hills Blv	Sun City Ca	92586-2477
339-132-003	Harry J & Eileen Wigmore	25861 Musselburgh Dr	Sun City Ca	92586-2645
339-092-002	Harry J & Mary Pathiakis	25891 Interlechen Dr	Sun City Ca	92586-2638
330-292-004	Harvey J & Oreta Green	26788 Calle Emiliano	Sun City Ca	92585-8832
338-092-011	Harvey S Mcclain	29318 Murrieta Rd	Sun City Ca	92586-5824
337-410-009	Hasler	26070 Bonita Vista Ct	Sun City Ca	92586-3544
331-100-023	Haywood G Hollingsworth	PO Box 921	Sun City Ca	92586-0921
339-124-003	Hazel B Johnson	25873 Interlechen Dr	Sun City Ca	92586-2638
339-125-020	Hazel I Burt	28640 Wee Burn Way	Sun City Ca	92586-2613
327-072-006	Hector & Margarita Correa	28165 Benigni Ave	Sun City Ca	92585-9461
339-133-001	Helen A Patmore	28777 Murrieta Rd	Sun City Ca	92586-2750
330-280-035	Helen B Buchanan	25955 Camino Juarez	Sun City Ca	92585-8819
335-261-032	Helen C Coverdill	26070 Crestone Dr	Sun City Ca	92586-2140
331-350-005	Helen E Ingold	26580 Sherman Rd	Sun City Ca	92585-9229
335-132-045	Helen E Minor	26064 Mccall Blvd	Sun City Ca	92586-1934
338-091-048	Helen L Evans	29366 Murrieta Rd	Sun City Ca	92586-2876
339-141-010	Helen M Misevic	28931 W Worcester Rd	Sun City Ca	92586-2629

APN	Owner	Address	City, State	Zip
331-150-036	Helena Prop	6068 Us Highway 12 W	Helena Mt	59601-9687
423-300-005	Henrieta C Lee	8750 Hillcrest Rd	Buena Park Ca	90621-1014
423-300-001	Henrietta C Lee	8750 Hillcrest Rd	Buena Park Ca	90621-1014
423-300-002	Henrietta C Lee	8750 Hillcrest Rd	Buena Park Ca	90621-1014
423-300-003	Henrietta C Lee	8750 Hillcrest Rd	Buena Park Ca	90621-1014
423-300-004	Henrietta C Lee	8750 Hillcrest Rd	Buena Park Ca	90621-1014
337-103-016	Henry C & Marian Zaranton	26140 Falsterbor Dr	Sun City Ca	92586-2709
339-112-023	Henry C Coburn	3565 Linden Ave 335	Long Beach Ca	90807-4541
335-144-024	Henry M & Betty Shearer	26096 Fairlane Dr	Sun City Ca	92586-1924
337-121-012	Herbert C & Alice Gregory	28670 Murrieta Rd	Sun City Ca	92586-2758
339-111-022	Herbert D & Bonnie Phipps	25870 Middlebury Way	Sun City Ca	92586-2668
335-273-022	Herbert G & Dorothy Sautter	PO Box 638	Bodega Bay Ca	94923-0638
335-274-003	Herman W & Blendon Mack	27645 Decatur Way	Sun City Ca	92586-2110
327-071-008	Hien T Bui	10572 Desser Ln	Anaheim Ca	92804-5958
329-263-014	Homer & Ruby Wark	25962 Westwinds Dr	Sun City Ca	92585-9449
335-424-034	Homer L & Grace Aguilar	27155 Stagewood St	Sun City Ca	92586-3755
329-070-073	Homeside Lending Inc	9601 Mcallister Fwy	San Antonio Tx	78216-9099
329-070-070	Hossein Rajah	2500 Michelson Dr 100	Irvine Ca	92612-1504
337-124-010	Howard & Constance Labadie	19121 Lonerock St	Santa Clarita	91351-2831
337-124-010	Howard & Constance Labadie	19121 Lonerock St	Santa Clarita Ca	91351-2831
426-030-002	Howard M Markham	17261 Gothard St 8	Huntington Beach	92647-5454
426-030-018	Howard M Markham	17261 Gothard St 8	Huntington Beach	92647-5454
337-112-033	Howard N & Ruby Amos	28590 Murrieta Rd	Sun City Ca	92586-2742
329-143-004	Hoyt J & Oma Bibby	27865 Van Buren Ave	Sun City Ca	92585-9243
337-021-003	Hoyt R Hiddleston	1611 W Via Rancho Pky	Escondido Ca	92029-7264
338-091-072	Hubert J & Elaine Tempel	29294 Murrieta Rd 92	Sun City Ca	92586-2874
330-292-015	Hubert J Claudy	26944 Corte Adelita	Sun City Ca	92585-8820
327-340-030	Hubert R & Merrelin Bland	28243 Tower View Ct	Romoland Ca	92585-9559

APN	Owner	Address	City, State	Zip
335-144-023	Hugh D & Josephine Ogden	26108 Fairlane Dr	Sun City Ca	92586-1923
335-092-030	Hugh P & Mary Monahan	25890 Mccall Blvd	Sun City Ca	92586-2391
338-301-031	Hugo & Maria Garcia	26039 Crestmont Cir	Sun City Ca	92586-5811
335-274-010	Hunter	27750 Provo Ct	Sun City Ca	92586-2119
337-410-015	Hymie D & Polly Sugarman	26021 Bonita Vista Ct	Sun City Ca	92586-2409
331-190-044	Icenogle Machine Inc	PO Box 249	Winchester Ca	92596-0249
337-410-043	Icw	26650 Cherry Hills Bl	Sun City Ca	92586-2517
337-410-043	Icw	26650 Cherry Hills Blv	Sun City Ca	92586-2517
337-112-026	Ida H Phillips	25575 Orion Ct	Sun City Ca	92586-3802
330-280-051	Ilene Y Collier	26618 Calle Emiliano	Sun City Ca	92585-8829
337-410-021	Ilse Kelman	28193 Bucna Mesa Dr	Sun City Ca	92586-2411
337-102-026	Inez Braynard	26096 Fountain Bleu D	Sun City Ca	92586-2759
337-102-026	Inez Braynard	26096 Fountain Bleu Dr	Sun City Ca	92586-2759
337-131-021	Irene Prampin	28838 Murrieta Rd	Sun City Ca	92586-2734
339-125-013	Irene A Urminowicz	28740 Wee Burn Way	Sun City Ca	92586-2676
339-092-012	Irene D Hampel	28257 W Worcester Rd	Sun City Ca	92586-2653
337-022-017	Irene P Evans	26070 Saint Marys St	Sun City Ca	92586-2464
339-051-018	Irvin C & Betsy Tange	25971 Mccall Blvd	Sun City Ca	92586-2312
337-090-005	Irwin & Janet Fishman	26055 Cherry Hills Bl	Sun City Ca	92586-2468
337-090-005	Irwin & Janet Fishman	26055 Cherry Hills Blv	Sun City Ca	92586-2468
337-410-019	Isabel Shearer	2444 S Tracy Ct	Visalia Ca	93292-1493
331-150-025	Isael & Teresa Rubalcaba	26450 Dawson Rd	Romoland Ca	92585-9732
329-261-004	Israel G Menendez	28191 Springwinds Dr	Sun City Ca	92585-9774
327-080-051	Italio & Nada Benigni	PO Box 79	Nuevo Ca	92567-0079
327-080-052	Italio & Nada Benigni	PO Box 79	Nuevo Ca	92567-0079
327-080-054	Italo J & Nada Benigni	10502 San Miguel Ave	South Gate Ca	90280-6636
327-071-035	Ivy L & Josephine Johnson	28126 Patti Ln	Sun City Ca	92585-9018
327-080-057	J M & Socorro Saucedo	10502 San Miguel Ave	South Gate Ca	90280-6636

APN	Owner	Address	City, State	Zip
327-080-058	J M & Socorro Saucedo	8018 Bergman Ln	Downey Ca	90242-2404
327-080-059	J M & Socorro Saucedo	8018 Bergman Ln	Downey Ca	90242-2404
327-080-060	J M & Socorro Saucedo	10502 San Miguel Ave	South Gate Ca	90280-6636
327-080-061	J M & Socorro Saucedo	10502 San Miguel Ave	South Gate Ca	90280-6636
339-061-007	Jack A Shoemaker	7240 Wild Creek Dr	San Jose Ca	95120-3438
337-410-010	Jack D & Edna Richards	26060 Bonita Vista Ct	Sun City Ca	92586-3544
337-112-020	Jack H & Suzanne Campbell	26230 Burlington Way	Sun City Ca	92586-2716
309-050-045	Jack L & Debbie Williams	PO Box 611	Nuevo Ca	92567-0611
327-340-015	Jack M & Nora Luc	28200 Mapes Rd	Sun City Ca	92585-9723
339-103-006	Jack M Burnham	28451 Murrieta Rd	Sun City Ca	92586-2736
335-273-013	Jack P & Iona Winn	26086 Allentown Dr	Sun City Ca	92586-2137
339-061-018	Jack R Vorhies	25910 Roanoke Rd	Sun City Ca	92586-2329
335-422-082	Jack W & Virginia Hayden	26079 Shadywood St	Sun City Ca	92586-3752
339-141-007	Jackoleen M Gibson	20823 Lull St	Canoga Park Ca	91306-2036
339-092-032	Jacqueline Schroder	25921 Cherry Hills Bl	Sun City Ca	92586-2467
339-092-032	Jacqueline Schroder	25921 Cherry Hills Blv	Sun City Ca	92586-2467
337-140-021	Jafatte B Russell	130 Pageantry Dr	Placentia Ca	92870-4330
331-200-018	James & B Nadir	3011 S Hacienda Blvd	Hacienda Heights	91745-5331
331-200-019	James & B Nadir	3011 S Hacienda Blvd	Hacienda Heights	91745-5331
331-200-020	James & B Nadir	3011 S Hacienda Blvd	Hacienda Heights	91745-5331
335-424-048	James & Gale Murphy	27042 Rangewood St	Sun City Ca	92586-3744
335-426-015	James A & Eula Romines	26081 Bluebell St	Sun City Ca	92586-3754
309-360-014	James A & Karen Arviso	PO Box 1742	Romoland Ca	92585-1942
339-111-019	James A & Susan Westhoff	25900 Middlebury Way	Sun City Ca	92586-2669
339-111-020	James A & Susan Westhoff	25890 Middlebury Way	Sun City Ca	92586-2668
330-292-005	James A Boano	26926 Via Valdez	Sun City Ca	92585-8821
339-125-001	James A Walben	28641 Murrieta Rd	Sun City Ca	92586-2733
338-091-069	James C & Elizabeth Amer	18765 Markham St	Riverside Ca	92508-9644

APN	Owner	Address	City, State	Zip
330-291-015	James W Weaver	26953 Via Valdez	Sun City Ca	92585-8822
335-132-003	Jan & Christine Den Blanken	26033 Lancaster Dr	Sun City Ca	92586-1932
331-170-017	Jan French	PO Box 1205	Romoland Ca	92585-0205
337-114-017	Jane L Nordin	28530 Skokie Ct	Sun City Ca	92586-2737
339-122-025	Jane M Hermanowski	25890 Baltrustrol Dr	Sun City Ca	92586-2633
335-413-001	Janes T & Jan Tabor	20233 Paseo El Sicna	Laguna Niguel Ca	92677
335-142-001	Janet M Osborn	26010 Brandywine Dr	Sun City Ca	92586-1950
337-410-031	Janet S West	26043 Verde Grande Ct	Sun City Ca	92586-2425
335-412-024	Janice A Tucker	26037 Sunnywood St	Sun City Ca	92586-3702
337-090-027	Janice R Poteat	1864 Pamela Ln	Escondido Ca	92026-1029
331-200-024	Janice Y Kawamura	7812 Bayport Dr	Huntington Beach	92648-5701
331-200-013	Janice Y Long	2900 N Perris Blvd	Perris Ca	92571-3238
337-410-003	Janice Y Long	2900 N Perris Blvd	Perris Ca	92571-3238
329-100-016	Jason Joseph	28575 Watson Rd	Sun City Ca	92585-8802
338-301-014	Jay E Short	26004 Barrington Ct	Sun City Ca	92586-5807
337-410-035	Jay L Patterson	26083 Verde Grande Ct	Sun City Ca	92586-3562
338-301-020	Jay W & Sandra Tuttle	26097 Barrington Ct	Sun City Ca	92586-5807
338-301-032	Jayme & Nancy Allec	26057 Crestmont Cir	Sun City Ca	92586-5811
335-273-021	Jean Boni	27620 Decatur Way	Sun City Ca	92586-2183
339-133-006	Jean Devaney	26737 Cornell St	Hemet Ca	92544-7455
339-142-014	Jean A Butler	1276 Halifax Ct	Ventura Ca	93004-2727
330-291-011	Jeane L Ferrell	26772 Calle Gregorio	Sun City Ca	92585-8825
339-111-006	Jeanette C Chase	28573 Murrieta Rd	Sun City Ca	92586-2732
338-092-012	Joanne E Desmaele	29320 Murrieta Rd	Sun City Ca	92586-5824
331-340-026	Jeff Yeargain	397 23Rd St	Newport Beach Ca	92660-3608
423-030-042	Jens L & Sharon List	7662 Concordia Pl	Westminster Ca	92683-6221
423-030-044	Jens L & Sharon List	7662 Concordia Pl	Westminster Ca	92683-6221
337-103-017	Jerald F Krutsch	26130 Falsterbor Dr	Sun City Ca	92586-2709

