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APPENDIX N

WATER RESOURCES

APPENDIX N-1

MGS NPDES PERMIT NUMBER CA0001180

Winston H. Hickox
Secretary for Environmental Protection

California Regional Water Quality Control Board

Los Angeles Region

(50 Years Serving Coastal Los Angeles and Ventura Counties)

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Gray Davis
Governor

May 18, 2001

Mr. R.W. Lawhn, Manager
Environmental Department
Reliant Energy
12301 Kurland Drive
Huston, TX 77034

Dear Mr. Lawhn:

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT (NPDES) – RELIANT ENERGY INCORPORATED, MANDALAY GENERATING STATION, (NPDES PERMIT NO. CA0001180, CI 2093)

Our letter dated March 27, 2001, transmitted revised tentative requirements for your waste discharge.

Pursuant to Division 7 of the California Water Code, this Regional Board at a public hearing held on April 26, 2001, reviewed the revised tentative requirements with the change sheet, considered all factors in the case, and adopted Order No. 01-057 (copy attached) relative to this waste discharge. This Order serves as a permit under the National Pollutant Discharge Elimination System (NPDES), and expires on March 10, 2006. Section 13376 of the California Water Code requires that an application for a new permit must be filed at least 180 days before the expiration date.

The adopted Order includes the changes described in the March 27, 2001 letter and was modified with the inclusion of language describing the chlorination profile test performed in the Spring of 2000 in Finding No. 27. The Monitoring and Reporting Program was also updated to include quarterly monitoring of fecal coliform, total coliform and enterococci, and a change from analysis for total residual sodium bromide to oxidant concentrations in the monitoring program for algicide spraying.

The "Monitoring and Reporting Program" requires you to implement the monitoring program on the effective date of this Order. Your first monitoring report for May 2001 is due by July 1, 2001. All monitoring reports should be sent to the Regional Board, ATTN: Information Technology Unit.

When submitting monitoring or technical reports to the Regional Board per these requirements, please include a reference to Compliance File CI-2093 and NPDES No. CA0001180, which will

assure that the reports, are directed to the appropriate file and staff. Please do not combine your discharge monitoring reports with other reports. Submit each type of report as a separate document.

If you have any question please contact Cassandra Owens at (213) 576-6750.

Sincerely,

David Hung, Chief
Industrial Permitting Unit

Enclosures

cc: Environmental Protection Agency, Region 9, Permits Branch (WTR-5)
U.S. Army Corps of Engineers
NOAA, National Marine Fisheries Service
Department of Interior, U.S. Fish and Wildlife Service
Mr. Jim Kassel, State Water Resources Control Board, Division of Water Quality
Mr. William Paznokas, Department of Fish and Game, Region 5
Department of Health Services, Sanitary Engineering Section
California State Parks and Recreation
California Coastal Commission, South Coast Region
County of Ventura, Resource Management Agency, Environmental Health Division
County of Ventura, Department of Planning
County of Ventura, Public Works Agency, Flood Control, and Water Resources Department
Ms. Vicki Musgrove, County of Ventura, Flood Control District
City of Oxnard, Department of Public Works
City of San Buenaventura, Department of Public Works
City of Ventura
Citizens to Preserve Ojai
Sierra Club, Southern Coastal Coordinator
Friends of the Ventura River
Mr. Paul Jenkin, Surfrider Foundation, Ventura County Chapter
Ms. Jessica Altstatt, Santa Barbara Channel Keeper
Vicki Clark, Environmental Defense Center
Dr. Mark Gold, Heal the Bay
Mr. David Beckman, NRDC
Ms. Julie Babcock, Reliant Energy
Mr. Ed Malinowski, Mandalay Generating Station

State of California
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION

ORDER NO. 01-057

NPDES NO. CA0001180

WASTE DISCHARGE REQUIREMENTS FOR RELIANT ENERGY INCORPORATED (Mandalay Generating Station)

The California Regional Water Quality Control Board, Los Angeles Region (Regional Board), finds:

1. Reliant Energy, Inc (hereinafter Reliant or Discharger) discharges waste from the Mandalay Generating Station (hereinafter Mandalay) under waste discharge requirements contained in Order No. 94-131 (NPDES No. CA0001180) adopted by this Regional Board on December 5, 1994.

2. Reliant Energy has filed a Report of Waste Discharge (ROWD) and has applied for renewal of its waste discharge requirements and National Pollutant Discharge Elimination System (NPDES) permit.

3. A permit for the operation of Mandalay (Order No. 94-131) was originally issued to Southern California Edison. On April 2, 1998, the Regional Board was notified that Mandalay had been sold to Ocean Vista Power Generation, L.L.C., a subsidiary of Houston Industries Incorporated, changed its name to Reliant Energy Mandalay L.L.C., a subsidiary of Reliant Energy, Inc. and concurrently, the name of the power station became Mandalay.

Description of the Facility Operations

4. The Discharger operates Mandalay, a plant with a design capacity of 560 megawatts, at 393 North Harbor Boulevard, Oxnard, California. Mandalay discharges up to 255.3 million gallons per day (mgd) of wastes consisting of once-through cooling water from two steam electric generating units (four condenser halves), metal cleaning wastes, and low volume wastes (includes softener regeneration wastes, fireside and air preheater washes, floor drains, boiler blowdown and evaporator blowdown wastes) into the Pacific Ocean at Mandalay Beach in Oxnard, a water of the United States. The wastes are discharged through a concrete and rock-revetted structure (Discharge Serial No. 001) located at a point directly across the beach, west of the plant (Latitude: 34° 12' 23"; Longitude: 119° 15' 09").

March 8, 2001
Revised: March 23, 2001
Revised: April 26, 2001

The cooling water intake structure is located east of the plant at the shoreline (Discharge Serial No. 002 during heat treatment as described below) and draws water from the surface to a depth of 18 feet via a canal originating in the Channel Islands Harbor. Figure 1 shows the location map of the facility.

5. The operations contributing to flow at the Mandalay facility includes:

Operation	Flow (mgd)	Treatment Description
Once-through cooling water	255	Ocean Discharge
Boiler Blowdown	0.012	Ocean Discharge
Evaporator Blowdown	0.04	Ocean Discharge
South Yard Drains	Negligible	Retention & Ocean Discharge
North Yard Drains	Negligible	Retention & Ocean Discharge
Softener Regeneration	0.013	Retention & Ocean Discharge
Fireside and Air Preheater Wash	0.035	Retention & Ocean Discharge
Floor Drains	0.072	Oil Removal, Retention, & Ocean Discharge
Condensate Overboard	Negligible	Oil Removal, Retention, & Ocean Discharge
Chemical Metal Cleaning	0.08	Lime Precipitation, Retention, Sludge Disposal, & Ocean Discharge
West Yard Drains	Negligible	Retention & Ocean Discharge

Figure 2 shows the schematic diagram of the wastewater flow.

6. The chemical metal cleaning wastes are placed in portable tanks, then processed through a contractor-owned mobile lime treatment unit that discharges to the retention basin. The treated chemical metal cleaning wastes, non-chemical metal cleaning wastes, and low volume wastes are then stored in two settling basins before discharge to the Pacific Ocean through the Discharge Serial No. 001. Sludge and residues in the basins and from treatment are periodically hauled away to legal disposal sites.

7. The Discharger sprays algicide to the banks of the Mandalay intake canal during the spring and summer months to control undesirable algal growth which clogs the intake screens and impedes the pumping of cooling water through the generating station. No adverse water quality impacts have been observed due to algicide applications.

8. The Discharger controls marine fouling of the cooling water conduit (intake and four waterboxes) by temporarily recirculating (thus increasing the temperature) and diverting the flow of the once-through cooling water through the recirculation tunnel. This procedure (referred to as "heat treatment") is typically conducted every five (5) weeks and lasts for about two (2) hours per conduit. During heat treatment, the temperature of waste discharged does not exceed 125°F except during adjustment of the recirculation gate at which time the temperature of the wastes discharged does not exceed 135°F.

Temperature fluctuations during gate adjustment above 125°F will last no longer than 30 minutes.

9. Any debris that accumulates in the intake structure is collected in a container, removed and disposed of by the City of Oxnard.

10. The condenser tubes are arranged in banks of two per generating station. Biological growth on the condenser tubes is controlled by intermittently injecting chlorine in the form of sodium hypochlorite into the cooling water system. There are two chlorination cycles per day during November through February, and three chlorination cycles per day during March through October. Each cycle consists of 10 minutes per condenser half, plus 10 minutes for each of three bearing cooling water heat exchangers. Condenser halves and heat exchangers are chlorinated sequentially during each cycle. The maximum total daily chlorination time is 210 minutes or 3.5 hours per day. During November through February, the total daily chlorination time is 140 minutes/day.

Storm Water Management

11. Mandalay currently does not separate process wastewater from storm water runoff. The stormwater is collected in a holding basin and discharged to the ocean via Discharge Serial No. 001. During major storm events the storm water runoff is discharged directly to the ocean.

12. Pursuant to Section 402(p) of the Clean Water Act and 40 CFR Parts 122, 123, and 124, the State Board adopted a general NPDES permit to regulate stormwater discharges associated with industrial activity (State Board Order No. 91-13-DWQ adopted in November 1991, amended by Order No. 92-12-DWQ adopted in September 1992, and renewed by Order No. 97-03-DWQ, NPDES Permit No. CAS000001 adopted on April 17, 1997). Storm water discharges from power plants are subject to requirements under this general permit.

Mandalay has implemented a Storm Water Pollution Prevention Plan (SWPPP) in accordance with the general NPDES permit for stormwater discharges.

Discharge Quality

13. The effluent characteristics as reported in the permit application follows:

Constituent	Units	30-Day Average	Daily Maximum
Flow	mgd	----	255.3
Temperature			
Winter (Oct. - April)	°F	102	123*
Summer (May - Sept.)	°F	110	129*

Constituent	Units	30-Day Average	Daily Maximum
pH	pH units	----	8.8
$BOD_5$20°C	mg/L	----	1.0
COD	mg/L	----	34
Total suspended solids	mg/L	----	13.5
Bromide	mg/L	----	48
Total residual chlorine	mg/L	----	0.23
Fecal coliform	MPN/100ml	----	>23
Fluoride	mg/L	----	0.4
Nitrate-Nitrite (as Nitrogen)	mg/L	----	0.9
Nitrogen (Total organic)	mg/L	----	1.5
Oil and grease	mg/L	----	9.1
Phosphorous	mg/L	----	0.3
Aluminum	mg/L	----	1.43
Barium	mg/L	----	0.021
Boron	mg/L	----	3.34
Iron	mg/L	----	1.34
Magnesium	mg/L	----	826
Molybdenum	mg/L	----	0.008
Manganese	mg/L	----	0.071
Titanium	mg/L	----	0.069
Copper	mg/L	----	0.010
Sulfite (as SO_3)	mg/L	----	2.0
Sulfate (as SO_4)	mg/L	----	2150
Radium, Total	pCi/L	----	1.32
Beta, Total	pCi/L	----	156.4
Alpha, Total	pCi/L	----	3.39

* During heat treatment.

All other targeted analytes were not detected.

14. Over the five-year period between December 1994 and December 2000, the Discharger had six exceedances of the 30-day average for copper. Exceedances were recorded in June and December of 1996, December of 1997, June and December of 1998 and December of 2000. There was also one exceedance of the 30-day average for lead reported in June 1998.

Noncompliance issues have been referred to the Enforcement Unit.

Applicable Plans, Policies, and Regulations

15. Section 316 (b) of the Federal Clean Water Act (Clean Water Act) requires that the location, design, construction, and capacity of cooling water intake structures reflect the best available technology for minimizing adverse environmental impacts.

In accordance with Federal and State guidelines for Section 316(b) of the Clean Water Act, the Discharger conducted a study to determine whether the cooling water intake structures are in compliance. The study adequately addressed the important ecological and engineering factors specified in the guidelines, demonstrated that ecological impacts of the intake system are environmentally acceptable, and determined that no modification to the intake structure is required. The design, construction, and operation of the intake structure represent Best Available Technology as is required by Section 316(b) of the Clean Water Act.

16. On November 19, 1982, the USEPA promulgated *Effluent Guidelines and Standards for the Steam Electric Power Generating Point Source Category* (40 CFR Part 423). This regulation prescribes effluent limitations for once-through cooling water and various in-plant waste streams.

    40 CFR 423.12(a) includes provisions to adjust the limitations in 40 CFR Part 423 for in-plant waste streams for certain plants where the factors used in developing the limitations are significantly different from those associated with the equipment or facilities involved.

17. On July 23, 1997, the State Water Resource Control Board (State Board) adopted a revised *Water Quality Control Plan for Ocean Waters of California* (Ocean Plan). The Ocean Plan contains water quality objectives for coastal waters of California. This Order includes effluent and receiving water limitations, prohibitions, and provisions that implement the objectives of the Ocean Plan.

18. On September 18, 1975, the State Board adopted a revised version of the *Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Waters and Enclosed Bays and Estuaries of California* (Thermal Plan). The Thermal Plan contains temperature objectives for the Pacific Ocean.

    In compliance with the Thermal Plan and in accordance with Regional Board specification, the Discharger conducted a thermal effects study. The study demonstrated that waste discharges from the power plant are in compliance with the Thermal Plan and beneficial uses of the receiving waters are protected, as required by Section 316 (a) of the Clean Water Act.

19. On June 13, 1994, the Regional Board adopted a revised *Water Quality Control Plan for the Coastal Watersheds of Los Angeles and Ventura Counties* (Basin Plan) as amended on January 27, 1997 by Regional Board Resolution No. 97-02. The Basin Plan (i) designates beneficial uses for surface and groundwaters, (ii) sets narrative and numerical objectives that must be attained or maintained to protect the designated beneficial uses and conform to the state antidegradation policy (*Statement of Policy with Respect to Maintaining High Quality Waters in California*, State Water Resources Control Board (State Board) Resolution No. 68-16, October 28, 1968), and (iii) describes implementation programs to protect all waters in the Region. In addition, the Basin Plan incorporates (by reference) all applicable State and Regional Board plans and policies and other pertinent

water quality policies and regulations. The 1994 update of the Basin Plan has been prepared to be consistent with all State and Regional Board plans and policies adopted to date. This Order implements the plans, policies and provisions of the Regional Board's Basin Plan.

20. **Beneficial Uses**. The Basin Plan contains water quality objectives and beneficial uses for the Pacific Ocean.

Nearshore Zone (Bounded by the shoreline and a line 1,000 feet from the shoreline or the 30-foot depth contour, whichever is farther from shore):

Existing: industrial service supply, navigation, water contact and non-water contact recreation, commercial and sport fishing, support of marine habitat, support of wildlife habitat, preservation of biological habitats, support of rare, threatened, or endangered species, migration of aquatic organisms, support of habitats suitable for spawning, reproduction, and/or early development, and support of habitats suitable for shellfish harvesting.

Offshore Zone:

Existing: navigation, contact and non-contact recreation, commercial and sport fishing, support of marine habitat, support of wildlife habitat, support of rare, threatened, or endangered species, migration of aquatic organisms, support of habitats suitable for spawning, and support of habitats suitable for shellfish harvesting.

21. **Watershed Approach.** The Regional Board has implemented a Watershed Management Approach, in accordance with *Watershed Protection: A Project Focus* (EPA841-R-95-003, August 1995), to address water quality protection in the Los Angeles Region. Programs covered under the Watershed Management Initiative include regulatory (e.g., NPDES), monitoring and assessment, basin planning and water quality standards, watershed management, wetlands, total maximum daily loads (TMDLs), 401 certifications, groundwater (as appropriate), and nonpoint source management activities. The Watershed Management Approach integrates the Regional Board's many diverse programs, particularly, permitting, planning, and other surface-water oriented programs. It emphasizes cooperative relationships between regulatory agencies, the regulated community, environmental groups, and other stakeholders in the watershed to achieve the greatest environmental improvements with the resources available. This approach facilitates a more accurate assessment of cumulative impacts of pollutants from both point and nonpoint sources.

The Los Angeles Region encompasses ten Watershed Management Areas (WMA) which are the geographically defined watershed areas where the Regional Board implements the watershed approach. The Board has enumerated significant issues in each of the WMAs. Significant watershed issues in the Ventura Coastal Watershed Management Area for the wetlands and coastal waters are:

- Historic pesticide contamination;
- Loss of quality habitat;
- Impacts from oil spills and agriculture;
- Use by endangered species; and
- Impairments: from historic pesticides and from coliform.

Pursuant to this Regional Board's Watershed Initiative Chapter January 2000, the Ventura River Watershed and Ventura Coastal areas are targeted for the 2001-2002 fiscal year.

22. **Executive Order D-22-01.** On February 8, 2001, the State and Regional Boards received the Governor's Executive Order D-22-01 concerning the California electricity supply shortage that requires that all existing power plants increase their generation output. The Governor's Executive Order provides, in part, that "power plants in the State of California are not precluded from operating as a result of thermal limits in waste discharge requirements."

This permit is consistent with the Governor's Executive Order D-22-01 to responsibly address the energy emergency and is consistent with the objectives of environmental protection.

Applicable Water Quality Objectives

23. 40 CFR Part 122.44(d)vi(A) requires the establishment of numeric effluent limitations to attain and maintain applicable narrative water quality criteria to protect the designated beneficial uses.

24. Effluent limitations established pursuant to Sections 301 (Effluent Limitations), 302 (Water Quality-Related Effluent Limitations), 303 (Water Quality Standards and Implementation Plans), 304 (Information and Guidelines), and 402 (NPDES) of the Federal Clean Water Act and amendments thereto, are applicable to the discharges herein.

25. Total residual chlorine (TRC) levels in the once-though cooling water have exceeded effluent limitations based on 40 CFR Part 423 guideline (0.20 mg/L) and the 1983 Ocean Plan objectives for Discharge Serial No. 001 The current Ocean Plan objectives for TRC are more stringent. However, chlorination bioassay studies performed by the Discharger showed no significant adverse impact on the receiving waters as a result of the chlorine levels in the discharge.

In September 1984, the Discharger submitted a request for variance from the effluent residual chlorine limitation based on Ocean Plan objectives. The Regional Board and the State Board approved the variance request (Resolution 88-80) and forwarded it to the USEPA in August 1988 for concurrence, pursuant to Section 301(g) of the Clean Water Act.

In 1987, the Discharger and the City of Los Angeles Department of Water and Power conducted a chlorine toxicity screening study at three power plants which were determined to be representative of discharge conditions. The study was completed in response to State Board's concerns prior to the issuance of State Board's Resolution 88-80. It showed that chlorine was not detected outside the zone of initial dilution during a chlorination event.

