Moss Landing Power Plant

Morro Bay Power Plant

South Bay Power Plant

Marine Mammal Protection Act

Small Take Permit

Application

February 20, 2001

Prepared by: Duke Engineering & Services

for

Duke Energy Moss Landing LLC

Duke Energy Morro Bay LLC

Duke Energy South Bay LLC

Duke Engineering & Services℠
A Duke Energy Company

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February 21, 2001

Mr. James Lecky
Assistant Administrator
Office of Protected Resources
National Marine Fisheries Service
Southwest Region
501 W. Ocean Blvd., Suite 4200
Long Beach, CA 90802-4213

Subject: Application for Small Take Exemption Permits
Moss Landing Power Plant, Morro Bay Power Plant, and South Bay Power Plant

Dear Mr. Lecky:

Duke Energy Moss Landing LLC, the owner of Moss Landing Power Plant (MLPP), Duke Energy Morro Bay LLC, the owner of Morro Bay Power Plant (MBPP), and Duke Energy South Bay LLC, the owner of South Bay Power Plant (SBPP), hereby submit the enclosed application, pursuant to Section 101(a)(5)(A) of the Marine Mammal Protection Act and in accordance with 50 CFR 216.104.

This application requests separate small take exemption permits for each of the three power plants to authorize the potential incidental taking of a small number of pinnipeds as a result of operations at each of the plants. Although no marine mammal deaths or injuries have been recorded due to operation of these cooling water systems in the past, the applicant requests this authorization in the rare event that such takings occur in the future.

If you have any questions pertaining to this application, please contact me at 916-564-4214.

Sincerely,

DUKE ENGINEERING & SERVICES, INC.

Richard D. Williams
Senior Biologist

bcc: Steve Goschke/James White
Tom Guthrie/Susan Pizzo
Mark Hays
Jim Lynch
Gene McCrillis/Lee Genz
Brian Waters

Attachment

MARINE MAMMAL PROTECTION ACT
SMALL TAKE PERMIT APPLICATION

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MARINE MAMMAL PROTECTION ACT
SMALL TAKE EXEMPTION PERMIT

APPLICATION

1. **A detailed description of the specific activity or class of activities that can be expected to result in incidental taking of marine mammals.**

Moss Landing Power Plant (MLPP) and Morro Bay Power Plant (MBPP) are owned and operated by Duke Energy Moss Landing LLC (DEML) and Duke Energy Morro Bay LLC (DEMB), respectively. South Bay Power Plant is operated by Duke Energy South Bay LLC (DESB). No incidental lethal or injurious takings of marine mammals have been recorded in the past due to operation of the cooling water systems at these three power plants and there is minimal risk of such takings occurring in the future. However, DEML, DEMB AND DESB are requesting a small take exemption permit pursuant to Section 101(a)(5)(A) of the Marine Mammal Protection Act (MMPA) and in accordance with 50 CFR 216.104 in the unlikely event of future incidental takings of any marine mammals under National Marine Fishery Service (NMFS) jurisdiction.

A. Design and History of Power Plant Cooling Water Systems at each Facility

Moss Landing Power Plant

The MLPP is located on the eastern shoreline of Moss Landing Harbor in Monterey County, California, about 110 miles (177 km) south of San Francisco (Figures 1 and 2). Moss Landing Harbor is located roughly midway between the cities of Santa Cruz and Monterey and is open to Monterey Bay. The area around MLPP is sparsely developed with some industrial facilities, extensive agricultural lands, few residences, recreational beaches, and tidal wetlands. The MLPP has two separate intake structures in Moss Landing Harbor for withdrawal of cooling water that is necessary to remove excess heat from the power generation process (Figure 3). One intake previously serviced the now retired Units 1 through 5 and is currently unused. A second intake structure services the presently operating Units 6 and 7. Cooling water from Units 6 and 7 is discharged into Monterey Bay through two (one per unit) subsurface conduits.

MLPP began commercial operation in the early 1950s under the ownership of Pacific Gas and Electric Company (PG&E), and has been generating electrical energy continuously for 50 years. Historically, MLPP had a combined gross capacity of 2,113 megawatts (MW) and a combined cooling water flow of 980,699 gallons per minute (gpm) when all 7 units were operating. PG&E retired Units 1 through 5 from service in 1995. DEML purchased MLPP from PG&E on July 1, 1998, as part of PG&E's divestiture of fossil-fueled power plants and the transition of the

Figure 1. Regional map for Moss Landing Power Plant.

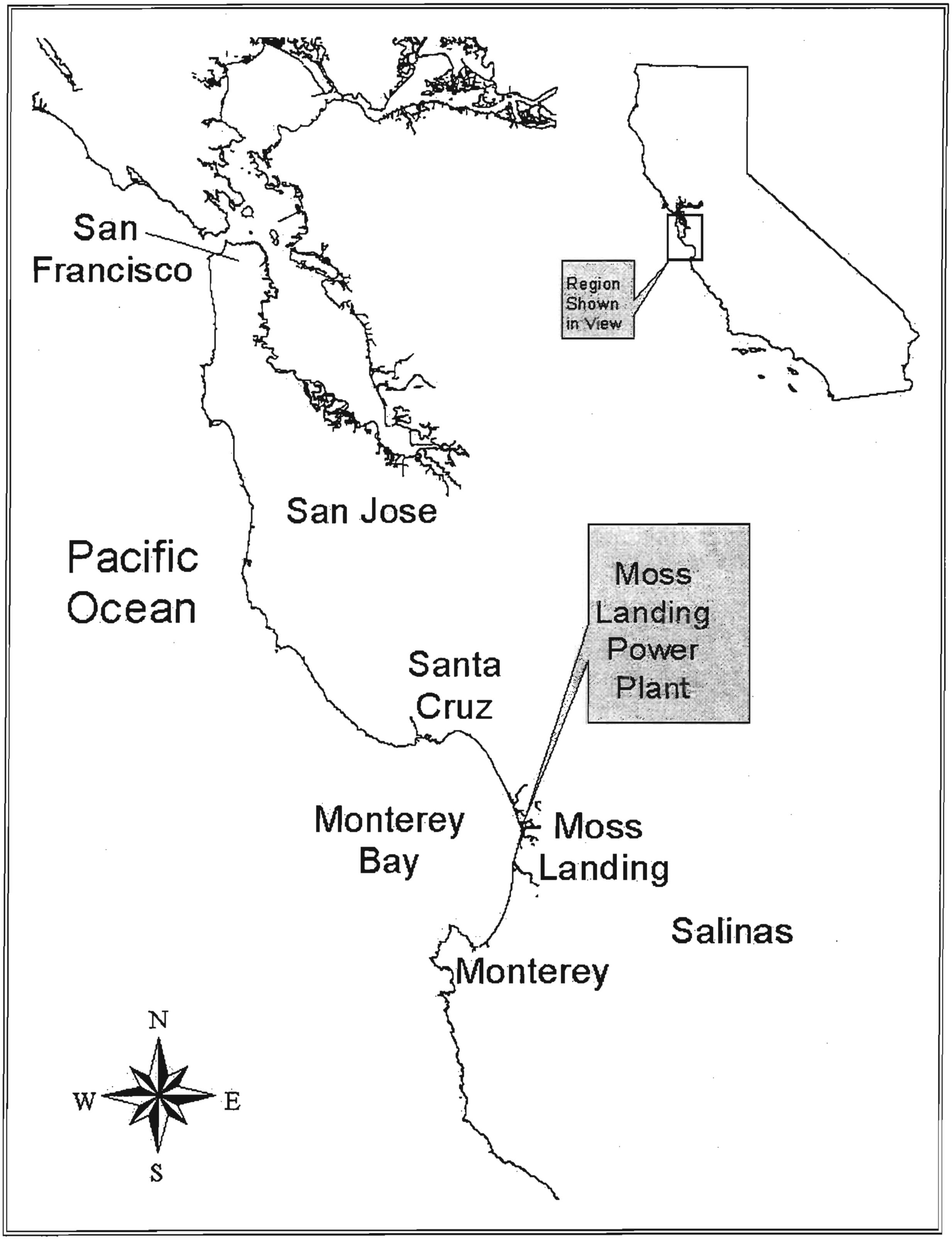


Figure 2. Vicinity map for the Moss Landing Power Plant.

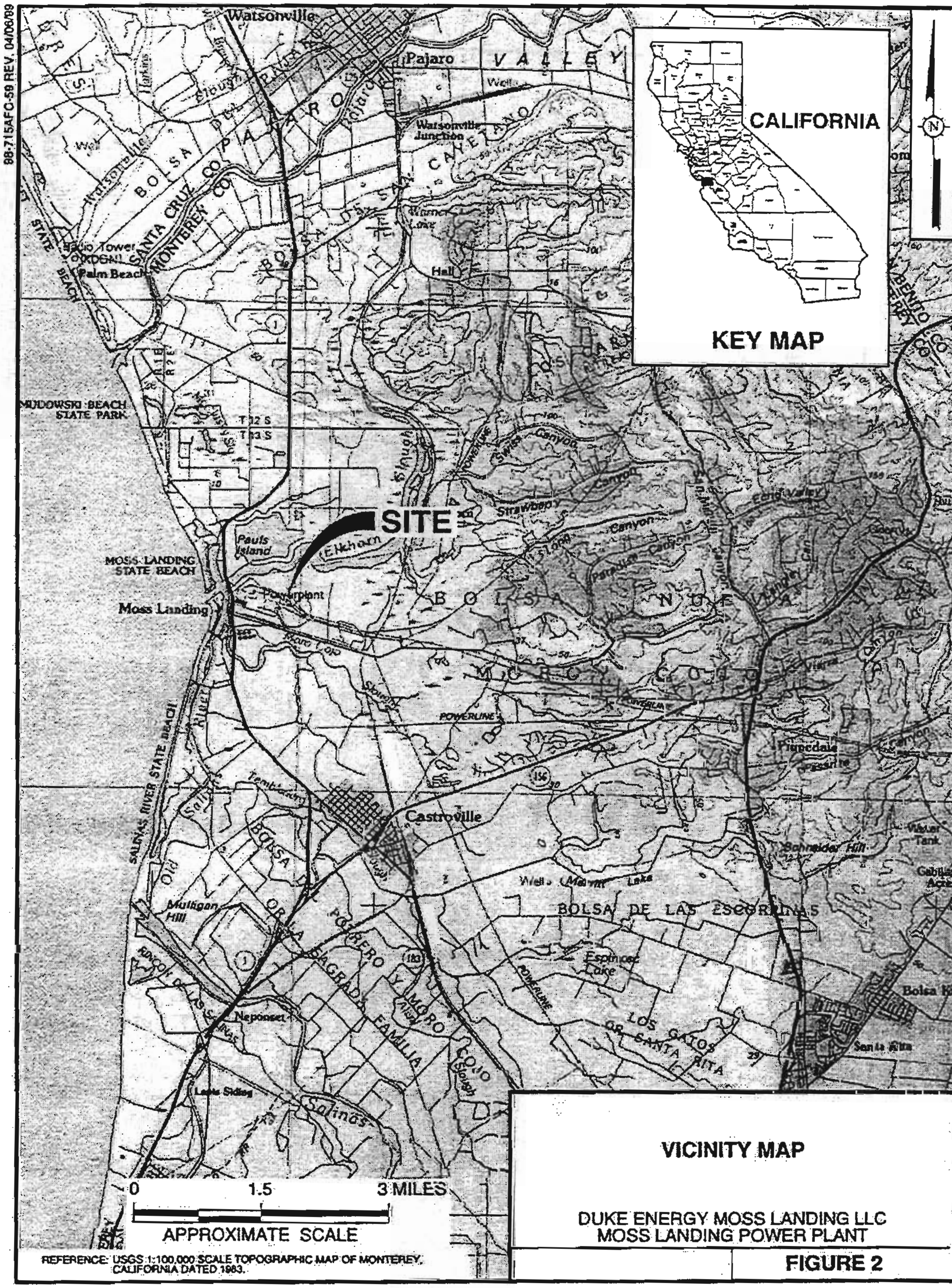
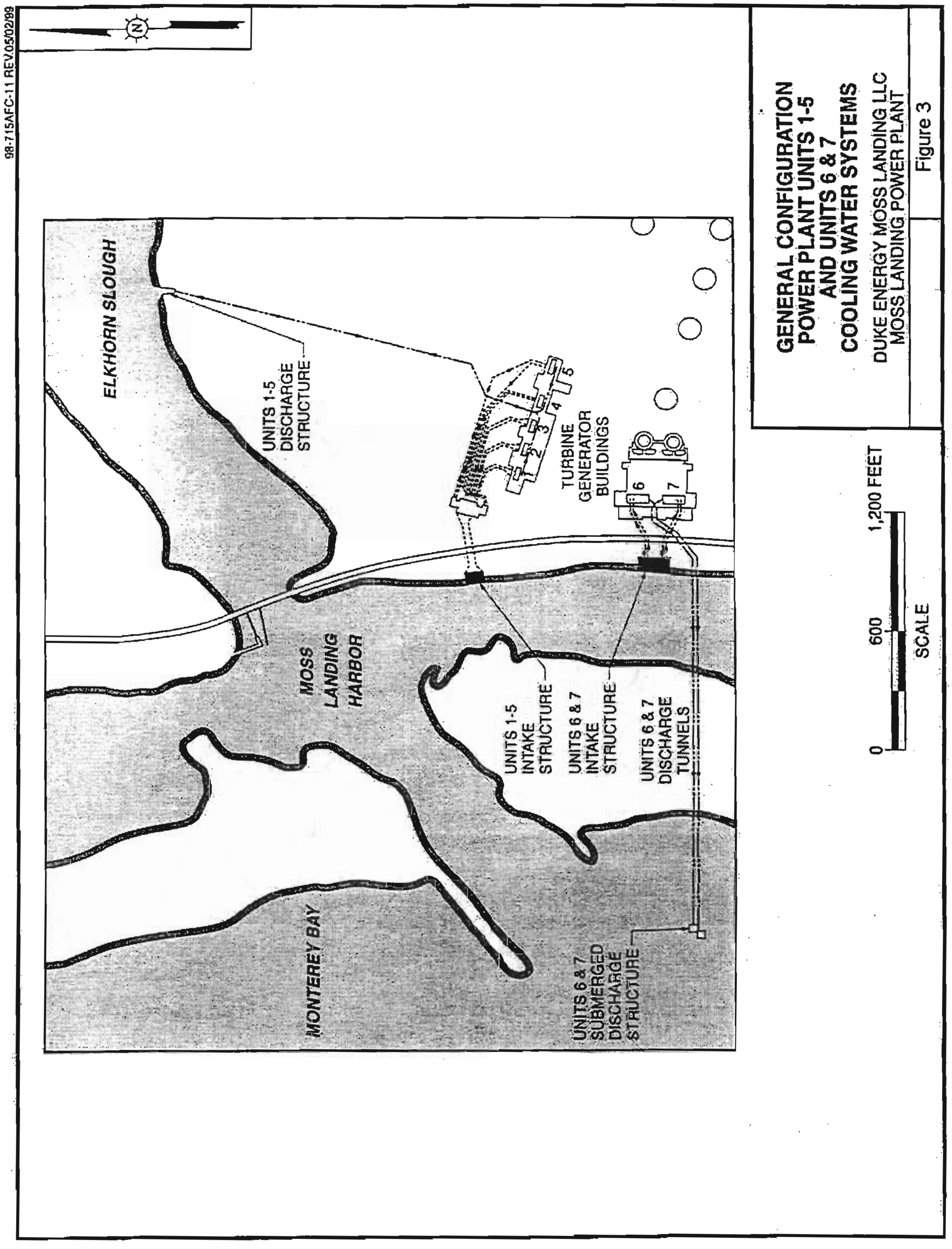


Figure 3. General configuration of cooling water system intake and discharge facilities at Moss Landing Power Plant.



California electric generation market to a competitive market. On October 25, 2000, the California Energy Commission (CEC) issued its Final Decision in support of licensing the modernization of MLPP through the installation of two 530-MW high efficiency combined-cycle units. Each combined-cycle unit will consist of two advanced class combustion turbine generators, two heat recovery steam generators, and a single steam turbine generator. Only the new steam turbine generators will require a significant amount of ocean cooling water. About two-thirds of the total new power output will be produced by the combustion turbine generators, which require no ocean cooling water.