APN	Owner	Address	City, State	Zip
330-280-002	James C & Mary Fornes	26664 Calle Gregorio	Sun City Ca	92585-8994
331-190-033	James D & Helen Varos	24171 Angela St	El Toro Ca	92630-1808
337-022-001	James E & Allen Claborn	26071 Pine Valley Rd	Sun City Ca	92586-2476
335-142-003	James E & Joanne Willson	26030 Brandywine Dr	Sun City Ca	92586-1950
339-112-004	James E & Joyce Wetherell	25851 Middlebury Way	Sun City Ca	92586-2665
339-063-010	James E & Sharon Kolb	19570 Chinotto Ln	Riverside Ca	92508-6403
339-092-037	James E Bateson	248 Stedman Pl	Monrovia Ca	91016-2167
337-022-004	James F & Mary Wright	26111 Pine Valley Rd	Sun City Ca	92586-2461
337-140-020	James F & Ruth Berry	26096 Ridgemoor Rd	Sun City Ca	92586-2702
339-123-025	James G Quinn	25890 Interlochen Dr	Sun City Ca	92586-2637
337-121-003	James J & Mary Trascapoulos	28671 Amersfoot Way	Sun City Ca	92586-2713
330-280-048	James J & Pearl Deguelle	26644 Calle Emiliano	Sun City Ca	92585-8829
309-370-004	James J Joseph	8001 Irvine Center 900	Irvine Ca	92618
339-052-012	James L & Billye Huntington	25908 Sandy Lodge Rd	Sun City Ca	92586-5301
309-360-013	James L Olsen	7641 E Corto Rd	Anaheim Ca	92808-1348
337-021-007	James L Vorhes	28052 Murrieta Rd	Sun City Ca	92586-2419
329-070-044	James M & Cindy Sylvester	PO Box 1761	Sun City Ca	92585-1761
337-133-008	James M & Susana Roach	28870 Amersfoot Way	Sun City Ca	92586-2714
337-121-010	James M Roach	30710 Pier Pointe Cir	Menifee Ca	92584-8406
338-091-076	James P & Bessie Atwood	29302 Murrieta Rd 88	Sun City Ca	92586-5824
337-102-028	James R & Agnes Bell	26066 Fountain Bleu D	Sun City Ca	92586-2759
337-102-028	James R & Agnes Bell	26066 Fountain Bleu Dr	Sun City Ca	92586-2759
331-040-032	James R & Bettie Allison	26025 Nova Ln	Sun City Ca	92585-9483
327-340-014	James R & Dimple Parsons	PO Box 304	Sun City Ca	92586-0304
330-280-032	James R & Evelyn Sudbeck	25925 Camino Juarez	Sun City Ca	92585-8819
339-103-015	James R & Jacquelan Mc Card	25941 Coombe Hill Dr	Sun City Ca	92586-2609
335-424-039	James R & Phyllis Swanson	27114 Rangewood St	Sun City Ca	92586-3745
335-424-019	James S & Mary Madigan	26072 Goldenwood St	Sun City Ca	92586-3750

APN	Owner	Address	City, State	Zip
335-142-006	Jeri Tate	26082 Brandywine Dr	Sun City Ca	92586-1950
331-170-019	Jeronimo A & Susie Morales	11203 Elmhurst Dr	Norwalk Ca	90650-6905
329-142-008	Jerry & Pat Roseberry	27894 Van Buren Ave	Sun City Ca	92585-9243
329-100-017	Jerry D & Christy Nelson	PO Box 1567	Sun City Ca	92585-1567
339-103-021	Jerry G & Barbara Maceachern	7022 C Skinner Pky A2	Jacksonville F	32256
339-103-021	Jerry G & Barbara Maceachern	7022 C Skinner Pky A20	Jacksonville Fl	32256
309-360-017	Jerry L Searan	28370 Ellis Ave	Romoland Ca	92585-3335
330-210-010	Jerry R Gardner	26399 Murrieta Rd	Sun City Ca	92585-9217
330-210-013	Jerry R Gardner	26399 Murrieta Rd	Sun City Ca	92585-9217
331-150-024	Jesus & Luz Cardenas	2057 S Vineyard Ave	Ontario Ca	91761-8066
339-061-005	Jesus & Olivia Salazar	28191 Murrieta Rd	Sun City Ca	92586-2431
329-070-022	Jesus Gutierrez	28485 Mapes Rd	Sun City Ca	92585-9032
331-040-031	Jesus M & Emilia Ochoa	24088 Golden Pheasant	Murrieta Ca	92562-4652
339-111-004	Jewell C Williams	28547 Murrieta Rd	Sun City Ca	92586-2732
331-170-025	Jiles E & Elizabeth Gum	400 Latigo Ranch Rd	Williams Or	97544-9706
337-131-026	Jill K Huett	429 S Valley St	Anaheim Ca	92804-2436
337-021-004	Joan Quade	28094 Murrieta Rd	Sun City Ca	92586-2419
339-061-010	Joan G Danley	25980 Roanoke Rd	Sun City Ca	92586-2329
337-131-013	Joan K James	31707 Winchester Rd 1	Temecula Ca	92590
337-131-013	Joan K James	31707 Winchester Rd 10	Temecula Ca	92590
337-150-002	Joan L Mccants	PO Box G	Sun City Ca	92586-0993
338-091-083	Joan S Fairchild	29348 Murrieta Rd 81	Sun City Ca	92586-2875
337-410-029	Joann Lance	26023 Verde Grande Ct	Sun City Ca	92586-2425
426-030-007	Joanne Pauli	121 Northstar Mall	Marina Del Rey C	90292-6794
337-021-032	Joanne K & Ralph Ansel	28071 Saint Marys St	Sun City Ca	92586-2465
335-132-004	Joaquin & Ana Mariota	26047 Lancaster Dr	Sun City Ca	92586-1932
335-092-012	Joe D & Amy Armijo	25901 Lancaster Dr	Sun City Ca	92586-2305
335-141-003	John & Clorinda Raimondo	27860 Murrieta Rd	Sun City Ca	92586-2321

APN	Owner	Address	City, State	Zip
339-132-004	John & Margaret Fekete	25851 Musselburgh Dr	Sun City Ca	92586-2645
335-131-005	John & Mary Pytel	26051 Fairlane Dr	Sun City Ca	92586-1937
335-132-046	John & Teresa Ivan	5193 Sequoia Ave	Cypress Ca	90630-2936
339-051-019	John Simon	28025 Murrieta Rd	Sun City Ca	92586-2427
338-301-003	John A & Meri Nunley	26045 Ridgemoor Rd	Sun City Ca	92586-2788
337-104-008	John B Johnson	28478 Murrieta Rd	Sun City Ca	92586-2743
335-261-031	John C & Margaret Harris	26084 Crestone Dr	Sun City Ca	92586-2140
338-091-038	John D & Betty Lewis	29206 Murrieta Rd	Sun City Ca	92586-5823
330-280-016	John E & Emily Scanlon	26538 Calle Gregorio	Sun City Ca	92585-8823
330-280-033	John E & Marianne Porter	25935 Camino Juarez	Sun City Ca	92585-8819
330-291-016	John E & Marie Blanchfill	26943 Via Valdez	Sun City Ca	92585-8822
335-143-026	John E & Vera Kafoury	26096 Germantown Dr	Sun City Ca	92586-1919
339-103-014	John E & Veronica Houlihan	25951 Coombe Hill Dr	Sun City Ca	92586-2610
327-340-027	John E Christian	18781 Mariposa Ave	Riverside Ca	92508-9620
330-280-003	John F & Dora Pasiorb	26656 Calle Gregorio	Sun City Ca	92585-8994
330-291-004	John F & Kathleen Sweeney	26710 Calle Gregorio	Sun City Ca	92585-8803
339-133-007	John G & Karen Marman	29442 Stampede Way	Canyon Lake Ca	92587-7635
337-131-006	John H & Marlene Ridder	PO Box 2006	Quartzsite Az	85346-2006
330-292-016	John J & Patricia Smolinski	26954 Corte Adelita	Sun City Ca	92585-8820
339-133-034	John J Lakatosh	28830 Wee Burn Way	Sun City Ca	92586-2679
327-071-023	John L & Brenda Armstrong	28189 Patti Ln	Sun City Ca	92585-9018
335-261-034	John L & Elaine Putman	27520 Emory Ct	Sun City Ca	92586-2112
338-301-021	John L & Patricia Srack	26115 Barrington Ct	Sun City Ca	92586-5809
335-132-008	John L Boyd	27620 Medford Way	Sun City Ca	92586-2118
337-112-030	John L Dudley	28634 Murrieta Rd	Sun City Ca	92586-2730
331-220-042	John L Sutton	1706 Marlin Way	Newport Beach Ca	92660-4328
338-091-002	John M Carr	25690 Sun City Blvd	Sun City Ca	92586-2608
338-091-052	John M Carr	29374 Murrieta Rd	Sun City Ca	92586-2876

APN	Owner	Address	City, State	Zip
337-090-006	John M Costin	26065 Cherry Hills Bl	Sun City Ca	92586-2468
337-090-006	John M Costin	26065 Cherry Hills Blv	Sun City Ca	92586-2468
339-101-011	John M Hussey	28258 W Worcester Rd	Sun City Ca	92586-2616
331-040-028	John O Weirick	26175 Mclaughlin Rd	Sun City Ca	92585-9665
335-131-002	John P & Ann Ketsdever	27920 Murrieta Rd	Sun City Ca	92586-5300
337-021-031	John R & Annette Pellegrino	28057 Saint Marys St	Sun City Ca	92586-2465
338-301-026	John R & Teresa Watterson	26046 Crestmont Cir	Sun City Ca	92586-5811
339-061-001	John T & William Fleming	28141 Murrieta Rd	Sun City Ca	92586-2431
335-424-020	John U Regus	31292 Emperor Dr	Sun City Ca	92587-7742
329-110-001	John V & Evelyn Motte	30161 12Th St	Nuevo Ca	92567-9648
329-110-003	John V & Evelyn Motte	30161 12Th St	Nuevo Ca	92567-9648
329-110-007	John V & Evelyn Motte	30161 12Th St	Nuevo Ca	92567-9648
329-110-010	John V & Evelyn Motte	30161 12Th St	Nuevo Ca	92567-9648
329-110-011	John V & Evelyn Motte	30161 12Th St	Nuevo Ca	92567-9648
329-110-014	John V & Evelyn Motte	30161 12Th St	Nuevo Ca	92567-9648
331-110-028	John V & Evelyn Motte	445 S D St	Perris Ca	92570-2134
331-140-022	John V & Evelyn Motte	445 S D St	Perris Ca	92570-2134
331-150-034	John V & Evelyn Motte	445 S D St	Perris Ca	92570-2134
331-180-008	John V & Evelyn Motte	445 S D St	Perris Ca	92570-2134
337-104-011	John W Scott	26141 Falsterbor Dr	Sun City Ca	92586-2769
338-301-012	Jorge & Hector Martinez	26040 Barrington Ct	Sun City Ca	92586-5807
331-340-015	Jorge R & Sonia Gallo	27410 Cataluna Cir	Sun City Ca	92585-9709
335-273-018	Joseph & Martha Leblanc	27700 Decatur Way	Sun City Ca	92586-2184
337-131-028	Joseph & Mary Canale	13455 Mcgehee Dr	Moreno Valley	92555-8507
337-131-028	Joseph & Mary Canale	13455 Mcgehee Dr	Moreno Valley Ca	92555-8507
339-111-001	Joseph & Mary Canale	13455 Mcgehee Dr	Moreno Valley	92555-8507
339-111-001	Joseph & Mary Canale	13455 Mcgehee Dr	Moreno Valley Ca	92555-8507
339-133-002	Joseph Santillo	28928 Thornhill Dr	Sun City Ca	92586-2921

APN	Owner	Address	City, State	Zip
329-261-005	Joseph Sarllo	28175 Springwinds Dr	Sun City Ca	92585-9774
339-051-012	Joseph A & Susanna Langone	16829 Acebo Dr	San Diego Ca	92128-2603
339-052-015	Joseph D & Esther Lavachek	6910 Grovespring Dr	Rancho Palos V	90275-3036
339-052-015	Joseph D & Esther Lavachek	6910 Grovespring Dr	Rancho Palos Ver	90275-3036
335-131-029	Joseph E & Jane Marianowits	26104 Lancaster Dr	Sun City Ca	92586-1926
335-261-006	Joseph E Dressler	26077 Chambers Ave	Sun City Ca	92586-2122
339-133-011	Joseph G Gracia	28950 W Worcester Rd	Sun City Ca	92586-2630
337-131-022	Joseph J & Lorretta Adelaars	2096 Applegate Dr	Corona Ca	92882-3762
329-261-002	Joseph J & Terry Pfeiffer	28211 Springwinds Dr	Sun City Ca	92585-9759
330-280-012	Joseph J Coletti	26474 Calle Gregorio	Sun City Ca	92585
335-425-008	Joseph L & Lilly Bilka	27105 Rangewood St	Sun City Ca	92586-3742
335-273-014	Joseph P & Lois Menally	26074 Allentown Dr	Sun City Ca	92586-2137
335-132-044	Josephine Bochenek	26052 Mccall Blvd	Sun City Ca	92586-1934
338-091-056	Josephine See	29382 Murrieta Rd	Sun City Ca	92586-2876
335-261-030	Josephine A Contristana	26098 Crestone Dr	Sun City Ca	92586-2140
338-301-027	Joshua & Kelly Mchugh	26028 Crestmont Cir	Sun City Ca	92586-5811
339-112-025	Jovita B Williams	28621 Middlebury Way	Sun City Ca	92586-2671
335-261-001	Joy F Akins	26013 Chambers Ave	Sun City Ca	92586-2122
339-133-029	Joyce C Berry	25851 Morgantown Way	Sun City Ca	92586-2644
338-091-009	Joyce E Puccio	705 La Costa Dr	Banning Ca	92220-5319
338-091-010	Joyce E Puccio	705 La Costa Dr	Banning Ca	92220-5319
338-091-011	Joyce E Puccio	705 La Costa Dr	Banning Ca	92220-5319
338-091-012	Joyce E Puccio	705 La Costa Dr	Banning Ca	92220-5319
335-423-018	Jozsef & Maria Fekete	26098 Shadywood St	Sun City Ca	92586-3733
338-091-021	Juan A & Jean Estrada	22500 Bass Pl	Canyon Lake Ca	92587-7824
335-141-014	Judith J Howard	27891 Covington Way	Sun City Ca	92586-1902
327-072-008	Julia Castillo	28245 Benigni Ave	Sun City Ca	92585-9626
330-280-034	June Jaggars	11000 Wilshire Blvd	Los Angeles Ca	90024-3602

APN	Owner	Address	City, State	Zip
337-112-027	June A Miller	28575 Amersfoot Way	Sun City Ca	92586-2711
330-280-039	June M Hines	26583 Calle Gregorio	Sun City Ca	92585-8826
309-050-038	Jung H & Hee Son	22580 Pico Ave	Nuevo Ca	92567-9096
309-050-041	Jung H & Hee Son	22580 Pico Ave	Nuevo Ca	92567-9096
309-380-003	Jung K Ho	2115 S Santa Anita Ave	Arcadia Ca	91006-4612
338-091-023	Karin Garten	29276 Murrieta Rd	Sun City Ca	92586-2873
331-140-018	Karlan A & Rodson Chamberlin	26375 Dawson Rd	Sun City Ca	92585-9795
331-200-023	Karoline Neumann	2123 Glentree Dr	Lomita Ca	90717-3412
331-210-008	Karoline Neumann	2123 Glentree Dr	Lomita Ca	90717-3412
337-132-011	Katherine Meisenheimer	26090 Kitt Ansett Dr	Sun City Ca	92586-2761
339-053-014	Katherine F Heatherington	25929 Sandy Lodge Rd	Sun City Ca	92586-5306
329-070-057	Katherine L Bangs	PO Box 1161	Murrieta Ca	92564-1161
339-124-002	Kathleen F Burch	25881 Interlochen Dr	Sun City Ca	92586-2638
310-250-001	Kathryn A Miller	PO Box 1774	La Quinta Ca	92253-1774
310-250-002	Kathryn A Miller	PO Box 1774	La Quinta Ca	92253-1774
303-310-002	Kaufman & Broad Of Southern	801 Corporate Center D	Pomona Ca	91768-2646
303-310-005	Kaufman & Broad Of Southern	801 Corporate Center D	Pomona Ca	91768-2646
303-310-006	Kaufman & Broad Of Southern	801 Corporate Center D	Pomona Ca	91768-2646
303-310-011	Kaufman & Broad Of Southern	801 Corporate Center D	Pomona Ca	91768-2646
337-022-015	Kendall G & Diane Paulson	26090 Saint Marys St	Sun City Ca	92586-2464
339-063-015	Kenneth Baustian	26820 Cherry Hills Bl	Sun City Ca	92586-2531
339-063-015	Kenneth Baustian	26820 Cherry Hills Blv	Sun City Ca	92586-2531
330-291-001	Kenneth C Heckman	26682 Calle Gregorio	Sun City Ca	92585-8824
335-144-026	Kenneth C Steele	26050 Fairlane Dr	Sun City Ca	92586-1924
329-070-009	Kenneth D & Christine Schwar	PO Box 599	Sun City Ca	92586-0599
309-360-030	Kenneth D Pellam	28375 Santa Rosa Ave	Romoland Ca	92585-9510
339-133-012	Kenneth E & Joan Stevens	28940 W Worcester Rd	Sun City Ca	92586-2630
335-412-018	Kenneth E Mosher	26093 Sunnywood St	Sun City Ca	92586-3704