26. On May 23, 1996, USEPA approved Mandalay's request for a variance from BAT (best available technology economically achievable) for TRC pursuant to Section 301(g) of the CWA with the following conditions:

a. The effluent from Outfall 001 must meet a limitation of 0.365 mg/L total residual chlorine (instantaneous maximum) based on daily sampling at Outfall 001 during periods of chlorination.

b. The effluent from Outfall 001 must meet a chronic toxicity limit of 3.6 TU_c (daily maximum). The chronic toxicity tests must be representative of actual discharge conditions (at a minimum) or of the PMEL (Proposed Modified Effluent Limitation) conditions. This means that, at a minimum, the effluent samples must be chlorinated in the laboratory to levels consistent with the maximum TRC effluent concentration measured during periods of chlorination during the previous 3 months. Alternatively, the sample may be chlorinated to the PMEL concentration (unless the maximum TRC concentration from the previous 3 months exceeds the PMEL concentration). All other procedures shall be consistent with monitoring requirements in the Ocean Plan and NPDES permit. This requirement to chlorinate in the laboratory applies only if the recorded TRC concentrations exceed the BAT limit of 0.2 mg/L during the previous 3 months.

c. In the event the effluent chronic toxicity limitation is exceeded, the Discharger shall increase the monitoring frequency to monthly in accordance with the NPDES permit. If the limit is exceeded again during the accelerated monitoring period, the Discharger shall conduct a Toxicity Reduction Evaluation (TRE) to determine the cause of toxicity. The TRE shall be conducted in accordance with EPA's most recent TRE/ toxicity investigation evaluation (TIE) manuals.

d. The Discharger shall conduct a residual chlorine receiving water study, as set forth in the NPDES permit, in order to assess the impact of chlorine and chlorine by-products within the receiving waters during period of maximum chlorination.

e. This 301(g) approval can be reviewed and revised by EPA at any time if subsequent information indicates that the PMEL will not result in compliance with all 301(g) criteria. This includes subsequent chronic toxicity results, TRE findings that indicate that the discharge of TRC at concentrations greater than the BAT limit results in toxicity, and receiving water data.

27. Per the December 5, 1994, NPDES permit (Footnote No. 3, Item II.A.1., Monitoring and Reporting Program CI-2093), the Discharger conducted a "Chlorine Sampling Optimization

Study" for Mandalay. The study determined the time during the chlorination cycle of peak residual chlorine concentration in the ocean discharge of the generating station. The purpose of this determination was to ensure that compliance monitoring samples for TRC were collected at the time of highest chlorine level in the stations' combined effluent.

Chlorination at Mandalay depends on the time of year. Between March and October, each condenser half is chlorinated for ten minutes each time and three times per day. The halves are chlorinated one at a time, and an interval of several minutes occurs between the end of chlorine injection to one half and the start to the next half. Once the condensers have been chlorinated, Units 1 & 2, and 3 bearing cooling water heat exchangers are chlorinated for ten minutes each. Between November and February, the condenser halves and bearing cooling water heat exchangers are chlorinated for ten minutes twice a day.

The test was performed on February 17, 1995. The results showed four distinct peaks that corresponded to the chlorination of each condenser half. The highest chlorine level was noted at forty-four (44) minutes after the start of the chlorination cycle. The Discharger used the result of this study to modify their sampling procedures to ensure that the samples are collected at or near the time of peak chlorine levels in the effluent.

In the spring of 2000, Mandalay Generating Station started repairs to the chlorinating system. After completion of the repairs, a profile test was performed on September 14, 2000. The results showed six distinct plateaus that correspond to the chlorinating of each condenser half and the two bearing cooling systems. The highest chlorine level is noted six minutes after the start of each respective chlorination cycle. The plateau lasts for about seven minutes. The Discharger has modified the sampling procedures to ensure that samples are collected during peak chlorine levels.

28. Prior to exercising the 301(g) variance the Discharger conducted a *Special Chlorine Study for 301(g) Variances*. The study was completed instead of a study required in Monitoring and Reporting Program No. 2093 Section III. F., which required that the Discharger conduct a study to demonstrate that there is no significant impact on the receiving water as a result of the discharge of higher levels of chlorine granted by the variance.

In a letter dated October 10, 1997, to the Regional Board, the Discharger discussed the results of a chronic toxicity test. Effluent samples were spiked with the BAT level (0.2 mg/L) and the maximum chlorine levels allowed by the 301(g) variance (0.365 mg/L) in the laboratory. The results indicated that discharge of chlorine at the maximum allowed 301(g) variance level would not cause chronic toxicity of the effluent to exceed permitted effluent limits. The Discharger indicated that the results of this investigation suggested that an additional receiving water study on the effects of chlorine discharges at the variance level was not necessary.

Between October 1996 and September 1997, Mandalay exceeded the BAT level for chlorine and exercised the variance on 2 days. It was not possible to complete a receiving water chlorine study at the variance levels since the chlorine level only exceeded the BAT

level infrequently. The chlorine studies completed by Southern California Edison were reviewed and verbally accepted by Regional Board staff.

29. The Discharger also completed a study of the concentrations of chlorine measured in the receiving waters during chlorination. The investigation was completed for Southern California Edison Company and Los Angeles Department of Water and Power. Nine generating stations were grouped according to discharge characteristics and one candidate from each group was chosen for the study. Scattergood Generating Station was chosen as the station representative of the open coastal discharge. Hence, the results from the study at Scattergood were used as a model to characterize chlorine concentrations in the receiving waters at Mandalay; also considered an open coastal discharge.

    Total chlorine, when detected, was always within the zone of initial dilution during a chlorination event.

30. Effluent limitations based on Ocean Plan objectives were calculated using a minimum dilution ration (i.e., parts sea water to one part effluent) of 2.6 to 1 for Discharge Serial No. 001. This ratio is based on calculations made by the State Water Resources Control Board (State Board) using standard dilution models and transmitted to the Regional Board in the State Board memorandum dated February 4, 1985.

31. For toxic constituents regulated in the Ocean Plan (Table B) that the Discharger does not add into or produce in the treatment process and/or waste streams, no numerical limits are prescribed. Also, no numerical limits are prescribed for toxic constituents which are added but usage has been determined that there is very low probability of causing or contributing to excursion in the water quality standards. However, a narrative limit to comply with all Ocean Plan objectives is provided. The Discharger is also required to monitor for all priority pollutants once during the term of the permit.

32. Acute toxicity monitoring conducted from February 1990 to November 1994 demonstrated consistent compliance with the Ocean Plan objectives. Hence, no numerical limits are prescribed for acute toxicity; the constituent is covered with a narrative limit to comply with all Ocean Plan objectives provided.

33. The requirements contained in this Order are based on the Basin Plan, the Ocean Plan, USEPA National Recommended Water Quality Criteria, other applicable Federal and State plans, policies, guidelines, and best professional judgement, and, as they are met, will be in conformance with the goals of the aforementioned water quality control plans and will protect and maintain existing beneficial uses of the receiving water.

34. Pursuant to California Water Code Section 13320, any aggrieved party may seek review of this Order by filing a petition to the State Board. A petition must be sent to the State Water Resources Control Board, P.O. Box 100, 901 P. Street, Sacramento, CA 95812, within 30 days of adoption of this Order.

35. The issuance of waste discharge requirements for this discharge is exempt from the provisions of Chapter 3 (commencing with Section 21100) of Division 13 of the Public Resources Code (California Environmental Quality Act) in accordance with Water Code Section 13389.

The Regional Board has notified the Discharger and interested agencies and persons of its intent to issue waste discharge requirements for this discharge and has provided them with an opportunity to submit their written views and recommendations.

The Regional Board, in a public hearing, heard and considered all comments pertaining to the discharge and to the tentative requirements.

This Order shall serve as a NPDES permit pursuant to Section 402 of the Federal Clean Water Act or amendments thereto, and shall take effect at the end of ten days from the date of its adoption, provided the Regional Administrator, USEPA, has no objections.

IT IS HEREBY ORDERED Reliant Energy, Inc. (Mandalay), in order to meet the provisions contained in Division 7 of the California Water Code and regulations adopted thereunder, and the provisions of the Federal Clean Water Act and regulations and guidelines adopted thereunder, shall comply with the following:

I. DISCHARGE LIMITATIONS

A. Effluent Limitations

1. Waste discharged shall be limited to those described in the findings only, as proposed.

2. The pH of wastes discharged shall at all times be within the range 6.0 to 9.0.

3. The temperature of the wastes discharged shall not exceed 106°F during normal operation of the facility. During heat treatment, the temperature of waste discharged shall not exceed 125°F except during adjustment of the recirculation gate at which time the temperature of wastes discharged shall not exceed 135°F. Temperature fluctuations during gate adjustment above 125°F shall not last for more than 30 minutes.

4. The discharge of an effluent from Discharge Serial No. 001 with constituents in excess of the following limits is prohibited:

		Discharge Limitations[1]	
Constituents	Units	30-Day Average	Daily Maximum
Arsenic	µg/L	21	107
	lbs/day	44.7	227.8

Constituents	Units	Discharge Limitations[1] 30-Day Average	Daily Maximum
Cadmium	µg/L	3.6	14.4
	lbs/day	7.7	30.7
Hexavalent chromium[2]	µg/L	7.2	28.8
	lbs/day	15.3	61.3
Copper	µg/L	5.6	38
	lbs/day	11.9	8.1
Lead	µg/L	7.2	28.8
	lbs/day	15.3	61.3
Mercury	µg/L	0.143	0.575
	lbs/day	0.3	1.22
Nickel	µg/L	18	72
	lbs/day	38.3	153
Selenium	µg/L	54	216
	lbs/day	115	460
Silver	µg/L	2.1	9.66
	lbs/day	4.5	20.6
Zinc	µg/L	51.2	267
	lbs/day	109	568
Chronic Toxicity[3]	TU_c	----	3.6
Radioactivity	Not to exceed limits specified in Title 17, Division 1, Chapter 5, Subchapter 4, Group 3, Article 3, Section 30269, California Code of Regulations.		

1 Concentration limits are based on Ocean Plan objectives using a dilution ration of 2.6 parts of seawater to 1 part effluent. The daily mass emission limits (in lbs per day) are determined using the tabulated concentration limits and the maximum permitted flow rate (255.3 mgd).

2 The Discharger has the option to meet the hexavalent chromium limitations with a total chromium analysis. However, if the total chromium level exceeds the hexavalent chromium limitation, it will be considered a violation unless an analysis has been made for hexavalent chromium in a replicate sample and the result is in compliance with the hexavalent chromium limits.

[3] The chronic toxicity of the effluent shall be expressed and reported in toxic units, where:

$$TU_C = 100/NOEC$$

The No Observable Effect Concentration (NOEC) is expressed as the maximum percent effluent

concentration that causes no observable effect on a test organisms, as determined by the results of a critical life stage toxicity test.

Chronic toxicity of 100% effluent shall not exceed a daily maximum of 3.6 TU_C in a critical life stage test.

If the chronic toxicity of the effluent exceeds the daily maximum of 3.6 TU_C, the Discharger shall immediately implement accelerated chronic toxicity testing according to MRP No. 2093, Section III.B.4.b. If any three out of the initial test and the six accelerated tests results exceed 3.6 TU_C, the Discharger shall initiate a TIE and implement the Initial Investigation TRE Workplan, as specified in the following section of this Order (Section I.A.5).

The Discharger shall conduct chronic toxicity monitoring as specified in MRP No. 2093.

5. Preparation of an Initial Investigation TRE Workplan

The Discharger shall prepare and submit a copy of the Discharger's initial investigation TRE workplan to the Executive Officer of the Regional Board for approval within 90 days of the effective date of this permit. If the Regional Board Executive Officer does not disapprove the workplan within 60 days, the workplan shall become effective. The Discharger shall use USEPA manuals EPA/600/2-88/070 (industrial) or EPA/833B-99/002 (municipal) as guidance. This workplan shall describe the steps the Discharger intends to follow if toxicity is detected, and should include, at a minimum:

a. A description of the investigation and evaluation techniques that will be used to identify potential causes and sources of toxicity, effluent variability, and treatment system efficiency;

b. A description of the facility's methods of maximizing in-house treatment efficiency and good housekeeping practices, and a list of all chemicals used in the operation of the facility; and,

c. If a TIE is necessary, an indication of the person who would conduct the TIE (i.e., an in-house expert or an outside contractor). See MRP No. 2093, Section III.B.4.a.ii for the guidance manuals.

6. The wastes discharged from Discharge Serial No. 001 with concentration in excess of the following effluent limits are prohibited:

Constituents	Units	Discharge Limitations[4] 30-Day Average	Daily Maximum
Total residual chlorine[5,6]	mg/L	----	0.365
	lbs/day		777
Free available chlorine	mg/L	0.2	0.5
	lbs/day	426	1,065

[4] The daily mass emission limits (lbs/day) is determined using the tabulated concentration limits and the permitted maximum flow (255.3 mgd). For daily discharges where the total flow is not equal to the maximum permitted flow the mass emission limits shall be determined using the following equation:

Mass (lbs/day) = concentration (mg/L) * 8.34 * flow (million gallons per day)

[5] Based on the USEPA approved variance from BAT for TRC pursuant to Section 301(g) of the CWA based on daily sampling at Discharge Serial No. 001 during periods of chlorination. The USEPA and State Board approved Ocean Plan Exception utilized a minimum initial dilution of 2.6. Total residual chlorine may not be discharged from any single generating unit for more than 10 minutes per condenser half per shift.

[6] If other oxidants are used, this shall be the total oxidants reported as residual chlorine.

7. Effluent Limitations for In-plant Waste Streams:

a. The discharge of metal cleaning wastes[7] with constituents in excess of the following limits is prohibited:

Constituents	Units	Discharge Limitations[8] 30-Day Average	Daily Maximum
Suspended solids	mg/L	30	100
	lbs/day	20	66.7
Oil and grease	mg/L	15	20
	lbs/day	10	13.3
Copper, total	mg/L	1.0	1.0
	lbs/day	0.67	0.67
Iron, total	mg/L	1.0	1.0
	lbs/day	0.67	0.67

[7] Metal cleaning wastes shall mean any wastewater resulting from chemical cleaning of any metal process equipment including, but not limited to, boiler tube, boiler fireside, and air preheaters.

[8] The daily mass emission limits (in lbs/day) has been determined using the tabulated concentration limits and the flow rate for inplant wastes (0.08 mgd).

b. The discharge of low volume wastes[9] with constituents in excess of the following limits is prohibited:

		Discharge Limitations[10]	
		30-Day	Daily
Constituents	Units	Average	Maximum
Suspended solids	mg/L	30	100
	lbs/day	43	143
Oil and grease	mg/L	15	20
	lbs/day	21.5	28.7

[9] Low volume wastes includes softener regeneration wastes, fireside and air preheater washes, floor drains, boiler blowdown and evaporator blowdown wastes.

[10] The daily mass emission limits (in lbs/day) has been determined using the tabulated concentration limits and reported flow rate for low volume wastes (0.172 mgd).

c. In the event that waste stream from various sources (6-a and 6-b) are combined for treatment or discharge, the quantity of each pollutant property attributable to each controlled waste source shall not exceed the specified limitation for that waste source.

B. Receiving Water Limitations

1. Within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board, but including all kelp beds, the following bacterial objectives throughout the water column shall be maintained:

   a. Samples of water from each sampling station shall have a density of total coliform organisms less than 1,000 per 100 ml (10 per ml) provided that not more than 20 percent of the samples at any sampling station in any 30-day period may exceed 1,000 per 100 ml (10 per ml), and provided further that no single sample when verified by a repeat sample taken within 48 hours shall exceed 10,000 per 100 ml (100 per ml).

   b. The fecal coliform density based on a minimum of not less than five samples for any 30-day period, shall not exceed a geometric mean of 200 per 100 ml nor shall more than 10 percent of the total samples during any 60-day period exceed 400 per 100 ml.

2. At all areas where shellfish may be harvested for human consumption, as determined by the Regional Board, the following bacterial objectives throughout the water column shall not be exceeded:

   The median total coliform density shall not exceed 70 per 100 ml, and not more than 10 percent of the samples shall exceed 230 per 100 ml.

3. If a receiving water monitoring location consistently exceeds a coliform objective or exceeds a geometric mean enterococcus density of 24 organisms per 100 ml for a 30-day period or 12 organisms per 100 ml for a six-month period, the Discharger shall conduct a sanitary survey to determine if the discharge is the source of the contamination.

4. Floating particulates and grease and oil shall not be visible as a result of wastes discharged.

5. Wastes discharged shall not cause aesthetically undesirable discoloration of the ocean surface (receiving waters).

6. Wastes discharged shall not cause the transmittance of natural light to be significantly reduced at any point outside the initial dilution zone.

7. The rate of deposition and the characteristics of inert solids in ocean sediments shall not be altered such that benthic communities are degraded as a result of wastes discharged.

8. The dissolved oxygen concentration shall not be depressed more than 10 percent from that which occurs naturally as the result of the discharge of oxygen demanding waste materials.

9. The pH of the receiving water shall not be changed at any time more than 0.2 units from that which occurs naturally.

10. The dissolved sulfide concentration of waters in and near sediments shall not be significantly increased above that present under natural conditions.

11. The wastes discharged shall not increase the concentration in marine sediments of toxic substances listed in Chapter IV, Table B of the Ocean Plan, to levels that would degrade indigenous biota.

12. The concentration of organic materials in marine sediments shall not be increased to levels that would degrade marine life as a result of waste discharged.

13. Nutrient materials shall not cause objectionable aquatic growths or degrade indigenous biota as a result of waste discharged.

14. Waste discharged shall not degrade marine communities, including vertebrate, invertebrate, and plant species.

15. Waste discharged shall not alter the natural taste, odor, and color of fish, shellfish, or other marine resources used for human consumption.

16. The concentration of organic material in fish, shellfish or other marine resources used for human consumption shall not bioaccumulate to levels that are harmful to human health as a result of waste discharged

17. The wastes discharged shall not cause receiving waters to contain any substance in concentrations toxic to human, animal, plant, or fish life.

18. No physical evidence of wastes discharged shall be visible at any time in the water on the shores, rocks or structures.

19. The salinity of the receiving waters shall not be changed by the wastes discharged to an extent such as to be harmful to marine biota.

20. The wastes discharged shall not contain individual pesticides or a combination of pesticides in concentrations that adversely affect beneficial uses.

II. REQUIREMENTS AND PROVISIONS

A. Discharge of any unpermitted wastes to any point other than specifically described in this Order and permit is prohibited and constitutes a violation thereof.

B. This Order includes the attached Monitoring and Reporting Program (Attachment T). If there is any conflict between provisions stated in the Monitoring and Reporting Program and the Standard Provisions, those provisions stated in the Monitoring and Reporting Program prevail.