The new combined-cycle units will be capable of generating about 1,060 MW while using about 250,000 gpm of once-through ocean cooling water (at 20 °F [11.1 °C] temperature increase). By comparison, the existing Units 6 and 7 alone require about 600,000 gpm of ocean cooling water (at 28 °F [15.5 °C] temperature increase) to generate the current output of 1,500 MW.

In addition to the new combined-cycle units, DEML will upgrade the existing Units 6 and 7 through replacement of the steam turbine high-pressure rotor, which will add an additional 15 MW of generation capacity per unit. Therefore, the modernization project will yield a total generation capacity of 2,590 MW (i.e., [1,500 MW existing Units 6 and 7] + [30 MW for Units 6 and 7 upgrade] + 1,060 MW for new units]) and all units will be fueled by natural gas.

<u>Intake Structure for Units 1 Through 5</u>

Since 1995, Units 1 through 5 have been removed from service and use of that cooling water system has been discontinued. The existing intake system for Units 1 through 5, which will be renovated to service the new combined-cycle units, is located on the east shore of Moss Landing Harbor (Figure 3). Seawater that is drawn through bar racks at the entrance to the intake structure previously passed under the coast highway through approximately 350 feet of tunnel to reach the traveling screens and circulating water pumps located in a pumpwell structure inside the plant (Figure 4). Each of the five units had two circulating water pumps that historically pumped cooling water to the condensers through two conduits, one serving each condenser half.

The original design had bar racks spaced four inches on center and located about 350 feet in front of six vertical traveling screens, which prevented the entry of large objects into the cooling water system. The vertical traveling screens had a mesh size of 3/8-inch to retain smaller objects. Materials retained by the screens were removed during screen rotation and washing, which was initiated automatically at approximately 24-hour intervals, or when the across-screen hydraulic pressure differential exceeded a predetermined maximum.

The modernization project proposes to modify the existing intake structure previously used for Units 1 through 5 to serve the new units. The traveling screens for the modernized Units 1 through 5 intake will be located as close as practical to the shoreline, thus reducing the length of the intake tunnel upstream of the screens from 350 feet to approximately 10 feet. The new traveling screens will be made of continuously woven 18 x 18 x 14 wire mesh with 3-inch tines to assist with removal of accumulated eelgrass (*Zostera marina*) during the fall season. The wire mesh will have the equivalent of a 5/16-inch opening and will have the maximum width possible to fit between the existing stop log guides.

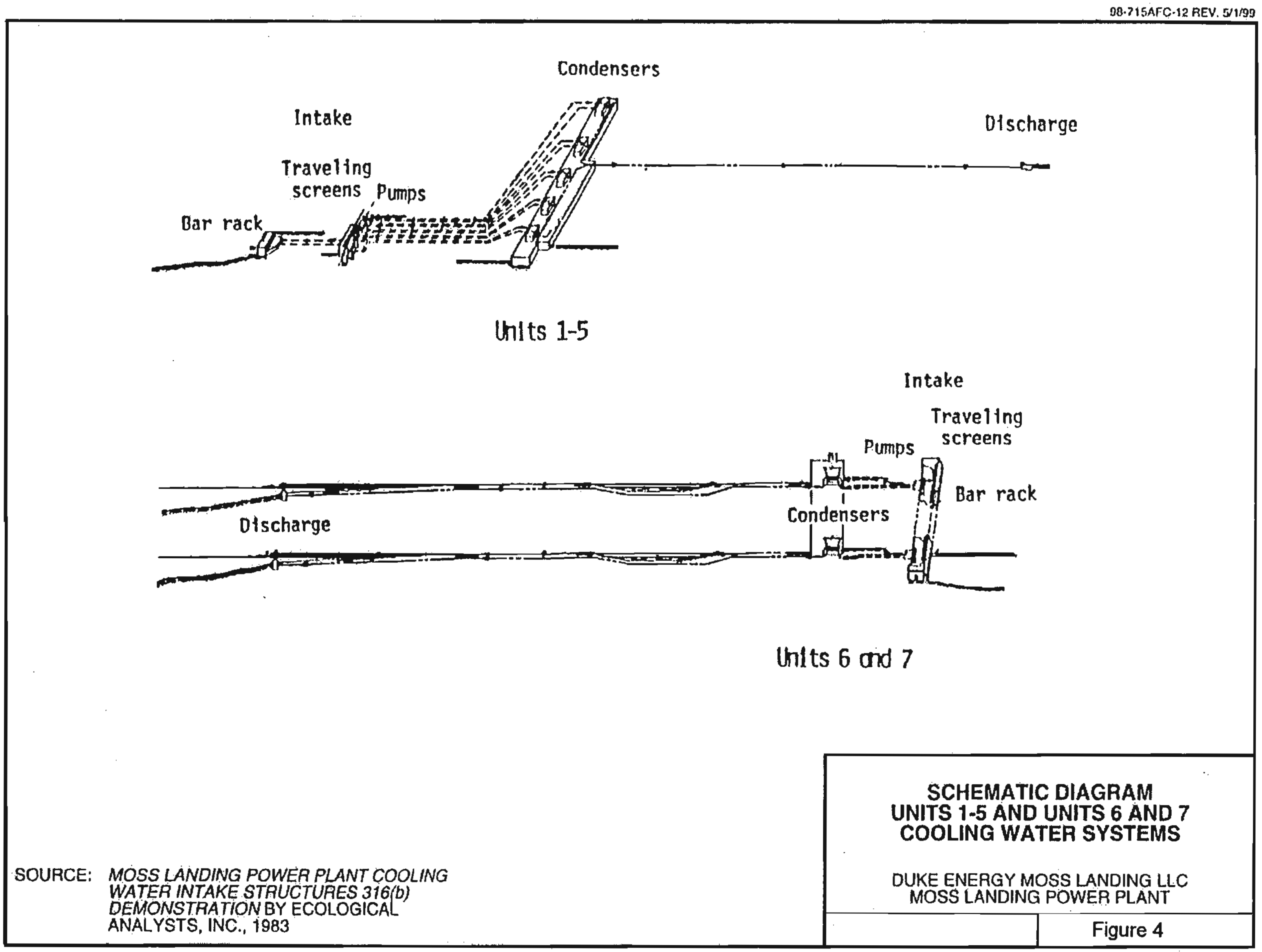


Figure 4. Schematic diagram of cooling water systems at Moss Landing Power Plant.

The cooling water volume pumped through the Units 1 through 5 intake structure will be reduced from 381,000 gpm to 250,000 gpm for the new combined-cycle units. The new traveling screens will be inclined at an approximate angle of 73° from horizontal thus providing more surface screen area that will result in lower through-screen velocities. The lower flow rate approaching the screens and higher cross-sectional area of the screens have the net effect of reducing the approach velocity at maximum capacity and mean low, low water, from the historic value of about 0.9 feet per second (fps) to approximately 0.5 fps for the new units.

0.27 mps 0.15 mps.

Intake Structure for Units 6 and 7

The intake for the once-through seawater cooling system currently serving Units 6 and 7 is located on the shore 700 feet south of the Units 1 through 5 intake structure (Figure 3). This structure consists of bar racks, traveling screens, and circulating water pumps (Figures 4 and 5). The cooling water flow of Unit 6 is separate from that of Unit 7. The bar racks, spaced 4 inches on center, are located about 15 feet in front of 8 vertical traveling screens with 3/8-inch mesh. Material retained by the screens is removed during screen rotation and washing. Washing is initiated automatically either by a timer, at approximately 24-hour intervals under normal operating conditions, or when the hydraulic pressure differential across the screen exceeds a predetermined maximum. During screen washing, spray nozzles wash the collected material into a surrounding sluiceway which empties into a screenwash wet well. The screenwash discharge, less the impinged materials, is returned to Monterey Bay by large-diameter screen refuse pumps that empty into the discharge conduit of Unit 6. The impinged material that separates in the wet well is periodically removed by a local refuse collection contractor and trucked to a sanitary landfill for disposal.

Historic Discharge Structure for Units 1 Through 5

Historically, cooling water from Units 1 through 5 discharged into Elkhorn Slough (Figure 3). The retirement of Units 1 through 5 in 1995 rendered this discharge structure unnecessary and it is not proposed for use with the new units.

Discharge Structure for Units 6 and 7 and the New Combined-Cycle Units

Separate subsurface conduits carry the discharge from Units 6 and 7 to a submerged offshore discharge structure located in Monterey Bay 2,400 feet from the plant and about 550 to 600 feet offshore (Figure 3). The new combined-cycle units cooling water discharge will combine with the existing Units 6 and 7 cooling water discharge lines on-shore, inside the plant. There are no design changes proposed to the existing Units 6 and 7 outfall structures. The tops of the discharge pipes are located approximately 20 feet off the bottom and 20 feet below the surface. 1668-183

The net effect of adding the new combined-cycle units' discharge cooling water to the Units 6 and 7 discharge flow in the existing 12 foot diameter lines is to increase the velocity in the pipe from approximately 5.9 fps to approximately 8.6 fps at maximum flow. It should be noted that in the future, at energy demands at the MLPP of less than about 1,000 MW, the velocity in each pipe will be reduced to approximately 2.5 fps as only the two new more efficient combined-cycle plants will be operating.

Figure 5. Schematic diagrams of Units 6 and 7 intake structure.

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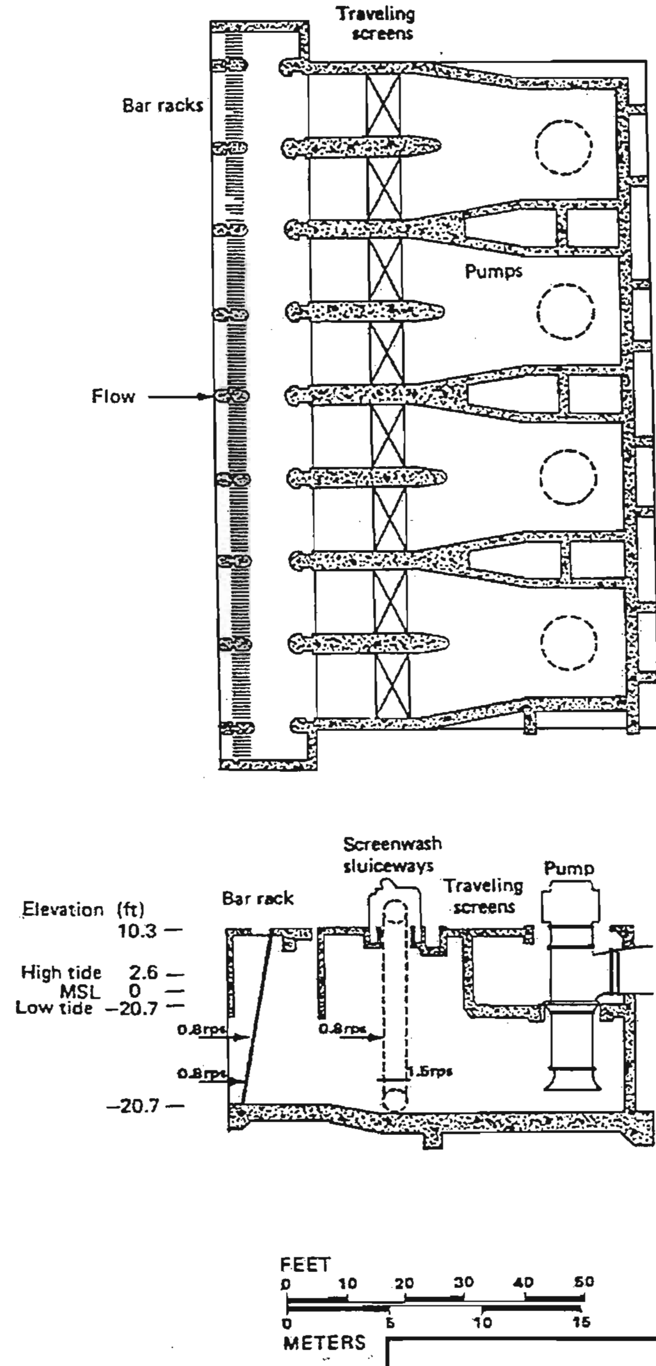


PLAN AND SECTION SCHEMATIC DIAGRAMS UNITS 6 AND 7 INTAKE STRUCTURE

DUKE ENERGY MOSS LANDING LLC
MOSS LANDING POWER PLANT

Figure 5

SOURCE: *MOSS LANDING POWER PLANT COOLING WATER INTAKE STRUCTURES 316(b) DEMONSTRATION* BY ECOLOGICAL ANALYSTS, INC., 1983

Morro Bay Power Plant

The MBPP is located within the City of Morro Bay, San Luis Obisbo County, California, near the eastern shore of Morro Bay Harbor (Figures 6 and 7). The 107-acre plant site is bordered on the west by Embarcadero Road and on the east by Highway 1. Excess heat from the power generation process is removed by a once-through seawater cooling system that includes an intake structure drawing water from Morro Bay and an ocean outfall that discharges water into Estero Bay (Figure 8).

MBPP began commercial operation of Unit 2 (170 MW) in 1955 under the ownership of PG&E and Unit 1 (170 MW) began operation in 1956. PG&E expanded the generation capacity of MBPP with the construction of Units 3 and 4 (345 MW each), which began operating in 1962 and 1963, respectively. These units brought the total production capacity of the plant to 1,030 MW (1,002 MW net).

In July of 1998, DEMB purchased the MBPP from PG&E as part of the transition of the California electricity market to a competitive environment. DEMB filed an Application for Certification with the CEC (Duke Energy 2000) on October 23, 2000, for modernization of the MBPP with a state-of-the-art combustion turbine, combined-cycle electric generating plant that is substantially smaller yet capable of producing more power than the existing facility. The modernization project will increase power generation from the current 1,002 MW to 1,200 MW by constructing two new combined-cycle units, each capable of producing a nominal 600 MW. The new units will replace the currently operating Units 1 and 2 (326 MW) and Units 3 and 4 (676 MW). Pending CEC approval, full-scale commercial operation is expected in late 2003.

Intake Structure

The existing seawater intake structure located on the east shore of Morro Bay Harbor houses eight cooling water pumps (two pumps per unit) and related auxiliary equipment (Figures 9, 10, and 11). The pumps supply cooling water for all four existing units. Monthly average intake water temperatures for 1994 through 1999 ranged from 52 to 64° F. Water is drawn through bar racks spaced four inches on center and located approximately 20 feet in front of vertical traveling screens with a 3/8-inch mesh. The bar racks effectively prevent entry by large objects into the system while the screens exclude small objects. After passing through the traveling screens, water flows to the circulating water pumps located downstream of the screens. As construction of the new combined-cycle units nears completion, new cooling water pumps will be installed in the pump house structure and connections made inside the plant property to re-route the seawater to the new units.

Overall, the amount of seawater used for cooling will decrease significantly with the new combined-cycle units, from 464,000 gpm at the maximum capacity of about 1,000 MW to 330,000 gpm at a maximum capacity of about 1,200 MW. Additionally, the seawater intake flow velocity will decrease. The current design approach to bar racks flow velocity for Units 1 through 4 is 0.5 fps. The flow approach velocity at the bar rack for the new units will be reduced to about 0.3 fps due to their lower cooling water requirements.

Figure 6. Regional map for Morro Bay Power Plant.

