CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

FACT SHEET
ORDER NO. R9-2004-0154
NPDES PERMIT NO. CA0001368

WASTE DISCHARGE REQUIREMENTS
DUKE ENERGY SOUTH BAY, LLC
SOUTH BAY POWER PLANT
SAN DIEGO COUNTY

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SUMMARY OF SIGNIFICANT CHANGES AND NEW REQUIREMENTS INCORPORATED INTO RENEWAL NPDES PERMIT (ORDER NO. R9-2004-0154)

Order No. R9-2004-0154 (*Waste Discharge Requirements Duke Energy South Bay, LLC, South Bay Power Plant, San Diego County*) renews and updates NPDES Permit No. CA0001368 and supersedes the current NPDES permit, Order No. 96-05, in its entirety.

Following is a summary of significant changes and new requirements that have incorporated into Order No. R9-2004-0154, with respect to the previous version of the NPDES permit (i.e. Order No. 96-05). (The subsequent sections of this Fact Sheet discuss in greater detail the rationale for these changes and the basis for the findings, effluent limitations, monitoring requirements, contained in the Order):

1. EFFLUENT LIMITATIONS:

   Significant Changes:

   a. New Effluent Limitations for Copper

      Final effluent limitations for total recoverable copper (4.44 μg/l – maximum daily and 3.53 μg/l – average monthly) have been incorporated into the Order. These limitations were calculated based on the *Policy for Implementation of Toxic Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (State Implementation Policy, SIP) and the *California Toxics Rule* (CTR), in conjunction with recent CTR test data provided by Duke Energy.

      The Order includes a time-schedule for Duke Energy to comply with these final CTR limitations for copper. Duke Energy will be required to develop and implement a Workplan for additional source control measures, pollutant minimization actions, waste treatment to control copper in its discharge, or other measures to comply with the final CTR limitations for copper. Duke Energy will be provided 12 months to develop the Workplan. Duke Energy will be required to fully implement the Workplan and comply with its final CTR limitations for copper no later than 36 months after adoption of the Order. Progress reports on the implementation of the Workplan will be required on a semiannual basis. A final Progress Report on the implementation of the Workplan will be due no later than 30 months after adoption of the Order.

      Order No. R9-2004-0154 includes interim limitations for copper that would remain in effect until the facility is subject to the final CTR limitations, 36 months after adoption of the Order. The interim limitation requires the maximum daily concentration of copper in the discharge to not exceed the concentration of copper in the intake water by more than 2.5 μg/L.

b. New Requirement for Relocation of Thermal Discharge Limitations Compliance Point:

The Order includes requirements for Duke Energy to develop, submit, and implement a Workplan to achieve compliance with its thermal discharge limitations (i.e. average daily and instantaneous maximum Delta T limitations of 15 and 25 degrees F respectively) at the point of discharge (i.e. at or inland of the SBPP property line) within 36 months. In the interim, compliance with effluent temperature limitations shall be enforced at monitoring station S1 (i.e. 1000 feet into the discharge channel).

This change in compliance point is necessary it order for Duke Energy to fully comply with federal NPDES regulations (40 CFR 122.45 and CFR 122.41(j)(1)) that require effluent limitations to be enforced a location that is close to or at the point of discharge and representative of the discharge.

Duke Energy shall be required to submit the Workplan no later than 12 months after adoption of the Order. Progress Reports on the implementation of the Workplan shall be submitted on a semiannual basis after submission of the Workplan. A final Progress Report on the implementation of the Workplan will be due no later than 30 months after adoption of the Order.

c. The Order eliminates intake water credits for acute toxicity and pH.

d. The Order prohibits simultaneous chlorination of multiple Units.

2. MONITORING REQUIREMENTS:

Significant Changes:

a. Monthly effluent dissolved oxygen (DO) monitoring has been added. The final Order may be re-opened to include an appropriate numerical effluent limitation for DO.

b. Monthly intake, effluent, and receiving water monitoring for total recoverable copper have been added to enable demonstration of compliance with the new effluent limitations for copper.

c. Monthly effluent and receiving water monitoring for other priority metals (cadmium, lead, mercury, arsenic, chromium, silver, and zinc) have been added to the MRP, in order to comply with CTR and SIP provisions. Although the Reasonable Potential Analysis (RPA) conducted for these metals suggests that effluent limitations are not required, the RPA was based on just one sampling event. Since these metals have frequently been found in the discharge in detectable quantities, the Regional Board feels that it is necessary to closely monitor the seasonal variation in the concentrations of these metals in the discharge over an annual cycle and periodically conduct an RPA. If an RPA conducted in the future indicate that effluent limitations are needed for these metals, the NPDES permit will be amended to incorporate these limitations.

d. Monitoring for total residual chlorine in the effluent has been increased from twice a month to weekly. Furthermore, weekly receiving water monitoring for total residual chlorine (at two stations in the discharge channel that are closest to the property line) has been added. Weekly intake monitoring for total residual chlorine has also been added.

e. The frequency of monitoring for acute/chronic toxicity in intake and effluent has been increased from quarterly to monthly.

f. The bar rack approach velocity and sediment accumulation monitoring requirements for intake structures have been eliminated.