C. This Order includes the attached *Standard Provisions and General Monitoring and Reporting Requirements* (Standard Provisions) (Attachment N). If there is any conflict between provisions stated hereinbefore and the attached Standard Provisions, those provisions attached herein prevail.

D. The Discharger must comply with the lawful requirements of municipalities, counties, drainage districts, and other local agencies regarding discharges of storm water to storm drain systems or other water courses under their jurisdiction; including applicable requirements in municipal storm water management program developed to comply with NPDES permits issued by the Regional Board to local agencies.

E. The Discharger shall comply with all Ocean Plan objectives.

F. The Discharger shall comply with all applicable effluent limitations, national standards of performance, toxic effluent standards, and all federal regulations established pursuant to Sections 301, 302, 303(d), 304, 306, 307, 316, and 423 of the Federal Clean Water Act and amendments thereto.

G. In the determination of compliance with the monthly average limitations, the following provisions shall apply to all constituents:

1. If the analytical result of a single sample, monitored monthly or at a lesser frequency, does not exceed the monthly average limit for that constituent, the Discharger will have demonstrated compliance with the monthly average limit for that month.

2. If the analytical result of a single sample, monitored monthly or at a lesser frequency, exceeds the monthly average limit for any constituent, the Discharger shall collect three additional samples at approximately equal intervals during the month. All four analytical results shall be reported in the monitoring report for that month, or 45 days after the sample was obtained, whichever is later.

   If the numerical average of the analytical result of these four samples does not exceed the monthly average limit for that constituent, compliance with the monthly average limit has been demonstrated for that month. Otherwise, the monthly average limit has been violated.

3. If Item II.G.2. has not been implemented, and the result of one sample (Item II.G.1.) exceeds the monthly average, then the Discharger is in violation of the monthly average limit.

4. In the event of noncompliance with a monthly average effluent limitation, the sampling frequency for that constituent shall be increased to weekly and shall continue at this level until compliance with the monthly average effluent limitation has been demonstrated.

H. The Discharger shall comply with all applicable requirements, such as the Storm Water Pollution Prevention Plan (SWPPP) updates and Monitoring and Reporting Program, of State Board's general permit for *Discharges of Storm Water Associated with Industrial Activities* (State Water Resources Control Board Order No. 97-03-DWQ adopted on April 17, 1997).

I. The discharge of any product registered under the Federal Insecticide, Fungicide, and Rodenticide Act to any waste stream which may ultimately be released to waters of the United States is prohibited unless specifically authorized elsewhere in this permit. This requirement is not applicable to products used for lawn and agricultural purposes. Discharge of chlorine for disinfection in plant potable and service water systems and in sewage treatment is authorized.

J. The discharge of any waste resulting from the combustion of toxic or hazardous wastes to any waste stream which ultimately discharges to waters of the United States is prohibited, unless specifically authorized elsewhere in this permit.

K. There shall be no discharge of polychlorinated biphenyl compounds such as those once commonly used for transformer fluid.

L. The Discharger shall notify the Executive Officer in writing no later than six months prior to planned discharge of any chemical, other than chlorine or other product previously reported to the Executive Officer, which may be toxic to aquatic life. Such notification shall include:

a. Name and general composition of the chemical,
b. Frequency of use,
c. Quantities to be used,
d. Proposed discharge concentrations, and
e. USEPA registration number, if applicable.

No discharge of such chemical shall be made prior to the Executive Officer's approval.

M. The Regional Board and USEPA shall be notified immediately by telephone, of the presence of adverse conditions in the receiving waters or on beaches and shores as a result of wastes discharged; written confirmation shall follow as soon as possible but not later than five working days after occurrence.

N. This Order may be modified, revoked, and reissued or terminated in accordance with the provisions of 40 CFR Parts 122.44, 122.62, 122.63, 122.64, 125.62, and 125.64. Causes for taking such actions include, but are not limited to: failure to comply with any condition of this order and permit, endangerment to human health or the environment resulting from the permitted activity; or acquisition of newly obtained information which would have justified the application of different conditions if known at the time of Order adoption and issuance.

The filing of a request by the Discharger for an order and permit modification, revocation and issuance, or termination; or notification of planned changes or anticipated noncompliances does not stay any condition of this order and permit.

O. This Order may also be modified, in accordance with the provisions set forth in 40 CFR Part 122 and 124, to include requirements for the implementation of the watershed protection management approach.

III. EXPIRATION DATE

This Order expires on March 10, 2006.

The Discharger must file a Report of Waste Discharge in accordance with Title 23, California Code of Regulations, not later than 180 days in advance of the expiration date as application for issuance of new waste discharge requirements.

IV. RESCISSION

Order No. 94-131, adopted by this Board on December 5, 1994, is hereby rescinded, except for enforcement purposes.

I, Dennis A. Dickerson, Executive Officer, do hereby certify that the foregoing is a full, true and correct copy of an Order adopted by the California Regional Water Quality Control Board, Los Angeles Region on April 26, 2001.

Dennis A. Dickerson
Executive Officer

/ CDO

Figure 1
LOCATION MAP
MANDALAY GENERATING STATION
Oxnard, Ventura County, CA

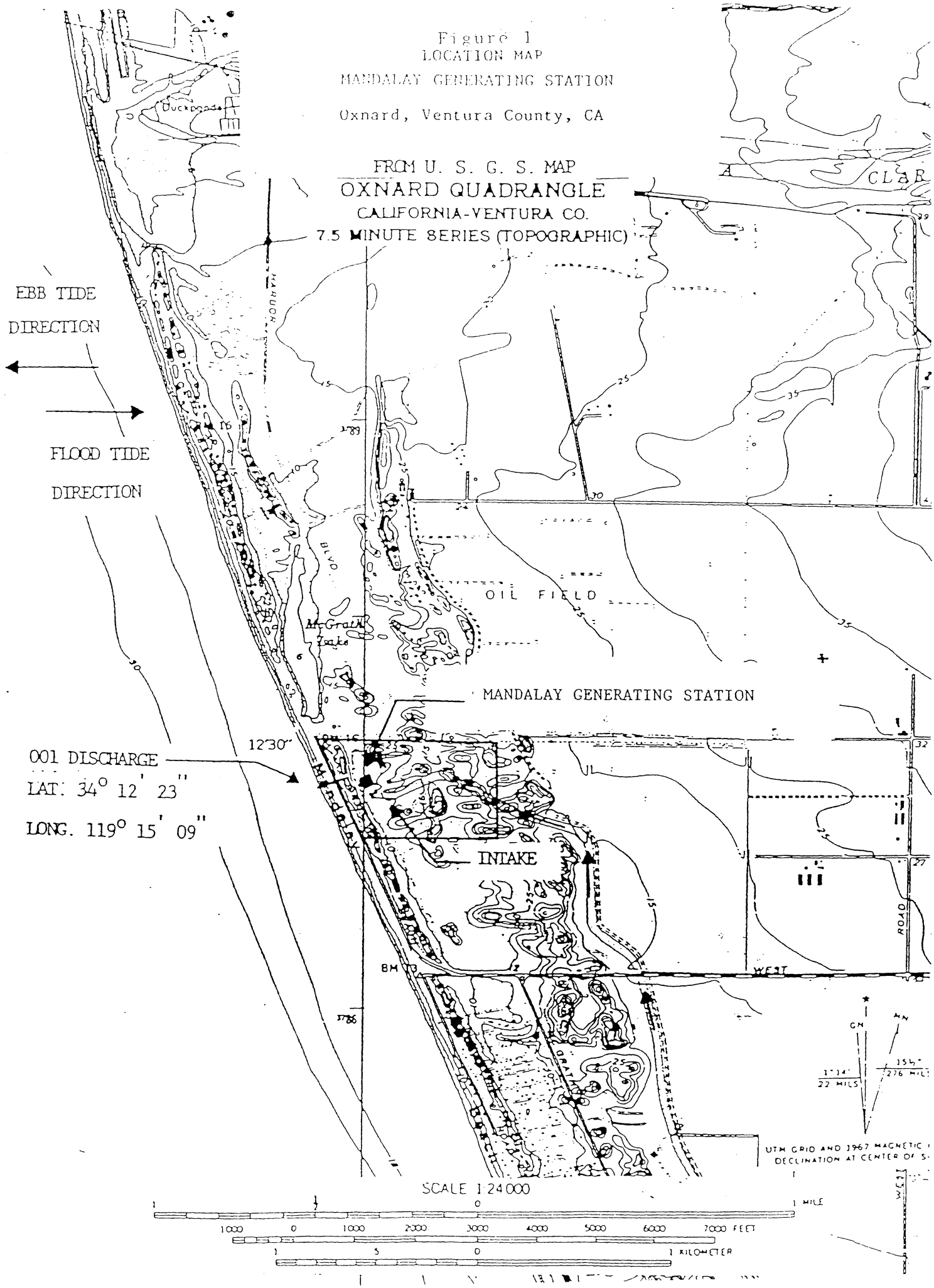
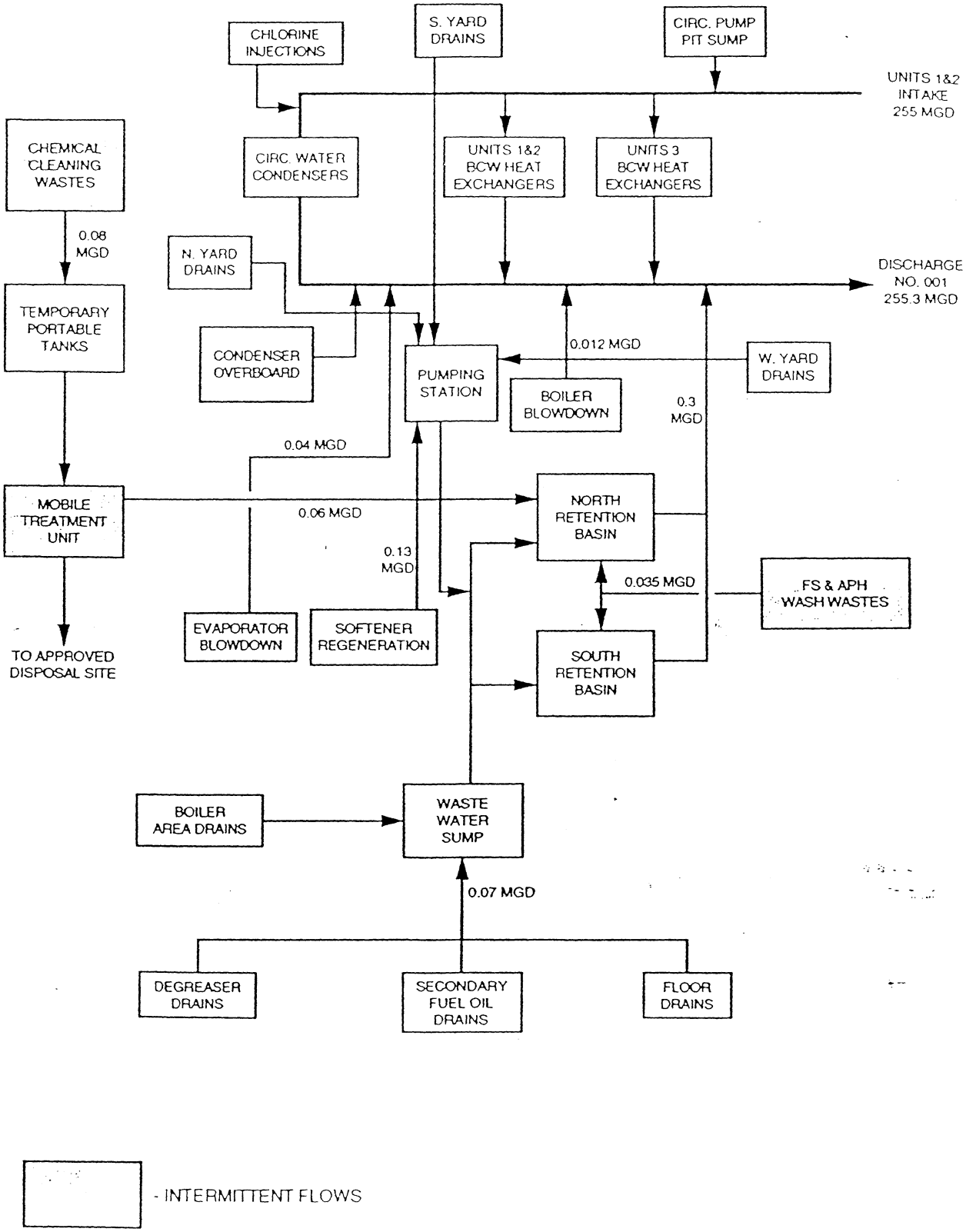


Figure 2
SCHEMATIC OF WATER FLOW

Mandalay Generating Station
OXNARD, CALIFORNIA
DECEMBER, 1998



State of California
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION

MONITORING AND REPORTING PROGRAM NO. CI - 2093
for
RELIANT ENERGY INCORPORATED, INC.
(CA0001180)

I. REPORTING REQUIREMENTS

A. The Discharger shall implement this monitoring program on the effective date of this Order. Effluent monitoring reports shall be submitted monthly, by the first day of the second month following each monthly sampling period. The first monitoring report shall be received the Regional Board by July 1, 2001, covering May 2001.

B. Quarterly effluent analyses shall be performed during the months of February, May, August and November. Semiannual effluent analyses shall be performed during the months of May and November. Annual effluent analyses shall be performed during the month of May. Results of quarterly, semiannual, and annual analyses shall be reported in the appropriate monthly monitoring report following the analyses. Should there be instances when monitoring could not be done during these specified months, the Discharger must notify the Regional Board, state the reason, and obtain approval for an alternate schedule.

C. By March 1 of each year, the Discharger shall submit an annual summary report to the Regional Board. The report shall contain a discussion, tabular, and graphical summaries of the monitoring data obtained during the previous calendar year. In addition, the Discharger shall discuss the compliance record and the corrective actions taken or planned, which may be needed to bring the discharge into full compliance with the waste discharge requirements. The data shall be submitted to the Regional Board on hard copy and on 3 ½" computer diskette. The submitted data must be IBM compatible, preferably using Microsoft Excel software.

D. All monitoring and annual summary reports must be addressed to the Regional Board, Attention: Information Technology Unit. Reference the reports to Compliance File No. CI-2093 to facilitate routing to the appropriate staff and file.

E. For every item where the requirements are not met, the Discharger shall submit a statement of the cause(s), and actions undertaken or proposed which will bring the discharge into full compliance with waste discharge requirements at the earliest possible time, including a timetable for implementation of these actions.

F. Any mitigation/remedial activity including any pre-discharge treatment conducted at the site must be reported in the quarterly monitoring report.

March 8, 2001
Revised: March 23, 2001
Revised: April 26, 2001

G. Database Management System – The Regional Board is developing a compliance monitoring database management system that may require the Discharger to submit the monitoring and annual reports electronically when it becomes fully operational.

II. EFFLUENT MONITORING REQUIREMENTS

A. Sampling station(s) shall be established for the point of discharge and shall be located where representative samples of that effluent can be obtained. Provisions shall be made to enable visual inspection before discharge. If oil sheen, debris, and/or other objectionable materials or odors are present, the discharge shall not be commenced until compliance with the requirements has been demonstrated. All visual observations shall be included in the monitoring report.

B. This Regional Board shall be notified in writing of any change in the sampling stations once established, or in the methods for determining the quantities of pollutants in the individual waste streams.

C. Pollutants shall be analyzed using the methods described in 40 CFR 136.3, 136.4, and 136.5 (revised May 14, 1999); or where no methods are specified for a given pollutant, methods approved by Regional Board or State Board. Laboratories analyzing monitoring samples shall be certified by the California Department of Health Services and must include quality assurance/quality control (QA/QC) data with their report.

The monitoring report shall specify the USEPA analytical method used, the Method Detection Limit (MDL) and the Minimum Level (ML) for each pollutant. For the purpose of reporting compliance with numerical limitations, performance goals, and receiving water limitations, analytical data shall be reported by one of the following methods, as appropriate:

1. An actual numerical value for sample results greater than, or equal to, the ML; or,

2. "Detected, but Not Quantified (DNQ)" if results are greater than or equal to the laboratory's MDL but less than the ML; or,

3. "Not-Detected (ND)" for sample results less than the laboratory's MDL with MDL indicated for the analytical method used.

Current MLs (Attachment T-1) are those published by the State Water Resources Control Board in the *Policy for the Implementation of Toxics*

Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California, March 2, 2000.

D. Where possible, the MLs employed for effluent analyses shall be lower than the permit limits established for a given parameter. If the ML value is not below the effluent limitation, then the lowest ML value and its associated analytical method shall be selected for compliance purposes. At least once a year (in the annual report), the Discharger shall submit a list of the analytical methods employed for each test and associated laboratory quality assurance/quality control (QA/QC) procedures.

The Regional Board, in consultation with the State Board Quality Assurance Program, shall establish an ML that is not contained in Attachment T-1 to be included in the Discharger's permit in any of the following situations:

1. When the pollutant under consideration is not included in Attachment T-1;

2. When the Discharger and Regional Board agree to include in the permit a test method that is more sensitive than those specified in 40 CFR 136 (revised May 14, 1999);

3. When the Discharger agrees to use an ML that is lower than that listed in Attachment T-1;

4. When a Discharger demonstrates that the calibration standard matrix is sufficiently different from that used to establish the ML in Attachment T-1 and proposes an appropriate ML for their matrix; or,

5. When the Discharger uses a method whose quantification practices are not consistent with the definition of an ML. Examples of such methods are the USEPA-approved Method 1613 for dioxins and furans, Method 1624 for volatile organic substances, and Method 1625 for semi-volatile organic substances. In such cases, the Discharger, the Regional Board, and the State Board shall agree on a lowest quantifiable limit, and that limit will substitute for the ML for reporting and compliance determination purposes.

H. Laboratory analyses – all chemical, bacteriological, and toxicity analyses shall be conducted at a laboratory certified for such analyses by the California Department of Health Services Environmental Laboratory Accreditation Program (ELAP). A copy of the laboratory certification shall be submitted with the Annual Report.

E. Water/wastewater samples must be analyzed within allowable holding time limits as specified in 40 CFR Part 136.3. All QA/QC samples must be run on the same

dates the samples were actually analyzed, and the results must be reported in the Regional Board format if available, and submitted with the laboratory reports.

F. All analyses shall be accompanied by the chain of custody, including but not limited to data and time of sampling, sample identification, and name of person who performed sampling, date of analysis, name of person who performed analysis, QA/QC data, method detection limits, analytical methods, copy of laboratory certification, and a perjury statement executed by the person responsible for the laboratory.