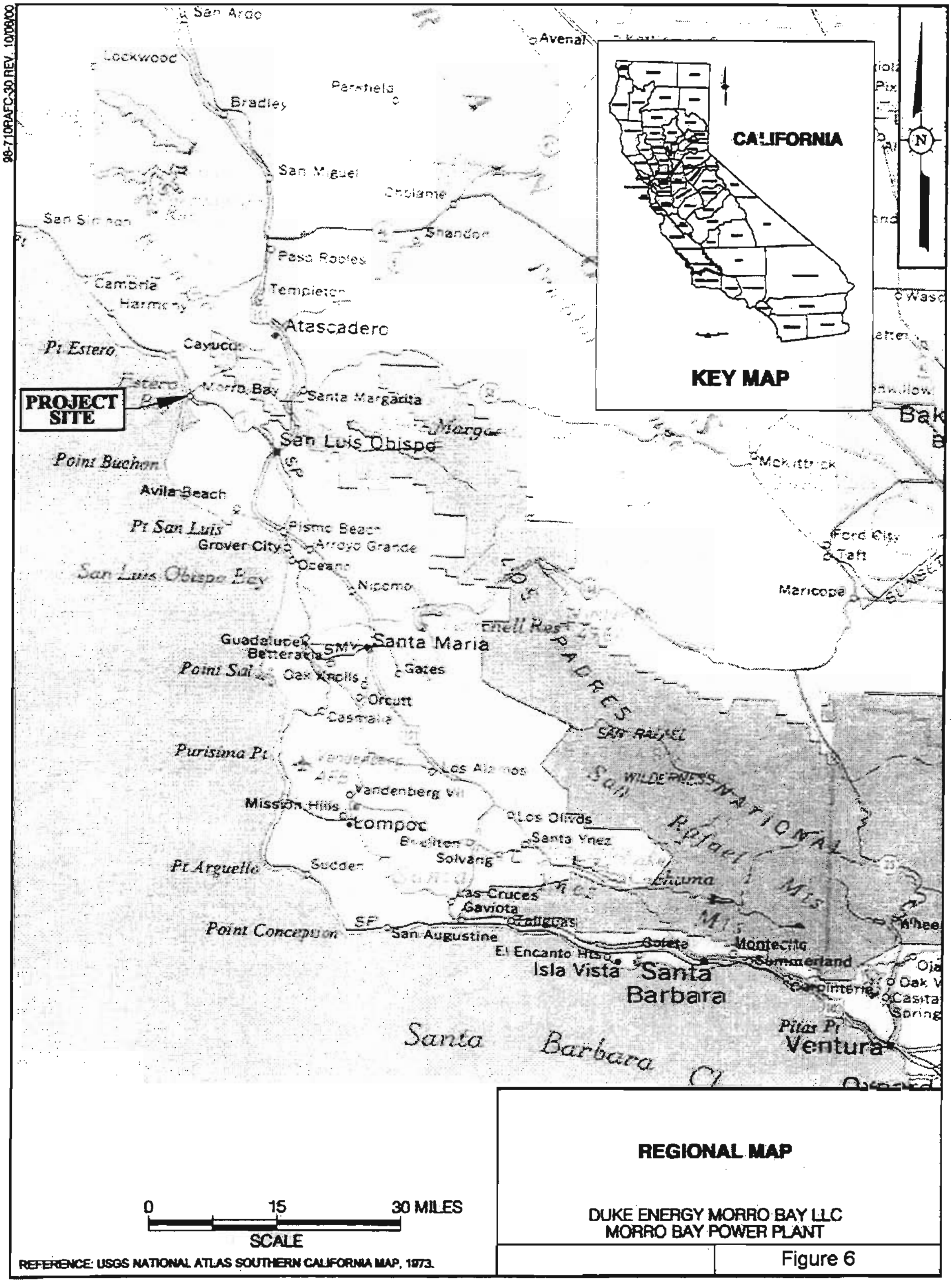


Figure 7. Site map for Morro Bay Power Plant.

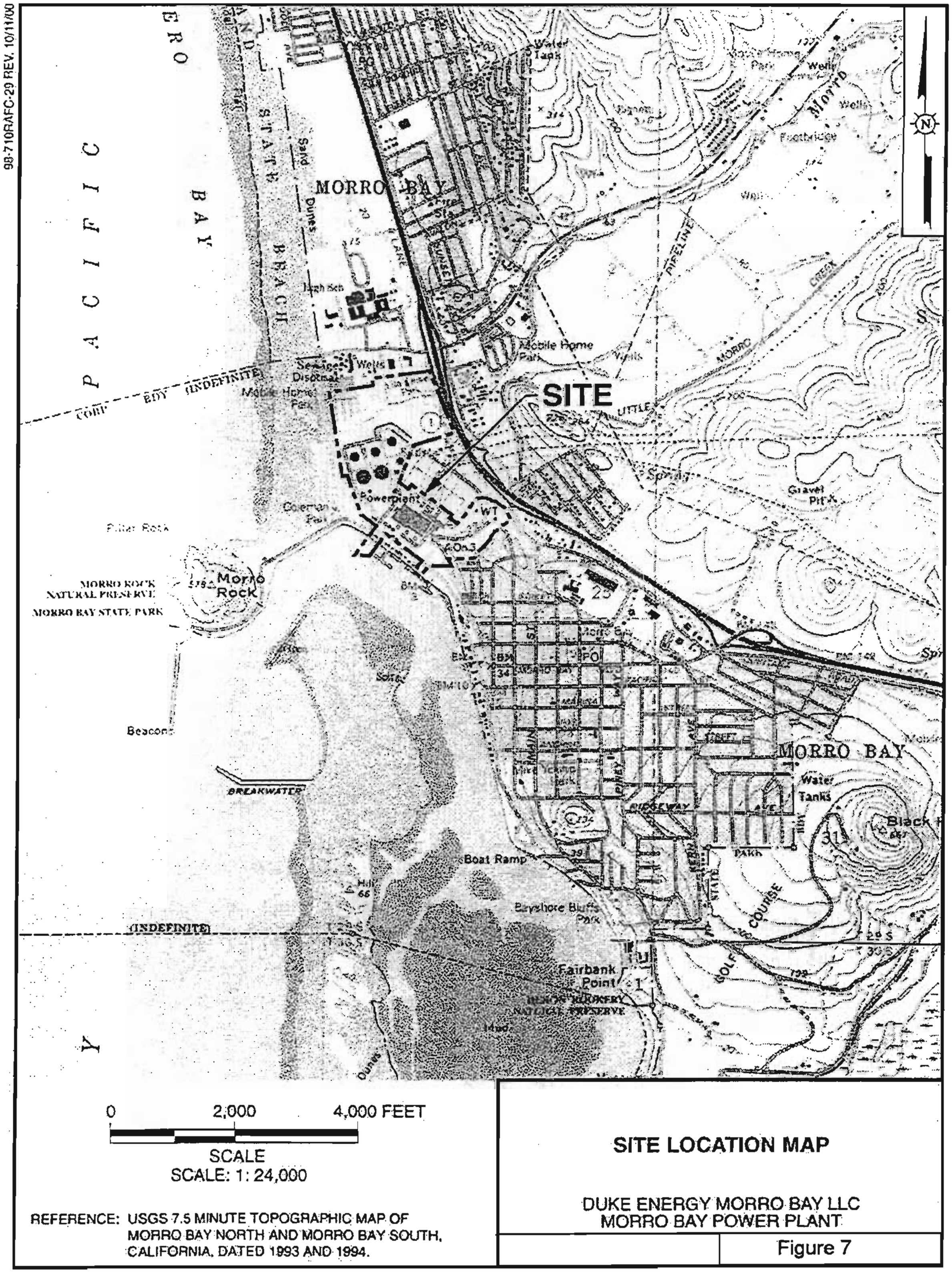
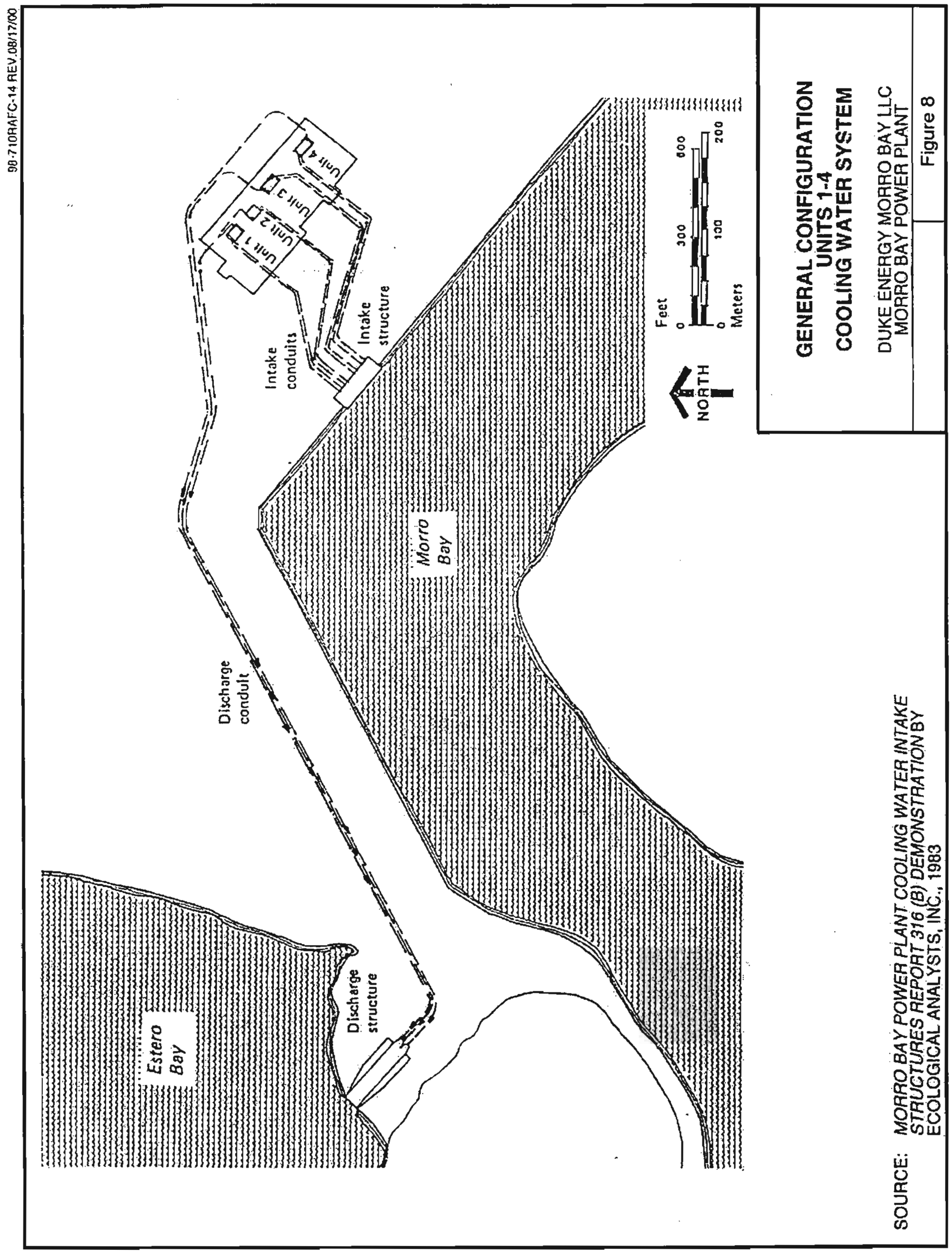


Figure 8. General configuration of the cooling water system at Morro Bay Power Plant.



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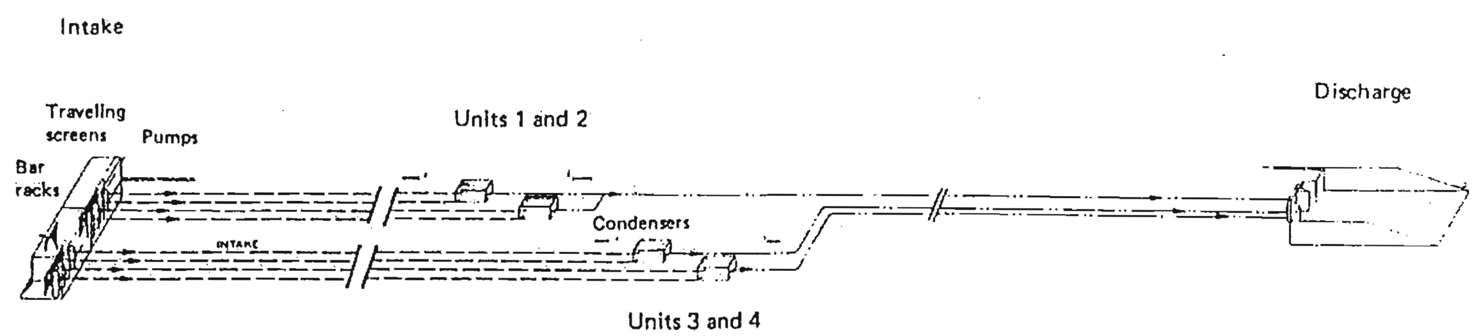

SOURCE: *MORRO BAY POWER PLANT COOLING WATER INTAKE STRUCTURES REPORT 316 (B) DEMONSTRATION* BY ECOLOGICAL ANALYSTS, INC., 1983.

**SCHEMATIC DIAGRAM
UNITS 1-4
COOLING WATER SYSTEM**

DUKE ENERGY MORRO BAY LLC
MORRO BAY POWER PLANT

Figure 9

Figure 9. Schematic diagram of Units 1-4 cooling water system at Morro Bay Power Plant.

Figure 10. Plan and sectional diagrams of Units 1 and 2 intake structure at Morro Bay Power Plant.

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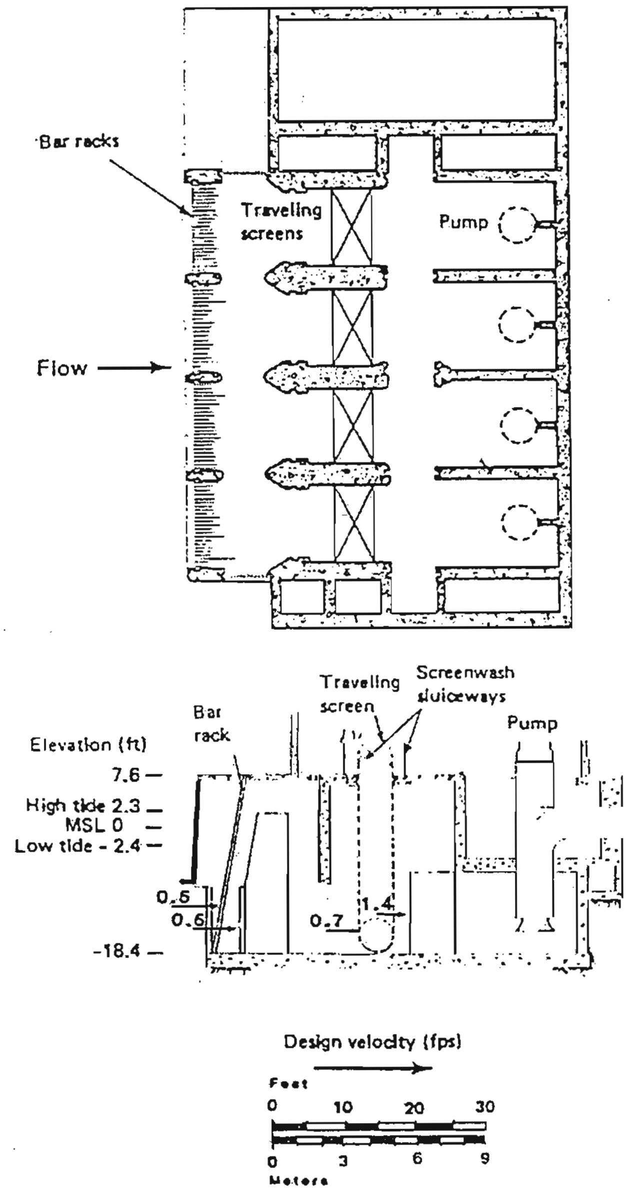

SOURCE: *MORRO BAY POWER PLANT COOLING WATER INTAKE STRUCTURES REPORT 316 (B) DEMONSTRATION* BY ECOLOGICAL ANALYSTS, INC., 1983.

PLAN AND SECTION DIAGRAMS
UNITS 1 AND 2 INTAKE STRUCTURE

DUKE ENERGY MORRO BAY LLC
MORRO BAY POWER PLANT

Figure 10

Figure 11. Plan and section diagrams of Units 3 and 4 intake structure at Morro Bay Power Plant.