APN	Owner	Address	City, State	Zip
330-280-018	Kenneth G & Peggy Caldwell	25970 Camino Juarez	Sun City Ca	92585-8818
339-111-021	Kenneth J Cook	25880 Middlebury Way	Sun City Ca	92586-2668
335-143-025	Kenneth K & Maria Ito	26108 Germantown Dr	Sun City Ca	92586-1920
339-103-009	Kenneth L & Ruby Brown	28491 Murrieta Rd	Sun City Ca	92586-2736
337-131-024	Kenneth L Austin	28798 Murrieta Rd	Sun City Ca	92586-2757
337-090-004	Kenneth M Sickles	26045 Cherry Hills Bl	Sun City Ca	92586-2468
337-090-004	Kenneth M Sickles	26045 Cherry Hills Blv	Sun City Ca	92586-2468
335-422-081	Kenneth P Bisson	PO Box 2437	Wrightwood Ca	92397-2437
423-250-009	Kenneth S Lorin	18881 Von Karman Ave 3	Irvine Ca	92612-6589
423-250-013	Kenneth S Lorin	18881 Von Karman Ave 3	Irvine Ca	92612-6589
423-260-002	Kenneth S Lorin	18881 Von Karman Ave 3	Irvine Ca	92612-6589
423-260-006	Kenneth S Lorin	18881 Von Karman Ave 3	Irvine Ca	92612-6589
423-270-004	Kenneth S Lorin	18881 Von Karman Ave 3	Irvine Ca	92612-6589
423-270-006	Kenneth S Lorin	18881 Von Karman Ave 3	Irvine Ca	92612-6589
423-280-001	Kenneth S Lorin	18881 Von Karman Ave 3	Irvine Ca	92612-6589
339-103-018	Kenneth W & Janice Kowalski	25901 Coombe Hill Dr	Sun City Ca	92586-2609
338-091-018	Key	228 Avenida Santa Barb	San Clemente Ca	92672-4141
329-262-013	Kilauni R Camacho	25942 Northwinds Dr	Sun City Ca	92585-9713
335-423-022	Kirby B & Connie Creel	26073 Goldenwood St	Sun City Ca	92586-3747
339-063-012	Kirk Montgomery	1459 Copper Mountain	Diamond Bar Ca	91765-2612
339-063-012	Kirk Montgomery	1459 Copper Mountain D	Diamond Bar Ca	91765-2612
331-060-007	Klaus K Schuegraf	2968 Via Alvarado	Palos Verdes Est	90274-4331
337-410-017	Krutsch	26041 Bonita Vista Ct	Sun City Ca	92586-6824
335-131-001	L V Bagwill	27906 Murrieta Rd	Sun City Ca	92586-5300
331-150-035	Ladd Associates Inc	445 S D St	Perris Ca	92570-2134
338-301-042	Lance & Brenna Gemmill	41661 Enterprise Cir N	Temecula Ca	92590-5815
335-100-001	Land Researchers Inc	2 N Lake Ave 800	Pasadena Ca	91101-1870
339-063-013	Larry Trevathan	624 Penn St	El Segundo Ca	90245-3121

APN	Owner	Address	City, State	Zip
337-122-017	Larry F & Marie Webster	28681 Troon Ct	Sun City Ca	92586-2738
335-424-029	Larry K & Michael Kolbo	6102 Galipean Dr	Huntington Beach	92647-6417
330-292-001	Laurence L & Irene Hill	26762 Calle Emiliano	Sun City Ca	92585-8831
330-291-010	Laurine D Oyler	26764 Calle Gregorio	Sun City Ca	92585-8825
335-274-007	Lavelle P & Arthur Weber	27729 Provo Ct	Sun City Ca	92586-2119
337-021-028	Lavera P Williams	26080 Pine Valley Rd	Sun City Ca	92586-2462
339-112-027	Laverne C Nielsen	28591 Middlebury Way	Sun City Ca	92586-2605
330-280-015	Lawrence & Dona Nelsen	3021 E Minnehaha Pky	Minneapolis Mn	55417-1429
330-291-013	Lawrence & Roslyn Terfansky	26790 Calle Gregorio	Sun City Ca	92585-8825
337-124-001	Lawrence A & Judy Austin	26071 Fresh Meadow Dr	Sun City Ca	92586-2719
331-090-008	Lawrence C Rael	1800 E Garry Ave 118	Santa Ana Ca	92705-5803
338-091-055	Lawrence E & Dorothy Lowe	29380 Murrieta Rd	Sun City Ca	92586-2876
339-061-003	Lawrence E & Ruth Davisson	28165 Murrieta Rd	Sun City Ca	92586-2431
339-102-026	Lawrence R & Bos Page	25870 Coombe Hill Dr	Sun City Ca	92586-2636
339-141-004	Leatrice J Normington	28991 W Worcester Rd	Sun City Ca	92586-2629
335-424-038	Lee Amaradio	27122 Rangewood St	Sun City Ca	92586-3745
338-301-041	Lee Clymer	263 Old East Lake Rd	Tarpon Springs F	34689-8507
329-261-003	Leland D Sigley	28205 Springwinds Dr	Sun City Ca	92585-9759
339-061-013	Leland L & Elizabeth Obar	25950 Roanoke Rd	Sun City Ca	92586-2329
335-423-021	Leocadio F & Esperanza Estra	26065 Goldenwood St	Sun City Ca	92586-3747
337-112-035	Leon B & Roxann Keeton	28560 Murrieta Rd	Sun City Ca	92586-2742
329-110-023	Leon E & Darlene Motte	29100 Watson Rd	Romoland Ca	92585-9518
327-071-013	Leon M & Bari Parker	28110 Patti Ln	Sun City Ca	92585-9018
330-291-017	Leonard E & Carol Morris	26933 Via Valdez	Sun City Ca	92585-8822
337-132-012	Leonard M & Betty Michel	253 Via San Andreas	San Clemente C	92672-3712
337-132-012	Leonard M & Betty Michel	253 Via San Andreas	San Clemente Ca	92672-3712
338-091-086	Leonard W & Louise Smith	30072 Shoreline Dr	Menifee Ca	92584-8054
339-124-023	Leonardo Villahermosa	25860 Musselburgh Dr	Sun City Ca	92586-2646

APN	Owner	Address	City, State	Zip
339-133-032	Leroy C & Shelby Horton	25881 Morgantown Way	Sun City Ca	92586-2644
330-291-012	Leroy G & Janet Beers	26782 Calle Gregorio	Sun City Ca	92585-8825
338-092-009	Lester & Constance Gremard	29314 Murrieta Rd	Sun City Ca	92586-5824
327-330-040	Lester R & Barbara Hill	2619 W Edinger Ave F1	Santa Ana Ca	92704-3501
327-330-041	Lester R & Barbara Hill	2619 W Edinger Ave F1	Santa Ana Ca	92704-3501
327-330-042	Lester R & Barbara Hill	2619 W Edinger Ave F1	Santa Ana Ca	92704-3501
327-330-043	Lester R & Barbara Hill	2619 W Edinger Ave F1	Santa Ana Ca	92704-3501
335-412-020	Leta J Tate	26075 Sunnywood St	Sun City Ca	92586-3704
335-131-030	Lewis F & Lois Brooks	26094 Lancaster Dr	Sun City Ca	92586-1927
339-062-015	Lewis G Sorrell	25880 Warwick Rd	Sun City Ca	92586-2432
338-091-041	Lewis H Warren	2540 1St Ave	San Diego Ca	92103-6505
309-370-010	Li	1410 Belhaven Rd	San Marino Ca	91108-2709
339-092-036	Lillian A Svoboda	25961 Cherry Hills Bl	Sun City Ca	92586-2467
339-092-036	Lillian A Svoboda	25961 Cherry Hills Blv	Sun City Ca	92586-2467
339-133-014	Lillian E Jeffries	28922 W Worcester Rd	Sun City Ca	92586-2630
339-061-017	Lillian F Vineyard	25920 Roanoke Rd	Sun City Ca	92586-2329
338-301-011	Linda A Scott	26058 Barrington Ct	Sun City Ca	92586-5807
329-070-054	Linda J Mayer	25050 Happy Acres Dr	Sun City Ca	92585-9423
339-053-011	Lloyd E & Barbara Davis	25885 Sandy Lodge Rd	Sun City Ca	92586-2397
327-340-019	Loi S & Luz Chan	418 Jordan Dr	Redlands Ca	92373-7140
335-424-047	Lois E Hansford	27050 Rangewood St	Sun City Ca	92586-3707
335-092-028	Loren & Hazel Houck	25920 Mccall Blvd	Sun City Ca	92586-2357
337-112-028	Lorette	28585 Amersfoot Way	Sun City Ca	92586-2711
426-430-001	Lori A Sukoff	PO Box 3369	Manhattan Beach	90266-1369
426-440-006	Lori A Sukoff	PO Box 3369	Manhattan Beach	90266-1369
339-103-020	Lorne K Lahodny	341 Westbrook Pl	Costa Mesa Ca	92626-6132
337-021-010	Lorraine Roberg	28026 Murrieta Rd	Sun City Ca	92586-2419
330-280-065	Lorraine C Galvond	26599 Calle Emiliano	Sun City Ca	92585-8833

APN	Owner	Address	City, State	Zip
335-092-020	Lot Common	None		
335-092-031	Lot Common	None		
337-021-012	Lot Common	None		
337-090-023	Lot Common	None		
339-051-040	Lot Common	Unknown		
339-092-040	Lot Common	Unknown		
339-142-011	Lou E Duncan	1035 San Pablo Dr	San Marcos Ca	92069-4812
335-131-004	Louis & Lois Rosenthal	27921 Covington Way	Sun City Ca	92586-1913
338-091-036	Louis & Mary Sloiz	29210 Murrieta Rd	Sun City Ca	92586-5823
335-273-024	Louis A & Betty Grenier	27515 Boston Dr	Sun City Ca	92586-2105
338-301-002	Louis E & Shirley Chabot	26033 Ridgemoor Rd	Sun City Ca	92586-2788
335-413-003	Louise G Blalock	26026 Sunnywood St	Sun City Ca	92586-3746
335-425-004	Loveta A Zimmer	27073 Rangewood St	Sun City Ca	92586-3742
339-112-005	Lowry W & Inez Rodine	25841 Middlebury Way	Sun City Ca	92586-2640
335-426-009	Luciano & Maria Tafoya	26027 Bluebell St	Sun City Ca	92586-3754
329-070-063	Luciano Correa	25050 Tradewinds Dr	Sun City Ca	92585-9481
338-091-022	Lucinda A Land	Rte 1 Box 15	Taft Ca	93268
337-410-016	Luella Schulkey	26031 Bonita Vista Ct	Sun City Ca	92586-2409
339-103-008	Luther C & Shirley Lester	28477 Murrieta Rd	Sun City Ca	92586-2736
335-424-031	Lvg Reve	27131 Stagewood St	Sun City Ca	92586-3756
331-200-022	M L & Janice Kawamura	12059 Stonegate Ln	Garden Grove Ca	92845-1631
330-280-011	Madeleine D Burchnell	26584 Calle Gregorio	Sun City Ca	92585-8823
337-021-014	Madelon B La Chance	26055 Mccall Blvd	Sun City Ca	92586-1917
337-021-033	Mae E Lecornu	28093 Saint Marys St	Sun City Ca	92586-2465
309-050-043	Manuel & Evangelina Jimenez	4537 W 137Th Pl	Hawthorne Ca	90250-6907
309-050-044	Manuel & Evangelina Jimenez	4537 W 137Th Pl	Hawthorne Ca	90250-6907
309-360-028	Manuel & Vicenta Plasencia	27535 Harrison Ave	Romoland Ca	92585-9565
339-125-004	Manuel Curiel	28685 Murrieta Rd	Sun City Ca	92586-2733

APN	Owner	Address	City, State	Zip
327-071-021	Manuel F & Rosario Acevedo	28125 Patti Ln	Sun City Ca	92585-9018
309-360-023	Manuel J Blanco	28340 Roan Ranch Rd	Romoland Ca	92585-9085
329-261-007	Manuela M Nila	28135 Springwinds Dr	Sun City Ca	92585-9774
335-426-006	Marbeth Balensiefer	27161 Rangewood St	Sun City Ca	92586-3743
327-071-001	Marc J & Cynthia Gold	200 E Washington Ave 2	Escondido Ca	92025-1806
329-264-013	Margaret Glaser	25944 Tradewinds Dr	Sun City Ca	92585-9779
335-274-008	Margaret E Horvath	27739 Provo Ct	Sun City Ca	92586-2119
339-112-018	Margaret E Swinney	28611 Hoylake Ct	Sun City Ca	92586-2604
337-021-006	Margaret H Duryee	28066 Murrieta Rd	Sun City Ca	92586-2419
337-103-014	Margaret H Engle	26160 Falsterbor Dr	Sun City Ca	92586-2709
330-280-036	Margaret J Drost	25965 Camino Juarez	Sun City Ca	92585-8819
339-112-024	Margaret M Perry	28635 Middlebury Way	Sun City Ca	92586-2671
337-140-018	Margaret W Abbott	26068 Ridgemoor Rd	Sun City Ca	92586-2702
335-262-016	Margie L & Roy Locke	26055 Crestone Dr	Sun City Ca	92586-2144
337-133-010	Margit Makovics	28850 Amersfoot Way	Sun City Ca	92586-2714
339-133-030	Marguerite Enochs	25861 Morgantown Way	Sun City Ca	92586-2644
335-142-002	Marguerite T Ludwig	26020 Brandywine Dr	Sun City Ca	92586-1950
329-263-013	Maria Andrade	25946 Westwinds Dr	Sun City Ca	92585-9478
337-121-011	Maria Peraza	28684 Murrieta Rd	Sun City Ca	92586-2758
327-330-039	Maria Sauceda	2445 1St St	La Verne Ca	91750-5534
335-132-043	Maria C Duron	26040 Mccall Blvd	Sun City Ca	92586-1934
339-063-014	Marian C Tyler	PO Box 176	Sun City Ca	92586-0176
335-131-028	Marian E Heinl	26118 Lancaster Dr	Sun City Ca	92586-1926
337-021-005	Marianne Pelayo	28080 Murrieta Rd	Sun City Ca	92586-2419
337-140-015	Marie T Lemay	26020 Ridgemoor Rd	Sun City Ca	92586-2702
339-092-006	Marine Associates Inc	32875 Pines Airpark R	Winchester Ca	92596-9487
339-092-006	Marine Associates Inc	32875 Pines Airpark Rd	Winchester Ca	92596-9487
335-426-013	Mario J Fiore	26063 Bluebell St	Sun City Ca	92586-3754