G. Each monitoring report must affirm in writing that: "All analyses were conducted at a laboratory certified for such analyses by the California Department of Health Services, and in accordance with current USEPA guideline procedures or as specified in this Monitoring Program."

H. Each report shall contain the following completed declaration:

"I declare under penalty of law that I have personally examined, and am familiar with, the information submitted in this document and all attachments, and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. [CWC Sections 13263, 13267, and 13268]".

Executed on the _____day of _____at_____.

_____(Signature)
_____(Title)

III. EFFLUENT MONITORING PROGRAM

A. The following shall constitute the effluent monitoring program for the final effluent at Discharge No. 001:

Constituent	Units	Type of Sample	Minimum Frequency of Analysis
Total waste flow[1]	gal/day	----	daily
Temperature[1]	°F	continuous	----
pH	pH units	grab	weekly
Total residual chlorine[2]	mg/L	grab[3]	daily
Free available chlorine[2]	mg/L	grab[3]	daily
Chronic toxicity	TU_c	grab	quarterly
Fecal coliform	MPN/100ml	grab	quarterly
Total coliform	MPN/100ml	grab	quarterly
Enterococci	MPN/100ml	grab	quarterly
Ammonia nitrogen	µg/L	grab	annually
Nitrate nitrogen	mg/L	grab	annually
Radioactivity[4]	pCi/ml	grab	annually
Acute toxicity	TU_a	grab	annually
Priority Pollutants	µg/L	grab	annually[5]

1 Where continuous monitoring of temperature, and flow is required, the following shall be included in the report:

Temperature: Only the maximum temperature for each calendar day shall be reported, except when temperatures exceed 106°F, in which case the reason(s), time of day, and duration of such events shall also be reported.

Flow: Total daily flow.

2 Monitoring is only applicable during periods of chlorine addition. A statement certifying that chlorination did not occur during the day may be submitted in lieu of an analysis

3 Multiple grab samples, with at least four equally spaced samples during each hour of chlorine addition, the maximum and average concentrations on the duration of chlorine addition shall be reported. Alternatively, a single grab sample may be collected at the time of peak residual chlorine concentration.

4 Radioactivity determinations of gross and net beta activity, in picocuries per liter, shall be made within 48 hours following preparation of samples. The overall efficiency of the counting system, size of sample, and counting time shall be such that radioactivity can be determined to a sensitivity of ten picocurie per liter with a 95% confidence limit not to exceed 50 percent.

A statement certifying that radioactive pollutants were not added to the discharge may be submitted in lieu of monitoring.

5 Sampling and analysis shall be completed annually. Analysis should include priority pollutants listed on page T-23 except metals listed in Section III.C.

B. Chronic Toxicity Effluent Monitoring Requirements

1. The Discharger shall conduct critical life stage chronic toxicity tests on 24-hour composite 100% effluent samples or receiving water samples in accordance with USEPA's *Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms*, Third Edition, July 1994, (EPA/600/4-91/002) or USEPA's *Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms*, August 1995, (EPA/600/R-95/136).

2. Effluent samples shall be collected after all treatment processes and before discharge to the receiving water. Receiving water samples shall be collected in accordance with the conditions specified in this MRP. Receiving water samples shall be collected at mid-depth.

3. Marine and Estuarine

   a. The Discharger shall conduct tests as follows: with a vertebrate, an invertebrate, and an alga for the first three suites of tests. After the screening period, monitoring shall be conducted using the most sensitive species.

   b. Re-screening is required every 15 months. The Discharger shall re-screen with the three species listed above and continue to monitor with the most sensitive species. If the first suite of re-screening tests demonstrate that the same species is the most sensitive than the re-screening does not need to include more that one suite of tests. If a different species is the most sensitive or if there is ambiguity then the discharger shall proceed with suites of screening tests for a minimum of three, but not to exceed five suites.

   c. The presence of chronic toxicity shall be estimated as specified using West Coast marine organisms according to EPA' s Short-Term Methods for Estimating Chronic Toxicity of Effluent and Receiving Waters to West Coast Marine and Estuarine Organisms, August, 1995 (EPA/600/R-95/136)

4. Additional Requirements for Chronic Toxicity Monitoring Programs

   a. Quality Assurance

i. Concurrent testing with a reference toxicant shall be conducted. Reference toxicant tests shall be conducted using the same test conditions as the effluent toxicity tests (e.g., same test duration, etc).

ii. If either the reference toxicant test or effluent test does not meet all test acceptability criteria (TAC) as specified in the test methods manuals (EPA/600/4-91/002 and EPA/600/R-95/136), then the Discharger must re-sample and re-test within 14 days.

iii. Control and dilution water should be receiving water or laboratory water, as appropriate, as described in the manual. If the dilution water used is different from the culture water, a second control using culture water shall be used.

b. Accelerated Monitoring

i. If toxicity is detected as defined in Order No. 01-057, Sections I.A.4, then the Discharger shall conduct six additional tests, approximately every 7 days, over a six-week period. The samples shall be collected and the tests initiated no less than 7 days apart. The Discharger shall ensure that they receive results of a failing acute toxicity test within 24 hours of completion of the test and the additional tests shall begin within 3 business days of receipt of the result.

ii. If any three out of the initial test and the six additional tests results exceed 3.6 TU_c, the Discharger shall immediately implement the Initial Investigation Toxicity Reduction Evaluation (TRE) Workplan.

iii. If implementation of the Initial Investigation TRE Workplan indicates the source of toxicity (e.g., a temporary plant upset, etc.), then the Discharger shall return to the normal sampling frequency required in Section III.A of this MRP.

iv. If toxicity is not detected in any of the six additional tests required above, then the Discharger shall return to the normal sampling frequency required in Section III.A of this MRP.

v. If a TRE/Toxicity Identification Evaluation (TIE) is initiated prior to completion of the accelerated testing schedule required by Section III.B.4.b of this MRP, then the accelerated testing schedule may be terminated, or used as necessary in performing the TRE/TIE, as determined by the Executive Officer.

vi. The Discharger shall obtain six (6) consecutive chronic toxicity results less than or equal to 3.6 TU_c in order to return to the normal sampling frequency required in Section III.A of this MRP.

c. Steps in TRE and TIE

i. Following a TRE trigger, the Discharger shall initiate a TRE in accordance with the facility's initial investigation TRE workplan. At a minimum, the Discharger shall use USEPA manuals EPA/600/2-88/070 (industrial) or EPA/833B-99/002 (municipal) as guidance. The Discharger shall expeditiously develop a more detailed TRE workplan for submittal to the Executive Officer within 15 days of the trigger that will include, but not be limited to:

(a) Further actions to investigate and identify the cause of toxicity;

(b) Actions the Discharger will take to mitigate the impact of the discharge and prevent the recurrence of toxicity;

(c) Standards the Discharger will apply to consider the TRE complete and to return to normal sampling frequency; and,

(d) A schedule for these actions.

ii. The following is a stepwise approach in conducting the TRE:

(a) Step 1 includes basic data collection. Data collected as part of the accelerated monitoring requirement may be used to conduct the TRE;

(b) Step 2 evaluates the optimization of the treatment system operation, facility housekeeping, and the selection and use of in-plant process chemicals;

(c) If Steps 1 and 2 are unsuccessful, Step 3 implements the TIE employing all reasonable efforts and using currently available TIE methodologies. The objective of the TIE is to identify the substance or combination of substances causing the observed toxicity;

(d) Assuming successful identification or characterization of the toxicant(s), Step 4 evaluates final effluent treatment options;

(e) Step 5 evaluates in-plant treatment options; and

(f) Step 6 consists of confirmation once a toxicity control method has been implemented.

Many recommended TRE elements parallel source control, pollution prevention, and storm water control program best management practices (BMPs). To prevent duplication of efforts, evidence of implementation of these control measures may be sufficient to comply with the TRE requirements. By requiring that the first steps of a TRE be accelerated testing and review of the facility's TRE workplan, a TRE may be ended in its early stages. All reasonable steps shall be taken to reduce toxicity to the required level. The TRE may be ended at any stage if monitoring finds there is no longer toxicity (or six consecutive chronic toxicity results are less than or equal to 3.6 TU_c).

iii. The Discharger may initiate a TIE as part of the TRE process to identify the cause(s) of toxicity. The Discharger shall use the USEPA acute and chronic manuals, EPA/600/6-91/005F (Phase I), EPA/600/R-96-054 (for marine), EPA/600/R-92/080 (Phase II), and EPA-600/R-92/081 (Phase III) as guidance.

iv. If a TRE/TIE is initiated prior to completion of the accelerated testing schedule required by Section III.B.4.b of this MRP, then the accelerated testing schedule may be terminated, or used as necessary in performing the TRE/TIE, as determined by the Executive Officer.

v. Toxicity tests conducted as part of a TRE/TIE may also be used for compliance, if appropriate.

vi. The Board recognizes that toxicity may be episodic and identification of causes of and reduction of sources of toxicity may not be successful in all cases. Consideration of enforcement action by the Board will be based in part on the Discharger's actions and efforts to identify and control or reduce sources of consistent toxicity.

d. Reporting

i. The Discharger shall submit a full report of the toxicity test results, including any accelerated testing conducted during the month as required by Section III.B.4.b of this MRP. Test results shall be reported in Toxicity Units (percent survival or TU_c) with the discharge monitoring reports (DMR) for the month in which the test is conducted.

If an initial investigation indicates the source of toxicity and accelerated testing is unnecessary, pursuant to Section III.B.4.b, then those results shall also be submitted with the DMR for the period in which the Investigation occurred.

ii. The full report shall be submitted on or before the end of the month the DMR is submitted.

iii. The full report shall consist of (1) the results; (2) the dates of sample collection, initiation, and completion of each toxicity test; and (3) the acute toxicity average limit or chronic toxicity limit or trigger as described in Section I.A.4 of Order No. 01-057.

iv. Test results for toxicity tests shall also be reported according to the appropriate manual chapter on Report Preparation and shall be attached to the DMR. Routine reporting shall include, at a minimum, as applicable, for each test:

(a) sample date(s);
(b) test initiation date;
(c) test species;
(d) end point values for each dilution (e.g., number of young, growth rate, percent survival);
(e) NOEC value(s) in percent effluent;
(f) IC_{15}, IC_{25}, IC_{40} and IC_{50} values in percent effluent;

(g) TU_c values $\left(TU_c = \frac{100}{NOEC}\right)$

(h) Mean percent mortality (±standard deviation) after 96 hours in 100% effluent (if applicable);

(i) NOEC and LOEC values for reference toxicant test(s);

(j) IC_{25} value for reference toxicant test(s);

(k) Any applicable control charts; and,

(l) Available water quality measurements for each test (e.g., pH, D.O., temperature, conductivity, hardness, salinity, and ammonia).

v. The Discharger shall provide a compliance summary, which includes a summary table of toxicity data from at least eleven of the most recent samples.

vi. The Discharger shall notify, by telephone or electronically, this Regional Board of any toxicity exceedance of the limit or trigger within 24 hours of receipt of the results followed by a written report within 14 calendar days of receipt of the results. The verbal or electronic notification shall include the exceedance and the plan the Discharger will pursue. The written report shall describe actions the Discharger has taken or will take to investigate and correct the cause(s) of toxicity. It may also include a status report on any actions required by the permit, with a schedule for actions not yet completed. If no actions have been taken, the reasons shall be given.

C. Metals

Constituent	Units	Type of Sample	Minimum Frequency of Analysis
Antimony	µg/L	grab	semiannually
Arsenic	µg/L	grab	semiannually
Beryllium	µg/L	grab	semiannually
Cadmium	µg/L	grab	semiannually
Chromium	µg/L	grab	semiannually
Hexavalent chromium	µg/L	grab	semiannually
Copper	µg/L	grab	semiannually
Lead	µg/L	grab	semiannually
Mercury	µg/L	grab	semiannually

Constituent	Units	Type of Sample	Minimum Frequency of Analysis
Nickel	µg/L	grab	semiannually
Selenium	µg/L	grab	semiannually
Silver	µg/L	grab	semiannually
Thallium	µg/L	grab	semiannually
Zinc	µg/L	grab	semiannually

IV. EFFLUENT MONITORING PROGRAM FOR IN-PLANT WASTE STREAMS

A. Metal Cleaning Wastes:

Constituent	Units	Type of Sample	Minimum Frequency of Analysis
Flow[5]	mgd	----	monthly
pH	pH units	grab	monthly
Suspended solids	mg/L	grab	monthly
Oil and grease	mg/L	grab	monthly
Copper, total	mg/L	grab	monthly
Iron, total	mg/L	grab	monthly

[5] If no discharge occurred during the month, the report shall so state.

B. Non-Chemical Metal Cleaning Wastes:

Constituent	Units	Type of Sample	Minimum Frequency of Analysis
Flow[6]	mgd	----	monthly
pH	pH units	grab	monthly
Suspended solids	mg/L	grab	monthly
Oil and grease	mg/L	grab	monthly
Copper[7]	mg/L	grab	monthly
Iron[7]	mg/L	grab	monthly

[6] If no discharge occurred during the month, the report shall so state.

[7] Dissolved metal fraction only.

C. Low Volume Wastes:

Constituent	Units	Type of Sample	Minimum Frequency of Analysis
Flow[8]	mgd	----	monthly
pH	pH units	grab	monthly
Suspended solids	mg/L	grab	monthly
Oil and grease	mg/L	grab	monthly
Priority Pollutants	µg/L	grab	annually[9]

[8] If no discharge occurred during the month, the report shall so state.

[9] Sampling and analyses shall be on a quarterly basis during the first two years after adoption of this Order, and annually thereafter. Analysis for priority pollutants in low volume waste should include metals. See page T-23 for constituent list.

D. Intake Cooling Water Monitoring Program:

The intake cooling water shall be analyzed for metals semi-annually as listed in III.C. for a period of two years following the date of this permit. The sampling and analyses for both effluents and intake cooling water shall be performed at the same time. The Executive Officer has the authority to require continuation of such monitoring at his discretion.

V. RECEIVING WATER MONITORING

A. Receiving Water

1. Pursuant to the Code of Federal Regulations [40 CFR § 122.41(j) and §122.48(b)], the monitoring program for a discharger receiving a NPDES permit must determine compliance with NPDES permit conditions, and demonstrate that State water quality standards are met.

2. Since compliance monitoring focuses on the effects of point source discharge, it is not designed to assess impacts from other sources of pollution (e.g., nonpoint source runoff, aerial fallout) nor to evaluate the current status of important ecological resources on a regional basis.

B. Regional Database

1. Several efforts are underway to develop and implement a comprehensive regional monitoring program for the Southern California Bight. These efforts

have the support and participation from regulatory agencies, dischargers, and environmental groups. The goal is to establish a regional program to address public health concerns, monitor trends in natural resources and nearshore habitats, and assess regional impacts from all contaminant sources.

2. Two pilot regional monitoring programs were conducted; one during the summer of 1994 and another in 1998. The purpose of the pilot programs were to test an alternative sampling design that combines elements of compliance monitoring with a broader regional assessment approach. The pilot program was designed by USEPA, the State Board, and three Boards (Los Angeles, Santa Ana, and San Diego) in conjunction with the Southern California Coastal Water Research Project and participating discharger agencies.

   The pilot regional monitoring programs included the following components: microbiology; water quality; sediment chemistry; sediment toxicity testing; benthic infauna; demersal fish; and bioaccumulation.

3. The two pilot regional monitoring programs were funded primarily, by resource exchanges with the participating discharger agencies. During the year when pilot regional monitoring was scheduled, USEPA and this Regional Board eliminated portions of the routine compliance monitoring programs for that year, while retaining certain critical compliance monitoring elements. A certain percentage of the traditional sampling sites were also retained to maintain continuity of the historical record and to allow comparison of different sampling designs. The exchanged resources were redirected to complete sampling within the regional monitoring program design. Thus, the Discharger's overall level of effort for the 1994 and 1998 pilot programs remained approximately the same as the compliance monitoring programs.

4. Given the apparent benefits realized by the first two regional monitoring programs, it is probable that similar comprehensive sampling efforts will be repeated for the California Bight at periodic intervals (perhaps every four or five years). At the present time, it appears likely that the next regional monitoring program will be attempted during the summer of 2002 - 2003.

5. We anticipate that future regional monitoring programs will be funded in a similar manner. Revisions to the routine compliance monitoring program will be made under the discretion of the USEPA and this Regional Board as necessary to accomplish this goal; and may include resource exchanges in the number of parameters to be monitored, the frequency of monitoring, or the number, type, and location of samples collected.

6. The compliance monitoring programs for the Mandalay Generating Station, and other major ocean dischargers will serve as the framework for the regional

monitoring program. However, substantial changes to these programs may be required to fulfill the goals of regional monitoring, while retaining the compliance monitoring component required to evaluate the potential impacts from NPDES discharges. Revisions to the existing program will be made under the discretion of the USEPA and this Regional Board as necessary to accomplish this goal; and may include a reduction or increase in the number of parameters to be monitored, the frequency of monitoring, or the number, type, and location of samples collected.

C. Monitoring for Algicide Spraying

The Discharger periodically sprays the banks of the Mandalay Intake Canal with an algicide to control algal growth in the intake canal. The Discharger shall notify the Regional Board at least two weeks prior to each application of algicide. Water samples shall be collected at a minimum of three locations (Wooley Road, 5th Street and Unocal Bridge, or other locations subject to approval by the Executive Officer) and analyzed for total residual oxidant concentrations. The Discharger also shall conduct visual observations of the canal following algicide applications to assess the effectiveness of the spraying program in controlling algal growth and to observe any unusual mortality of fish or invertebrates. The Discharger shall report the results of sample analysis and visual observations, as well as a description of the amounts and locations of all algicide applications, in the appropriate monthly monitoring report to the Regional Board.

D. Receiving Water Monitoring

The receiving water monitoring program shall consist of periodic biological surveys of the area surrounding the discharge, and shall include studies of those physical-chemical characteristics of the receiving water which may be impacted by the discharge.

Location of Sampling Stations (see Attached Figure 1):

1. Receiving water stations in the surf zone shall be located as follows:

   a. Station RW1 - 1180 feet upcoast of the discharge channel.

   b. Station RW2 - 1180 feet downcoast of the discharge channel.

   c. Station RW3 - 2360 feet upcoast of the discharge channel.

   d. Station RW4 - 2360 feet downcoast of the discharge channel.

   e. Station RW5 - At the discharge channel.