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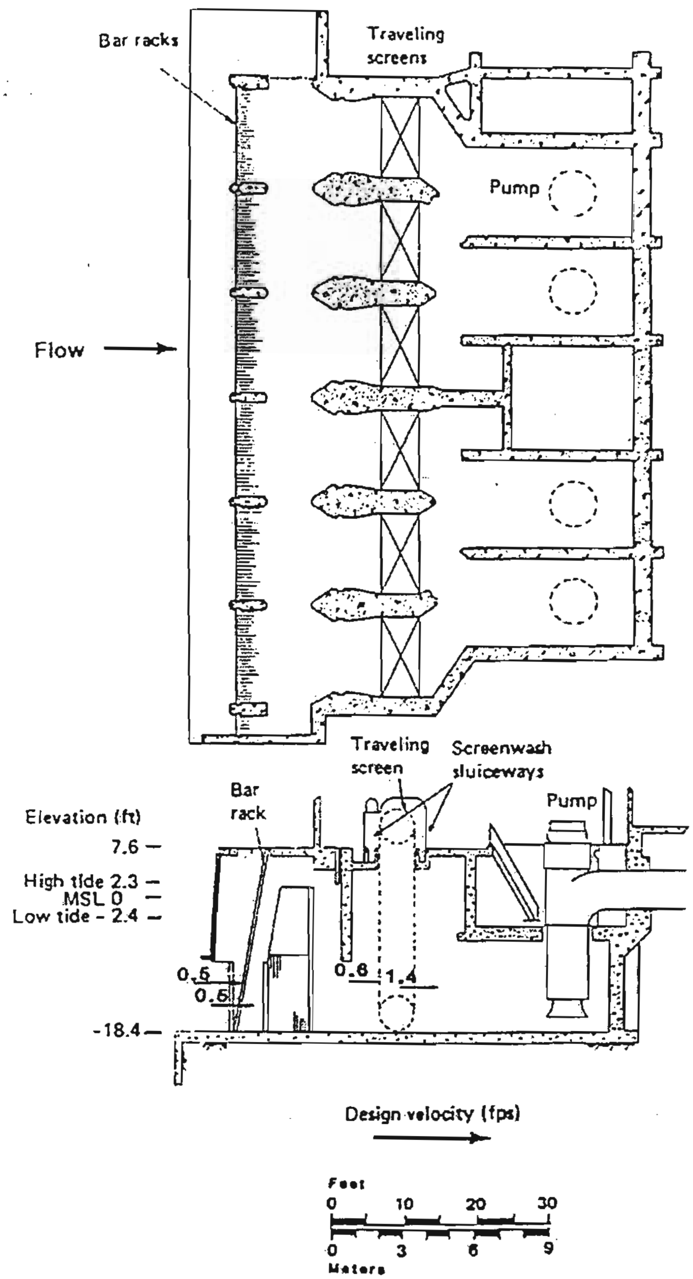


PLAN AND SECTION DIAGRAMS
UNITS 3 AND 4 INTAKE STRUCTURE

DUKE ENERGY MORRO BAY LLC
MORRO BAY POWER PLANT

Figure 11

SOURCE: *MORRO BAY POWER PLANT COOLING WATER INTAKE STRUCTURES REPORT 316 (B) DEMONSTRATION* BY ECOLOGICAL ANALYSTS, INC., 1983.

Discharge Structure
Cooling water is returned to the ocean via a canal supplied by three separate underground tunnels. Units 1 and 2 share a common cooling water discharge tunnel that runs about 3,500 feet from the condensers to a short (275-foot) outfall canal on Estero Bay just north of Morro Rock (Figure 8). Units 3 and 4 each have separate, parallel 4,000-foot long discharge tunnels that also discharge into the outfall canal on Estero Bay (Figure 8). Following construction of the new combined-cycle units, the thermal discharge (in terms of British Thermal Units [BTU] of heat released to the ocean) will be reduced from a maximum of about 73 million BTU/min to a maximum of about 55 million BTU/min. Monthly average discharge water temperatures for 1994 through 1999 ranged from 59 to 78° F.

South Bay Power Plant

The SBPP is located within the City of Chula Vista, San Diego County, California on the extreme southeastern end of San Diego Bay (Figures 12 and 13). The 150-acre facility is located about 2,000 feet west-southwest of the intersection of L Street and Interstate 5 (Figure 14). The topography of the site is moderate to flat and generally slopes westward toward San Diego Bay. Several streams and storm channels drain into south San Diego Bay in the vicinity of the plant's cooling water intake. These include the Sweetwater River and "J" Street Channel which discharge to the Bay north of the plant; the Telegraph Canyon storm channel which crosses the Plant property; and the Palomar Drain and Otay River which discharge to the bay to the south and west of the Plant, respectively. These drainages collect water from the Sweetwater and Otay Hydrographic Units and their discharges influence the quality of the bay water that makes up the plant's intake cooling water.

The power plant burns natural gas, with the capability of burning oil, to generate electricity via four steam-powered generating units (Units 1 - 4) and a smaller gas turbine unit. Units 1 (145 MW net), 2 (150 MW net), 3 (175 MW net), and 4 (222 MW net) began operating in July 1960, June 1962, September 1964, and December 1971, respectively, under the ownership of San Diego Gas & Electric Company (SDG&E). A gas turbine (15 MW net) was installed and began operation in October 1966; however, this unit does not use cooling water. Each of these units can generate independently or in conjunction with each other. DESB assumed responsibility for operation of the facility on April 23, 1999.

The excess heat from the power generation process is removed by a once-through seawater cooling system that includes an intake structure that draws water from San Diego Bay (SDG&E 1980). The cooling water system utilizes up to 601.1 million gallons per day of bay water to condense steam and cool auxiliary equipment. The quantity of cooling water circulated through the plant is dependent upon the number of steam turbine generator units in operation. Water is drawn into a shared intake structure for Units 1 and 2, and individual cooling intake structures for Units 3 and 4, pumped through steam condensers and heat exchangers, and then discharged back to San Diego Bay through separate discharge pipes for each unit (Figure 15). The intake and discharge channels are separated by a 7,000-foot long earthen dike built in 1963 to reduce the mixing rate between the intake and discharge waters. The dike was expanded with fill material in 1978-79 and now forms the Chula Vista Wildlife Island, with access controlled by DESB and the Port of San Diego, and management of the wildlife resource values performed by the U.S. Fish and Wildlife Service (USFWS).

Figure 12. Regional map of the South Bay Power Plant.

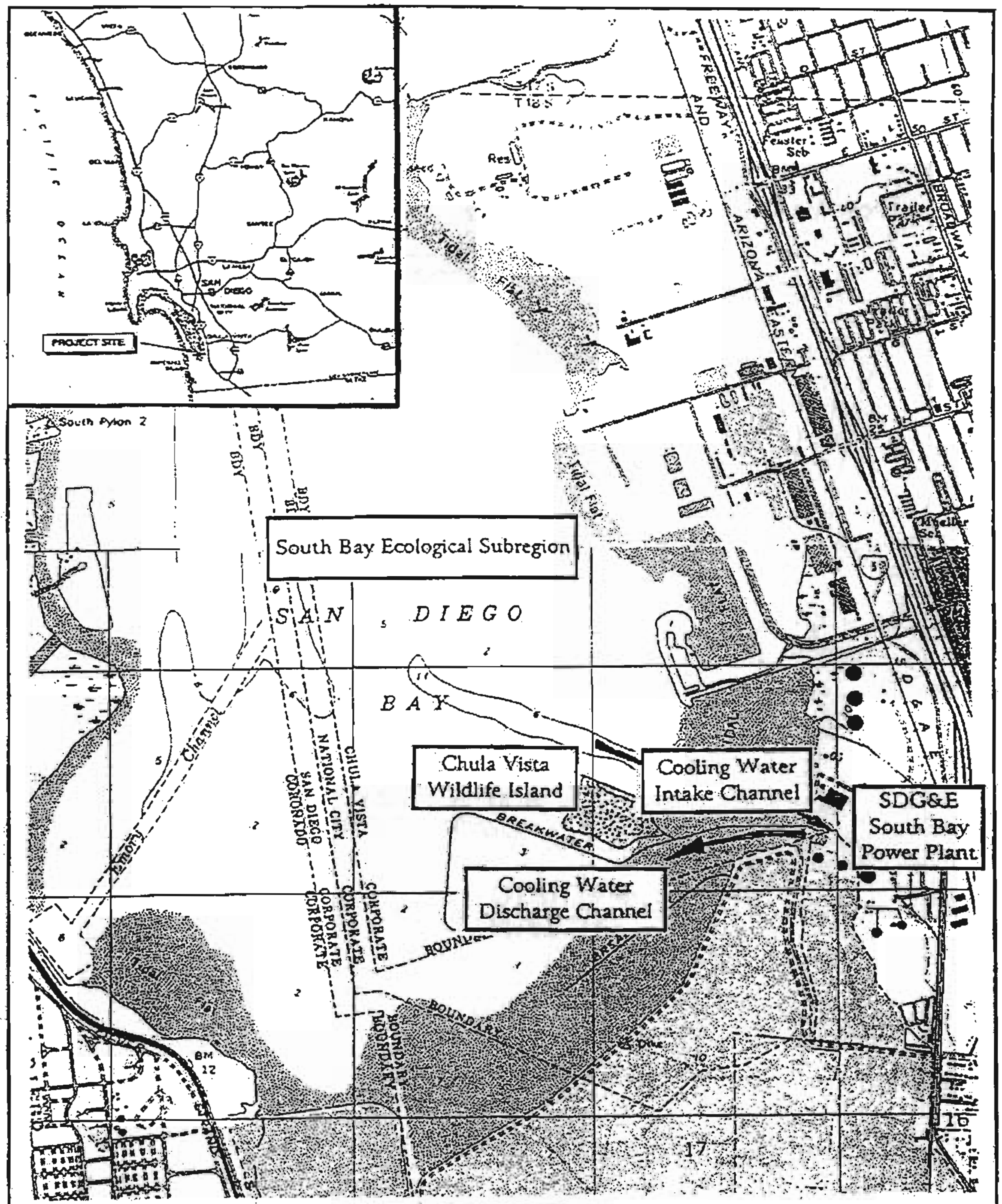
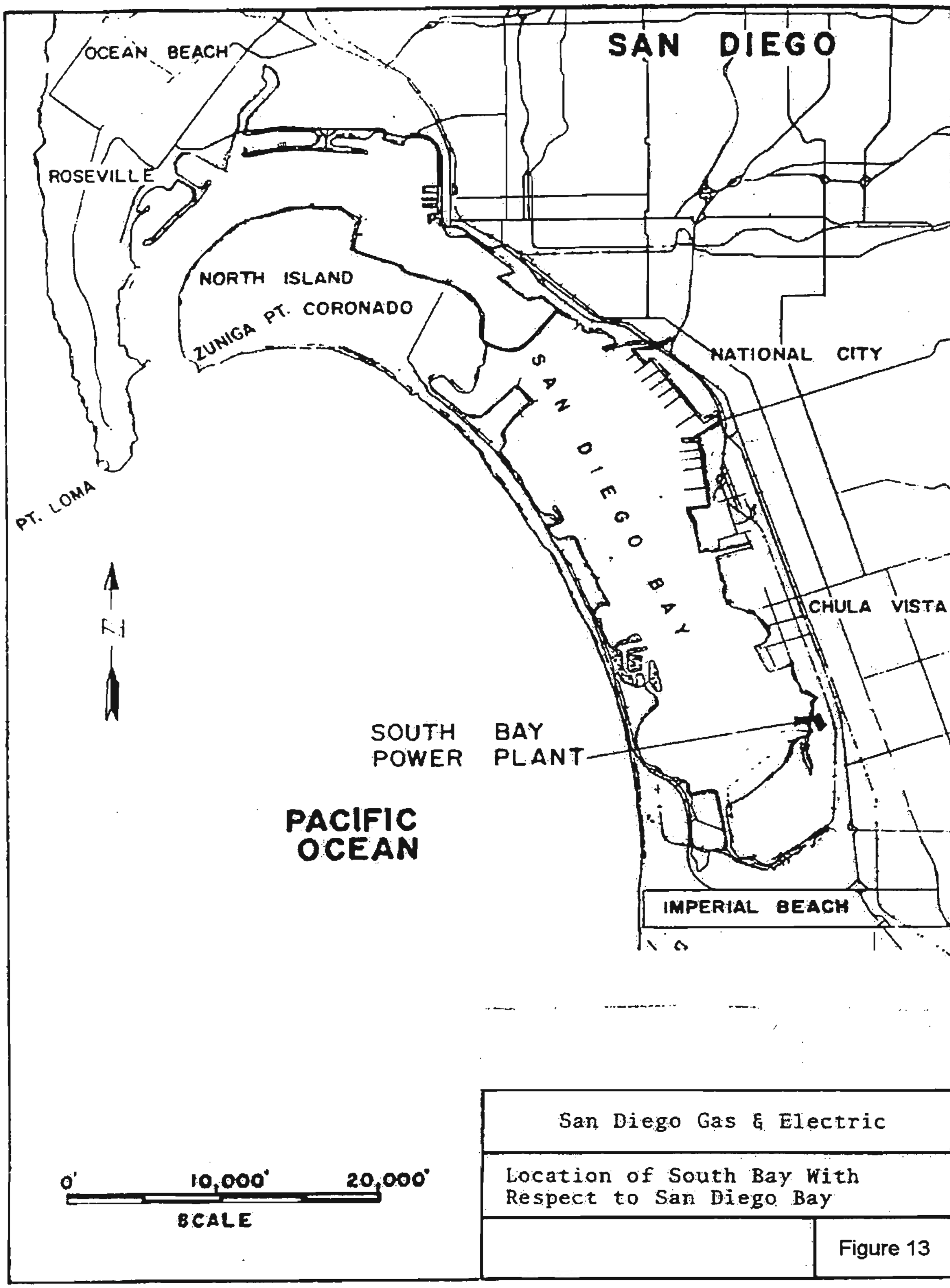


Figure 12. South San Diego Bay study region.
Base MapSource: USGS 7.5' Imperial Beach, Point Loma and National City, CA Quadrangles

Figure 13. Vicinity map of the South Bay Power Plant.