APN	Owner	Address	City, State	Zip
339-133-004	Marion J & Wilma Rudeseal	28825 Murrieta Rd	Sun City Ca	92586-2751
339-053-010	Marion L & Bessie Leonhart	25869 Sandy Lodge Rd	Sun City Ca	92586-2397
335-424-042	Marion L Paine	27090 Rangewood St	Sun City Ca	92586-3745
335-141-011	Marius W & Mary Schwitters	27845 Covington Way	Sun City Ca	92586-1902
337-021-018	Marjorie A & Dee Mcmillan	20095 Gustin Rd	Perris Ca	92570-8065
338-091-028	Marjorie B Combs	25814 Ridgemoor Rd	Sun City Ca	92586-2692
331-040-009	Mark A Mortensen	26760 Maris Ct	Sun City Ca	92586-2517
337-090-031	Martha E Alexandroff	28210 E Worcester Rd	Sun City Ca	92586-2722
335-273-027	Martha L Shoaf	12172 Lakeview Dr	Trona Ca	93562-1509
339-123-003	Martha Y Castelo	25871 Baltrustrol Dr	Sun City Ca	92586-2634
339-092-008	Martin C & Pearl Grey	28207 W Worcester Rd	Sun City Ca	92586-2653
337-410-036	Marva J Hothan	28252 Buena Mesa Dr	Sun City Ca	92586-2410
337-131-003	Marvin & Helen Revell	28771 Amersfoot Way	Sun City Ca	92586-2756
327-071-027	Marvin E & Linda Pulcheon	17504 Krameria Ave	Riverside Ca	92504-6017
339-141-005	Marvin J & Betty Randall	28981 W Worcester Rd	Sun City Ca	92586-2629
309-290-033	Marvin L Smith	RR 1 Box 18530	Porum Ok	74455-9611
339-123-001	Mary Gillen	25891 Baltrustrol Dr	Sun City Ca	92586-2634
339-103-005	Mary Williams	25706 Dorval Ct	Menifee Ca	92584-8690
339-141-011	Mary A Walling	28921 W Worcester Rd	Sun City Ca	92586-2629
339-122-003	Mary E & Rodger Grider	25871 Sun City Blvd	Sun City Ca	92586-2662
335-413-008	Mary E Branson	26070 Sunnywood St	Sun City Ca	92586-3746
335-422-084	Mary E Cook	26097 Shadywood St	Sun City Ca	92586-3734
335-424-046	Mary E Jost	27058 Rangewood St	Sun City Ca	92586-3722
339-051-020	Mary E Molter	28041 Murrieta Rd	Sun City Ca	92586-2427
337-131-015	Mary E Smith	29870 Moondance Way	Sun City Ca	92586-3614
338-092-014	Mary F Gasparevich	29324 Murrieta Rd	Sun City Ca	92586-2875
339-125-019	Mary H & James Turner	28658 Wee Burn Way	Sun City Ca	92586-2613
335-424-028	Mary H Velky	27107 Stagewood St	Sun City Ca	92586-3756

APN	Owner	Address	City, State	Zip
335-141-005	Mary J Cochran	27830 Murrieta Rd	Sun City Ca	92586-2321
339-092-010	Mary J Wilson	28229 W Worcester Rd	Sun City Ca	92586-2653
330-280-049	Mary M Sourp	26636 Calle Emiliano	Sun City Ca	92585-8829
339-101-008	Mary M Steele	28218 W Worcester Rd	Sun City Ca	92586-2616
338-091-062	Mary R Purdum	29184 Murrieta Rd	Sun City Ca	92586-2870
337-410-012	Mary S Teske	26040 Bonita Vista Ct	Sun City Ca	92586-3544
339-052-009	Mary V & David Naugle	25883 Whitman Rd	Sun City Ca	92586-2333
330-291-006	Maryjane Megginson	26728 Calle Gregorio	Sun City Ca	92585-8825
338-091-071	Marzelle Hinrichs	29292 Murrieta Rd 93	Sun City Ca	92586-2874
335-424-043	Mast	27082 Rangewood St	Sun City Ca	92586-3745
337-114-026	Mathieu	29815 Camino Cristal	Menifee Ca	92584-8310
335-261-035	Mathilde Liggett	27510 Emory Ct	Sun City Ca	92586-2112
331-190-034	Matthews International Corp	2 N Shore Ctr	Pittsburgh Pa	15212-5838
337-102-002	Maureen Franzmathes	29049 Thornhill Dr	Sun City Ca	92586-2916
337-112-034	Maurice E & Karen Kalloch	28572 Murrieta Rd	Sun City Ca	92586-2742
335-423-020	Maxine Thompson	26080 Shadywood St	Sun City Ca	92586-3733
335-141-012	Maxine E Koehler	27861 Covington Way	Sun City Ca	92586-1902
337-103-003	Mcgee	28850 Pebble Beach Dr	Sun City Ca	92586-2812
339-101-010	Mckinnon	28244 W Worcester Rd	Sun City Ca	92586-2616
337-104-018	Melba J Iiles	26071 Falsterbor Dr	Sun City Ca	92586-2717
309-360-029	Melodie R Swaine	28325 Santa Rosa Ave	Romoland Ca	92585-9510
337-114-001	Melvin C & Marian Pecka	26231 Burlington Way	Sun City Ca	92586-2715
335-413-014	Melvin C & Suzanne Klein	5617 Downey Ave	Lakewood Ca	90712-1409
337-124-005	Melvin W & Emma Marmet	26161 Fresh Meadow Dr	Sun City Ca	92586-2778
335-426-010	Merlin E Dunn	26037 Bluebell St	Sun City Ca	92586-3754
339-051-030	Merlyn F & Olga Hunter	25890 Whitman Rd	Sun City Ca	92586-2334
337-131-016	Merrill H & Helen Olson	28929 E Worcester Rd	Sun City Ca	92586-2752
425-030-006	Met W	1416 9Th St 22	Sacramento Ca	95814-5511

APN	Owner	Address	City, State	Zip
335-091-005	Michael & Linda Kaplan	27900 Niagara Ct	Sun City Ca	92586-2322
338-301-033	Michael & Vicki Leonard	26075 Crestmont Cir	Sun City Ca	92586-5811
338-301-017	Michael Mikkelson	26043 Barrington Ct	Sun City Ca	92586-5807
339-103-004	Michael A & Ann Dorescenzi	28421 Murrieta Rd	Sun City Ca	92586-2736
339-124-001	Michael C Santilli	25891 Interlechen Dr	Sun City Ca	92586-2638
329-100-023	Michael D & Kathleen Wilson	28515 Watson Rd	Sun City Ca	92585-8802
327-340-024	Michael E Pulcheon	29163 Citation Ave	Romoland Ca	92585-9714
327-340-028	Michael H & Katherine Thisse	28177 Tower View Ct	Sun City Ca	92585-9515
339-111-017	Michael I Garot	28548 Middlebury Way	Sun City Ca	92586-2642
329-070-048	Michael J & Emma Kossman	PO Box 1502	Sun City Ca	92585-0502
327-360-026	Michael J & Lucia Bagley	PO Box 1582	Sun City Ca	92585-1582
330-280-042	Michael J & Mary Regan	26611 Calle Gregorio	Sun City Ca	92585-8826
339-062-014	Michael L Holmgren	25890 Warwick Rd	Sun City Ca	92586-2432
330-280-057	Michael M & Betty Ford	26564 Calle Emiliano	Sun City Ca	92585-8828
309-050-050	Michele D Medina	22690 Pico Ave	Nuevo Ca	92567-9546
331-030-008	Miguel L & Yolanda Calvillo	16549 Gilmore St	Van Nuys Ca	91406
339-052-010	Miki L Bowen	25899 Whitman Rd	Sun City Ca	92586-2333
339-052-011	Mildred B Dolloff	25911 Whitman Rd	Sun City Ca	92586-5304
335-413-007	Mildred I Mcclintic	26062 Sunnywood St	Sun City Ca	92586-3746
335-424-030	Mildred L Ruhr	27123 Stagewood St	Sun City Ca	92586-3756
337-112-001	Mildred M Adams	48 Cornell Dr	Rancho Mirage	92270-3630
337-112-001	Mildred M Adams	48 Cornell Dr	Rancho Mirage Ca	92270-3630
335-144-001	Mildred T Sieckhaus	26051 Germantown Dr	Sun City Ca	92586-1922
337-131-012	Miller R & Martha Rowe	28861 Amersfoot Way	Sun City Ca	92586-2701
330-291-003	Milton C & Joan Funk	26700 Calle Gregorio	Sun City Ca	92585-8803
330-291-018	Milton O Peterson	26923 Via Valdez	Sun City Ca	92585-8822
337-090-029	Minnie L Kruger	28182 E Worcester Rd	Sun City Ca	92586-2721
339-061-020	Mitchel C & Sharon Truitt	25870 Roanoke Rd	Sun City Ca	92586-5310

APN	Owner	Address	City, State	Zip
335-413-004	Mitchell W & Lucy Trefry	26034 Sunnywood St	Sun City Ca	92586-3746
337-114-022	Monte P & Frances Melain	36147 Venee Dr	Murrieta Ca	92562-8455
330-280-052	Monte S & Laura Taylor	26608 Calle Emiliano	Sun City Ca	92585-8829
335-425-001	Morrison H & Betty Groff	27049 Rangewood St	Sun City Ca	92586-3742
329-110-019	Motte Commercial Account	445 S D St	Perris Ca	92570-2134
329-100-010	Motte Farms Inc	445 S D St	Perris Ca	92570-2134
337-410-014	Mozelle Randolph	26020 Bonita Vista Ct	Sun City Ca	92586-2406
335-440-007	Mt San Jacinto Community Col	1499 N State St	San Jacinto Ca	92583-2325
303-310-009	Mwd	336		
426-430-002	Mwd	PO Box 54153	Los Angeles Ca	90054-0153
426-440-005	Mwd	PO Box 54153	Los Angeles Ca	90054-0153
335-131-007	Myron A Corey	26095 Fairlane Dr	Sun City Ca	92586-1937
337-114-018	Nanci P Nelson	28520 Skokie Ct	Sun City Ca	92586-2737
339-111-009	Nancy Scott	28605 Murrieta Rd	Sun City Ca	92586-2729
426-440-002	Nancy B Cunningham	PO Box 3369	Manhattan Beach	90266-1369
339-125-003	Nancy E Harrison	28671 Murrieta Rd	Sun City Ca	92586-2733
309-050-030	Natalia Gallegos	22624 Pico Ave	Nuevo Ca	92567-9546
335-425-007	Neil A & Barbara Geariety	27097 Rangewood St	Sun City Ca	92586-3742
339-141-001	Nelson E & Betty Cauble	28941 Murrieta Rd	Sun City Ca	92586-2735
338-091-003	Nestor Gold	29338 Murrieta Rd	Sun City Ca	92586-2875
330-280-017	New John E&Mary G	26530 Calle Gregorio	Sun City Ca	92585-8823
338-251-014	Newell & Mary Kallestad	26064 Baldy Peak Dr	Sun City Ca	92586-3449
331-040-043	Nicholas & Charlotte Jones	1501 W Florida Ave	Hemet Ca	92543-3813
331-190-045	Nick Jones	PO Box 1077	Hemet Ca	92546-1077
331-040-011	Njuguna G & Elizabeth Gichu	26832 Maris Ct	Sun City Ca	92586-2517
339-133-033	Noel M & Judy Dick	28850 Wee Burn Way	Sun City Ca	92586-2679
339-111-011	Norma Ernstrom	28636 Middlebury Way	Sun City Ca	92586-2670
337-021-027	Norma J Jackson	26090 Pine Valley Rd	Sun City Ca	92586-2462

APN	Owner	Address	City, State	Zip
309-030-017	Norman D Abbott	7440 Sepulveda Blvd 32	Van Nuys Ca	91405-0001
309-030-018	Norman D Abbott	7440 Sepulveda Blvd 32	Van Nuys Ca	91405-4938
337-021-019	Norman E & Lavern Hermann	26105 Mccall Blvd	Sun City Ca	92586-1936
335-274-014	Norman H & Ruth Stvincent	26079 Allentown Dr	Sun City Ca	92586-2136
339-101-012	Norman P Leonardson	28272 W Worcester Rd	Sun City Ca	92586-2616
426-430-004	Nuevo Water Co	30427 11Th St	Nuevo Ca	92567-9528
337-140-007	Nurturing	24348 Jacarte Dr	Murrieta Ca	92562-4005
337-104-016	Ofelia C Marta	26091 Falsterbor Dr	Sun City Ca	92586-2717
335-426-017	Ole W & Virginia Espen	26101 Bluebell St	Sun City Ca	92586-3754
309-050-039	Olegario & Carlota Velasco	28625 Central Ave	Nuevo Ca	92567-9176
339-122-024	Olindo & Carol Dercole	25880 Baltrustrol Dr	Sun City Ca	92586-2633
329-070-052	Omerlee Buterbaugh	PO Box 433	Nuevo Ca	92567-0433
426-030-017	Oscar A & Pauline Hanson	13460 Barker Ln	Corona Ca	92879-1913
331-040-036	Oscar J & Florence Fuhrmann	26510 Murrieta Rd	Sun City Ca	92585-9463
335-261-002	Oscar J & Joan Consiglio	26025 Chambers Ave	Sun City Ca	92586-2122
337-102-003	Oster	69730 Highway 111 207	Rancho Mirage	92270-2874
337-102-003	Oster	69730 Highway 111 207	Rancho Mirage Ca	92270-2874
337-140-016	Oster	69730 Highway 111 201	Rancho Mirage	92270-2869
337-140-016	Oster	69730 Highway 111 201	Rancho Mirage Ca	92270-2869
339-092-007	Oster	24348 Jacarte Dr	Murrieta Ca	92562-4005
339-092-034	Oster	69730 Highway 111 N 2	Rancho Mirage	92270-2467
339-092-034	Oster	69730 Highway 111 N 2C	Rancho Mirage Ca	92270-2467
339-133-010	Oster	24348 Jacarte Dr	Murrieta Ca	92562-4005
335-261-039	Otis F & Arlene Robinson	27591 Decatur Way	Sun City Ca	92586-2142
339-125-016	Owen E Nesler	28698 Wee Burn Way	Sun City Ca	92586-2675
423-260-001	Pacific Lighting Service Co	720 W 8Th St	Los Angeles Ca	90017-4604
329-141-003	Pamela Gourley	3630 University Blvd	Dallas Tx	75205-1838
329-141-008	Pamela Gourley	3630 University Blvd	Dallas Tx	75205-1838