2. Receiving water stations offshore of the discharge area shall be located as follows:

   a. Station RW6 - directly offshore of station RW13 at a depth of 30 feet.

   b. Station RW7 - directly offshore of station RW16 at a depth of 30 feet.

   c. Station RW8 – directly offshore of station RW11 at a depth of 30 feet.

   d. Station RW9 – directly offshore of station RW17 at a depth of 30 feet.

   e. Station RW10 – directly offshore of station RW12 at a depth of 30 feet.

   f. Station RW11 – directly offshore of station RW5 at a depth of 20 feet.

   g. Station RW12 – directly offshore of station RW4 at a depth of 20 feet.

   h. Station RW13 – directly offshore of station RW3 at a depth of 20 feet.

   i. Station RW14 – 5,910 feet downcoast of the discharge channel at a depth of 20 feet.

   j. Station RW15 – 5,910 feet upcoast of the discharge channel at a depth of of 20 feet.

   k. Station RW16 – directly offshore of station RW1 at a depth of 20 feet.

   l. Station RW17 – directly offshore of station RW2 at a depth of 20 feet.

3. Benthic stations shall be located as follows:

   a. Station B1 shall be located directly beneath Station RW11.

   b. Station B2 shall be located directly beneath Station RW12.

   c. Station B3 shall be located directly beneath Station RW13.

   d. Station B4 shall be located directly beneath Station RW14.

   e. Station B5 shall be located directly beneath Station RW15.

4. Trawling stations shall be located as follows:

   a. Station T1 – Parallel to the shore at a depth of 20 feet, extending equidistant to either side of Station RW15.

   b. Station T2 – Parallel to the shore at a depth of 20 feet, extending equidistant to either side of Station RW16.

   c. Station T3 – Parallel to the shore at a depth of 20 feet, extending equidistant to either side of Station RW17.

   d. Station T4 – Parallel to the shore at a depth of 20 feet, extending equidistant to either side of Station RW14.

E. Type and Frequency of Sampling:

1. Surface temperatures, dissolved oxygen levels and pH shall be measured semiannually (summer and winter) each year at Stations RW1 through RW5. All stations shall be sampled on both a flooding tide and an ebbing tide during each semiannual survey.

2. Temperature profiles shall be measured semiannually (summer and winter) each year at Stations RW6 through RW17 from surface to bottom at a minimum of one-meter intervals. Dissolved oxygen levels and pH shall be measured semiannually at least at the surface, mid-depth and bottom at each station. All stations shall be sampled on both a flooding tide and an ebbing tide during each semiannual survey.

3. Impingement sampling for fish and commercially important macroinvertebrates shall be conducted at least once every two months at intake Serial No. 002. Impingement sampling shall coincide with heat treatments for at least three of the six sampling events during the year.

   Fish and macroinvertebrates shall be identified to the lowest possible taxon. For each intake point, data reported shall include numerical abundance of each fish and macroinvertebrate species, wet weight of each species (when combined weight of individuals in each species exceeds 0.2 kg), number of individuals in each 1-centimeter size class (based on standard length) for each species and total number of species collected. When large numbers of given species are collected, length/weight data need only be recorded for 50 individuals and total number and total weight may be estimated based on aliquots samples. Total fish impinged per heat treatment or sampling event shall be reported and data shall be expressed per unit volume water entrained.

4. Native California mussels (Mytilus Californianus) shall be collected during the summer from the discharge conduit, as close to the point of discharge as possible, for bioaccumulation monitoring. The mussels shall be collected and analyzed as described in Appendix A of the *California State Mussel Watch Marine Water Quality Monitoring Program 1985-86* (Water Quality Monitoring Report No. 87-2WQ). Mussel tissue shall be analyzed for copper, chromium, nickel, and zinc at a minimum.

5. Sampling by otter trawl shall be conducted semiannually (summer and winter) each year along transects at Stations T1 through T4. Trawls are specialized gear used in large open water areas of reservoirs, lakes, large rivers, estuaries, and offshore marine areas. They are used to gain information on a particular species of fish rather than on overall fish populations. The otter trawl is used to capture near-bottom and bottom fishes.

   a. Trawl net dimensions shall be as follows:

      1. At least a 25 ft throat width.

      2. 1.5 in mesh-size (body).

      3. 0.5 in mesh-size (linear in the cod end).

   b. Two replicate trawls shall be conducted at each station for a duration of 10 minutes each at a uniform speed between 2.0 and 2.5 knots.

   c. The identity, size (standard length), wet weight, and number of fish in each trawl shall be reported. The number of fish affected by abnormal growth or disease, such as fin erosion, lesions, and papillomas, shall be reported. Fish species shall be reported in rank order of abundance and frequency of occurrence for each trawl. The Shannon-Wiener diversity index shall also be computed for each trawl.

   d. All commercially important macroinvertibrates shall be identified, enumerated, and reported in the same manner as fish species.

6. Benthic sampling shall be conducted annually during the summer at Stations B1 through B5.

a. One liter sediment core samples shall be collected by divers at each of the benthic stations for biological examination and determination of biomass and diversity, and for sediment analyses. Four replicates shall be obtained at each station for benthic analyses, and each shall be analyzed separately. A fifth sample shall be taken at each station for sediment analyses and general description.

b. Each benthic replicate sample shall be sieved through a 0.5 mm standard mesh screen. All organisms recovered shall be enumerated· an identified to the lowest taxon possible. Infaunal organisms shall be reported as concentrations per liter for each replicate and each station. Total abundance, number of species and Shannon-Weiner diversity indices shall be calculated (using natural logs) for each replicate and each station.

Biomass shall be determined as the wet weight in grams or milligrams retained on a 0.5 millimeter screen per unit volume (e.g., 1 liter) of sediment. Biomass shall be reported for each major taxonomic group (e.g., polychaetes, crustaceans, mollusks) for each replicate and each station.

c. Sediment grain size analyses shall be performed on each sediment sample (sufficiently detailed to calculate percent weight in relation to the size). Sub-samples (upper tow centimeters) shall be taken from each sediment sample and analyzed for copper, chromium, nickel and zinc.

7. The following general observations or measurement at receiving water, benthic and trawl stations shall be reported:

a. Tidal stage, time, and date of monitoring.

b. General water conditions.

c. Color of the water.

d. Appearance of oil films or greases, or floatable materials.

e. Extent of visible turbidity or color patches.

f. Direction of tidal flow.

g. Description of odor, if any, of the receiving water.

h. Depth at each station for each sampling period.

i. Presence or absence of red tide.

j. Presence and activity of marine life.

k. Presence of the California Least Tern and California Brown Pelican.

8. During the discharge of calcareous material (excluding heat treatment discharge) to the receiving waters, the following observations or measurements shall be recorded and reported in the next monitoring report:

a. Date and times of discharge(s).

b. Estimate of volume and weigh of discharge(s).

c. Composition of discharge(s).

d. General water conditions and weather conditions.

e. Appearance and extent of any oil films or grease, floatable material or odors.

f. Appearance and extent of visible turbidity or color patches.

g. Presence of marine life.

h. Presence and activity of the California least tern and the California brown pelican.

SUMMARY OF RECEIVING WATER MONITORING PROGRAM

Constituent	Units	Stations	Type of Sample	Minimum Frequency of Analysis
Temperature	°C	RW1-RW5	surface	semiannually (flood, ebb)
Temperature	°C	RW6-RW17	vertical profile	semiannually (flood, ebb)
Dissolved oxygen	mg/L	RW1-RW5	surface	semiannually (flood, ebb)
Dissolved oxygen	mg/L	RW6-RW17	vertical profile	semiannually (flood, ebb)
pH	pH Units	RW1-RW5	surface	semiannually (flood, ebb)
pH	pH Units	RW6-RW17	vertical profile	semiannually (flood, ebb)
Fish and macro Invertebrates	----	T1-T4	trawl	semiannually
Fish and macro Invertebrates	----	Intake Serial No. 002	impinge-ment	bimonthly
Benthic Infauna	----	B1-B5	grab	annually
Sediments	----	B1-B5	grab	annually
Mussels	----	Discharge Serial No. 001	tissue	annually

The receiving water monitoring report containing the results of semiannual and annual monitoring shall be received at the Regional Board on March 1 of each year following the calendar year of data collection.

VI. STORM WATER MONITORING AND REPORTING

The Discharger shall implement the Monitoring and Reporting Requirements for individual dischargers contained in the general permit for *Dischargers of Storm Water Associated with Industrial Activities* (State Board Order No. 97-030-DWQ) adopted on April 17, 1997. The monitoring reports shall be received at the Regional Board by July 1 of each year. Indicate in the report the Compliance File CI-2093.

Ordered by: _____ Date: April 26, 2001

Dennis A. Dickinson
Executive Officer

/COD

PRIORITY POLLUTANTS

Metals

Antimony
Arsenic
Beryllium
Cadmium
Chromium
Copper
Lead
Mercury
Nickel
Selenium
Silver
Thallium
Zinc

Miscellaneous

Cyanide
Asbestos (only if specifically required)

Pesticides & PCBs

Aldrin
Chlordane
Dieldrin
4,4'-DDT
4,4'-DDE
4,4'-DDD
Alpha-endosulfan
Beta-endosulfan
Endosulfan sulfate
Endrin
Endrin aldehyde
Heptachlor
Heptachlor epoxide
Alpha-BHC
Beta-BHC
Gamma-BHC
Delta-BHC
Toxaphene
PCB 1016
PCB 1221
PCB 1232
PCB 1242
PCB 1248
PCB 1254
PCB 1260

Base/Neutral Extractibles

Acenaphthene
Benzidine
1,2,4-trichlorobenzene
Hexachlorobenzene
Hexachloroethane
Bis(2-chloroethyl) ether
2-chloronaphthalene
1,2-dichlorobenzene
1,3-dichlorobenzene
1,4-dichlorobenzene
3,3'-dichlorobenzidine
2,4-dinitrotoluene
2,6-dinitrotoluene
1,2-diphenylhydrazine
Fluoranthene
4-chlorophenyl phenyl ether
4-bromophenyl phenyl ether
Bis(2-chloroisopropyl) ether
Bis(2-chloroethoxy) methane
Hexachlorobutadiene
Hexachlorocyclopentadiene
Isophorone
Naphthalene
Nitrobenzene
N-nitrosodimethylamine
N-nitrosodi-n-propylamine
N-nitrosodiphenylamine
Bis (2-ethylhexyl) phthalate
Butyl benzyl phthalate
Di-n-butyl phthalate
Di-n-octyl phthalate
Diethyl phthalate
Dimethyl phthalate
Benzo(a) anthracene
Benzo(a) pyrene
Benzo(b) fluoranthene
Benzo(k) fluoranthene
Chrysene
Acenaphthylene
Anthracene
1,1,2-benzoperylene
Fluorene
Phenanthrene
1,2,5,6-dibenzanthracene
Indeno (1,2,3-cd) pyrene
Pyrene
TCDD
2-Chloronaphtalene

Acid Extractibles

2,4,6-trichlorophenol
P-chloro-m-cresol
2-chlorophenol
2,4-dichlorophenol
2,4-dimethylphenol
2-nitrophenol
4-nitrophenol
2,4-dinitrophenol
4,6-dinitro-o-cresol
Pentachlorophenol
Phenol

Volatile Organics

Acrolein
Acrylonitrile
Benzene
Carbon tetrachloride
Chlorobenzene
1,2-dichloroethane
1,1,1-trichloroethane
1,1-dichloroethane
1,1,2-trichloroethane
1,1,2,2-tetrachloroethane
Chloroethane
Chloroform
1,1-dichloroethylene
1,2-trans-dichloroethylene
1,2-dichloropropane
1,2-dichloropropylene
Ethylbenzene
Methylene chloride
Methyl chloride
Methyl bromide
Bromoform
Bromodichloromethane
Dibromochloromethane
Tetrachloroethylene
Toluene
Trichloroethylene
Vinyl chloride
2-chloroethyl vinyl ether
Xylene

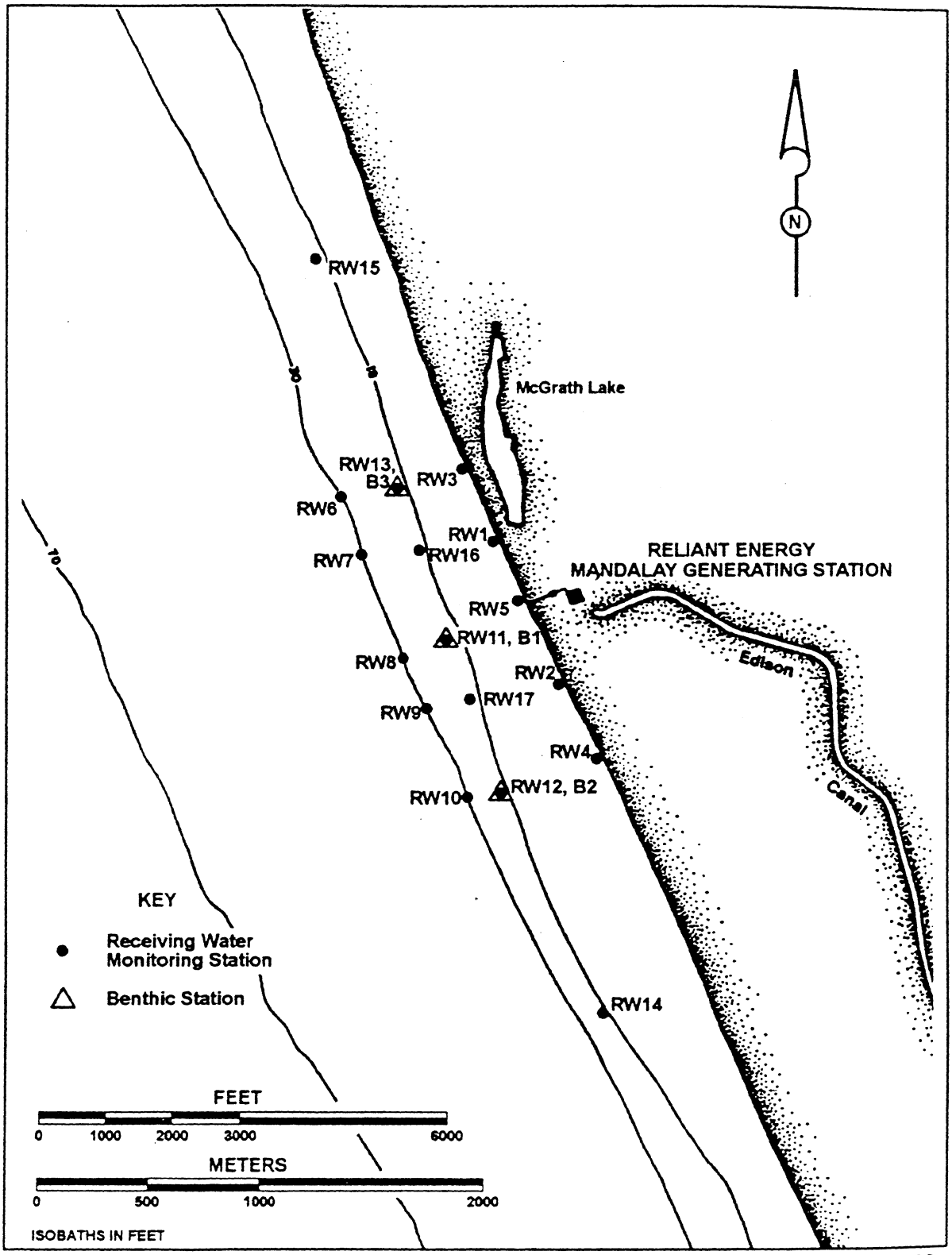


Figure 1 Location of monitoring stations. Reliant Energy Mandalay generating station NPDES, 1998.

SWRCB Minimum Levels in ppb (µg/L)

The Minimum Levels (MLs) in this appendix are for use in reporting and compliance determination purposes in accordance with section 2.4 of this Policy. These MLs were derived from data for priority pollutants provided by State certified analytical laboratories in 1997 and 1998. These MLs shall be used until new values are adopted by the SWRCB and become effective. The following tables (Tables 2a - 2d) present MLs for four major chemical groupings: volatile substances, semi-volatile substances, inorganics, and pesticides & PCBs.

Table 2a - VOLATILE SUBSTANCES*	GC	GCMS
1,1 Dichloroethane	0.5	1
1,1 Dichloroethene	0.5	2
1,1,1 Trichloroethane	0.5	2
1,1,2 Trichloroethane	0.5	2
1,1,2,2 Tetrachloroethane	0.5	1
1,2 Dichlorobenzene (volatile)	0.5	2
1,2 Dichloroethane	0.5	2
1,2 Dichloropropane	0.5	1
1,3 Dichlorobenzene (volatile)	0.5	2
1,3 Dichloropropene (volatile)	0.5	2
1,4 Dichlorobenzene (volatile)	0.5	2
Acrolein	2.0	5
Acrylonitrile	2.0	2
Benzene	0.5	2
Bromoform	0.5	2
Bromomethane	1.0	2
Carbon Tetrachloride	0.5	2
Chlorobenzene	0.5	2
Chlorodibromo-methane	0.5	2
Chloroethane	0.5	2
Chloroform	0.5	2
Chloromethane	0.5	2
Dichlorobromo-methane	0.5	2
Dichloromethane	0.5	2
Ethylbenzene	0.5	2
Tetrachloroethene	0.5	2
Toluene	0.5	2
trans-1,2 Dichloroethylene	0.5	1
Trichloroethene	0.5	2
Vinyl Chloride	0.5	2

*The normal method-specific factor for these substances is 1, therefore, the lowest standard concentration in the calibration curve is equal to the above ML value for each substance.