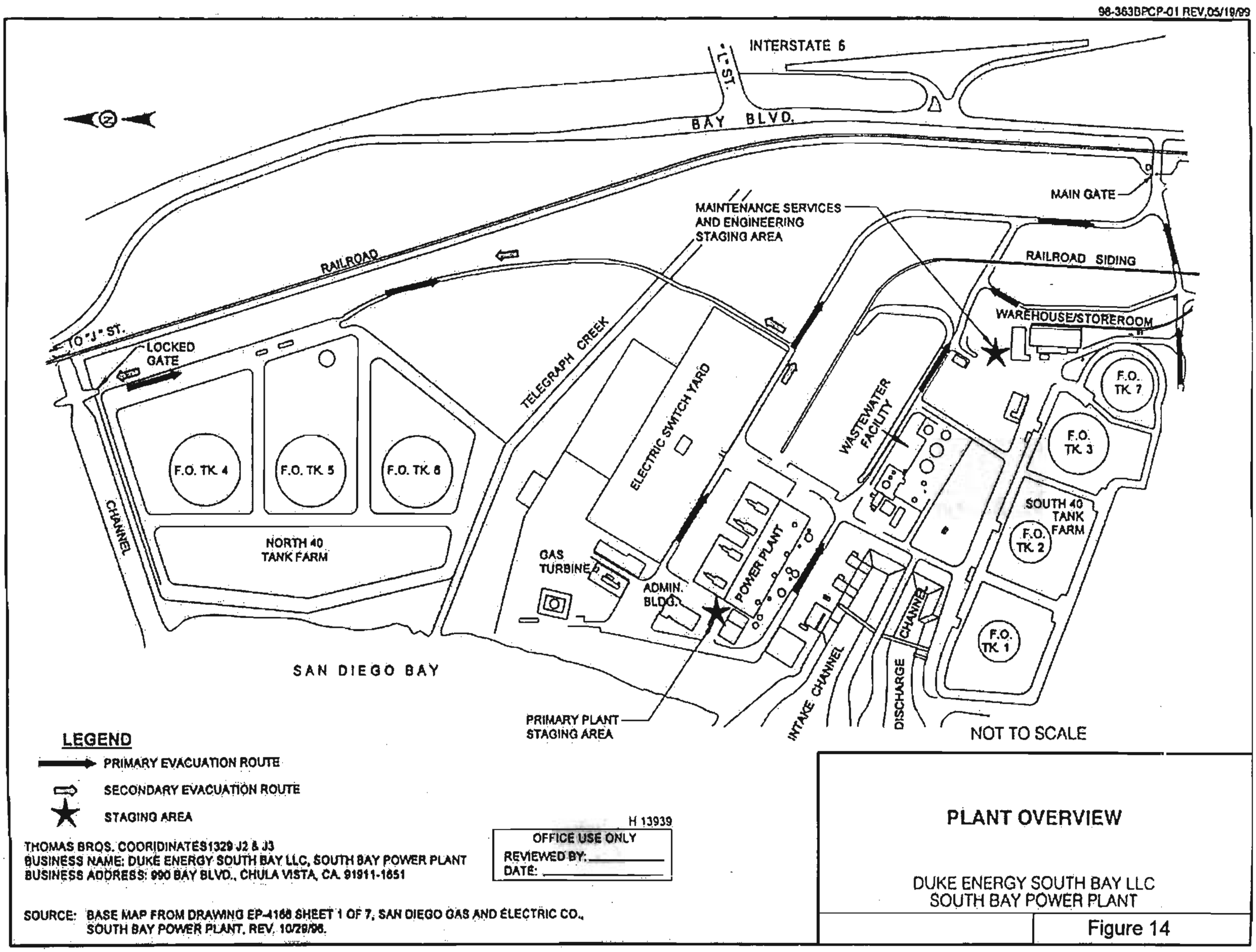
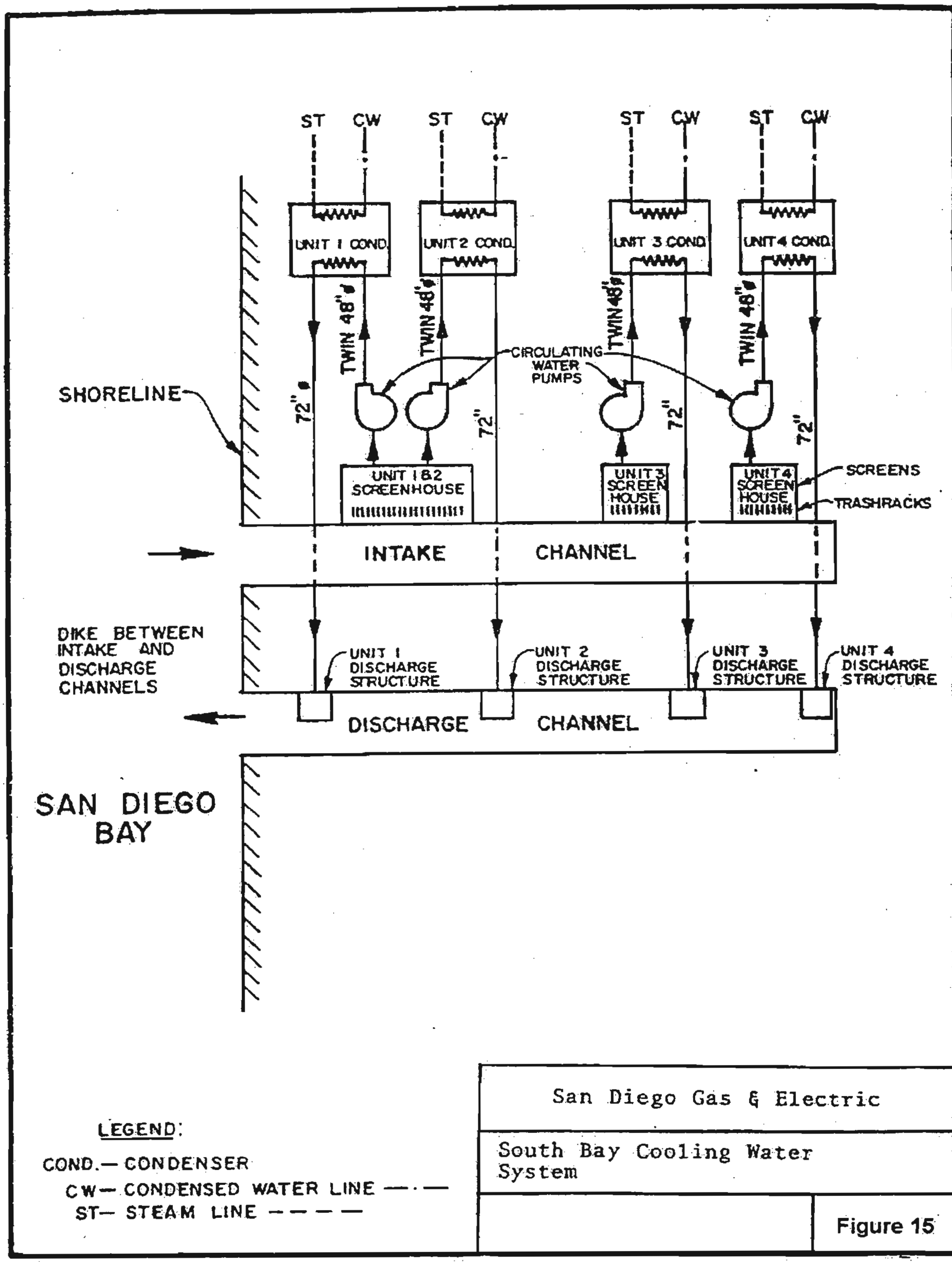


Figure 14. Site map for the South Bay Power Plant.

Figure 15. Schematic diagram of the cooling water system at South Bay Power Plant.



Intake System and Structures

The intake structure is located about 200 feet from the power plant at the head of the intake channel extending from San Diego Bay (Figures 14 and 15). The intake channel was designed to have a bottom width of 200 feet at its widest point and taper to 50 feet near the Unit 4 screenhouse. The bottom elevation of the channel was designed to be approximately 15 feet below mean sea level. The channel was constructed through dredging and diking. Over the years some filing in has occurred, although it has been minimal in the area near the units' screens. Variations in the water surface due to the tide are from a low of –5.0 feet to a high of +5.7 feet.

Floating booms are situated in the intake channel in front of the circulating water intake structures to retain large floating debris washed in from the bay. As the cooling water flows into each intake structure, it passes through trash racks with bars located 3.5 inches apart on center. The racks prevent the passage of large debris.

The power plant has three separate screen structures for its 4 units. Units 1 and 2 are served by one screen structure with four traveling screens. Units 3 and 4 are served by separate screen structures with two traveling screens each. Water flowing in the intake channel approaches the screens for Units 1 and 2, Unit 3, and Unit 4 in that order. The horizontal distance between the screens for Units 1 and 2 and the Unit 3 screens is approximately 131 feet; the distance between the individual screens for Units 3 and 4 is approximately 93 feet. The height of each of the three screen structures is 27.5 feet. Screen structure widths are 63.5 feet, 32.0 feet, and 31.0 feet for Units 1 and 2, Unit 3, and Unit 4, respectively. The intake openings in each screen structure are all 11.25 feet wide.

The velocity of the cooling water as it approaches the traveling water screens varies with unit operation, water level, and amount of debris on the screens. Calculated maximum velocities at high and low tides with completely clean screens ranges from a low of 0.4 fps (Units 1 and 2 during high tide) to a high of 1.5 fps (Unit 4 during low tide). As cooling water flows through the screen structures, it passes through 3/8-inch mesh traveling screens (except for Unit 1 east, Unit 2 east and west, and Unit 4 west, which have 1/8-inch by ½-inch mesh) for removal of smaller debris before entering the pump wells. The screens are conventional through-flow, vertically rotating, single entry, band-type screens, mounted in the screen wells of the intake structures. Each screen consists of a series of baskets or screen panels attached to a chain drive. Cooling water passes through the wire mesh screening surface and floating or suspended matter is retained on the screens. The screens rotate automatically when the debris buildup causes a predetermined level differential across the screen. The debris removed from the traveling screens is washed into a fish return and screen debris trough that feeds into the discharge channel.

Each generating unit has two circulating water pumps with approximate combined capacities ranging from 78,000 gpm for Units 1 and 2 to 136,000 gpm for Unit 4. Each pump draws in water through the traveling water screens and discharges into a pipe for transport to the condenser. The pumps for Units 1 and 2 discharge into 48-inch diameter pipes and the pumps for Units 3 and 4 discharge into 60-inch diameter pipes. Each pipe is approximately 200 feet in length. At full operation, the cooling water flow through the plant is 417,400 gpm or 601.1 million gallons per day.

Discharge System and Structures

Heated water from the condensers discharges to four separate pipes ranging from 72 inches to 84 inches in diameter. All of the discharge pipes cross under the intake channel to discharge structures located on the north bank of the discharge channel (Figures 14 and 15). The total plant flow returns to San Diego Bay through the discharge channel, which extends into the Bay, parallel to the intake channel. The bottom width of the channels ranges from 50 feet near the Unit 4 discharge structure to approximately 1,200 feet at its widest point in the Bay. The maximum depth of the channel is about 15.0 feet below mean sea level and the total surface area is 287 acres.

B. Incidental Takings by Cooling System Intakes

Moss Landing Power Plant

No incidental lethal or injurious takings of marine mammals have been recorded in the past due to operation of the cooling water system at MLPP and there is minimal risk of such takings occurring in the future. Although the NMFS has stranding reports for 5 pinnipeds that were captured at or near the MLPP intake structure from 1992 through 1998, all of these animals were described by the stranding reports as suffering from various illnesses (Table 1). The presence of these animals at the intake structure is likely a function of their illness more than any operational effects of the cooling water system as no healthy individuals have been stranded to date.

Table 1

Summary of Marine Mammal Stranding Reports from the Vicinity of Moss Landing Power Plant, 1992-1998

Date	Species	No.	Age	Sex	Comment
5-27-92	California sea lion	1	Yearling	Female	Underweight, pneumonia, parasites
5-31-92	California sea lion	1	Yearling	Male	Underweight, pneumonia, parasites, abscesses
5-12-93	California sea lion	1	Yearling	Male	Ill, emaciated
5-26-98	California sea lion	1	Adult	Female	Domoic acid toxicosis, seizures, unresponsive, injuries
5-26-98	California sea lion	1	Adult	Female	Domoic acid toxicosis, seizures, unresponsive

The original cooling water intake system for Units 1 through 5 has been redesigned to support the new combined-cycle units. This redesign will reduce the potential for entrapment and impingement (the retention of organisms on the intake screens) by lowering approach velocities, installation of modernized, angled rotating fish screens, and by removing a forebay tunnel that previous to 1996, trapped fishes and invertebrates, but no marine mammals. Entrainment (the drawing of organisms into the cooling water system) effects of the existing intake system will also be significantly and directly reduced by the new units' 34 percent reduction in intake cooling water flow capacity. The results of the 1999-2000 entrainment field sampling conducted as part of the 316(b) demonstration program studies indicate a projection of low entrainment effects on all marine biota (Tenera, Inc. 2000). New bar racks spaced four inches on center will be installed at the entrance to the intake structure, preventing entry of any marine mammals.

Morro Bay Power Plant

No incidental lethal or injurious takings of marine mammals have been recorded in the past due to operation of the cooling water system at MBPP and there is minimal risk of such takings occurring in the future. Although the NMFS has stranding reports for three pinnipeds that were captured at or near the MBPP intake and discharge structures from 1996 through 1999, all of these animals were described by the stranding reports as suffering from various illnesses (Table 2). The presence of these animals at the intake and discharge structures is assumed to be a function of their illness rather than due to operation of the facility.

Table 2

Summary of Marine Mammal Stranding Reports from the Vicinity of Morro Bay Power Plant, 1996-1999

Date	Species	No.	Age	Sex	Comment
9-18-96 (intake)	Northern elephant seal	1	Yearling	Male	Mildly underweight, congested respiration, bloody mucous from mouth, skin disease
6-9-98 (discharge)	California sea lion	1	Yearling	Female	Moderately underweight, depressed, pox, scrapes on underside of flippers
6-12-99 (discharge)	California sea lion	1	Yearling	Female	Emaciated, congested respiration, alert but not active

Prior studies performed to satisfy National Pollutant Discharge Elimination System (NPDES) permitting requirements at MBPP have demonstrated that the existing cooling water system facilities represent the best technology available. The potential number of organisms entrained by the modernized MBPP intake facility will be fewer due to the nearly 29 percent reduction in cooling water system design flows at peak loads, and a 38 percent reduction on an annual basis. These lower flows will also result in lower intake velocities leading to a reasonable expectation of lower impingement levels (Duke Energy North America 2000), which should further reduce any risks to marine mammals and their prey.

South Bay Power Plant

No incidental lethal or injurious takings of marine mammals have been recorded in the past due to operation of the cooling water system at SBPP and there is minimal risk of such takings occurring in the future. Furthermore, NMFS has no stranding records for marine mammals from the cooling water intake or discharge channels.

The NPDES permit for the SBPP was renewed in November 1996 (California Regional Water Quality Control Board [RWQCB] 1996). Studies associated with the NPDES permit (e.g., Duke Energy South Bay, LLC 1999; Merkel & Associates 1995, 2000a, 2000b; TRC 1999) have demonstrated that the existing cooling water system facilities represent the best technology available and have not caused any appreciable harm to the aquatic community of San Diego Bay or significant adverse effects on the beneficial uses of the waters of the Bay (California RWQCB 1996).

2. **The date(s) and duration of such activity [i.e., power plant operation] and the specific geographical region where it will occur.**

Moss Landing Power Plant

MLPP participates in the California Power Exchange and is operated on demand from the California State Independent System Operator to meet the system's electrical demand. For example, maximum pump operation for Units 6 and 7 during 1998 ranged from 42.7 to 100 percent with an average of 84.8 percent. The annual average operating time for these units from 1994 through 1998 ranged from a low of 59.3 percent in 1996 to a high of 88.5 percent in 1994. With the availability and operation of the new combined-cycle units beginning in the summer of 2002, Units 6 and 7 are expected to operate at an annual capacity factor of about 40 percent and the combined-cycle units at an annual capacity factor of about 90 percent.

As described above, MLPP and its two cooling water intake structures are located on the eastern shoreline of Moss Landing Harbor in Monterey County, California, about 110 miles (177 km) south of San Francisco (Figures 1 and 2). Moss Landing Harbor is located roughly midway between the cities of Santa Cruz and Monterey and is open to Monterey Bay.

Morro Bay Power Plant

MBPP participates in the California Power Exchange and is operated on demand from the California State Independent System Operator to meet the system's electrical demand. For example, monthly generation capacity for Units 1 through 4 from July 1999 through June 2000 ranged from a low of 0 percent for Units 1 and 2 and up to approximately 74 percent for Unit 3. The overall average annual generation capacity factor for that period was about 44 percent. The overall percentage of operating time within that period for the 4 generating units was about 71 percent. Following completion of the new combined-cycle units, MBPP is expected to operate 7 days per week, 24 hours per day except during outages. Overall annual availability of the facility after installation of the new units is expected to be at least 90 percent.

As described above, MBPP and its two cooling water intake structure are located on the eastern shoreline of Morro Bay in San Luis Obisbo County, California (Figures 3 and 4).

South Bay Power Plant

SBPP participates in the California Power Exchange and is operated on demand from the California State Independent System Operator to meet the system's electrical demand. For example, the monthly generation capacity factor for SBPP (all units) from April 1999 through October 2000 ranged from a low of 8.25 percent up to 58.82 percent. The average annual generation capacity factor for the period of April 1999 to December 1999 was 29.32 percent, and for the period of January 2000 to October 2000 the factor was 38.56 percent. SBPP operates on average 7 days per week, 24 hours per day except during outages, although not all units are operating at all times. The overall annual availability of the facility is approximately 91.5 percent.

Units 1 and 2 are typically operated in unison as the "base load" units for the plant. As indicated above, generation typically cycles on a daily basis in response to electric demand. The demand is usually lowest at night, increasing in the early morning and through the day, and then decreasing again in the evening. To address this demand cycle, generation from Units 1 and 2 typically increases as demand increases in the morning. If demand continues to increase, Unit 3 is brought on line. As demand declines in the evening, Unit 3 load is reduced to a minimum and generation may be reduced at Units 1 and 2. Unit 4 was operated extensively from 1971 through the early 1980s, but has been used very infrequently since that time. Unit 4 was designed to be brought on- and off-line rapidly, in order to meet peak demands; because of this design it is very inefficient and, therefore, is only utilized during periods of very high demand.