APN	Owner	Address	City, State	Zip
310-190-009	Park West Associates	969 3Rd Ave	New York Ny	10022-2065
310-190-010	Park West Associates	969 3Rd Ave	New York Ny	10022-2065
310-190-015	Parkwest Associates	969 3Rd Ave	New York Ny	10022-2065
338-301-007	Patricia Diaz	26103 Ridgemoor Rd	Sun City Ca	92586-2789
337-410-032	Patricia Jones	26053 Verde Grande Ct	Sun City Ca	92586-2425
337-021-026	Patricia A Mcgreevey	26106 Pine Valley Rd	Sun City Ca	92586-2462
337-410-044	Patricia H Powell	111 Oliva Ct A	Novato Ca	94947-7105
335-143-005	Patricia J Kyllo	26123 Brandywine Dr	Sun City Ca	92586-1915
335-413-002	Patricia L Wallbank	26018 Sunnywood St	Sun City Ca	92586-3701
335-413-015	Patricia M Labus	27033 Rangewood St	Sun City Ca	92586-3742
338-091-049	Patrick A & Philomena Anders	29368 Murrieta Rd	Sun City Ca	92586-2876
339-124-024	Patrick H & Geraldine Pearce	26650 Amhurst Ct	Sun City Ca	92586-2234
329-320-003	Paul & Terry Byer	28514 Watson Rd	Sun City Ca	92585-9311
335-092-016	Paul A & A Kramer	25951 Lancaster Dr	Sun City Ca	92586-2305
331-040-034	Paul A & Martha Rodriguez	26085 Nova Ln	Sun City Ca	92585-9483
330-280-061	Paul C & Delphane Demello	26563 Calle Emiliano	Sun City Ca	92585-8833
331-150-017	Paul E & Dolores Phillips	1400 Colorado St C	Boulder City Nv	89005-2448
338-092-002	Paul E & Joe Carter	29234 Murrieta Rd	Sun City Ca	92586-2871
329-264-012	Paul W & Edda Flanary	25930 Tradewinds Dr	Sun City Ca	92585-9779
339-051-024	Pauline J Heller	25960 Whitman Rd	Sun City Ca	92586-5302
337-090-034	Pauline R Arnold	28256 E Worcester Rd	Sun City Ca	92586-2722
335-412-023	Pearl Campbell	26047 Sunnywood St	Sun City Ca	92586-3702
337-121-006	Pearl L Martinek	28721 Amersfoot Way	Sun City Ca	92586-2756
338-301-015	Pedro & Alba Montalvo	26007 Barrington Ct	Sun City Ca	92586-5807
337-114-025	Peggy A Alston	28596 Amersfoot Way	Sun City Ca	92586-2712
327-071-005	Penny S Skog	28135 Ellis Ave	Sun City Ca	92585-9108
339-103-012	Pete J Reynen	30833 Golden Gate Dr	Sun City Ca	92587-7724
335-132-059	Peter & Gertrud Keller	26010 Mccall Blvd D	Sun City Ca	92586-1983

APN	Owner	Address	City, State	Zip
330-280-006	Peter I & Henrietta Hamming	26680 Calle Gregorio	Sun City Ca	92585-8824
330-210-011	Peter J Salas	PO Box 3384	Quail Valley Ca	92587-1384
329-070-045	Peter T & Lucille Bacarella	27601 Sun City Blvd 8	Sun City Ca	92586-2260
335-092-022	Philip E Gatch	None		
337-103-004	Philip M Murphy	26127 Fountain Bleu D	Sun City Ca	92586-2776
337-103-004	Philip M Murphy	26127 Fountain Bleu Dr	Sun City Ca	92586-2776
337-114-024	Phillip & Lillian Peraza	PO Box 876	Wildomar Ca	92595-0876
335-426-007	Phillip B & Sandra Mickelson	26009 Bluebell St	Sun City Ca	92586-3740
338-302-006	Phillip E & Dj Thorstensen	26101 Westridge Ave	Sun City Ca	92586-5817
338-251-013	Phillip R & Suzanne Johnson	26042 Baldy Peak Dr	Sun City Ca	92586-3449
309-360-019	Phuoc V Nguyen	11453 Kinghorn St	Santa Fe Springs	90670-4206
337-410-026	Phyllis A Wrenn	26044 Verde Grande Ct	Sun City Ca	92586-2422
338-301-001	Priscila M Dizon	26015 Ridgemoor Rd	Sun City Ca	92586-2788
339-092-039	Priscilla Sizer	25991 Cherry Hills Bl	Sun City Ca	92586-2467
339-092-039	Priscilla Sizer	25991 Cherry Hills Blv	Sun City Ca	92586-2467
337-104-017	Purl G & Myrtle Pence	26081 Falsterbor Dr	Sun City Ca	92586-2717
309-360-009	Quang P Tat	810 Rimgrove Dr	La Puente Ca	91744-3348
309-360-012	Quang P Tat	810 Rimgrove Dr	La Puente Ca	91744-3348
337-104-006	Queen E Mcintosh	28450 Murrieta Rd	Sun City Ca	92586-2743
426-030-019	RR & At Sf	1700 E Golf Rd	Schaumburg Il	60173-5804
426-030-021	RR & At Sf	1700 E Golf Rd	Schaumburg Il	60173-5804
339-125-010	Ralph E & Odette Morris	28765 Murrieta Rd	Sun City Ca	92586-2750
329-262-015	Ralph L & Virginia Flint	25963 Westwinds Dr	Sun City Ca	92585-9778
335-131-032	Ralph M & Agnes Gibson	26050 Lancaster Dr	Sun City Ca	92586-1927
339-112-020	Ralph M & Marianne Thrasher	28600 Hoylake Ct	Sun City Ca	92586-2604
335-440-008	Randal Durham	27347 Murrieta Rd	Sun City Ca	92585-9401
327-071-025	Randy Newland	28240 Benigni Ave	Sun City Ca	92585-9626
329-261-001	Raul Riestra	28235 Springwinds Dr	Sun City Ca	92585-9759

APN	Owner	Address	City, State	Zip
339-103-013	Raul A Aguayo	25961 Coombe Hill Dr	Sun City Ca	92586-2610
339-133-013	Ray & Margaret Neuman	PO Box 476	Milford Pa	18337-0476
339-103-007	Raymond E Padilla	40526 Kasota Dr	Murrieta Ca	92562-5805
335-424-044	Raymond J Husband	27074 Rangewood St	Sun City Ca	92586-3722
339-101-034	Raymond L & Mildred Plas	25880 Plum Hollow Dr	Sun City Ca	92586-2652
337-114-030	Raymond M & Marilyn Howser	28540 Amersfoot Way	Sun City Ca	92586-2712
335-141-013	Raymond P & Geraldine Jones	27877 Covington Way	Sun City Ca	92586-1902
330-280-013	Real L & Lorraine Lagasse	26566 Calle Gregorio	Sun City Ca	92585-8823
338-091-020	Reba R Frizzle	29258 Murrieta Rd	Sun City Ca	92586-2872
330-280-044	Regan	26629 Calle Gregorio	Sun City Ca	92585-8827
338-091-045	Regina & Myron Grinel	29360 Murrieta Rd	Sun City Ca	92586-2876
330-280-022	Regina M Rundquist	25930 Camino Juarez	Sun City Ca	92585-8818
338-091-063	Regis C & Patricia Nebel	29182 Murrieta Rd 41	Sun City Ca	92586-2870
335-425-006	Regus	31520 Railroad Canyon	Sun City Ca	92587-9499
335-092-024	Rella W Fagan	25960 Mccall Blvd	Sun City Ca	92586-2357
327-080-027	Remo Benigni	PO Box 1085	Romoland Ca	92585-0085
327-330-018	Remo Benigni	PO Box 1085	Romoland Ca	92585-0085
327-330-023	Remo Benigni	PO Box 1085	Romoland Ca	92585-0085
339-122-001	Renate Lindemann	25891 Sun City Blvd	Sun City Ca	92586-2662
337-131-008	Reynilda Maldonado	28811 Amersfoot Way	Sun City Ca	92586-2701
329-360-019	Ria J Wiegmans	6860 Abel Stearns Ave	Riverside Ca	92509-6301
331-340-025	Ricardo & Robin Gindoy	26576 Trumble Rd	Sun City Ca	92585-9239
327-330-036	Richard & Retha Huffman	28122 Mahogany Ln	Sun City Ca	92585-9506
335-080-008	Richard Chen	3812 E Kirkwood Ave	Orange Ca	92869-5350
309-360-018	Richard Luu	810 Rimgrove Dr	La Puente Ca	91744-3348
338-302-007	Richard A & Hilda Raines	26119 Westridge Ave	Sun City Ca	92586-5817
338-091-042	Richard C & Jean Lynard	29354 Murrieta Rd 63	Sun City Ca	92586-2876
337-090-024	Richard D & Milagrina Mattso	28286 Murrieta Rd	Sun City Ca	92586-2747

APN	Owner	Address	City, State	Zip
337-114-020	Richard E Thompson	28541 Skokie Ct	Sun City Ca	92586-2737
337-021-016	Richard F & Marilyn Culley	13381 Lee Dr	Westminster Ca	92683-2414
309-050-051	Richard G & Donna Cribbs	22703 Westport Ln	Nuevo Ca	92567-9321
337-410-022	Richard J & Barbara Jacobs	28203 Buena Mesa Dr	Sun City Ca	92586-2447
329-070-014	Richard J Eller	25373 Palomar Rd	Romoland Ca	92585-9571
335-132-005	Richard K & Edna Collyar	26063 Lancaster Dr	Sun City Ca	92586-1932
329-070-071	Richard L & Alice Hilsabeck	28415 Moreland Rd	Sun City Ca	92585-9099
335-141-001	Richard L & June Johnson	26435 Potomac Dr	Sun City Ca	92586-3182
330-280-019	Richard L Walters	15711 Washington St	Riverside Ca	92504-5948
331-210-012	Richard R & Carol Kolesar	24092 Nuthatch Ln	Laguna Niguel Ca	92677-1382
335-261-029	Richard R & Mildred Mc Gown	26112 Crestone Dr	Sun City Ca	92586-2141
327-071-034	Richardo Simpson	28156 Patti Ln	Sun City Ca	92585-9018
337-131-007	Ridder M Dalton	28801 Amersfoot Way	Sun City Ca	92586-2701
335-273-026	Rita Riegel-Martin	30294 Calle Beleanto	Menifee Ca	92584-8902
335-425-002	Rita J White	27057 Rangewood St	Sun City Ca	92586-3742
331-170-026	Riverside Community Hospital	4445 Magnolia Ave	Riverside Ca	92501-4135
339-221-014	Riverside County	4080 Lemon St	Riverside Ca	92501-3679
307-130-069	Riverside County Flood Cont	PO Box 1033	Riverside Ca	92502-1033
309-020-042	Riverside County Flood Cont	26963		
337-021-001	Riverside County Flood Cont	PO Box 1033	Riverside Ca	92502-1033
338-090-022	Riverside County Flood Cont	PO Box 1033	Riverside Ca	92502-1033
338-302-008	Riverside County Flood Cont	1995 Market St	Riverside Ca	92501-1770
339-053-017	Riverside County Flood Cont	25969		
339-200-021	Riverside County Flood Cont	PO Box 1083	Riverside Ca	92502-1083
307-120-009	Riverside County Habitat Con	4080 Lemon St Fl12	Riverside Ca	92501-3679
329-120-031	Riverside County Transportat	3560 University Ave 10	Riverside Ca	92501-3329
329-141-006	Riverside County Transportat	3560 University Ave 10	Riverside Ca	92501-3329
331-180-004	Riverside County Transportat	3560 University Ave 10	Riverside Ca	92501-3329

APN	Owner	Address	City, State	Zip
331-190-006	Riverside County Transportat	3560 University Ave 10	Riverside Ca	92501-3329
335-412-017	Riverside Sun City Homeowner	431 N Brookhurst St 10	Anaheim Ca	92801-5620
338-302-004	Robert & Cindy Lawson	26065 Westridge Ave	Sun City Ca	92586-5815
338-301-013	Robert & Deborah Molina	26022 Barrington Ct	Sun City Ca	92586-5807
337-410-011	Robert & Edith Shaheen	151 Buck Ct	Fremont Ca	94539-6031
337-132-009	Robert & Gloria Stimson	26130 Kitt Ansett Dr	Sun City Ca	92586-2780
331-340-024	Robert & Patricia Roman	26510 Trumble Rd	Sun City Ca	92585-9239
335-142-005	Robert & Sarah Barcelo	26060 Brandywine Dr	Sun City Ca	92586-1950
426-030-003	Robert Domenigoni	PO Box 45	Winchester Ca	92596-0045
331-190-029	Robert Sherman	15 Empty Saddle Rd	Palos Verdes Pen	90274-4124
331-190-030	Robert Sherman	15 Empty Saddle Rd	Palos Verdes Pen	90274-4124
335-131-006	Robert C & Rose Schmidt	26071 Fairlane Dr	Sun City Ca	92586-1937
338-091-050	Robert D & Joann Lewis	29370 Murrieta Rd	Sun City Ca	92586-2876
329-070-046	Robert D Green	PO Box 1753	Sun City Ca	92585-1953
337-104-012	Robert E & Lotte Reece	26131 Falsterbor Dr	Sun City Ca	92586-2769
330-292-014	Robert E & Lupe Lavering	26934 Corte Adelita	Sun City Ca	92585-8820
327-340-031	Robert E & Patricia Serowik	28240 Mapes Rd	Sun City Ca	92585-9723
330-291-019	Robert E Dunavan	26913 Via Valdez	Sun City Ca	92585-8822
339-111-016	Robert E Eury	25850 Musselburgh Dr	Sun City Ca	92586-2646
338-301-029	Robert E Serowik	26003 Crestmont Cir	Sun City Ca	92586-5811
335-092-011	Robert G & Mary Tovaas	25891 Lancaster Dr	Sun City Ca	92586-2356
337-131-018	Robert G Dalrymple	28965 E Worcester Rd	Sun City Ca	92586-2752
337-112-025	Robert G Sheppy	22951 Compass Dr	Canyon Lake Ca	92587-7930
337-114-027	Robert G Sheppy	22951 Compass Dr	Canyon Lake Ca	92587-7930
335-426-005	Robert H & Elizabeth Weis	27153 Rangewood St	Sun City Ca	92586-3743
339-103-003	Robert H & Sara Heyer	28407 Murrieta Rd	Sun City Ca	92586-2736
339-111-003	Robert J & Ann Miller	28537 Murrieta Rd	Sun City Ca	92586-2732
335-440-028	Robert J & Arnold Stecher	PO Box 457	Sun City Ca	92586-0457