Table 2b - SEMI-VOLATILE SUBSTANCES*	GC	GCMS	LC	COLOR
1,2 Benzanthracene	10	5		
1,2 Dichlorobenzene (semivolatile)	2	2		
1,2 Diphenylhydrazine		1		
1,2,4 Trichlorobenzene	1	5		
1,3 Dichlorobenzene (semivolatile)	2	1		
1,4 Dichlorobenzene (semivolatile)	2	1		
2 Chlorophenol	2	5		
2,4 Dichlorophenol	1	5		
2,4 Dimethylphenol	1	2		
2,4 Dinitrophenol	5	5		
2,4 Dinitrotoluene	10	5		
2,4,6 Trichlorophenol	10	10		
2,6 Dinitrotoluene		5		
2- Nitrophenol		10		
2-Chloroethyl vinyl ether	1	1		
2-Chloronaphthalene		10		
3,3' Dichlorobenzidine		5		
3,4 Benzofluoranthene		10	10	
4 Chloro-3-methylphenol	5	1		
4,6 Dinitro-2-methylphenol	10	5		
4- Nitrophenol	5	10		
4-Bromophenyl phenyl ether	10	5		
4-Chlorophenyl phenyl ether		5		
Acenaphthene	1	1	0.5	
Acenaphthylene		10	0.2	
Anthracene		10	2	
Benzidine		5		
Benzo(a) pyrene(3,4 Benzopyrene)		10	2	
Benzo(g,h,i)perylene		5	0.1	
Benzo(k)fluoranthene		10	2	
bis 2-(1-Chloroethoxyl) methane		5		
bis(2-chloroethyl) ether	10	1		
bis(2-Chloroisopropyl) ether	10	2		
bis(2-Ethylhexyl) phthalate	10	5		
Butyl benzyl phthalate	10	10		
Chrysene		10	5	
di-n-Butyl phthalate		10		
di-n-Octyl phthalate		10		
Dibenzo(a,h)-anthracene		10	0.1	
Diethyl phthalate	10	2		
Dimethyl phthalate	10	2		
Fluoranthene	10	1	0.05	
Fluorene		10	0.1	
Hexachloro-cyclopentadiene	5	5		

Table 2b - SEMI-VOLATILE SUBSTANCES*	GC	GCMS	LC	COLOR
Hexachlorobenzene	5	1		
Hexachlorobutadiene	5	1		
Hexachloroethane	5	1		
Indeno(1,2,3,cd)-pyrene		10	0.05	
Isophorone	10	1		
N-Nitroso diphenyl amine	10	1		
N-Nitroso-dimethyl amine	10	5		
N-Nitroso -di n-propyl amine	10	5		
Naphthalene	10	1	0.2	
Nitrobenzene	10	1		
Pentachlorophenol	1	5		
Phenanthrene		5	0.05	
Phenol **	1	1		50
Pyrene		10	0.05	

* With the exception of phenol by colorimetric technique, the normal method-specific factor for these substances is 1000, therefore, the lowest standard concentration in the calibration curve is equal to the above ML value for each substance multiplied by 1000.

** Phenol by colorimetric technique has a factor of 1.

Table 2c – INORGANICS*	FAA	GFAA	ICP	ICPMS	SPGFAA	HYDRIDE	CVAA	COLOR	DCP
Antimony	10	5	50	0.5	5	0.5			1000
Arsenic		2	10	2	2	1		20	1000
Beryllium	20	0.5	2	0.5	1				1000
Cadmium	10	0.5	10	0.25	0.5				1000
Chromium (total)	50	2	10	0.5	1				1000
Chromium VI	5							10	
Copper	25	5	10	0.5	2				1000
Cyanide								5	
Lead	20	5	5	0.5	2				10,000
Mercury				0.5			0.2		
Nickel	50	5	20	1	5				1000
Selenium		5	10	2	5	1			1000
Silver	10	1	10	0.25	2				1000
Thallium	10	2	10	1	5				1000
Zinc	20		20	1	10				1000

* The normal method-specific factor for these substances is 1, therefore, the lowest standard concentration in the calibration curve is equal to the above ML value for each substance.

Table 2d - PESTICIDES – PCBs*	GC
4,4'-DDD	0.05
4,4'-DDE	0.05
4,4'-DDT	0.01
a-Endosulfan	0.02
a-Hexachloro-cyclohexane	0.01
Aldrin	0.005
b-Endosulfan	0.01
b-Hexachloro-cyclohexane	0.005
Chlordane	0.1
d-Hexachloro-cyclohexane	0.005
Dieldrin	0.01
Endosulfan Sulfate	0.05
Endrin	0.01
Endrin Aldehyde	0.01
Heptachlor	0.01
Heptachlor Epoxide	0.01
Lindane(g-Hexachloro-cyclohexane)	0.02
PCB 1016	0.5
PCB 1221	0.5
PCB 1232	0.5
PCB 1242	0.5
PCB 1248	0.5
PCB 1254	0.5
PCB 1260	0.5
Toxaphene	0.5

* The normal method-specific factor for these substances is 100, therefore, the lowest standard concentration in the calibration curve is equal to the above ML value for each substance multiplied by 100.

Techniques:

GC - Gas Chromatography
GCMS - Gas Chromatography/Mass Spectrometry
HRGCMS - High Resolution Gas Chromatography/Mass Spectrometry (i.e., EPA 1613, 1624, or 1625)
LC - High Pressure Liquid Chromatography
FAA - Flame Atomic Absorption
GFAA - Graphite Furnace Atomic Absorption
HYDRIDE - Gaseous Hydride Atomic Absorption
CVAA - Cold Vapor Atomic Absorption
ICP - Inductively Coupled Plasma
ICPMS - Inductively Coupled Plasma/Mass Spectrometry
SPGFAA - Stabilized Platform Graphite Furnace Atomic Absorption (i.e., EPA 200.9)
DCP - Direct Current Plasma
COLOR - Colorimetric

APPENDIX N-2

SEA LEVEL RISE ANALYSIS

AECOM

Appendix N-2

Technical Memorandum

Sea Level Rise Analysis

Prepared in Support of Application for Certification, Puente Power Project

OVERVIEW

NRG Oxnard Energy Center LLC has evaluated potential impacts of climate change influenced sea level rise (SLR) on the proposed Puente Power Project (P3 or project). This memorandum summarizes the estimated SLR at two planning horizons (i.e., years 2030 and 2050), presents an evaluation of the impacts of SLR, and considers the potential combined effects of SLR and other sources of flooding that may occur simultaneously due to natural phenomena such as an earthquake or weather related events. The sources of the flooding include tidal flooding, wave and storm surge flooding, riverine inundation, and erosion of the dunes. Descriptions of the potential sources of flooding in combination with SLR are:

1. Tidal Flooding – inundation caused by extreme tides which are combined with SLR for planning horizons 2030 and 2050. Potential impacts could be overtopping of the protective dunes.
2. Wave and Storm Surge Flooding – inundation caused by waves in addition to high water levels. It is equal to the sum of the Stillwater Level (SWL), the wave setup, and wave run-up. Potential impacts could include overtopping of the protective dunes when combined with SLR.
3. Riverine Inundation – inundation caused by flooding of the Santa Clara River that could flood the site from the inland direction, whether due to SLR and/or other natural phenomena (i.e., earthquake induced tsunami or weather events).
4. Erosion of the dunes – The long term exposure of the dunes to wave action that over time could cause failure of the dunes. The likelihood of this occurring increases with SLR.

The following sections of this memorandum provide further detail for each of these potential flooding sources in combination with SLR and evaluate the potential impact to P3.

In summary, the analysis derived from a number of technical resources indicates that SLR in proximity to the proposed P3 may be 2 to 8 inches by 2030 and 7 to 25 inches by 2060 for low to high SLR predicted scenarios.

The predicted SLR elevations would be below the site elevation of 14 feet (North American Vertical Datum, 1988 [NAVD88])) and are below the toe (elevation of approximately 14 feet) of the existing sand dunes along the west property boundary of the site that separate the site from the ocean; the elevation of the top of the beach dunes ranges from approximately 20 to 30 feet. All elevations unless otherwise noted are relative to the NAVD88 datum. If any of the sources of flooding occurs in combination with SLR, the estimated wave-run-up elevation is still anticipated to be below the top of the beach dunes at elevations of 20 to 30 feet. Hence, the existing beach dunes provide adequate protection to the coastline in proximity to P3.

SITE DESCRIPTION

P3 will be developed on approximately 3 acres of previously disturbed vacant brownfield land located within the existing boundaries of Mandalay Generating Station (MGS). MGS is at 393 North Harbor Boulevard, Oxnard, in Ventura County, California - within the Rio De Santa Clara Spanish Land Grant

Sections inferred as 35 and 36, Township 2 North, Range 23 West, on the U.S. Geological Survey Oxnard/Oxnard OE Topographic Map Quadrangles (Latitude: 34.207115; Longitude: 119.250000). The property is bounded by North Harbor Boulevard to the east, undeveloped land and McGrath Lake to the north, the Pacific Ocean to the west, and industrial uses to the south (including a petrochemical facility and the McGrath Peaker Plant). A site vicinity map and aerial project location map are included as Figures 1 and 2, respectively.

MGS currently operates two conventional steam turbine units (Units 1 and 2) and one natural gas combustion turbine unit (Unit 3). Units 1 and 2 were constructed in the 1950s, and have a combined generating capacity of 430 megawatts (MW). Unit 3 was commissioned in 1970, and has a generating capacity of approximately 130 MW.

The California Independent System Operator (CAISO) has recognized the importance of the existing MGS location in providing energy and contingency reserve for the Moorpark Sub-Area of the Big Creek/Ventura Local Reliability Area. Specifically, this location provides essential electrical service to the existing Southern California Edison (SCE) Mandalay switchyard through a dedicated 230-kilovolt (kV) transmission line connection. P3 will ensure the long-term viability of this existing critical generating location and will provide essential electrical service to the residents of Ventura County and the City of Oxnard.

SITE BACKGROUND FOR SEA LEVEL RISE ANALYSIS

The P3 site is located at ground elevation of 14 feet NAVD88. Elevation data used for this analysis are from the NOAA Coastal California TopoBathy Merge Project (NOAA, 2013). The topographic LIDAR data used in this merged project was the 2009-2011 CA Coastal Conservancy LIDAR Project. The data were collected between October 2009 and August 2011. Existing beach dunes separate the ocean and the proposed site. The top of the existing beach dunes range from approximately 20 to 30 feet. The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for Oxnard shows that the coastal zone adjacent to the proposed project is classified as Zone VE with a baseline flood elevation of 13 feet (FEMA, 2010). Storm surge is taken into account when FEMA conducts coastal zone flood analyses, but potential SLR is not.

Inundation from storm surge and wave run-up has occurred at Mandalay Beach Road along Oxnard Shores on several occasions (e.g., 1982-83 El Nino Event, "Great Storm of 1988", FEMA 2015). Mandalay Road is at an elevation of 10 to 12 feet, a few feet lower in elevation than the toe of the dunes fronting the proposed P3 facility. This is consistent with anecdotal observations by MGS personnel that the highest water levels have been at the toe of the dunes at elevation of approximately 12 to 14 feet. A review of large storm events that have caused damage at Oxnard Shores (1960, '63, '65, '71, '78, '83, '88, '95 and '97-98) indicated no impact to the project site with the exception of the need to repair rip-rap at the MGS outfall in 1983.

TIDAL FLOODING

Tidal flooding is inundation caused by extreme tides, which are combined with SLR for future planning horizons (e.g., 2030 and 2050). Predictions for SLR have been developed by various entities, including the California Climate Change Center (2009), Pacific Institute (2009), USACE (2011), National Research Council (NRC) (NRC, 2012), and the Nature Conservancy (ESA-PWA, 2013). Predictions generally are presented for different projection years (e.g., 2030, 2050) and different SLR scenarios (e.g., low, medium, and high).

As explained in the *State Of California Sea-Level Rise Guidance Document*, predictions of SLR involve significant uncertainty – particularly at individual locations. From the *State Of California Sea-Level Rise Guidance Document* (California Coastal Commission, 2013): "We do not believe that there is enough certainty in the sea-level rise projections nor is there a strong scientific rationale for specifying specific sea-level rise values at individual locations along California's coastline. The uncertainties in future sea-level rise projections increase as the projected time horizon is extended forward through the 21st Century. These uncertainties arise from an incomplete understanding of the global climate system, the inherent unpredictability of natural climate variation, the inability of global climate models to accurately represent all important global and regional components, and the need to make assumptions about important climate drivers over future decades (e.g., greenhouse gas emissions, aerosols, land use). For the near future (out to 2030), confidence in the global and regional projections is relatively high, but uncertainty grows larger as the time horizon of the projection is extended forward. There are large uncertainties in projections for 2100 made using any existing methodology, including process-based numerical models, extrapolations, and semi-empirical methods. The actual sea-level rise value for 2100 is likely to fall within the wide uncertainty bounds provided in the NRC West Coast Sea Level Rise Report, but a precise value cannot be specified with any reasonable level of confidence."

P3 will have a project life of approximately 30 years. In light of the project life, and the uncertainty associated with far future projections discussed above, the analysis evaluates potential future impacts through 2050, which would coincide with the end of the expected project life. Figure 3 compares the projections of SLR along the California Coast to other measures of SLR, including estimates of global SLR and Vermeer and Rahmstorf (2009), which is presently used for coastal planning in California. The estimates from NRC (2012) are slightly less than Vermeer and Rahmstorf predictions and similar to projections for global SLR for the year 2050.

Projections from the Ventura County Resilience Study (ESA-PWA, 2013) are summarized in Table 1 for comparison. Predicted SLR, compared to year 2010, is estimated to range from 2.3 inches by year 2030 (low SLR scenario) to as much as 25.3 inches by year 2060 (high SLR scenario). These projections are similar to the results from NRC (2012) which projected SLR increase of 1.57 inches (low estimate) for the year 2030 to a high estimate for the year 2050 of 24 inches. Note that the Resilience Study and the NRC study have different base years, 2010 versus 2000.

Table 1
Sea-Level Rise Predictions

Year	Low SLR	Medium SLR	High SLR
2030	2.3 inches	5.2 inches	8.0 inches
2060	7.4 inches	16.1 inches	25.3 inches

Source: ESA-PWA, 2013
Note:
SLR = Sea-Level Rise

Figure 4 compares the NRC estimates for SLR to the beach and dune elevations at the P3 site. Under non-storm conditions, even with the high projections for SLR rise at the year 2050, the water level will still be below the level of the toe of the dunes. Even assuming a high estimate of SLR, there would still be about 20 feet of freeboard between the top of the dunes and the high water level. Therefore, the existing beach dunes provide protection against coastal inundation to the MGS site, including the P3 project area.

WAVE AND STORM SURGE FLOODING

Wave and storm surge flooding is inundation caused by waves and storm surge, in addition to high water levels. This is referred to as total water level in FEMA flood studies, and is equal to the sum of the stillwater level, the wave setup, and wave run-up. On FEMA flood maps, areas subject to flooding from coastal high water and waves are referred to as V zones, defined as areas subject to inundation by the 1-percent-annual-chance flood event with additional hazards due to storm-induced velocity wave action. The beach fronting the project site is classified as a FEMA zone VE with an elevation of 13 feet, about 1 foot below the elevation of the project site and over 10 feet below the top of the dunes.

The NRC (2012) report presented results for extreme water levels calculated for high seas off San Francisco. Though the numbers may be slightly different for Southern California, the trend should be the same. Figure 5 shows the change in frequency and duration of extreme high seas from the years 1960 to 2100. Extreme high seas are defined as seas that exceed 99.99 percent of water levels (about 4.6 feet above mean sea level). Under existing conditions, individual events of extreme high water last 1 to 2 hours; by mid-century, extreme high water is projected to occur more than 250 hours per decade. However, as can be seen in Figure 5, most of the increase occurs in the last half of the century, after the year 2050, and after the expected end of the P3 project life.

The FEMA VE zone at the project site is 13 feet NAVD88. With SLR of between 7 inches and 2 feet by 2050 (see Table 1 and Figure 3), future wave run-up will be higher. If accretion of the beach due to sediment supplied by the Santa Clara River during large storm events and/or trapping by the jetty and breakwater at Channel Island Harbor (see Section on Erosion below) is similar to the rate of sea level rise, the beach will be able to maintain a similar slope and width as existing. In this case the increase in run-up would be about the same as the increase in sea level. The expected elevation would be about 14 to 16 feet. This would still be well below the top of the dunes.

If the accretion of the beach cannot keep up with SLR, the beach will erode and become narrower. The Ventura County Resilience Study (ESA-PWA 2013) predicted about 130 feet of erosion on Mandalay Beach Road beach. The beach in front of the P3 site varies in width but is generally greater than 300 feet wide. If SLR were to cause erosion of the beach on the order of 130 feet and if seasonal variations in width (the beach tends to be narrower in the winter than in the summer) reduce the width farther during large storm events, large waves could run-up the face of the dunes rather than only on the beach. Since the dunes are steeper than the beach, the additional run-up would be greater than the increase in SLR. Under worst-case conditions (i.e., beach has eroded most of the way back to the dunes, 2 feet of SLR by 2050), the increase in run-up could be on the order of 5 to 10 feet. This would put the new run-up elevation to between 20 and 25 feet (13 ft + 2ft SLR + 5-10 feet additional run-up). This would put the run-up near the top of the dunes. However, for this to occur the beach would need to erode most of the way back to the dunes (over 300 feet). Given that the beach is now stable or accreting and the upper beach is over 10 feet in elevation above mean higher high water, 2 feet of SLR will likely not result in this drastic a change in beach morphology. Thus, the likelihood of wave and storm surge flooding is remote.

RIVERINE INUNDATION

The closest river is the Santa Clara River, approximately 2 miles north of the project site. The project site is not in a FEMA-designated 100-year floodplain associated with the Santa Clara River. The Coastal Resilience Report also does not show the project site in a 100-year floodplain for future year 2060 conditions. The northern portion of the MGS property, where the new P3 facility will be located, is in "Other Areas Zone X" (areas determined to be outside the 0.2 percent annual chance floodplain) (FEMA, 2010). Part of the MGS property is in an "X" zone defined as "Areas of 0.2% annual chance flood; areas

of 1% annual chance flood with average depth of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from the 1% annual chance flood". The "X" zone extends about 3 miles from the project site to the Santa Clara River to the northeast about 3 to 4 miles upstream from the mouth of the river where the river breaks out of its banks and flows over the Oxnard Plain. These flows, if they were to occur, would consist mostly of sheet or shallow flow and could be accommodated in the project design. Therefore, this potential flood source would not impact the project in the future.

EROSION

The long-term exposure of the dunes to wave action can, over time, cause failure of the dunes. The likelihood of this occurring increases with SLR.

Accretion has been occurring along the stretch of beach adjacent to the project site. Aerial photographs of the beach taken between 1947 and 2014 (see Attachment 1) show significant accretion, as shown in Figure 6; the beach pictured in 2014 was approximately 300 feet wider than that pictured in 1947. Because the aerial photographs may not all have been taken at the same part of the tide, and the average daily tidal horizontal variation is about 75 feet, the beach has widened about 200 feet during this period.

The U.S. Geological Survey (USGS) (Barnard, et al, 2009) studied beach erosion and accretion along the coasts of Santa Barbara and Ventura Counties. Beach profiles from 1987 through 2007 were collected at several locations along the coast including along the Mandalay Beach area. The sections showed a general trend of accretion south of the Santa Clara River though not consistently through all times or sections. The study identified the Santa Clara River as a large source of sediment that caused accretion south of the river mouth. This was attributed to large pulses of sediment from the river after large storm events (e.g., January 2005) (Barnard, et al, 2009). Elwany and Diener (2000) evaluated changes in nearshore bathymetry at Mandalay Beach. They reviewed bathymetry data from 1933 to 1987. They reported slight erosion from 1933 to 1977 and stable or modest advancement since 1987. This increase in beach width may also be a consequence of the jetties and breakwater constructed at the mouth of Channel Islands Harbor, which may be trapping sediment and causing accretion.