As described above, SBPP and its cooling water intake structures are located on the extreme southeastern shoreline of San Diego Bay in San Diego County, California (Figures 5 and 6).

3. **The species and numbers of marine mammals likely to be found within the activity area.**

Whales, dolphins, pinnipeds, and southern sea otters (*Enhydra lutris nereis*) all occur along the central and southern California Coasts. California sea lion (*Zalophus californianus californianus*), northern elephant seal (*Mirounga angustirostris*), harbor seal (*Phoca vitulina richardsi*), and southern sea otter are observed regularly in the immediate vicinity of MLPP and MBPP. USFWS data indicate that only California sea lion and the Pacific bottle-nosed dolphin occur in the vicinity of SBPP (USFWS 1998). However, there are no records of dolphins in the intake channel of SBPP and the species is extremely unlikely to be affected by cooling system operation.

Jurisdiction under the MMPA for the sea otter is held by the USFWS rather than NMFS. Therefore, a detailed discussion of sea otter distribution and numbers is not included in this application. In short, however, the current range of the southern sea otter extends from Cojo Cove south of Point Conception to Año Nuevo Island in Santa Cruz County. There are now roughly 2,200 sea otters (Harris 1999) living in a 250-mile range along the central coast and individuals are observed regularly at Moss Landing Harbor and Morro Bay.

This remainder of this application focuses on the three pinnipeds (harbor seal, California sea lion, northern elephant seal) known to occur regularly near MLPP, MBPP, and/or SBPP based on the potential risk to these species and their NMFS jurisdictional status.

Population counts for harbor seal, California sea lion, and northern elephant seal have not been developed specifically for waters in the vicinity of MLPP, MBPP, and SBPP. However, detailed California Stock Assessments have been developed by NMFS for these pinnipeds, and are provided elsewhere in this application (see response to Question No. 4).

Descriptions of marine mammal habitat in the vicinity of MLPP, MBPP, and SBPP are provided below.

Moss Landing Power Plant

Description of the Marine Environment

The MLPP is situated at the intersection of three distinct marine geographic areas: Elkhorn Slough (tidal lagoon), Moss Landing Harbor, and Monterey Bay. Each of these areas has its own unique aquatic habitats. Distinct aquatic habitats present within the boundaries of Moss Landing Harbor and Elkhorn Slough include shallow open water, submerged aquatic vegetation, sand/mud/salt flats, fresh/salt/brackish marshes, rocky subtidal and intertidal. Distinct habitats present in Monterey Bay include sandy beach, rocky intertidal and subtidal and open water areas.

Elkhorn Slough is a narrow, shallow water embayment that extends 6.2 miles inland from the eastern margin of Monterey Bay. As it extends inland, it gradually narrows and decreases in depth. Tidal mud flats and pickleweed (*Salicornia* spp.) marsh extend the length of the slough. The drainage basin for Elkhorn Slough is small, only 226 square miles in area. The land near the slough is used primarily for agriculture. Shallow open water and lagoon habitats comprise the majority of aquatic habitat provided by the Elkhorn Slough and Moss Landing Harbor complex.

Monterey Bay, California's largest open-coast embayment, is formed by the extent of shoreline between Santa Cruz and Monterey and by the offshore depths of the Monterey submarine canyon. The opening of the bay is 23 miles across and 10 miles wide. Four main tributaries, the Pajaro River, Elkhorn Slough, Salinas River, and the San Lorenzo River flow into the bay. The Bay's immense supply of cold, nutrient-rich, ocean water is exchanged tidally with the Elkhorn Slough and harbor located midway along the bay shoreline at the head of the canyon.

Monterey Bay is characterized by a gently sloping shelf cut by a system of submarine canyons, the largest of which is the Monterey Submarine Canyon. The head of this canyon is located off of the entrance to Moss Landing Harbor. The depth of the canyon ranges from 60 feet to 2,800 feet. The canyon is 650 feet wide at the head and approximately 7.5 miles wide at the mouth of Monterey Bay. The Bay's sandy beach habitat extends in nearly a continuous reach of approximately 20 miles from Santa Cruz to Monterey, encompassing the Moss Landing area.

Marine Mammal Prey Resources in Vicinity of MLPP

Fish and various invertebrates are among the primary prey for marine mammals in the Monterey Bay area. Elkhorn Slough and Monterey Bay provide habitat for at least 97 species of fish (Nybakken *et al.* 1977, Yoklavich *et al.* 1992, Oxman 1995, Lindquist 1998, Yoklavich *et al.* 1999). Most (76) of the fish species are marine species from Monterey Bay. Fish species commonly preyed upon by pinnipeds in Monterey Bay include northern anchovy (*Engraulis mordax*), shiner perch (*Cymatogaster aggregata*), topsmelt (*Atherinops affinis*), Pacific herring (*Clupea pallasi*), Pacific staghorn sculpin (*Leptocottus armatus*), and bocaccio (*Sebastes paucispinis*). Squid (*Loligo opalescens*) and dungeness crab (*Cancer magister*) are also commonly preyed upon by pinnipeds in Monterey Bay (Love 1996).

Morro Bay Power Plant

Description of Morro Bay, Estero Bay, and the Marine Environment

Morro Bay is a shallow, seasonally hyper-saline bar-built estuary, approximately 4.3 miles long and 1.8 miles wide. It is formed behind a barrier sand spit formed by littoral transport north from the vicinity of Point Buchon. This natural (south) barrier spit separates the bay and the delta of Chorro and Los Osos Creeks from the more open waters of Estero Bay. The mouth of Morro Bay opens into Estero Bay, a shallow, sandy bottom bay that lies between Estero Point to the north and Point Buchon to the south. Estero Bay is a little more than 15 miles long and arcs inland a distance of about 5.5 miles. Estuarine and lagoon habitats are found within the boundaries of Morro Bay, whereas Estero Bay is distinctly marine.

The total surface area of Morro Bay is approximately 3.3 square miles. Much of the Bay is intertidal, so that the area of open water at low tide (the subtidal area) is considerably smaller – less than one square mile (Tetra Tech 1999). The average depth for the system over the entire tidal regime is about 3.8 feet below Mean Tide Level. This very shallow average depth reflects the presence of relatively narrow channels through a considerable expanse of intertidal flats and marsh. In contrast, Estero Bay has a gently sloping bottom with a maximum depth of about 300 feet.

Dominant ecological communities in Morro Bay are intertidal mud flats, eelgrass beds, and a coastal salt marsh. Morro Bay also contains sandy subtidal, rocky intertidal, and brackish marshes.

Marine Mammal Prey Resources in Vicinity of MBPP
Fish and various invertebrates are among the primary prey for pinnipeds in the Morro Bay and Estero Bay areas. At least 79 species of fishes have been identified in Morro Bay, with speckled sanddab (*Citharichthys stigmaeus*) northern anchovy, shiner surfperch, Pacific staghorn sculpin, and English sole (*Parophrys vetulus*) being among the common species (Fierstine *et al.* 1973; Horn 1980; DENA 2000). Common crab species in Morro Bay are the brown rock crab (*Cancer antennarius*), red rock crab (*Cancer productus*), yellow rock crab (*Cancer anthonyi*), and slender crab (*Cancer gracilis*) (CDFG 1998). Common crustaceans in Estero Bay include sand crab (*Emerita analoga*) and the spiny mole crab (*Blepharipoda occidentalis*) (Kozloff 1983).

South Bay Power Plant

Description of the Marine Environment
San Diego Bay can be characterized by four ecological subregions: North, North-Central, South-Central, and South Bay (Merkel & Associates, Inc. 1995). The South Bay Ecological Subregion is defined by an east/west trending line extending between the Sweetwater River channel on the east and Crown Cove on the west flanks of the bay. Along this axis there is approximately a 1-1.5 meter decrease in depth between the south end of the South-Central Bay and the north end of South Bay. South of this line, the south bay is characterized by generally very shallow waters (0-2.5 meters) with minimal bathymetric variability. The primary exception is the main bay channel, which after passing just south of the Sweetwater River, divides into three smaller channels that ultimately branch to service a few access routes throughout the south bay. The South San Diego Bay is comprised of thousands of acres of highly productive intertidal and shallow subtidal environments, including mudflats, salt marsh, salt ponds, and seagrass and algal beds. It also offers vital habitat to numerous fish species and other aquatic life.
The main channels and branches in the south bay are believed to facilitate higher rates of water movement during tidal exchanges than the otherwise shallow, flat bay bottom which has extremely low tidal velocities. Both the intake and discharge channels of SBPP contribute to this channel network and are believed to play an important role in the movement of water in the south bay (Merkel & Associates, Inc. 1995).

The temperature regime of the south bay can be substantially affected by the cooling water discharge of SBPP. Low current velocities and shallow water provide for the development of well-defined horizontal gradients originating from the plant. When three of the power plant units are in operation, the maximum measured extent of the thermal plume is approximately 4,500-6,000 feet from the outer end of the discharge channel, with its extent being markedly influenced by season and the phase of the tidal cycle. The maximum extent of the thermal plume when all four units are operating is approximately 9,000 feet from the point of discharge, and again is notably less during flood tides than during ebb tides. Temperatures higher than 80-88° F are generally restricted to the discharge channel with temperatures usually declining by 3-13° F between the beginning (i.e., closest to the power plant) and ending points of the channel.

Seagrass communities provide a valuable food and shelter resource to a number of juvenile and adult vertebrate and invertebrate organisms. Eelgrass, the predominant type of seagrass occurring in bays and estuaries along the Pacific Coast of North America, is present in small quantities just south and southeast of the discharge channel. Eelgrass habitat is far more substantial due west of the SBPP in the shallow waters adjacent to Silver Strand. Over two-thirds of the eelgrass in San Diego Bay occurs within the South Bay Ecological Subregion. Another seagrass present in the Bay is widgeon grass (*Ruppia maritima*). This seagrass is much more common in southern portions of the bay, and is far more tolerant of warmer temperatures and higher salinity than eelgrass.

San Diego Bay supports several species of sea turtles. The most abundant species is the green turtle (*Chelonia mydas*), an endangered species throughout most of its range. The SBPP discharge channel is the only location on the west coast of the United States where sea turtles are known to congregate. The NMFS has records of turtle entrainment and entrapment in power plant intakes at several facilities along the southern California coast. However, there have been no records of turtle entrainment or entrapment at the SBPP in spite of the fact that sea turtles in San Diego Bay appear to concentrate in the power plant discharge channel and the surrounding waters of south bay, from the Chula Vista Marina to the discharge channel (Merkel & Associates, Inc. 1995). They are also often sighted along the shore of Coronado Island, just across the bay from the discharge channel, and in other areas where stands of eelgrass occur. Although the San Diego Bay population of sea turtles consists of adult females, adult males, and juveniles, there is no confirmed evidence of breeding behavior or nesting.

Marine Mammal Prey Resources in Vicinity of SBPP

San Diego Bay supports a diverse assemblage of invertebrate and fish species that are prey for marine mammals in San Diego Bay. The SBPP NPDES permit required a three-year study (April 1997 through January 2000) to determine the species and abundance of fish in the plant's discharge channel (Merkel & Associates, Inc. 2000b). The study found that the channel supports a diverse fish community with a similar density as other areas of San Diego Bay and maintains, on average, a biomass that is approximately 270 percent higher than San Diego Bay as a whole. During the study, a total of 38 species were captured. In comparison, the U.S. Navy conducted a 5-year study of fish throughout the entire bay and with a much larger sample size and collected 78 species of fish.

Samples taken from the discharge channel by Merkel & Associates, Inc. (2000b) were dominated by slough anchovy (*Anchoa delicatissima*), which represented 91.4 percent of the total individuals caught during the survey. The next most abundant fish was deepbody anchovy (*Anchoa compressa*), comprising 1.4 percent of the total catch. Round stingray (*Urolophus halleri*) and topsmelt were only slightly less abundant, representing 1.1 percent and 1.0 percent of the total catch, respectively. Other fairly common species captured were California killifish (*Fundulus parvipinnis*), cheekspot goby (*Ilypnus gilberti*), arrow goby (*Clevlandia iso*), shadow goby (*Quietula y-cauda*), striped mullet (*Mugil cephalus*), bonefish (*Albula vulpes*), and California halfbeak (*Hyporhamphus rosae*). It is interesting to note that the discharge channel supports predominantly juvenile fish and is a nursery area for many of the species captured.

4. A description of the status, distribution, and seasonal distribution (when applicable) of the affected species or stocks of marine mammals likely to be affected by such activities.

[Note: Information provided below on status, distribution, and seasonal distribution of harbor seal, California sea lion, and northern elephant seal is taken from the NMFS Stock Assessments for the year 2000 (Forney et al. 2000) unless otherwise indicated.]

Harbor Seal

Stock Definition and Geographic Range

Harbor seals are distributed widely throughout the North Atlantic and North Pacific oceans. Two subspecies exist in the Pacific: *Phoca vitulina stejnegeri* in the western North Pacific, near Japan, and *P. v. richardsi* in the eastern North Pacific. The latter subspecies inhabits near-shore coastal and estuarine areas from Baja California, Mexico, to the Pribilof Islands in Alaska. These seals do not make extensive pelagic migrations, but do travel about 186-310 miles on occasion to find food or suitable breeding areas (Herder 1986; D. Hanan unpublished data). In California, approximately 400-500 harbor seal haul-out sites are widely distributed along the mainland and on offshore islands, including intertidal sandbars, rocky shores and beaches (Hanan 1996).

Assessments of harbor seal status made prior to the year 2000 recognized three management stocks along the west coast of the continental United States: 1) California; 2) Oregon and Washington outer coast waters; and 3) inland waters of Washington. Although the need for stock boundaries for management is real and is supported by biological information, the exact placement of a boundary between California and Oregon was largely a political/jurisdictional convenience. A small number of harbor seals also occur along the west coast of Baja California, but they are not considered to be a part of the California stock because no international agreements exist for the joint management of this species by United States and Mexico.

Population Size

A complete count of harbor seals in California is impossible because some are always away from the haul-out sites. A complete pup count (as is done for other pinnipeds in California) is also not possible because harbor seals are precocious, with pups entering the water almost immediately after birth. Population size is estimated by counting the number of seals ashore during the peak haul-out period (the May/June molt) and by multiplying this count by the inverse of the estimated fraction of seals on land. Various correction factors ranging from 1.2 to 2.0 have been suggested by researchers to estimate population size based on the proportion of seals hauled out to those in the water. The stock assessment estimate for the year 2000 (Forney *et al.* 2000) used a correction factor of 1.3 and counts conducted in May/June 1995 to estimate a harbor seal population in California of 30,293. A conservative correction factor of 1.2 has been used to generate a minimum population estimate of 27,962 based on 1995 data. A new count is planned for 2000 that may result in revisions of these estimates.

Current Population Trend and Net Productivity Rates

Harbor seal counts have continued to increase except during El Niño events (e.g., 1992-1993). The net production appears, however, to be slowing in California. NMFS calculated a realized rate of increase for the 1982-1995 period by linear regression of the natural logarithm of total count versus year. The slope of this regression line was 0.035 (s.e. = 0.007), which gives an annualized growth rate estimate of 3.5 percent. The current rate of net production is greater than this observed growth rate because fishery mortality takes a portion of the net production. Annual gillnet mortality may have been as high as 5-10 percent of the California harbor seal population in the mid-1980s; a kill this large would have depressed population growth rates appreciably. Therefore, NMFS calculated net productivity for 1980-1994 using the realized rate of population growth (increase in seal counts from year i to year i+1, divided by the seal count in year i) plus the human-caused mortality rate (fishery mortality in year i divided by population size in year i). Between 1983 and 1994, the net productivity rate for the California stock averaged 9.2 percent. Regression shows a decline in net production rates, but the decline is not statistically significant. Maximum net productivity rates cannot be estimated because measurements were not made when the stock size was very small. NMFS calculated a *Potential Biological Removal* level of 1,678 for the California stock based on calculating the minimum population size (27,962) times one-half of the default maximum net productivity rate for pinnipeds (12 percent) times a recovery factor of 1.0 (for a stock of unknown status that is growing). Thus,

$$[27{,}962 \times 0.12] \times 0.5 = 1{,}678$$

Human-Caused Mortality

Prior to state and federal protection, especially during the nineteenth century, harbor seals along the west coast of North America were greatly reduced by commercial hunting (Bonnot 1928, 1951; Bartholomew and Boolootian 1960). Only a few hundred individuals survived in a few isolated areas along the California coast (Bonnot 1928). The population has increased dramatically during the last half of the twentieth century.