APN	Owner	Address	City, State	Zip
337-140-005	Robert J & Betty Lampson	28880 E Worcester Rd	Sun City Ca	92586-2786
339-092-001	Robert J & Eleanor Taylor	28287 Murrieta Rd	Sun City Ca	92586-2741
339-061-015	Robert J & Elizabeth Bell	25936 Roanoke Rd	Sun City Ca	92586-2329
339-123-004	Robert J & Iris Crane	38964 Lewis Ct	Beaumont Ca	92223-4246
329-262-016	Robert L & Anna Smith	25945 Westwinds Dr	Sun City Ca	92585-9778
339-111-007	Robert L & Connie Adams	28591 Murrieta Rd	Sun City Ca	92586-2732
330-291-022	Robert L & Jean Gibson	26883 Via Valdez	Sun City Ca	92585-8822
330-280-045	Robert L & Lillian Parker	26639 Calle Gregorio	Sun City Ca	92585-8827
339-063-009	Robert L & Lois Clute	25885 Warwick Rd	Sun City Ca	92586-2480
330-292-006	Robert L & Shirleen Malley	26936 Via Valdez	Sun City Ca	92585-8821
339-142-017	Robert L Pense	25994 Ridgemoor Rd	Sun City Ca	92586-2693
339-051-026	Robert M Pitcher	25940 Whitman Rd	Sun City Ca	92586-5302
339-051-027	Robert M Pokrass	25187 Alta Vista Dr	Moreno Valley	92557-5232
339-051-027	Robert M Pokrass	25187 Alta Vista Dr	Moreno Valley Ca	92557-5232
327-071-016	Robert P & Cindy Ross	28010 Patti Ln	Sun City Ca	92585-9702
330-280-010	Robert R & Elsie Wilson	26592 Calle Gregorio	Sun City Ca	92585-8823
339-122-004	Robert S & Jean Saari	1002 N Avenida De La	San Clemente C	92672-3939
339-122-004	Robert S & Jean Saari	1002 N Avenida De La E	San Clemente Ca	92672-3939
331-190-043	Robert V Lange	42814 Beeman Dr	Murrieta Ca	92562-3303
330-280-014	Robert W & Mary Blum	26556 Calle Gregorio	Romoland Ca	92585-8823
339-051-025	Robert W & V Rowe	25950 Whitman Rd	Sun City Ca	92586-5302
335-131-008	Robert W Stevenson	26105 Fairlane Dr	Sun City Ca	92586-1925
339-061-009	Roberto & Rosario Lizardi	25990 Roanoke Rd	Sun City Ca	92586-2329
309-050-042	Roberto A & Enriqueta Gonzal	22650 Pico Ave	Nuevo Ca	92567-9546
327-340-021	Rodney P & Diana Robinson	12802 Poplar St	Garden Grove Ca	92845-2822
339-111-008	Rodolfo A & Maria Calderon	28605 Murrieta Rd	Sun City Ca	92586-2729
339-111-010	Rodolfo A & Maria Calderon	700 E Main St 33	Hillsboro Oh	45133-9234
327-071-015	Roger A & Geraldine Atchley	1571 Calathea Rd	Hemet Ca	92545-9002

APN	Owner	Address	City, State	Zip
327-071-032	Roger A & Geraldine Atchley	1571 Calathea Rd	Hemet Ca	92545-9002
335-426-012	Roger G Leingang	26055 Bluebell St	Sun City Ca	92586-3754
337-122-018	Roger L & Sandra Mitchell	28691 Troon Ct	Sun City Ca	92586-2738
337-122-019	Roger L Mccall	22350 Juniper Rd	Perris Ca	92570-9652
331-100-022	Roico Inv	170 Wilkerson Ave N B	Perris Ca	92570-2125
337-114-023	Rolland F & Jacqueline Spath	26110 Sun City Blvd	Sun City Ca	92586-2784
335-091-001	Roman Catholic Bishop Of Sb	1201 E Highland Ave	San Bernardino C	92404-4607
329-100-006	Romola General Partnership	170 Wilkerson Ave N B	Perris Ca	92570-2124
329-100-007	Romola General Partnership	170 Wilkerson Ave N B	Perris Ca	92570-2124
327-072-005	Ronald & Shirley Deloise	28133 Benigni Ave	Sun City Ca	92585-9461
337-122-020	Ronald A & Betty Turner	28670 Amersfoot Way	Sun City Ca	92586-2754
339-112-029	Ronald B & Sherry Hoffman	28561 Middlebury Way	Sun City Ca	92586-2605
327-340-029	Ronald G & Kelly Lawler	28243 Tower View Ct	Romoland Ca	92585-9559
335-422-080	Ronald J & Irene Wood	26092 Bluebell St	Sun City Ca	92586-3741
339-103-022	Ronald J & Joan Shaw	1519 Cortina Cir	Escondido Ca	92029-5542
338-091-060	Ronald J & Kathlee Schutzenh	29190 Murrieta Rd	Sun City Ca	92586-2870
337-131-001	Ronald L & Esther Neumen	27254 Flagler St	Sun City Ca	92586-2074
327-080-043	Ronald L & Ronald Mcamis	205 W Bristol Ln	Orange Ca	92865-2605
335-144-003	Ronald L Neumen	27254 Flagler St	Sun City Ca	92586-2074
338-301-016	Ronald R & Tiffany Mc Daniel	26025 Barrington Ct	Sun City Ca	92586-5807
335-143-001	Ronald W & Elizabeth Miles	26051 Brandywine Dr	Sun City Ca	92586-1914
338-091-001	Ronnie G & Charlene Hall	1140 Millertown Rd	Auburn Ca	95603-9400
335-144-022	Rosalind J Oakley	26120 Fairlane Dr	Sun City Ca	92586-1923
339-141-009	Roscoe F & Frances Johnson	28941 W Worcester Rd	Sun City Ca	92586-2629
339-112-026	Roy & Lucienne Devries	28605 Middlebury Way	Sun City Ca	92586-2671
337-104-004	Roy Vanrenselaar	28420 Murrieta Rd	Sun City Ca	92586-2743
337-124-004	Roy B & Patricia Smith	26131 Fresh Meadow Dr	Sun City Ca	92586-2778
339-112-021	Roy J Coats	28610 Hoylake Ct	Sun City Ca	92586-2604

APN	Owner	Address	City, State	Zip
337-104-003	Roy R & Cecile Dsabater	28406 Murrieta Rd	Sun City Ca	92586-2743
309-050-016	Ruben Mendoza	1240 Highridge St	Riverside Ca	92506-5771
309-050-018	Ruben Mendoza	1240 Highridge St	Riverside Ca	92506-5771
329-261-006	Ruby J Thomas	28165 Springwinds Dr	Sun City Ca	92585-9774
327-080-001	Rudy C Vega	28275 Ellis Ave	Sun City Ca	92585-9530
327-071-022	Rudy R & Erlinda Martinez	28155 Patti Ln	Sun City Ca	92585-9018
338-091-073	Rush	25024 Avenida Sombra	Murrieta Ca	92563-5009
329-142-009	Russell A & Wendy Morris	29339 Calle De Caballo	Sun City Ca	92585-9523
337-410-038	Russell T & Alta Thorpe	28232 Buena Mesa Dr	Sun City Ca	92586-2410
338-091-061	Ruth A Hope	29188 Murrieta Rd	Sun City Ca	92586-2870
330-292-012	Ruth E Kile	26925 Corte Adelita	Sun City Ca	92585-8820
337-410-034	Ruth N Bishop	26073 Verde Grande Ct	Sun City Ca	92586-3562
337-131-009	Ruth W Bell	28821 Amersfoot Way	Sun City Ca	92586-2701
426-030-022	Rv Cou	3133 7Th St	Riverside Ca	92507-4138
335-092-027	Sally L Conley	25930 Mccall Blvd	Sun City Ca	92586-2357
339-092-033	Sally L Head	29101 Shorecliff Dr	Lake Elsinore	92530-7222
339-092-033	Sally L Head	29101 Shorecliff Dr	Lake Elsinore Ca	92530-7222
339-133-031	Salvador J & Esther Garcia	25871 Morgantown Way	Sun City Ca	92586-2644
327-330-014	Sam & Melba Sparacio	1820 Olive Ave	Fullerton Ca	92833-3732
327-330-015	Sam & Melba Sparacio	1820 Olive Ave	Fullerton Ca	92833-3732
327-330-016	Sam & Melba Sparacio	1820 Olive Ave	Fullerton Ca	92833-3732
327-330-017	Sam & Melba Sparacio	1820 Olive Ave	Fullerton Ca	92833-3732
339-111-024	Samantha V Langley	25850 Middlebury Way	Sun City Ca	92586-2668
327-071-007	Samir Sadik	22876 Alessandro Blvd	Moreno Valley Ca	92553-8547
335-424-025	Samuel R & Jimmie Tobias	27083 Stagewood St	Sun City Ca	92586-3756
423-270-007	San Diego Gas & Electric Co	PO Box 1831	San Diego Ca	92112-9831
423-270-008	San Diego Gas & Electric Co	PO Box 1831	San Diego Ca	92112-9831
423-270-009	San Diego Gas & Electric Co	PO Box 1831	San Diego Ca	92112-9831

APN	Owner	Address	City, State	Zip
337-140-013	Sandra Scheimer	28926 Murrieta Rd	Sun City Ca	92586-2700
337-104-001	Sandra S Mathews	31566 Railroad Canyon	Sun City Ca	92587-2745
331-040-041	See	1501 W Florida Ave	Hemet Ca	92543-3813
339-142-012	Scheena M Whyte	25920 Ridgemoor Rd	Sun City Ca	92586-2693
339-092-005	Scott D & Benita Hyde	45607 Caminito Olite	Temecula Ca	92592-1201
335-413-016	Sergio C & Maureen Serrano	944 Trovita Dr	Corona Ca	92881-8713
331-040-035	Severiano & Margaret Nava	26115 Nova Ln	Sun City Ca	92585-9483
329-360-021	Shane & Michelle Craigmyle	25085 Tradewinds Dr	Sun City Ca	92585-9481
338-302-005	Shane R & Bonnie Chilton	26083 Westridge Ave	Sun City Ca	92586-5815
335-271-011	Sharilyn E Mccormick	26095 Albany Dr	Sun City Ca	92586-2158
338-091-008	Sharon A Miller	402 Corte Rojo	Upland Ca	91786-5167
335-092-014	Sharon K Duffer	25931 Lancaster Dr	Sun City Ca	92586-2305
329-142-007	Sharon K Fields	27888 Van Buren Ave	Sun City Ca	92585-9243
338-301-038	Shaun & April Brown	26078 Westridge Ave	Sun City Ca	92586-5815
327-080-050	Shaun M Johnston	4131 Olive Hill Rd	Fallbrook Ca	92028-9439
337-112-002	Shelly Rosenberg	26171 Falsterbor Dr	Sun City Ca	92586-2769
335-262-011	Sheridan J & Natalie Bishop	26096 Albany Dr	Sun City Ca	92586-2156
335-273-019	Shigeyo J & Ben Suechika	27680 Decatur Way	Sun City Ca	92586-2183
309-030-012	Shiraz & Laila Malad	1249 Falling Star Ave	Westlake Village	91362-5232
307-230-019	Shirlee L Preissman	550 S Hope St 2300	Los Angeles Ca	90071-2627
330-280-005	Shirley Brett	26638 Calle Gregorio	Sun City Ca	92585-8994
337-114-019	Shirley Hutton	12749 Lantana Ave	Yucaipa Ca	92399-4913
337-131-019	Shirley A Fryrear	28864 Murrieta Rd	Sun City Ca	92586-2734
337-090-002	Shirley H Barron	26025 Cherry Hills Bl	Sun City Ca	92586-2468
337-090-002	Shirley H Barron	26025 Cherry Hills Blv	Sun City Ca	92586-2468
335-092-023	Shirley H Ipson	25970 Mccall Blvd	Sun City Ca	92586-2357
331-020-005	Shirley S & Marilyn Louie	11521 Sierra Sky Dr	Whittier Ca	90601-1910
339-112-001	Sigurd C & Kim Stein	25881 Middlebury Way	Sun City Ca	92586-2665

APN	Owner	Address	City, State	Zip
330-280-068	Sophie R Boryla	26625 Calle Emiliano	Sun City Ca	92585-8834
335-091-004	Soren J Schultz	27910 Niagara Ct	Sun City Ca	92586-2322
426-030-013	Sou Ca Gas	5600 Beach Blvd	Buena Park Ca	90621-2007
331-030-018	Southern Calif Edison Co	PO Box 800	Rosemead Ca	91770-0800
331-060-015	Southern Calif Edison Co	PO Box 800	Rosemead Ca	91770-0800
335-110-025	Southern California College	2001 Associated Rd	Fullerton Ca	92831-1649
330-210-048	Southern California Edison C	PO Box 800	Rosemead Ca	91770-0800
331-020-015	Southern California Edison C	PO Box 800	Rosemead Ca	91770-0800
331-020-016	Southern California Edison C	PO Box 800	Rosemead Ca	91770-0800
331-100-018	Southern California Edison C	PO Box 800	Rosemead Ca	91770-0800
331-110-029	Southern California Edison C	PO Box 800	Rosemead Ca	91770-0800
331-140-023	Southern California Edison C	PO Box 800	Rosemead Ca	91770-0800
331-150-031	Southern California Edison C	PO Box 800	Rosemead Ca	91770-0800
331-180-016	Southern California Edison C	PO Box 800	Rosemead Ca	91770-0800
329-310-003	Southland Thoroughbred Farms	400 Oyster Point Blvd	South San Franci	94080-1920
329-310-004	Southland Thoroughbred Farms	400 Oyster Point Blvd	South San Franci	94080-1920
329-320-001	Southland Thoroughbred Farms	400 Oyster Point Blvd	South San Franci	94080-1920
425-030-007	St Ca	330 Golden Shore St 50	Long Beach Ca	90802-4247
338-301-005	Stan & Adella Tom	26073 Ridgemoor Rd	Sun City Ca	92586-2788
337-104-013	Stan Molvig	26121 Falsterbor Dr	Sun City Ca	92586-2769
335-273-025	Stanley A & Dolores Elzea	27519 Boston Dr	Sun City Ca	92586-2105
335-273-015	Stanley R Pierce	26062 Allentown Dr	Sun City Ca	92586-2137
423-030-032	State	Unknown 05-22-81		
423-030-033	State	Unknown 05-22-81		
423-030-035	State	Unknown 05-22-81		
423-290-003	State Dept Of Water Resource	PO Box 388	Sacramento Ca	95812-0388
423-300-006	State Dept Of Water Resource	PO Box 388	Sacramento Ca	95812-0388
423-030-009	State Of Calif	1416 9Th St 1206	Sacramento Ca	95814-5511