The Coastal Resilience Report [ESA-PWA, 2013] estimated the amount of shoreline erosion that is expected to occur up to the year 2100. Under worst-case conditions (i.e., high SLR and including potential erosion by a 500-year event), the beach could erode about 130 feet from its current location by year 2060 based on rates reported for Mandalay Beach Road.

Therefore, even given the worst-case scenario outlined above and assuming that historical accretion will not continue, the beach would be approximately the same width in 2050 as it was in 1947.

TSUNAMI INUNDATION

Tsunami Inundation Maps for Emergency Planning developed by CalEMA (2009) were reviewed to determine whether a Tsunami could inundate the P3 project area. A copy of the Tsunami Inundation Map for the Oxnard area is included as Attachment 2. The map shows that the project area is not within the Tsunami inundation zone. The inundation area on the map represents inundation from combining inundation results for an ensemble of source events affecting the Venture County coastline. Therefore, all of the inundation region in a particular area will not likely be inundated during a single tsunami event (CalEMA 2009). The contours on the map found in Attachment 2 indicate that the tsunami is at an elevation of between 10 and 15 feet. To confirm the elevation, the tsunami inundation boundary was compared to the NOAA LIDAR data used for the analysis in this Technical Memorandum. Based on this comparison, the tsunami water elevation at the project site was estimated to be about 14 to 15 feet.

With SLR, it was assumed that the elevation of tsunami would increase by the predicted amount of SLR; which for the P3 site would be between about 7 inches and 2 feet by 2050. With 2 feet of SLR the estimated elevation of the tsunami in 2050 would be 16 to 17 feet. This elevation is still less than the elevation of the ocean front dunes and berm to the north of the facility.

CONCLUSIONS

Climate change is expected to contribute to SLR, and to the frequency and intensity of weather-related events; however, potential future effects related to SLR are not anticipated to have significant impacts on P3 during the expected 30 year life of the project. As noted, SLR alone is anticipated to range from 2 to 25 inches from 2030 to 2050, that when added to high water levels is significantly below the beach dunes along the western boundary of the project site and the levee along the northern edge of the project site. As recommended in the State Of California Sea-Level Rise Guidance Document, consideration should be given to scenarios that combine extreme oceanographic conditions on top of the highest water levels projected to result from SLR over the expected life of a project. The combined effects of SLR, potential erosion of the berm, wave events, and storm surge run-up that could occur during the life of the project through planning horizon 2050 are not expected to adversely impact the project. The potential anticipated elevation of SLR, in combination with any of these natural phenomena or weather induced events, would be below the beach dunes in proximity to the west boundary of the project site.

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Figures

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Source: ESRI Basemap

SITE VICINITY MAP

Puente Power Project Site

NRG
Puente Power Project
April 2015 Oxnard, California

FIGURE 1

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Source: Imagery, USGS 2013

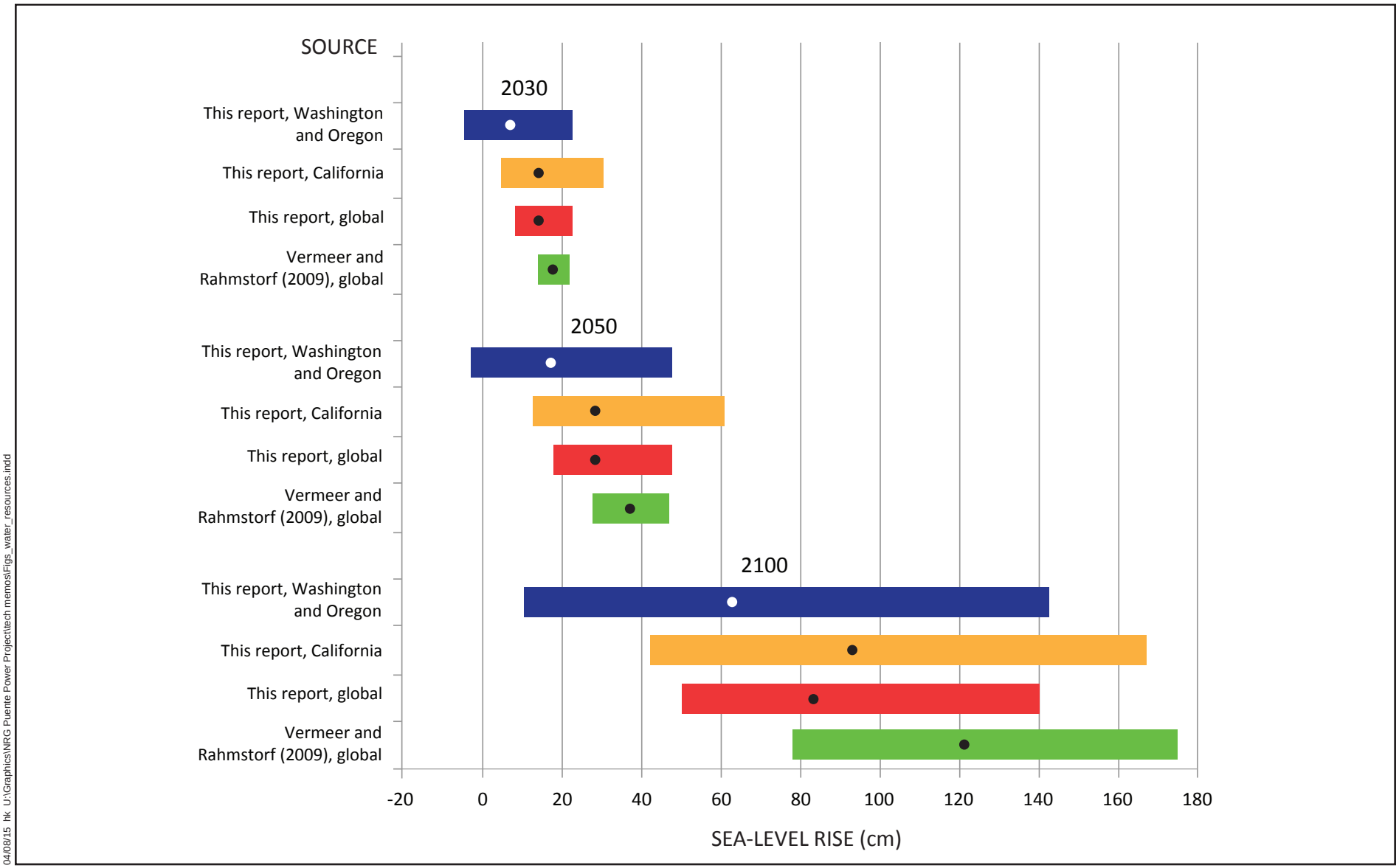
Mandalay Generating Station Property Boundary

Puente Power Project Proposed Boundary

PROJECT LOCATION MAP

NRG
Puente Power Project
April 2015 Oxnard, California

FIGURE 2



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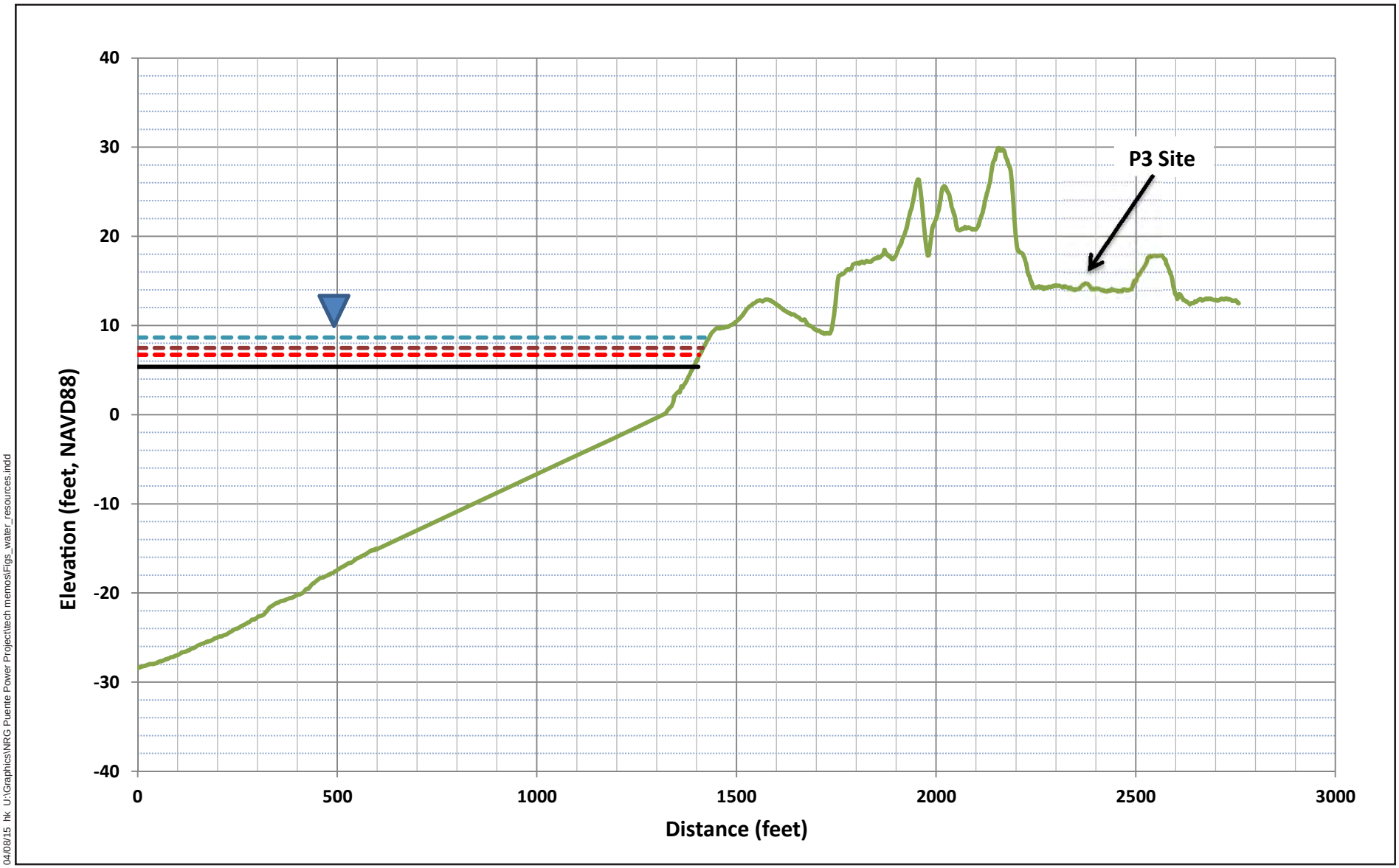
Source: Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future, National Academy of Sciences, 2012.

Note:
1. Committee's projected sea-level rise for California, Oregon, and Washington compared with global projections. The dots are the projected values and the colored bars are the ranges. Washington and Oregon = coastal areas north of Cape Mendocino; California = coastal areas south of Cape Mendocino.

NRC SEA LEVEL RISE PROJECTIONS

NRG
Puente Power Project
April 2015 Oxnard, California

FIGURE 3



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Beach and Dunes Profile at P3 Site

Existing MHHW

MHHW+Low SLR

MHHW+Medium SLR

MHHW+High SLR

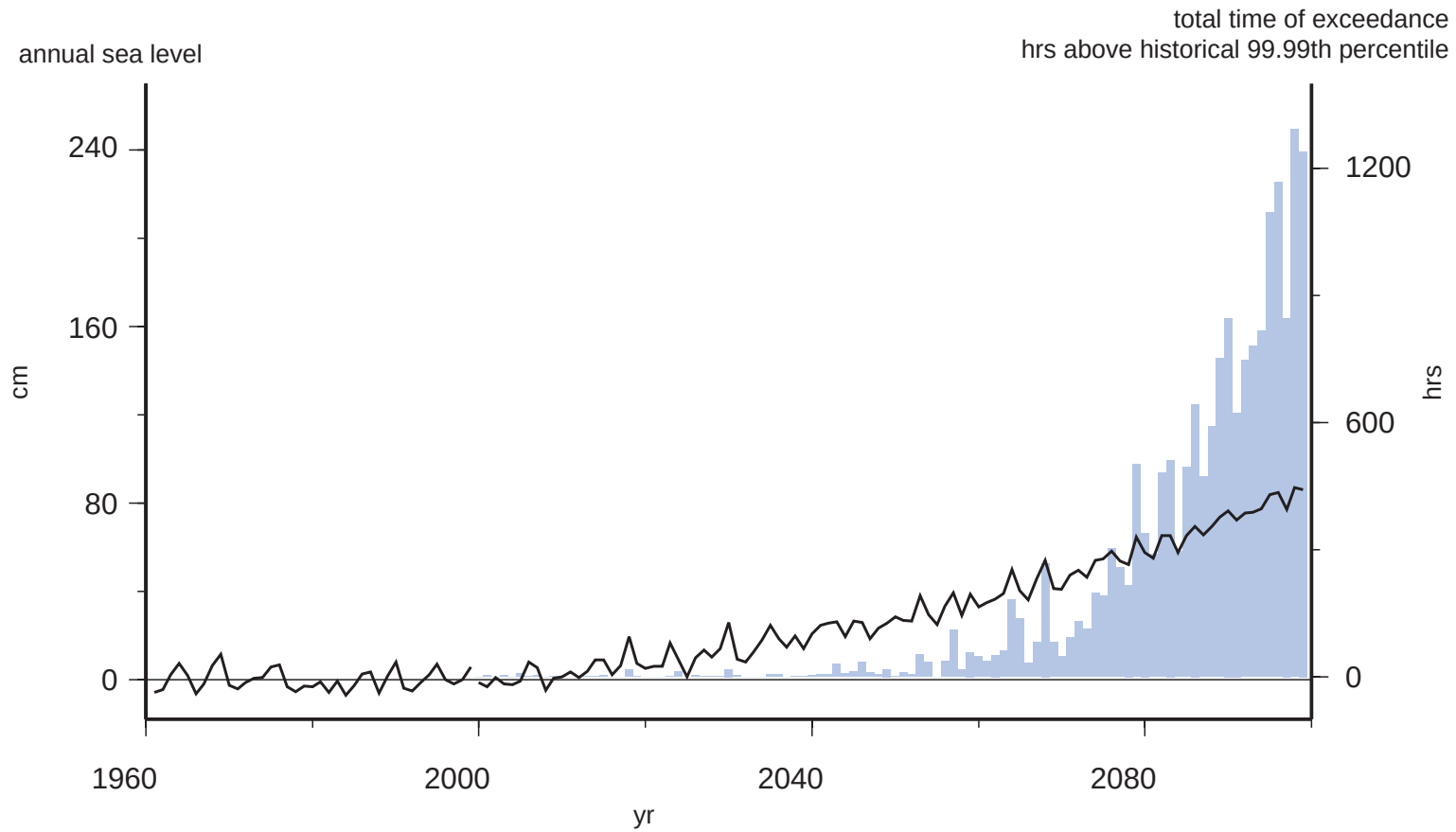
Notes:
1. MHHW=Mean Higher High Water
2. SLR=Sea Level Rise

OCEAN WATER LEVELS AND SEA LEVEL RISE

NRG
Puente Power Project
Oxnard, California

April 2015

FIGURE 4



04/08/15 tk U:\Graphics\NRG Puente Power Project\tech memos\Figs_water_resources.indd

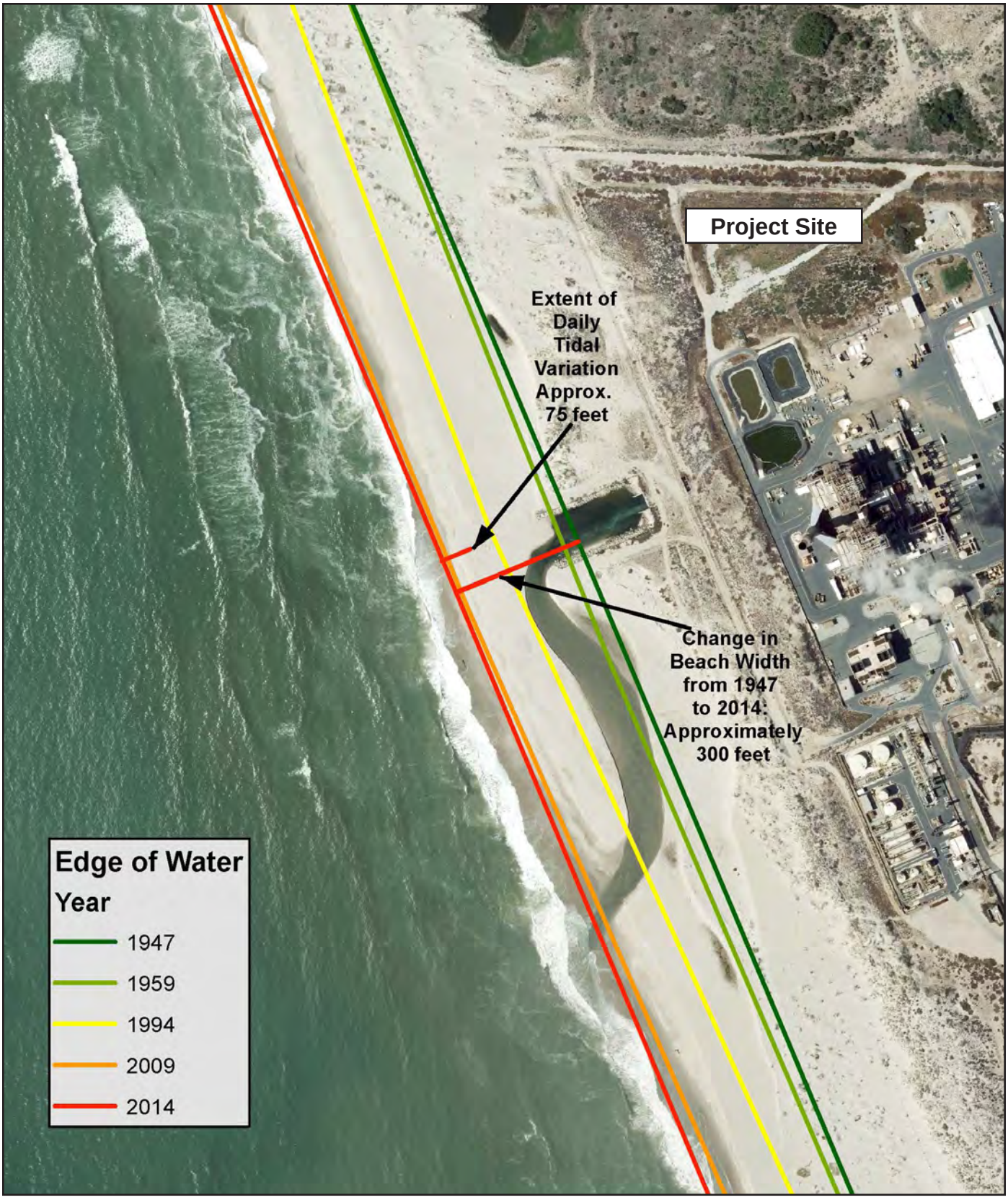
Source: Sea-Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future, National Academy of Sciences, 2012.