Most man-caused harbor seal mortality in California results from the set gillnet fishery; because that fishery has undergone dramatic reductions and redistribution of effort, and because that fishery has not been observed since 1994, average annual mortality cannot be accurately estimated for the recent years 1995-1998. However, rough estimates for that period have been made by extrapolation of prior kill rates using recent effort estimates. The resulting estimate of harbor seal mortality due to set gillnets during 1995-1998 range from 228 (1995) to 392 (1998) individuals. Preliminary gillnet observations from April to September 1999 included 47 seals in 24.6 percent of the sets for a rough extrapolated estimate of 191 mortalities over this six-month period.

Stranding data reported to the California Marine Mammal Stranding Network in 1995-1998 include the following other sources of harbor seal fatalities and injuries: 1) hook and line fisheries (17 deaths, 4 injuries); 2) gillnet fisheries (one death, two injuries); 3) boat collision (10 deaths, two injuries); 4) entrainment in power plants (20 deaths); and 5) shootings (nine deaths). None of the power plant entrainment mortalities were recorded at MLPP, MBPP, or SBPP.

Status of Stock

Harbor seals are not listed as "endangered" or "threatened" under the Endangered Species Act nor as "depleted" under the MMPA. Total fishing mortality cannot be accurately estimated for recent years but extrapolations from past years and preliminary data for 1999 indicate that human-caused mortality is less than the calculated *Potential Biological Removal* for the California stock (1,678); therefore they are not considered a "strategic" stock under the MMPA. The average rate of incidental fishery mortality for this stock is likely to be greater than 10 percent of the calculated *Potential Biological Removal*; therefore, fishery-related mortality cannot be considered insignificant (i.e., approaching zero mortality and serious injury rate). The population appears to be growing, fishery-caused mortality is declining, and there are no known habitat issues of particular concern for this stock. In addition, all west-coast harbor seals that have been tested for morbilliviruses were found to be seronegative, indicating that this disease is not endemic in the population and that this population is extremely susceptible to an epidemic of this disease (Ham-Lammé *et al.* 1999).

California Sea Lion

Stock Definition and Geographic Range

The California sea lion includes three subspecies: *Zalophus californianus wollebaeki* (on the Galapagos Islands), *Z. c. japonicus* (in Japan, but now thought to be extinct), and *Z. c. californianus* (from southern Mexico to southwestern Canada; herein referred to as the California sea lion). The breeding areas of the California sea lion are on islands located in southern California, western Baja California, and the Gulf of California. These three geographic regions delineate three stocks for *Z. c. californianus*: 1) the United States stock begins at the United States/Mexico border and extends northward into Canada; 2) the Western Baja California stock extends from the United States/Mexico border to the southern tip of the Baja California peninsula; and 3) the Gulf of California stock, which includes the Gulf of California from the southern tip of the Baja California peninsula and across to the Mexico mainland and extends to southern Mexico (Lowery *et al.* 1992). Some movement has been documented among these geographic stocks, but rookeries in the United States are widely separated from the major rookeries of western Baja California, Mexico. Males from western Baja California rookeries may spend most of the year in the United States. Genetic differences have been found between the United States stock and the Gulf of California stock (Maldonado *et al.* 1995). There are no international agreements for joint management of California sea lions among the United States, Mexico, and Canada.

Population Size

A complete count of the California sea lion population cannot be made because all age and sex classes are never ashore at the same time. In lieu of counting all sea lions, pups are counted during the breeding season (because this is the only age class that is ashore in its entirety), and the number of births is estimated from the pup count. The size of the population is then estimated from the number of births and the proportion of pups in the population.

Censuses are conducted in July after all pups have been born. To estimate the number of pups born, the pup count in 1999 (42,388) was adjusted for an estimated 15 percent pre-census mortality (Boveng 1988a; Lowery *et al.* 1992), giving an estimated 48,746 live births in the population. The fraction of newborn pups in the population (22.8% to 23.9%) was estimated from a life table derived for the northern fur seal (*Callorhinus ursinus*) (Boveng 1988a, Lowery *et al.* 1992), which was modified to account for the growth rate of this California sea lion population (5.0% to 6.2% per year). Multiplying the number of pups born by the inverse of these fractions (4.39 to 4.19) results in population estimates ranging from 214,000 to 204,000.

A minimum population estimate was determined from counts of all age and sex classes that were ashore at all the major rookeries and haul-out sites during the 1999 breeding season. The minimum population size of the United States stock is 109,854 (NMFS unpubl. data). It includes all California sea lions counted during the July 1999 census at the four rookeries in southern California and at the haul-out sites located between Point Conception and the Oregon/California border. The estimate does not include an additional unknown number of sea lions that were at sea or hauled out at locations that were not censused.

Current Population Trend and Net Productivity Rates

Based on data reported by Lowery (1999) and Lowery *et al.* (1992), NMFS determined that three major declines in the number of pups counted occurred during El Niño events in 1983, 1992-93, and 1998. A regression of the natural logarithm of the pup counts against year indicates that the counts of pups increased at an annual rate of 5.0 percent between 1975 and 1999. Since 1983, the counts of pups have increased at 6.2 percent annually.

The 1975-1999 series of pup counts shows the effect of three El Niño events on the sea lion population. Pup production decreased by 35 percent in 1983, 27 percent in 1992, and 64 percent in 1998. After the 1992-93 and 1997-98 El Niños, pup production rebounded by 52 percent and 185 percent, respectively, but there was no rebound after the 1983-84 El Niño. Unlike the 1992-93 and 1997-98 El Niños, the 1983-84 El Niño affected adult female survivorship (DeLong *et al.* 1991), which caused a decline in the number of adult females in the population capable of producing pups. Other characteristics are higher pup and juvenile mortality rates (DeLong *et al.* 1991, NMFS unpubl. data), which affect future recruitment into the adult population for the affected cohorts. The long term effects of the 1992-93 event is manifested in lower net productivity rates for 1997 and 1999 (relative to 1997) because fewer females reached reproductive age (i.e., at three to five years). As a result, the effects of the 1992-93 and 1997-98 El Niños will result in lower net productivity rates for several years. The drop in net production shows the long-term effects of El Niños and does not signal that the population has reached carrying capacity. The severity, timing, length, and frequency of future El Niños will govern the growth rate of the sea lion population in the future.

The rate of net production is greater than the observed growth rate because human-caused fatalities take a fraction of the net production. Net productivity therefore, was calculated for 1980-1999 as the realized rate of population growth (increase in pup counts from year i to year i+1, divided by the pup count in year i) plus the human-caused mortality rate (fishery mortality in year i divided by population size in year i). For California sea lions, the number of annual fatalities from 1980 to 1998 averaged about 2,290 (Range = 827 to 4,417) as estimated from NMFS, California Department of Fish and Game, Columbia River Area observer programs, and reports from stranding programs and from salmon net pen fisheries (Miller *et al.* 1983; Hanan *et al.* 1988; Hanan and Diamond 1989; Brown and Jeffries 1993; Barlow *et al.* 1994, Julian 1997, Julian and Beeson 1998, Cameron and Forney 1999; NMFS unpubl. data). Between 1980 and 1999, the net productivity rate average 16.1 percent. Maximum net productivity rates cannot be estimated from available data. The *Potential Biological Removal* level for this stock was calculated at 6,591 sea lions per year.

Human-Caused Mortality

California sea lions are killed incidentally in set and drift gillnet fisheries (Hanan *et al.* 1993; Barlow *et al.* 1994; Julian 1997; Julian and Beeson 1998, Cameron and Forney 1999). Logbook, observer data, and fishing reports indicate that fatality of California sea lions occurs, or has occurred in the past, also in the following other types of California fisheries: 1) salmon troll fisheries; 2) anchovy, herring, mackerel, squid, and tuna purse seine fishery; 3) salmon net pen fishery; 4) groundfish trawl fishery; 5) commercial passenger fishing vessel fishery (Forney *et al.* 2000). Similar incidental kills occur outside of California waters along the entire Pacific Coast. The California Marine Mammal Stranding Network database maintained by the NMFS, Southwest Region contains the following records of other human-related fishery fatalities of stranded California sea lions: 1) at least 17 fatalities and 17 injuries in 1998 as a result of fishing net entanglement; and 2) 24 fatalities and 31 injuries from hook and line fisheries.

Live strandings and dead beach-cast California sea lions have also been observed with gunshot wounds in California (Lowry and Folk 1987; Deiter 1991, Barocchi *et al.* 1993). Records from the 1998 California Marine Mammal Stranding Network and the Oregon and Washington stranding databases show the following nonfishery-related mortality: boat collisions (3 fatalities), entrainment in power plants (30 fatalities), and shootings (0 fatalities and 8 injuries).

Stranding records provide a gross under-estimate of injury and mortality. However, California Stranding Network records indicate a higher mortality rate as a result of shooting and hook and line entanglement during the 1997-98 El Niño period (115 shootings, 26 entanglements) than during the 1995-96 non- El Niño period (61 shootings, 5 entanglements). There are currently no estimates of the total number of California sea lions being killed or injured by guns, boat collisions, entrainment in power plants, marine debris, or gaffs, but the minimum number in 1998 was 144.

Status of Stock

California sea lions are not listed as "endangered" or "threatened" under the Endangered Species Act or as "depleted" under the MMPA. They are also not considered a "strategic" stock under the MMPA because total human-caused mortality (1,131 fishery-related fatalities plus 141 from other sources) is less than the *Potential Biological Removal* (6,591). The total fishery mortality and serious injury rate for this stock is not less than 10 percent of the calculated *Potential Biological Removal* and, therefore, cannot be considered to be insignificant and approaching a zero mortality and serious injury rate. The population has been growing recently at 6.2 percent per year, and the fishery mortality is increasing.

Northern Elephant Seal

Stock Definition and Geographic Range

Northern elephant seals breed and give birth in California and Baja California, Mexico, primarily on off-shore islands (Stewart *et al.* 1994) from December to March (Stewart and Huber 1993). Males feed near the eastern Aleutian Islands and in the Gulf of Alaska, and females feed further south (Stewart and Huber 1993; Le Boeuf *et al.* 1993). Adults return to land between March and August to molt, with males returning later than females. Adults return to their feeding areas again between their spring/summer molting and their winter breeding seasons.

Populations of northern elephant seals in the United States and Mexico were all originally derived from a few (tens to hundreds) individuals surviving in Mexico after being nearly hunted to extinction (Stewart *et al.* 1994). Given the very recent derivation of most rookeries, no genetic differentiation would be expected. Although movement and genetic exchange continues between rookeries, most elephant seals return to their natal rookeries when they start breeding (Huber *et al.* 1991). The California breeding population is now demographically isolated from the Baja California population. No international agreements exist for the joint management of this species by the United States and Mexico. The California breeding population is considered by NMFS to be a separate stock.

Population Size

A complete population count of elephant seals is not possible because all age classes are not ashore at the same time. Elephant seal population size is typically estimated by counting the number of pups produced and multiplying by the inverse of the expected ratio of pups to total animals (McCann 1985). Stewart *et al.* (1994) used McCann's multiplier of 4.5 to extrapolate from 28,164 pups to a population estimate of 127,000 elephant seals in the United States and Mexico in 1991. The multiplier of 4.5 was based on a non-growing population. Boveng (1988) and Barlow *et al.* (1993) argue that a multiplier of 3.5 is more appropriate for a rapidly growing population such as the California stock of elephant seals. Based on the estimated 24,000 pups in California in 1994-96 and this 3.5 multiplier, the California stock was approximately 84,000 in 1996.

NMFS (Forney *et al.* 2000) determined that a conservative estimate of the minimum population size for northern elephant seals is 51,625. This estimate includes twice the observed pup count (to account for the pups and their mothers) plus the peak number of males and juveniles counted at the Channel Islands and Año Nuevo (Le Boeuf 1996) sites in 1996.

Current Population Trend and Net Productivity Rates

Based on trends in pup counts, northern elephant seal colonies were continuing to grow in California through 1994 but appear to be stable or slowly decreasing in Mexico (Stewart *et al.* 1994). The number of pups born appears to be leveling off in California over the last five years. It is not yet known whether the reduction in growth at the California rookeries is temporary (as was observed in 1985) or whether it represents an approach to carrying capacity.

Although growth rates as high as 16 percent per year have been documented for northern elephant seal rookeries in the United States from 1959 to 1981 (Cooper and Stewart 1983), much of this growth was supported by immigration from Mexico. The highest growth rate measured for the whole United States/Mexico population was 8.3 percent between 1965 and 1977 (Cooper and Stewart 1983). A continuous growth rate of 8.3 percent is consistent with an increase from approximately 100 animals in 1900 to the current population size, and 8.3 percent represents the "maximum estimated net productivity rate" as defined in the MMPA. In California, the net productivity rate (i.e., realized rate of population growth [increase in pup abundance from year *i* to year *i*+1, divided by pup abundance in year i*]* plus the human-caused mortality rate (fishery mortality in year *i* divided by population size in year *i*) appears to have declined in recent years. The *Potential Biological Removal* for this stock is 2,142; calculated as the minimum population size (51,625) times one-half the observed maximum net growth rate for this stock (½ of 8.3%) times a recovery factor of 1.0 (for a stock of unknown status that is increasing (Wade and Angliss 1997).

Human-Caused Mortality

The average annual mortality from gillnet and hook and line fisheries for northern elephant seals during 1994-98 is not known with certainty but is likely somewhere between 33 and 100 individuals. The California Marine Mammal Stranding database contains the following records of non-fishery related fatalities and injuries from 1995-98: boat collision (one injury), automobile collision (five fatalities), and shootings (three fatalities). Forney *et al.* (2000) do not list any entrainment-related fatalities for elephant seals from the Stranding Database.

Status of Stock

A review of elephant seal dynamics through 1991 concluded that their status could not be determined with certainty, but that they might be within their Optimal Sustainable Population range (Barlow *et al.* 1993). They are not listed as "endangered" or "threatened" under the Endangered Species Act nor as "depleted" under the MMPA. Also, NMFS does not consider these seals to be a "strategic" stock under the MMPA, because their annual human-caused mortality is much less than the calculated *Potential Biological Removal* for this stock (2,142). The average rate of incidental fishery mortality for this stock over the last five years also appear to be less than 10 percent of the calculated *Potential Biological Removal*; therefore, the total fishery mortality appears to be insignificant and approaching a zero mortality and serious injury rate. The population is continuing to grow and fishery mortality is relatively constant. There are no known habitat issues that are of particular concern for this stock.

5. The type of incidental taking authorization that is being requested (i.e., takes by harassment only; takes by harassment, injury and/or death) and the method of incidental taking.

The type of incidental take authorization being requested in this application is for the potential entrapment, entrainment, or impingement of marine mammals in the cooling water systems of MLPP, MBPP, and SBPP. Although no marine mammal deaths or injuries have been recorded due to operation of these cooling water systems in the past, the applicant requests this authorization in the rare event that such takings do occur in the future.

6. **By age, sex, and reproductive condition (if possible), the number of marine mammals (by species) that may be taken by each type of taking identified in Section 5 above, and the number of times such takings by each type of taking are likely to occur.**

There have been no recorded marine mammal deaths or injuries to-date resulting from the operation of the cooling water systems at MLPP, MBPP, or SBPP. However, since there are significant populations of harbor seal, California sea lion, and northern elephant seal along the Pacific coast of California, and because their populations are apparently increasing (Forney *et al.* 2000), there remains some limited potential for future takings.