APN	Owner	Address	City, State	Zip
423-030-010	State Of Calif	1416 9Th St 22	Sacramento Ca	95814-5511
423-030-011	State Of Calif	1416 9Th St 22	Sacramento Ca	95814-5511
423-030-018	State Of Calif	1416 9Th St 22	Sacramento Ca	95814-5511
423-030-026	State Of Calif	1416 9Th St 22	Sacramento Ca	95814-5511
423-030-034	State Of Calif	1416 9Th St 1206	Sacramento Ca	95814-5511
423-030-040	State Of Calif	1416 9Th St 1206	Sacramento Ca	95814-5511
423-030-041	State Of Calif	1416 9Th St 1206	Sacramento Ca	95814-5511
423-040-003	State Of Calif	1416 9Th St 22	Sacramento Ca	95814-5511
423-040-004	State Of Calif	1416 9Th St 22	Sacramento Ca	95814-5511
423-040-005	State Of Calif	1416 9Th St 1206	Sacramento Ca	95814-5511
423-060-008	State Of Calif	1416 9Th St 1206	Sacramento Ca	95814-5511
423-060-010	State Of Calif	1416 9Th St 22	Sacramento Ca	95814-5511
423-060-015	State Of Calif	1416 9Th St 1206	Sacramento Ca	95814-5511
423-270-011	State Of Calif	1416 9Th St 1206	Sacramento Ca	95814-5511
423-290-005	State Of Calif	1416 9Th St 1206	Sacramento Ca	95814-5511
425-030-002	State Of Calif	1416 9Th St 1206	Sacramento Ca	95814-5511
425-040-001	State Of Calif	1416 9Th St 1206	Sacramento Ca	95814-5511
425-040-010	State Of Calif	1416 9Th St 1206	Sacramento Ca	95814-5511
426-020-004	State Of Calif	1416 9Th St 1206	Sacramento Ca	95814-5511
423-060-012	State Of Calif Dept Of Fish	Unknown 03-28-85		
423-060-013	State Of Calif Dept Of Fish	Unknown 03-28-85		
423-320-001	State Of Calif Dept Of Fish	Unknown 03-28-85		
423-030-003	State Of California	1416 9Th St 22	Sacramento Ca	95814-5511
339-063-011	Stephanie L Zweig	Unknown		
339-061-006	Stephen F & Mona Follin	28201 Murrieta Rd	Sun City Ca	92586-2428
329-100-015	Stephen M & Mary West	PO Box 1157	Sun City Ca	92585-0157
331-040-004	Steve Shin	9059 Wagner River Cir	Fountain Valley	92708-6449
327-071-004	Steve J & Barbara Langford	28111 Ellis Ave	Sun City Ca	92585-9108

APN	Owner	Address	City, State	Zip
327-340-025	Steven E & Jennifer Pulcheon	28248 Tower View Ct	Romoland Ca	92585-9559
327-340-026	Steven E & Jennifer Pulcheon	28248 Tower View Ct	Sun City Ca	92585-9559
327-340-023	Steven E Pulcheon	28248 Towerviewdr	Romoland Ca	92585
329-320-002	Steven E Pulcheon	28248 Tower View Ct	Romoland Ca	92585-9559
327-071-006	Strada	28155 Ellis Ave	Sun City Ca	92585-9108
338-301-008	Stuart M Higgs	26112 Barrington Ct	Sun City Ca	92586-5809
423-270-005	Stueve Brothers Farms	18881 Von Karman Ave 3	Irvine Ca	92612-6589
423-280-006	Stueve Brothers Farms	18881 Von Karman Ave 3	Irvine Ca	92612-6589
329-070-055	Sue E Briesch	28385 Eller Way	Sun City Ca	92585-9220
330-250-034	Sun City Bible Church	PO Box 48	Sun City Ca	92586-0048
330-250-035	Sun City Bible Church	PO Box 48	Sun City Ca	92586-0048
339-200-020	Sun City Civic Assn	26850 Sun City Blvd	Sun City Ca	92586-2948
335-110-012	Sun Meadows Mobile Home Esta	1112 Maybrook Dr	Beverly Hills Ca	90210-2718
330-280-058	Sun River Dev Corp	1818 S State College B	Anaheim Ca	92806-6053
330-292-017	Sun River Dev Corp	1818 S State College B	Anaheim Ca	92806-6053
337-410-024	Suruggs	26064 Verde Grande Ct	Sun City Ca	92586-2422
327-330-027	Susan K Gospodnetuch	19951 Flagstone Ln	Huntington Beach	92646-3821
337-021-034	Susan M Calderaro	28107 Saint Marys St	Sun City Ca	92586-2465
338-092-008	Sybil & Robert Page	PO Box 346	The Sea Ranch Ca	95497-0346
338-091-007	Sylvia Rodwell	402 Corte Rojo	Upland Ca	91786-5167
339-062-011	Syria Chilcott	25915 Roanoke Rd	Sun City Ca	92586-2328
331-050-001	Tava Dev Co	19600 Fairchild 270	Irvine Ca	92612-2517
331-050-002	Tava Dev Co	19600 Fairchild 270	Irvine Ca	92612-2517
331-050-003	Tava Dev Co	19600 Fairchild 270	Irvine Ca	92612-2517
331-050-004	Tava Dev Co	19600 Fairchild 270	Irvine Ca	92612-2517
337-131-017	Ted N & Lorie Harrison	26816 Hobie Cir A	Murrieta Ca	92562-7005
331-020-008	Tejinder Singh	978 Deep Springs Dr	Claremont Ca	91711-1400
335-092-015	Teresa C Olszewski	25941 Lancaster Dr	Sun City Ca	92586-2305

APN	Owner	Address	City, State	Zip
335-092-021	Teresa C Olszewski	None		
309-050-033	Terry & Susan Charlton	22710 Pico Ave	Nuevo Ca	92567-9546
309-050-053	Terry & Susan Charlton	22710 Pico Ave	Nuevo Ca	92567-9546
339-051-011	Thaylia M Moran	25901 Mccall Blvd	Sun City Ca	92586-2312
339-123-024	Thelma Spencer	25880 Interlechen Dr	Sun City Ca	92586-2637
330-280-004	Thelma L Alvarado	26646 Calle Gregorio	Sun City Ca	92585-8994
337-132-003	Thelma V Henry	26111 Port Rush Dr	Sun City Ca	92586-2783
330-292-010	Theodore & Barbara Gocal	26945 Corte Adelita	Sun City Ca	92585-8820
339-102-002	Theodore E Frederick	25881 Plum Hollow Dr	Sun City Ca	92586-2651
335-141-002	Theodore E Wood	27876 Murrieta Rd	Sun City Ca	92586-2321
335-426-004	Theodore J & Cecelia Macklem	27145 Rangewood St	Sun City Ca	92586-3743
335-424-023	Theodore W & Dorothy Edwards	27067 Stagewood St	Sun City Ca	92586-3756
335-143-027	Theresa D Durdon	19720 Conifer Dr	Huson Mt	59846-9684
338-092-013	Theresia M Rissling	29322 Murrieta Rd	Sun City Ca	92586-2875
329-110-006	Thomas & Susan Maulhardt	3820 Goldenrod St	Seal Beach Ca	90740-2909
339-062-010	Thomas Mayfield	3208 State Road 31	Racine Wi	53405-1277
339-125-006	Thomas D & Betty Mitchell	28711 Murrieta Rd	Sun City Ca	92586-2750
329-070-007	Thomas J Colgan	PO Box 1083	Romoland Ca	92585-0083
337-102-001	Thomas L & Amy Sylvester	PO Box 973	Sun City Ca	92586-0973
338-091-044	Thomas L & Glenneth Fletcher	29358 Murrieta Rd	Sun City Ca	92586-2876
327-071-002	Thomas P & Jomeda Dupont	28055 Ellis Ave	Sun City Ca	92585-9123
335-426-011	Thomas R Donohew	26045 Bluebell St	Sun City Ca	92586-3754
330-280-030	Thomas S & Stella Skrit	25905 Camino Juarez	Sun City Ca	92585-8819
337-133-001	Timmer	26271 Burlington Way	Sun City Ca	92586-2715
337-140-017	Timothy D Spangler	26050 Ridgemoor Rd	Sun City Ca	92586-2702
339-092-035	Timothy D Spangler	25951 Cherry Hills Bl	Sun City Ca	92586-2467
339-092-035	Timothy D Spangler	25951 Cherry Hills Blv	Sun City Ca	92586-2467
330-280-070	Timothy R Delaney	26643 Calle Emiliano	Sun City Ca	92585-8834

APN	Owner	Address	City, State	Zip
327-072-009	Tina Benigni	28120 Wendover Way	Romoland Ca	92585-9017
329-120-016	Tina Benigni	PO Box 1085	Romoland Ca	92585-0085
335-412-019	Toby J & Dorothy Montoya	26083 Sunnywood St	Sun City Ca	92586-3704
327-072-007	Tom Carlin	28197 Benigni Ave	Sun City Ca	92585-9461
337-140-014	Tom E & Daniel Collins	28940 Murrieta Rd	Sun City Ca	92586-2700
335-274-004	Tom F Masters	27685 Decatur Way	Sun City Ca	92586-2110
309-360-010	Tom K Lim	125 N Lincoln Ave N B	Monterey Park Ca	91754
309-360-011	Tom K Lim	125 N Lincoln Ave N B	Monterey Park Ca	91754
337-410-005	Tommie E Atwell	26061 Birkdale Rd	Sun City Ca	92586-2423
337-410-098	Tommie E Atwell	PO Box 2070	San Diego Ca	92112-2070
327-071-026	Trinidad Magana	1549 Marshall Ln	Corona Ca	92879-3036
339-141-003	Trust Van Powell	15905 Multiview Dr	Perris Ca	92570-7995
337-090-026	Twyla G Schneider	28314 Murrieta Rd	Sun City Ca	92586-2746
337-114-003	Umberto & Victoria Fania	26261 Burlington Way	Sun City Ca	92586-2715
339-200-004	Universal Edison Enterprises	2533 N Carson St 2988	Carson City Nv	89706-0147
329-264-015	Uriel Vargas	25976 Tradewinds Dr	Sun City Ca	92585-9779
339-123-022	Ute G Meth	25860 Interlechen Dr	Sun City Ca	92586-2637
339-092-009	V M & J F Punos Lvg Tr	28217 W Worcester Rd	Sun City Ca	92586-2653
331-340-017	Valeta R Mc Gilvray	27425 Cataluna Cir	Sun City Ca	92585-9709
339-125-015	Valkyrie V Freeman	28712 Wee Burn Way	Sun City Ca	92586-2676
338-091-005	Van E & Judy Beaver	PO Box 648	Sun City Ca	92586-0648
339-052-013	Vance K & Helen Vandalsem	25888 Sandy Lodge Rd	Sun City Ca	92586-2352
335-273-016	Velora C Schreier	26050 Allentown Dr	Sun City Ca	92586-2137
330-280-038	Vernon F & Marcia Mccabe	26573 Calle Gregorio	Sun City Ca	92585-8826
339-101-032	Vernon H & Jeanne Miller	28564 Portsmouth Dr	Sun City Ca	92586-2618
337-122-021	Vernon L & Nadine Bergman	28640 Amersfoot Way	Sun City Ca	92586-2754
339-111-018	Vicenta L Waigand	28530 Middlebury Way	Sun City Ca	92586-2642
309-050-040	Vicente Aguayo	23580 Sunnymead Blvd	Moreno Valley Ca	92553-1504

APN	Owner	Address	City, State	Zip
339-111-015	Victor D & Eloise Ramsey	28574 Middlebury Way	Sun City Ca	92586-2642
329-070-065	Victor F Ugarte	28369 Mapes Rd	Sun City Ca	92585-9032
339-062-013	Victor R Mason	25916 Warwick Rd	Sun City Ca	92586-2482
331-150-018	Vincent J & Peggy Stagliano	5501 Saint Andrews Ct	Plano Tx	75093-4235
331-150-027	Vincent J & Peggy Stagliano	5501 Saint Andrews Ct	Plano Tx	75093-4235
337-140-019	Viola Bostrom	26080 Ridgemoor Rd	Sun City Ca	92586-2702
337-021-037	Viola M Billings	26081 Saint Marys St	Sun City Ca	92586-2433
330-280-001	Virgil E & Neeitas Gressett	26674 Calle Gregorio	Sun City Ca	92585-8994
338-301-034	Virginia & Edgar Amerige	26093 Crestmont Cir	Sun City Ca	92586-5811
337-021-015	Virginia Galvan	26065 Mccall Blvd	Sun City Ca	92586-1917
335-422-056	Virginia Otlewis	26108 Bluebell St	Sun City Ca	92586-3753
327-071-003	Virginia E Parker	28101 Ellis Ave	Sun City Ca	92585-9108
337-104-002	Virginia J Englehart	28390 Murrieta Rd	Sun City Ca	92586-2745
337-021-009	Virginia L Paul	Unknown		
337-021-011	Virginia L Paul	28018 Murrieta Rd	Sun City Ca	92586-2419
339-124-022	Virginia O Hann	25850 Musselburgh Dr	Sun City Ca	92586-2646
327-071-024	Vita J & Anna Zuccarello	28221 Patti Ln	Sun City Ca	92585-9018
337-104-020	Walter Zabawsky	26051 Falsterbor Dr	Sun City Ca	92586-2717
331-180-007	Walter A & Irene Reggio	1049 Obispo Ave	Long Beach Ca	90804-3833
339-061-011	Walter C & Anna Gorham	25970 Roanoke Rd	Sun City Ca	92586-2329
335-273-012	Walter C & Renate Ernst	26098 Allentown Dr	Sun City Ca	92586-2137
337-090-009	Walter J Douthwright	26095 Cherry Hills Bl	Sun City Ca	92586-2468
337-090-009	Walter J Douthwright	26095 Cherry Hills Blv	Sun City Ca	92586-2468
339-125-017	Walter L & Joan Huegel	28686 Wee Burn Way	Sun City Ca	92586-2613
339-053-016	Walter M & Joanne Lander	25969 Sandy Lodge Rd	Sun City Ca	92586-5306
307-130-011	Walter P & Florence Britschg	7812 Chino Ave	Ontario Ca	91761-8211
307-130-012	Walter P & Florence Britschg	7812 Chino Ave	Ontario Ca	91761-8211
307-130-014	Walter P & Florence Britschg	7812 Chino Ave	Ontario Ca	91761-8211