Note:
1. Projected number of hours (blue bars) of extremely high sea level off San Francisco under an assumed sea-level rise and climate change scenario. In this exercise, a sea-level event registers as an exceedance when San Francisco's projected sea level exceeds its recent (1970–2000) 99.99th percentile level, 1.4 m above historical mean sea level. In the recent historical period, sea level has exceeded this threshold about one time (1 hour) every 14 months. Sea-level rise (black line) during 1960–1999 was arbitrarily set to zero, then increased to the committee's projected level for the San Francisco area over the 21st century (92 cm). SOURCE: Adapted from Cloern et al. (2011).

PROJECTED NUMBER OF HOURS OF EXTREME HIGH SEA LEVELS

NRG
Puente Power Project
April 2015 Oxnard, California

FIGURE 5



04/08/15 hk U:\Graphics\NRG Puente Power Project\tech memos\Figs_water_resources.indd

Note:
1. Beach position as shown on aerial photographs from 1947-2014.

Not to Scale

MANDALAY BEACH 1947 – 2014

NRG
Puente Power Project
April 2015 Oxnard, California

FIGURE 6

Attachment 1

Historic Aerial Photographs

Mandalay Energy Center Project Site
393 North Harbor Boulevard
Oxnard, CA 93035

Inquiry Number: 4185537.12
January 22, 2015

The EDR Aerial Photo Decade Package

6 Armstrong Road, 4th Floor
Shelton, Connecticut 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

When delivered electronically by EDR, the aerial photo images included with this report are for ONE TIME USE ONLY. Further reproduction of these aerial photo images is prohibited without permission from EDR. For more information contact your EDR Account Executive.

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

Date EDR Searched Historical Sources:

Aerial Photography January 22, 2015

Target Property:

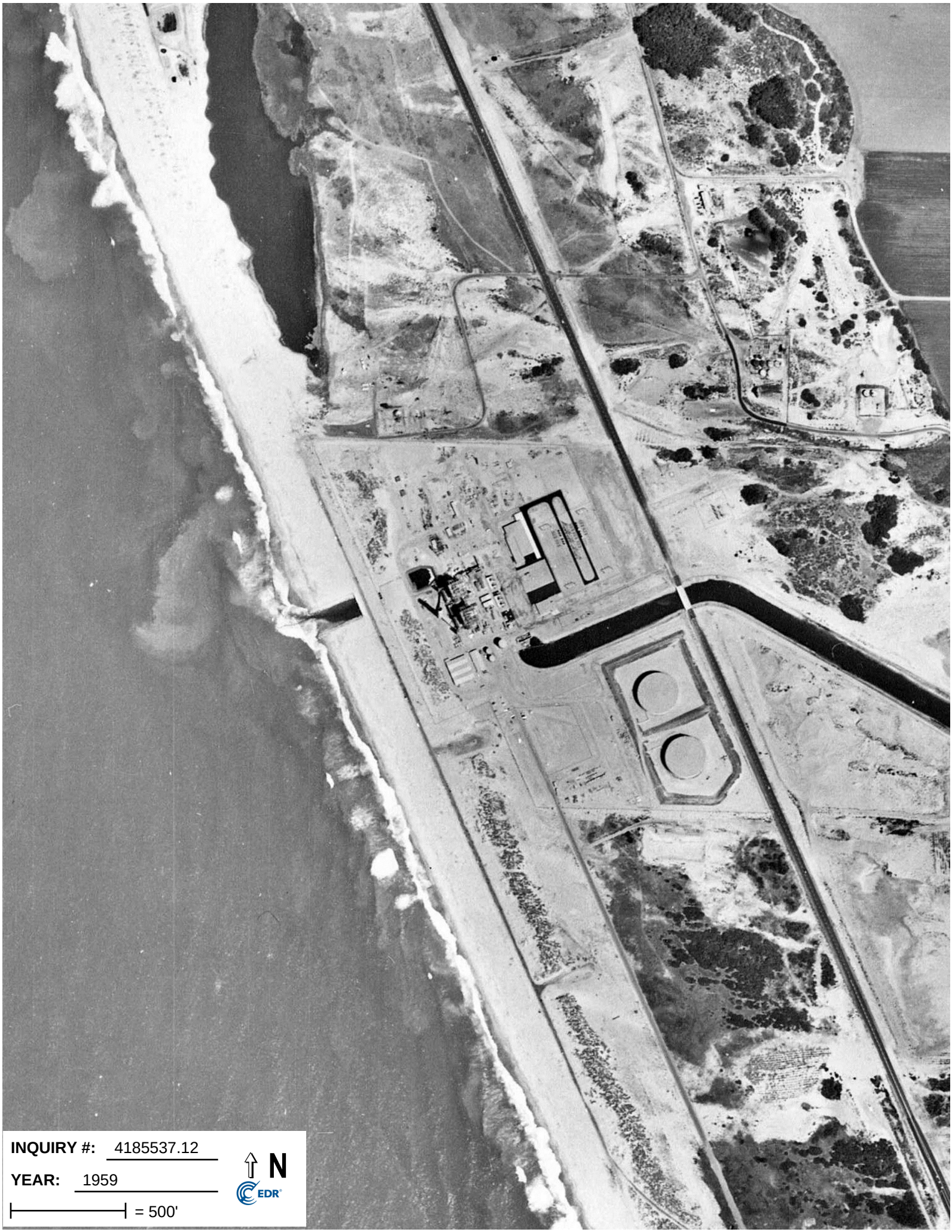
393 North Harbor Boulevard

Oxnard, CA 93035

Year	***Scale***	***Details***	***Source***
1947	Aerial Photograph. Scale: 1"=500'	Flight Year: 1947	USGS
1953	Aerial Photograph. Scale: 1"=500'	Flight Year: 1953	USGS
1959	Aerial Photograph. Scale: 1"=500'	Flight Year: 1959	Robinson
1967	Aerial Photograph. Scale: 1"=500'	Flight Year: 1967	USGS
1977	Aerial Photograph. Scale: 1"=500'	Flight Year: 1977	Teledyne
1984	Aerial Photograph. Scale: 1"=500'	Flight Year: 1984	USGS
1994	Aerial Photograph. Scale: 1"=500'	/DOQQ - acquisition dates: 1994	USGS/DOQQ
2005	Aerial Photograph. Scale: 1"=500'	Flight Year: 2005	USDA/NAIP
2009	Aerial Photograph. Scale: 1"=500'	Flight Year: 2009	USDA/NAIP
2010	Aerial Photograph. Scale: 1"=500'	Flight Year: 2010	USDA/NAIP
2012	Aerial Photograph. Scale: 1"=500'	Flight Year: 2012	USDA/NAIP


INQUIRY #: 4185537.12
YEAR: 1947
= 500'
N
EDR


INQUIRY #: 4185537.12
YEAR: 1953
= 500'
N
EDR



INQUIRY #: 4185537.12

YEAR: 1959

= 500'

N

EDR

INQUIRY #: 4185537.12

YEAR: 1967

= 500'

N

EDR


INQUIRY #: 4185537.12
YEAR: 1977
= 500'
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INQUIRY #: 4185537.12
YEAR: 1984
= 500'
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INQUIRY #: 4185537.12
YEAR: 1994
= 500'
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INQUIRY #: 4185537.12
YEAR: 2005
= 500'
N
EDR


INQUIRY #: 4185537.12
YEAR: 2009
= 500'
N
EDR


INQUIRY #: 4185537.12
YEAR: 2010
= 500'
N
EDR


INQUIRY #: 4185537.12
YEAR: 2012
= 500'
N
EDR

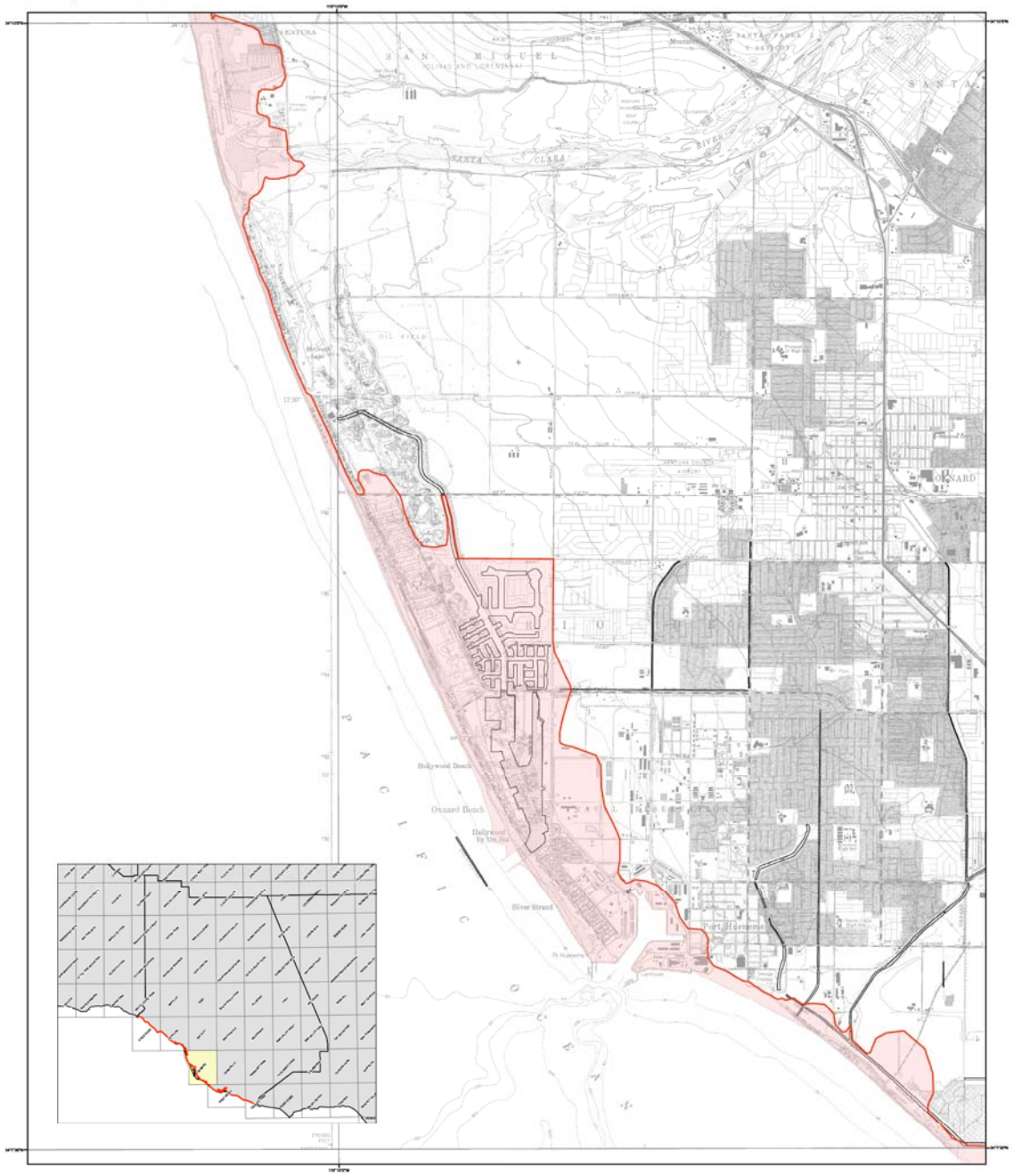
Attachment 2

Tsunami Inundation Map

California Emergency Management Agency
California Geological Survey
University of Southern California

Tsunami Inundation Map for Emergency Planning
Oxnard Quadrangle

State of California
County of Ventura



TSUNAMI INUNDATION MAP FOR EMERGENCY PLANNING

State of California ~ County of Ventura
OXNARD QUADRANGLE

February 15, 2009

SCALE 1:24,000

METHOD OF PREPARATION

Initial tsunami modeling was performed by the University of Southern California (USC) Tsunami Research Center funded through the California Emergency Management Agency (CalEMA) by the National Tsunami Hazard Mitigation Program. The tsunami modeling process utilized the MOST (Method of Splitting Tsunamis) computational program (Version 0), which allows for wave evolution over a variable bathymetry and topography used for the inundation mapping (Titov and Gonzalez, 1997, Titov and Synolakis, 1998).

The bathymetric/topographic data that were used in the tsunami models consist of a series of nested grids. Near-shore grids with a 3 arc-second (75- to 90-meters) resolution or higher, were adjusted to "Mean High Water" sea-level conditions, representing a conservative sea level for the intended use of the tsunami modeling and mapping.

A suite of tsunami source events was selected for modeling, representing realistic local and distant earthquakes and hypothetical extreme undersea, near-shore landslides (Table 1). Local tsunami sources that were considered include offshore reverse-thrust faults, restraining bends on strike-slip fault zones and large submarine landslides capable of significant seafloor displacement and tsunami generation. Distant tsunami sources that were considered include great subduction zone events that are known to have occurred historically (1960 Chile and 1964 Alaska earthquakes) and others which can occur around the Pacific Ocean "Ring of Fire."

In order to enhance the result from the 75- to 90-meter inundation grid data, a method was developed utilizing higher-resolution digital topographic data (3- to 10-meters resolution) that better defines the location of the maximum inundation line (U.S. Geological Survey, 1993; Intermap, 2003; NOAA, 2004). The location of the enhanced inundation line was determined by using digital imagery and terrain data on a GIS platform with consideration given to historic inundation information (Lander, et al., 1993). This information was verified, where possible, by field work coordinated with local county personnel.

The accuracy of the inundation line shown on these maps is subject to limitations in the accuracy and completeness of available terrain and tsunami source information, and the current understanding of tsunami generation and propagation phenomena as expressed in the models. Thus, although an attempt has been made to identify a credible upper bound to inundation at any location along the coastline, it remains possible that actual inundation could be greater in a major tsunami event.

This map does not represent inundation from a single scenario event. It was created by combining inundation results for an ensemble of source events affecting a given region (Table 1). For this reason, all of the inundation region in a particular area will not likely be inundated during a single tsunami event.

References:

Intermap Technologies, Inc., 2003, Intermap product handbook and quick start guide: Intermap NEXTmap document on 5-meter resolution data, 112 p.

Lander, J.F., Lockridge, P.A., and Kozuch, M.J., 1993, Tsunamis Affecting the West Coast of the United States 1806-1992: National Geophysical Data Center Key to Geophysical Record Documentation No. 29, NOAA, NESDIS, NGDC, 242 p.

National Atmospheric and Oceanic Administration (NOAA), 2004, Interferometric Synthetic Aperture Radar (IfSAR) Digital Elevation Models from GeoSAR platform (EarthData): 3-meter resolution data.

Titov, V.V., and Gonzalez, F.I., 1997, Implementation and Testing of the Method of Tsunami Splitting (MOST): NOAA Technical Memorandum ERL PMEL – 112, 11 p.

Titov, V.V., and Synolakis, C.E., 1998, Numerical modeling of tidal wave runup: Journal of Waterways, Port, Coastal and Ocean Engineering, ASCE, 124 (4), pp 157-171.

U.S. Geological Survey, 1993, Digital Elevation Models: National Mapping Program, Technical Instructions, Data Users Guide 5, 48 p.

Table 1: Tsunami sources modeled for the Ventura County coastline.

Sources (M = moment magnitude used in modeled event)		Areas of Inundation Map Coverage and Sources Used		
		Santa Barbara to Ventura	Ventura	Port Hueneme
Local Sources	Anacapa-Dume Fault		X	
	Catalina Fault			X
	Channel Island Thrust Fault	X	X	X
	Santa Monica Fault			
	Goleta Landslide #1	X	X	
	Goleta Landslide #2	X	X	
Distant Sources	Cascadia Subduction Zone #2 (M9.2)		X	
	Central Aleutians Subduction Zone#1 (M8.9)	X	X	X
	Central Aleutians Subduction Zone#2 (M8.9)		X	
	Central Aleutians Subduction Zone#3 (M9.2)	X	X	X
	Chile North Subduction Zone (M9.4)	X	X	X
	1952 Kamchatka Earthquake (M9.0)		X	X
	1960 Chile Earthquake (M9.3)		X	
	1964 Alaska Earthquake (M9.2)	X	X	X
	Japan Subduction Zone #2 (M8.8)		X	
	Kuril Islands Subduction Zone #2 (M8.8)		X	
	Kuril Islands Subduction Zone #3 (M8.8)		X	
	Kuril Islands Subduction Zone #4 (M8.8)		X	

MAP EXPLANATION

Tsunami Inundation Line

Tsunami Inundation Area

PURPOSE OF THIS MAP

This tsunami inundation map was prepared to assist cities and counties in identifying their tsunami hazard. It is intended for local jurisdictional, coastal evacuation planning uses only. This map, and the information presented herein, is not a legal document and does not meet disclosure requirements for real estate transactions nor for any other regulatory purpose.

The inundation map has been compiled with best currently available scientific information. The inundation line represents the maximum considered tsunami runup from a number of extreme, yet realistic, tsunami sources. Tsunamis are rare events, due to a lack of known occurrences in the historical record, this map includes no information about the probability of any tsunami affecting any area within a specific period of time.

Please refer to the following websites for additional information on the construction and/or intended use of the tsunami inundation map:

State of California Emergency Management Agency, Earthquake and Tsunami Program:
http://www.oes.ca.gov/WebPage/oeswebsite.nsf/Content/81EC51BA215931768825741F0056E8D80?OpenDocument

University of Southern California – Tsunami Research Center:
http://www.usc.edu/dept/tsunamis/2005/index.php

State of California Geological Survey Tsunami Information:
http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/Index.htm

National Oceanic and Atmospheric Agency Center for Tsunami Research (MOST model):
http://nctr.pmel.noaa.gov/time/background/models.html

MAP BASE

Topographic base maps prepared by U.S. Geological Survey as part of the 7.5-minute Quadrangle Map Series (originally 1:24,000 scale). Tsunami inundation line boundaries may reflect updated digital orthophotographic and topographic data that can differ significantly from contours shown on the base map.

DISCLAIMER