No substantive data exists from which to predict the age, sex, and reproductive condition of individuals that may be subject to incidental takings in the future. As indicated previously in the response to Question 1.B, NMFS has stranding reports for five pinnipeds that were captured at or near the MLPP intake structure from 1992 through 1998 (Table 1), and for three pinnipeds captured near the MBPP intake and outfall structures from 1996 through 1999 (Table 2). All of these animals were determined to be sick and the presence of these animals near the intake and discharge structures is assumed to be a function of their illness rather than due to operation of the facility. There have been no marine mammal stranding reports for SBPP.

7. The anticipated impact of the activity upon the species or stock of marine mammal.

Harbor seal, California sea lion, and northern elephant seal have the potential, albeit limited, to be taken due to cooling water system operations at MLPP, MBPP, and SBPP. The available data suggest that populations of all three species are increasing along the Pacific coast of California (Forney *et al.* 2000) and the continued operation of these facilities is expected to have a negligible effect on the California stocks of these species.

The MMPA, as amended in 1994, requires the NMFS to produce stock assessment reports for all marine mammal stocks in waters within the U.S. Exclusive Economic Zone. As part of that assessment, NMFS estimates the *Potential Biological Removal* for each stock of each species. The *Potential Biological Removal* is the maximum number of marine mammals, not including natural fatalities, that may be removed from a marine mammal stock while allowing the stock to reach or maintain its *Optimum Sustainable Population.* If the number of animals removed from the stock exceeds the *Potential Biological Removal*, the stock is declared "strategic", and additional conservation measures are implemented (Barlow *et al.* 1995). If the number removed is less than *Potential Biological Removal*, the stock is considered to be within the range of *Optimum Sustainable Population.*

The most recent determinations of *Potential Biological Removal* were published by Forney *et al.* (2000). For harbor seals, the *Potential Biological Removal* was determined to be 1,678 individuals. The available date is not adequate to allow an accurate estimation of the total annual take of harbor seals in recent years. However, extrapolations from data collected in past years and preliminary data for 1999 indicate that fishing-related mortality is less than the calculated *Potential Biological Removal* for this stock. Therefore, the California stock of harbor seals is not considered to be a "strategic" stock under the MMPA.

The *Potential Biological Removal* for California sea lion was determined to be 6,591 sea lions per year. The total annual human-caused mortality for this stock was estimated at 1,272. Therefore, this is not considered to be a "strategic" stock and the existing incidental take, combined with any potential future take from MLPP, MBPP, or SBPP would be insignificant.
For the California stock of northern elephant seals, the *Potential Biological Removal* was calculated at 2,142 individuals per year. As is the case with the harbor seal, the available data are not adequate to allow an accurate estimation of the total annual take of northern elephant seals in recent years. However, extrapolations from data collected in past years indicate that human-caused mortality falls somewhere between 33 and 100 individuals per year, which is much less than the calculated *Potential Biological Removal* for this stock. Therefore, the existing incidental take, combined with any potential future take from MLPP, MBPP, or SBPP, would be insignificant.

8. The anticipated impact of the activity on the availability of the species or stocks of marine mammals for subsistence uses.

Operation of the cooling water systems at MLPP, MBPP, and SBPP will not have an impact on the availability of marine mammals for subsistence purposes, as there is no subsistence harvest in California (J. Cordaro, NMFS pers. comm.).

9. **The anticipated impact of the activity upon the habitat of the marine mammal populations, and the likelihood of restoration of the affected habitat.**

The continued operations of MLPP, MBPP, and SBPP are anticipated to have negligible impact on the habitat of marine mammals. There are no power plant facilities or operational activities planned in offshore waters other than the continued operation of the cooling water systems at each power plant. Thus, potential impacts on marine mammal habitat are limited to those associated with the physical presence and operation of the intake and discharge structures and possible effects on prey species. The cooling water systems at MLPP, MBPP, and SBPP have been reviewed and authorized in accordance with NPDES permits issued to each facility by the Federal Environmental Protection Agency through the jurisdictional California Regional Water Quality Control Boards (RWQCB). Relevant information from NPDES permits and related studies on marine mammal habitat (including prey populations) are summarized below.

Moss Landing Power Plant

In 1998, DEML announced its plan to modernize the MLPP. The Central Coast RWQCB was contacted and a series of meetings were held to discuss the renewal of the NPDES permit. The RWQCB assembled a team of experts to assist the Board's staff in their review of the design and implementation of the 316(b) studies required pursuant to the Clean Water Act (CWA). The study plan entitled *Final Moss Landing Power Plant Modernization Project Cooling Water Intake and Discharge Study Plans*, (Tenera, Inc. 1999) was submitted to the RWQCB on November 18, 1999. The results of the study are detailed in the report: *Moss Landing Power Plant Modernization Project 316(b) Resource Assessment* (Tenera, Inc. 2000).

The design of the 316(b) field study program was based, in part, on information collected during previous studies of the potential effect on the aquatic communities of Moss Landing Harbor, Elkhorn Slough, and Monterey Bay resulting from operation of the MLPP's cooling water systems. The three most significant studies were those conducted by PG&E relating to the effect of the cooling water discharges on the beneficial uses of the receiving waters at the MLPP (PG&E 1973), the MLPP Units 1 through 5 316(a) demonstration program (PG&E 1978), and the MLPP Cooling Water Intake Structures 316(b) Demonstration (PG&E 1983). The study plan was developed using information collected in these and other studies of the area in combination with state and federal 316(b) guidelines.

The basic objective of the 316(b) program is to provide a sufficient basis for regulatory agencies to determine whether the new combined-cycle cooling water intake structure (formerly the Units 1 through 5 intake structure) reflects the best technology available for minimizing adverse environmental impacts. To accomplish this objective, a field study program was designed and conducted to determine the extent of entrainment effects at the MLPP. The numbers of aquatic organisms entrained are estimated from plankton samples collected in front of the intake structures. Samples collected in Monterey Bay, Moss Landing Harbor, and Elkhorn Slough provided estimates of the source water populations that may be affected by entrainment.

Consistent with the final study plan, impingement studies were not conducted. The intake structure for the new combined-cycle units will be modified as part of the modernization project.

Impingement rates at this intake structure are expected to decrease from those reported in PG&E (1983) as a direct result of these changes.

In 1991, otter trawls were conducted as part of a study of fish availability as prey items for harbor seals (Oxman 1995). Otter trawls were conducted monthly for a year (1991) in Elkhorn Slough in an effort to establish seasonal trends of fish availability and distribution. The 29 nighttime trawls resulted in 1,461 fishes representing 39 species.

Oxman (1995) reported that overall there was a slight change in the 1991 diurnal fish assemblage from that reported by Yoklavich et al. (1992) during 1974-1976. These changes included a decrease in the mean number of fish per tow, species diversity decrease at the Bridge and Dairies stations, and species diversity increases at Kirby Park. Species absent from the 1991 daytime trawls that were present in 1974-1980 trawls included topsmelt, jacksmelt (*Atherinopsis californiensis*), Pacific herring, threadfin shad (*Dorosoma petenense*), sand sole (*Psettichthys melanosticus*), blue rockfish (*Sebastes mystinus*), queenfish (*Seriphus politus*), and night smelt (*Spirinchus starksi*). Several species were less abundant; however, English sole, cabezon (*Scorpaenichthys marmoratus*), lingcod (*Ophidion elongatus*), and California tonguefish (*Symphurus atricauda*) increased in relative abundance and density.

Yoklavich (1999) concluded that in general, fish assemblages present in Elkhorn Slough in the 1990s are characterized by decreased abundance at most sample sites as well as less diversity than in the past. Within the last 20 years a homogenization of fish assemblages appears to have occurred between the lower main channel and tidal channels. These changes have coincided with the continued erosion and scouring of smaller channels to the point that they are now similar (in habitat type) to the main channel (Malzone and Kvitek, 1994).

The most abundantly collected fishes from studies reported in Nybakken *et al.* (1977), Yoklavich *et al.* (1991), from PG&E impingement studies in 1978–80 (PG&E, 1983), and from Lindquist's work in 1996-97 generally have remained the same. Northern anchovy, shiner perch, and Pacific herring were some of the most abundantly collected fishes from all three of these studies. Topsmelt was the only species collected in high numbers in impingement samples that was not collected in the other two studies. Oxman's (1995) studies in 1991 however, showed greater differences in species composition when compared to the other studies with the exception of the presence of shiner perch. This species was collected in high numbers in the slough from all studies. Fishes that were not collected in Oxman's study but were present in high numbers in all other studies were northern anchovy and Pacific herring. Both of these missing species were again collected in high numbers in Lindquist's 1996-97 (Lindquist 1998) studies.

Northern anchovy was the most abundant fish species collected from both intakes and constituted 61 percent of all fishes impinged. Shiner perch and topsmelt ranked second in abundance at nine percent each, followed by Pacific herring at four percent. These four species accounted for 83 percent of all fishes impinged during the entire study.

Morro Bay Power Plant

The MBPP is an existing power generating facility that has been in operation since the early 1950s. During its 50-year operation, extensive environmental monitoring has occurred, and no significant impacts to biological resources or to beneficial uses have been reported from operation of the plant. The RWQCB permitted and continuously reviewed (every five years) the existing facility's cooling water system intake and discharge by issuance of a NPDES permit. Results of these five-year reviews have repeatedly shown that the cooling water intake system represents the best technology available and that the discharge protects the receiving water's beneficial uses. The most recent studies performed in support of the NPDES permit renewal are a 12-month impingement study completed on September 8, 2000 and a year-long entrainment study completed in December 2000. In addition, a survey designed to assess the effects of the discharge was conducted during September through December 2000.

NPDES studies have shown that no significant entrainment impacts on Morro Bay's resident species are expected based on the small fraction of the Bay's dynamic volume withdrawn for cooling purposes and the high reproductive capacity of the species in the Bay. Similarly, it is essentially impossible for MBPP entrainment to impact Estero Bay species. Furthermore, since entrainment rates are directly related to the volume of water withdrawn by the plant, future entrainment losses will be reduced an estimated 38 percent based on corresponding reductions in water requirements once the new combined-cycle technology is completed. Operation of the cooling water system will also result in impingement of some organisms larger than the 3/8-inch mesh of the traveling screens that are weak swimmers or otherwise unable to avoid the intake. However, impingement rates will be reduced with modernization of the facility as the intake volume and "approach to bar rack" velocities are reduced.

Studies of the distribution and dispersion of MBPPs thermal plume have demonstrated little to no effect of the power plant's discharge on receiving water fish and invertebrate populations in Estero Bay. Although discharge temperature modified the rocky substrate community of marine organisms living in the facility's discharge canal and a short distance beyond, the canal discharges directly into the high-energy surf line of Estero Bay. These studies also established the absence of any possible thermal effects on Morro Bay's habitats. The reduced size of the modernized plant's thermal plume provides additional assurance that habitats in Estero Bay and Morro Bay will not be significantly affected by the discharge.

South Bay Power Plant

The NPDES permit for the SBPP was renewed in November 1996 (California RWQCB 1996). Various studies were conducted in compliance with the NPDES permit including investigations of potential power plant cooling water discharge effects on green turtles (Merkel & Associates, Inc. 1995), water quality [copper concentrations] (Duke Energy South Bay, LLC 1999), eelgrass (Merkel & Associates, Inc. 2000a), and fish (Merkel & Associates, Inc. 2000b).

The significance of entrainment and impingement effects at SBPP was also assessed based on prior 316(b) demonstration project results to determine if additional studies were necessary (SDG&E 1995). These results indicate that the cooling water system is not appreciably impacting phytoplankton, zooplankton, or ichthyoplankton of San Diego Bay. Losses of *Representative Important Species* due to impingement represent less than one percent of both the standing crop and the natural mortality of these species in the bay. There is also minimal impingement of commercial and recreational species. Entrainment losses are less than 0.2 percent of baywide productivity. The combined impact of impingement and entrainment is a reduction of four percent of *Representative Important Species* standing stock and eight percent of *Representative Important Species* optimum sustained yield.

Based on these studies, under Federal Environmental Protection Agency regulations, the San Diego RWQCB determined that marine receiving waters in the vicinity of SBPP contain viable, self-sustaining populations or communities of organisms and that the plant's cooling water system incorporates the best technology available to minimize adverse impacts on the environment (California RWQCB 1996).

10. The anticipated impact of the loss or modification of the habitat on the marine mammal populations involved.

Impacts to marine mammal habitat due to the operation of the cooling water systems at MLPP, MBPP, and SBPP are expected to be negligible. As indicated above, there have been no lethal or injurious takings of marine mammals caused by past operation of these facilities and no significant decline in prey populations due to impingement, entrainment, or thermal discharges.

11. The availability and feasibility (economic and technological) of equipment, methods, and manner of conducting such activity or other means of affecting the least practicable adverse impact upon the affected species or stocks, their habitat, and on their availability for subsistence uses, paying particular attention to rookeries, mating grounds, and other areas of similar significance.

There have been no recorded marine mammal deaths or injuries to-date resulting from the operation of the cooling water systems at MLPP, MBPP, or SBPP. The new intake system designs and/or flows for the proposed combined-cycle units at MLPP and MBPP, and the existing system at SBPP, represent the best technology available. Studies conducted in compliance with the Clean Water Act (PL 92-500 and 95-217) Section 316(b) indicate that potential entrainment and impingement effects are relatively minor at all facilities, and therefore any intake technology not already proposed would represent minor potential for further reductions. As a result, there is no basis at this time for developing and implementing alternative designs or operational protocols for the cooling water systems at MLPP, MBPP, or SBPP.

12. Where the proposed activity would take place in or near a traditional Arctic subsistence hunting area and/or affect the availability of a species or stock of mammal for Arctic subsistence uses, the applicant must submit either a plan of cooperation or information that identifies what measures have been taken and/or will be taken to minimize any adverse effects on the availability of marine mammals for subsistence uses.

Operation of the cooling water systems at MLPP, MBPP, and SBPP will not have an impact on the availability of marine mammals for subsistence purposes, as there is no subsistence harvest in California (J. Cordaro, NMFS pers. comm.).

13. The suggested means of accomplishing the necessary monitoring and reporting that will result in increased knowledge of the species, the level of taking or impacts on populations of marine mammals that are expected to be present while conducting such activities and suggested means of minimizing burdens by coordinating such reporting requirements with other schemes already applicable to persons conducting the activity. Monitoring plans should include a description of the survey techniques that would be used to determine the movement and activity of marine mammals near the activity sites(s) including migration and other habitat uses, such as feeding.

Monitoring of marine mammal occurrence at the MLPP, MBPP, and SBPP cooling water intake and discharge structures are conducted using the procedures identified below for each facility. More intensive monitoring of population status, migration patterns, and habitat utilization is not warranted based on the overall absence of take of marine mammals.

Moss Landing Power Plant

Four visual inspections of the intake barracks and traveling screens are performed at MLPP per day, or twice per 12-hour shift (Lee Genz, Duke/Fluor Daniel, pers. comm.). Inspections are only logged if an unusual situation is observed (e.g., dead or living marine mammal in the barracks area, debris that needs removal, or need to manually start the traveling screens).

Morro Bay Power Plant

The intake and outfall structures at MBPP are inspected once per day, at a minimum (James White, Duke/Fluor Daniel, pers. comm.). Operators inspect the screens and bar racks at the intakes and look for any unusual conditions at both the intake and outfall structures. Inspections are generally not documented unless an unusual situation is observed; however, operators do "time strike" the circular water temperature charts at both the intake and outfall structures.

South Bay Power Plant

Intake structures at SBPP are inspected visually by the operators at a minimum of once each afternoon (Robert Stolberg, SDG&E, pers. comm.). These inspections include cleaning of the trash racks, as necessary. Inspections are normally logged by the operators in the "Auxiliary Operators Log Book". Although there is no regularly scheduled inspection of the discharge channel, a visual inspection is typically conducted several times per week.

14. Suggested means of learning of, encouraging, and coordinating research opportunities, plans, and activities relating to reducing such incidental taking and evaluating its effects.

As discussed previously, there is minimal risk of incidental take of marine mammals due to operation of MLPP, MBPP, and SBPP. Therefore, intensive research on methods for reducing incidental take and evaluating the effects of take on marine mammal populations appears to be unwarranted at this time.

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