APN	Owner	Address	City, State	Zip
307-130-015	Walter P & Florence Britschg	7812 Chino Ave	Ontario Ca	91761-8211
307-130-016	Walter P & Florence Britschg	7812 Chino Ave	Ontario Ca	91761-8211
307-130-017	Walter P & Florence Britschg	7812 Chino Ave	Ontario Ca	91761-8211
307-130-020	Walter P & Florence Britschg	7812 Chino Ave	Ontario Ca	91761-8211
307-130-021	Walter P & Florence Britschg	7812 Chino Ave	Ontario Ca	91761-8211
307-130-022	Walter P & Florence Britschg	7812 Chino Ave	Ontario Ca	91761-8211
307-130-023	Walter P & Florence Britschg	7812 Chino Ave	Ontario Ca	91761-8211
307-130-026	Walter P & Florence Britschg	7812 Chino Ave	Ontario Ca	91761-8211
307-130-027	Walter P & Florence Britschg	7812 Chino Ave	Ontario Ca	91761-8211
307-130-055	Walter P & Florence Britschg	7812 Chino Ave	Ontario Ca	91761-8211
307-130-057	Walter P & Florence Britschg	7812 Chino Ave	Ontario Ca	91761-8211
307-130-059	Walter P & Florence Britschg	7812 Chino Ave	Ontario Ca	91761-8211
335-424-045	Walter P & Lucille Wendelin	27066 Rangewood St	Sun City Ca	92586-3722
329-360-013	Walter R & Dorothy Meclusky	25061 Tradewinds Dr	Sun City Ca	92585-9481
335-274-016	Walter R & Elisabeth Hanko	26097 Allentown Dr	Sun City Ca	92586-2136
338-091-051	Wanda J & Taone Irick	29372 Murrieta Rd	Sun City Ca	92586-2876
337-410-002	Warren F & Ester Lovell	26031 Birkdale Rd 2	Sun City Ca	92586-2423
335-262-015	Warren J & Edna Murbach	27570 Decatur Way	Sun City Ca	92586-2147
327-071-014	Wayne A & Jennifer Valencia	1571 Calathea Rd	Hemet Ca	92545-9002
338-092-003	Wayne C & Dolores Johnson	29236 Murrieta Rd	Sun City Ca	92586-2871
331-190-049	Wayne G Anastasi	846 Williamston St 105	Vista Ca	92084-5247
339-111-002	Wayne M & Geneva Dodds	28521 Murrieta Rd	Sun City Ca	92586-2732
331-070-010	Wen T & Tao Hsia	533 Doubletree Ct	Richland Wa	99352-1814
330-292-011	Wendell D & Lavada Sisk	26935 Corte Adelita	Sun City Ca	92585-8820
331-040-003	Wenshou Liou	533 Doubletree Ct	Richland Wa	99352-1814
331-070-009	Wenshou Liou	PO Box 800	Rosemead Ca	91770-0800
331-080-024	West Venture	300 E Magnolia Blvd 40	Burbank Ca	91502-3236
331-080-025	West Venture	300 E Magnolia Blvd 40	Burbank Ca	91502-3236

APN	Owner	Address	City, State	Zip
331-080-027	West Venture	300 E Magnolia Blvd 40	Burbank Ca	91502-3236
331-080-028	West Venture	300 E Magnolia Blvd 40	Burbank Ca	91502-3236
327-340-022	Wetto & Chris Gambino	784 N Orange St	Riverside Ca	92501-1312
339-051-022	Wilbert E & Antoinett Richar	28071 Murrieta Rd	Sun City Ca	92586-2427
335-426-001	Wilbur A & Lorraine Hampel	27121 Rangewood St	Sun City Ca	92586-3743
423-060-007	Wildon Associates	192201 Index St	Northridge Ca	91326-1680
337-103-001	Wilfred & Mary Gorton	26081 Fountain Bleu D	Sun City Ca	92586-2760
337-103-001	Wilfred & Mary Gorton	26081 Fountain Bleu Dr	Sun City Ca	92586-2760
335-261-005	Wilhelm & Gertrud Clever	26065 Chambers Ave	Sun City Ca	92586-2122
337-410-023	William & Cheryl Sauder	1512 N Nobhill Dr	Azusa Ca	91702-1549
339-092-003	William & Harriette Baines	28315 Murrieta Rd	Sun City Ca	92586-2740
337-131-004	William & Patricia Arthur	28779 Amersfoot Way	Sun City Ca	92586-2756
335-424-036	William Schmidt	27138 Rangewood St	Sun City Ca	92586-3745
337-121-008	William Stock	28722 Murrieta Rd	Sun City Ca	92586-2757
331-170-018	William A & Dorothy Allen	11281 Del Diablo Way	San Diego Ca	92129-1516
329-070-006	William A & Jean Bixler	13131 Rosalind Dr	Santa Ana Ca	92705-1842
330-291-005	William B & Florence Hoover	26718 Calle Gregorio	Sun City Ca	92585-8803
337-140-009	William C Stickney	28944 E Worcester Rd	Sun City Ca	92586-2787
338-301-010	William D & Barbara Stacy	26076 Barrington Ct	Sun City Ca	92586-5807
329-263-015	William D & Joan Blankenbake	25961 Tradewinds Dr	Sun City Ca	92585-8801
330-280-063	William E & Eugenia Draper	26581 Calle Emiliano	Sun City Ca	92585-8833
330-280-037	William E & Vivian Pritchard	26563 Calle Gregorio	Sun City Ca	92585-8826
335-273-017	William E Wyrick	27720 Decatur Way	Sun City Ca	92586-2184
331-040-029	William G & Ellen Franks	26203 Mclaughlin Rd	Sun City Ca	92585-9601
338-091-070	William G & Rose Oberg	29290 Murrieta Rd 94	Sun City Ca	92586-2874
335-424-035	William H & Cecelia Cowan	27146 Rangewood St	Sun City Ca	92586-3745
339-111-005	William H Cravens	28561 Murrieta Rd	Sun City Ca	92586-2732
337-122-004	William H Miller	26131 Sun City Blvd	Sun City Ca	92586-2785

APN	Owner	Address	City, State	Zip
331-180-006	William J & Colleen Halloran	1230 Luneta Dr	Del Mar Ca	92014-2533
331-180-014	William J & Colleen Halloran	1230 Luneta Dr	Del Mar Ca	92014-2533
331-180-015	William J & Colleen Halloran	1230 Luneta Dr	Del Mar Ca	92014-2533
339-061-002	William J & Joan Houser	28151 Murrieta Rd	Sun City Ca	92586-2431
339-092-011	William J & Peggy Oneill	28243 W Worcester Rd	Sun City Ca	92586-2653
331-190-010	William J Halloran	PO Box 1239	Vista Ca	92085-1239
331-190-011	William J Halloran	PO Box 1239	Vista Ca	92085-1239
331-190-014	William J Halloran	PO Box 1239	Vista Ca	92085-1239
331-190-035	William J Halloran	PO Box 1239	Vista Ca	92085-1239
338-091-064	William L & Mary Knoth	29214 Murrieta Rd	Sun City Ca	92586-2871
335-422-083	William M Peisley	26089 Shadywood St	Sun City Ca	92586-3752
337-021-035	William P Horan	26061 Saint Marys St	Sun City Ca	92586-2433
337-132-004	William R & Jewell Pierce	26131 Port Rush Dr	Sun City Ca	92586-2783
339-061-004	William R Brackett	28181 Murrieta Rd	Sun City Ca	92586-2431
426-440-007	William R Sweeney	PO Box 3369	Manhattan Beach	90266-1369
329-070-049	William W & Carol Shackley	28410 Moreland Rd	Romoland Ca	92585-9002
339-124-004	William W & Grace Anderson	25865 Interlechen Dr	Sun City Ca	92586-2638
339-051-010	Wilson Margaret H Estate Of	117 Falling Sr	Irvine Ca	92614
335-424-033	Wing & May Lee	27147 Stagewood St	Sun City Ca	92586-3756
329-070-058	Winiford C & Helen Lewis	PO Box 1337	Sun City Ca	92585-0337
330-280-024	Winifred Torbet 1993 Tr	25910 Camino Juarez	Sun City Ca	92585-8818
337-410-008	Wright	26080 Bonita Vista Ct	Sun City Ca	92586-3544
329-110-022	Yong L Li	382 N Lemon Ave 286	Walnut Ca	91789-2344
329-132-021	Yu C Mao	28944 Loire Valley Ln	Menifee Ca	92584-8103
309-040-008	Yu L & Ying Hsu	48 Del Ventura	Irvine Ca	92606-8858
335-424-018	Yvonne J Helash	26082 Goldenwood St	Sun City Ca	92586-3750
337-131-011	Zoltan & Henrietta Danczige	28841 Amersfoot Way	Sun City Ca	92586-2701

APN	Owner	Address	City, State	Zip
331-180-008	John V & Evelyn Motte	445 S D St	Perris, CA	92570-2134
331-180-016	Southern California Edison C	PO Box 800	Rosemead, CA	91770-0800
331-190-010	William J Halloran	PO Box 1239	Vista, CA	92085-1239
331-190-011	William J Halloran	PO Box 1239	Vista, CA	92085-1239
331-190-014	William J Halloran	PO Box 1239	Vista, CA	92085-1239
331-190-016	40 Ac Industrial Rail Ltd	846 Williamston St 105	Vista, CA	92084-5247
331-190-017	40 Ac Industrial Rail Ltd	846 Williamston St 105	Vista, CA	92084-5247
331-190-035	William J Halloran	PO Box 1239	Vista, CA	92085-1239
331-190-037	40 Ac Industrial Rail Ltd	846 Williamston St 105	Vista, CA	92084-5247
331-190-041	40 Ac Industrial Rail Ltd	846 Williamston St 105	Vista, CA	92084-5247
331-190-042	Wayne G Anastasi	846 Williamston St 105	Vista, CA	92084-5247
331-200-012	Cleto & Cleotilde Bustamant	212 S Brand Blvd	San Fernando, CA	91340-3609
331-200-018	James & B Nadir	3011 S Hacienda Blvd	Hacienda Heights	91745-5331
331-200-019	James & B Nadir	3011 S Hacienda Blvd	Hacienda Heights	91745-5331
331-200-020	James & B Nadir	3011 S Hacienda Blvd	Hacienda Heights	91745-5331
331-210-009	Carl L Myers	1126 E Buffalo Ave	Santa Ana, CA	92705-7003
331-210-012	Richard R & Carol Kolesar	24092 Nuthatch Ln	Laguna Niguel, CA	92677-1382
331-210-019	David & Lilian Liu	2340 Joan Dr	Hacienda Heights	91745-4518
331-210-020	David & Lilian Liu	2340 Joan Dr	Hacienda Heights	91745-4518
331-210-021	David & Lilian Liu	2340 Joan Dr	Hacienda Heights	91745-4518
331-210-022	David & Lilian Liu	2340 Joan Dr	Hacienda Heights	91745-4518
331-210-023	Luis Huerto	4171 Lewis Street	Oceanside, CA	92056-0000
331-210-024	Daniel D & Ronald Makabe	1645 Arroyo Sierra Cir	Santa Rosa, CA	95405-7704
331-210-025	Annette H Paquette	2722 S Hill Rd 64	Gladstone Mi	49837-2160
331-220-010	Riverside County Transportation	3560 University Ave #100	Riverside, CA	92501-0000
331-220-020	John Nottberg	26420 Palomar Road	Sun City, CA	92585-0000
331-220-021	Anacapa Land Co			
331-220-038	Southern California Edison Co	PO Box 800	Rosemead, CA	91770-0800
331-220-041	Edward F & Lynda J Metzler	38875 Avenida La Cresta	Murrieta, CA	92562-0000
331-230-002	Southern California Edison Co	PO Box 800	Rosemead, CA	91770-0800
331-240-001	Riverside County Transportation	3560 University Ave #100	Riverside, CA	92501-0000
331-240-002	Trudy Grant Living Trust	6200 Starwood Way	Rockville MD	20852-0000

APN	Owner	Address	City, State	Zip
331-240-003	Anacapa Land Co			
331-240-005	Southern California Edison Co	PO Box 800	Rosemead, CA	91770-0800
331-240-008	Lau Siu & Cheng Wai Hung	33311 Windtree Avenue	Wildomar, CA	92595-0000
331-240-009	Romola Prop Inc	209 Quadro Vecchio Drive	Pacific Palisades, CA	90272-0000
331-240-010	Romala Prop Inc	209 Quadro Vecchio Drive	Pacific Palisades, CA	90272-0000
331-250-002	Eugene & Marian Gabrych	2006 Highway 395	Fallbrook, CA	92028-0000
331-250-004	Riverside County Transportation	3560 University Ave #100	Riverside, CA	92501-0000
331-250-008	Robert V Lange	42814 Beeman Drive	Murrieta, CA	92562-0000
331-250-010	Laurel D Wirth	481 Michelle Lane	Hemet, CA	92544-0000
331-250-011	Laurel D Wirth	481 Michelle Lane	Hemet, CA	92544-0000
331-250-013	Jose & Maria Gallegos	26785 Menifee Road	Sun City, CA	92585-0000
331-250-014	Ray Rodriguez	5805 W Harmon Avenue #311	Las Vegas NV	89103-0000
331-250-015	Waring Trust & Pt	31150 Santiago Road	Temecula, CA	92592-0000
331-250-016	Romola Prop Inc	209 Quadro Vecchio Drive	Pacific Palisades, CA	90272-0000
331-250-018	Kurt Kragefsky	Am Rinzengarten 11	63688 Gedern Germany	
331-250-019	Kurt Kragefsky	Am Rinzengarten 11	63688 Gedern Germany	
331-250-020	Kurt Kragefsky	Am Rinzengarten 11	63688 Gedern Germany	
331-250-021	Eugene & Marian Gabrych	2006 Highway 395	Fallbrook, CA	92028-0000
331-280-003	Menifee Inc	3 Imperial Promenade Ste 850	Santa Ana, CA	92707-0000
331-280-004	Menifee Inc	3 Imperial Promenade Ste 850	Santa Ana, CA	92707-0000
333-070-008	Steven S & Janette C Hou	2230 Montecito Drive	San Marino, CA	91108-0000
333-070-011	Helen Hall Stephens	209 Quadro Vecchio Drive	Pacific Palisades, CA	90272-0000
333-070-020	Romola Prop Inc	209 Quadro Vecchio Drive	Pacific Palisades, CA	90272-0000
333-070-021	Steven S & Janette C Hou	2230 Montecito Drive	San Marino, CA	91108-0000
333-070-022	Harold Wierenga & George Larry Boersma	9271 56th Street	Riverside, CA	92509-0000
333-070-023	Reinhold Semmelroth	155 E 4th Street, Suite 230	Perris, CA	92570-0000
333-070-026	Margaret A Dienst	26851 Sun City Blvd	Sun City, CA	92586-0000
333-070-027	Voetsak Inc	2526 Angelo Drive	Los Angeles, CA	90077-0000
333-070-028	Voetsak Inc	2526 Angelo Drive	Los Angeles, CA	90077-0000
333-070-043	Michele Boyer	7171 La Presa Drive	Los Angeles, CA	90068-0000
333-170-001	Menifee Inc	3 Imperial Promenade Ste 850	Santa Ana, CA	92707-0000

APPENDIX O

CONFIDENTIAL PALEONTOLOGICAL RESOURCES

(FILED UNDER SEPARATE COVER)