3. UPDATED CLEAN WATER ACT (CWA) SECTION 316(a) and (b) STUDIES

Duke Energy conducted updated thermal discharge and intake structure impact assessment studies in 2003 to demonstrate compliance with Sections 316(a) and 316(b) of the CWA. The studies were addressed under technical study reports titled "*SBPP Cooling Water System Effects on San Diego Bay, Volume 1: Compliance with Section 316(a) of the Clean Water Act for the South Bay Power Plant*" and "*SBPP Cooling Water System Effects on San Diego Bay, Volume II: Compliance with Section 316(b) of the Clean Water Act for the South Bay Power Plan.*" Duke Energy's consultants *Tenera Environmental* and *Merkel & Associates* conducted the studies.

a. Findings of Adverse Environmental Impacts

Findings have been included in the Order (based on the Updated Section 316(a) Study) that acknowledge that the SBPP's discharge of once-through cooling water to south San Diego Bay has adversely impacted the Beneficial Uses (including Estuarine Habitat; Marine Habitat; Wildlife Habitat; Rare, Threatened or Endangered Species; Preservation of Biological Habitats of Special Significance; and Shellfish Harvesting) within the SBPP discharge channel, particularly in the area within 1000-1500 feet of the property line.

The Regional Board has determined that Duke Energy should be required to take measures to abate the detrimental impacts of the SBPP discharge to the discharge channel. Duke Energy should have to propose measures to restore the Beneficial Uses of south San Diego Bay and to rehabilitate the damage caused to the biological resources of the Bay. In an action separate from the adoption of the

Order, the Regional Board will consider the issuance of a CWC Section 13267 letter to Duke Energy directing it to provide a Workplan that proposes specific abatement and restoration measures. Duke Energy will be responsible for the financial costs associated with the implementation of the abatement and restoration measures.

Duke Energy will be required to develop and implement the abatement and restoration Workplan in consultation with representatives of the USEPA, Department of Fish and Game (DFG), U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), RWQCB/SWRCB, and the California Coastal Commission.

The Regional Board recognizes that the requirement to relocate the discharge temperature compliance point from Station S1 to the SBPP property line in order to comply with NPDES regulations (40 CFR 122.45 and CFR 122.41(j)(1)), may provide for important side benefits. In particular, this relocation may help in abating some of the detrimental thermal impacts to the discharge channel. This change in monitoring location will eliminate any potential mixing or dilution zones for temperature and ensure that less heat is dispensed to the discharge channel. Since there is a direct correlation between DO levels in the discharge channel and temperature, less heat dispensed to the discharge channel may also provide for higher DO levels. Higher DO levels and lower temperature regimes may positively impact the health and survivability of fish, benthic invertebrates, and eelgrass in the discharge channel. The Workplan developed by Duke Energy would, however, have to propose additional measures to reduce the thermal impacts of the discharge on the marine resources of the discharge channel and to fully restore Beneficial Uses. The Workplan would also have to propose measures to abate the impacts of the high velocity and volume of the discharge (redistribution of turbidity) on the discharge channel.

b. <u>Requirement for an Updated *Comprehensive Demonstration Study* for the New Section 316(b) Rule</u>

The U.S. EPA promulgated new provisions and performance standards for the Section 316(b) rule in February 2004. The 2003 Section 316(b) compliance study conducted by Duke Energy was not based on the provisions of the new 316(b) rule, since the new rule was promulgated in 2004. Furthermore, the results of the 2003 study indicate that Duke Energy does not meet the impingement and entrainment performance standards for the new Section 316(b) rule (Section 125.94(b)). Pursuant to Section 125.95(b) of the new rule, Duke Energy is required to perform a *Comprehensive Demonstration Study* to characterize impingement mortality and entrainment, to describe the operation of the cooling water intake structures at SBPP, and to confirm that the technologies, operational measures, and/or restoration measures it has selected or installed, or will install, to meet one of the five compliance alternatives listed in Section 125.94(a) of the new rule.

The new rule requires the discharger to demonstrate compliance with the requirements of the rule no later than January 7, 2008. As part of its 2003 Section 316(b) study, Duke Energy has already collected a majority of the information required for the *Comprehensive Demonstration Study.* It is reasonable to expect Duke Energy to complete the remaining components (*Technology Installation and Operation Plan* and/or *Restoration Plan* etc. and proposed implementation schedules) of the *Comprehensive Demonstration Study* much earlier than the January 7, 2008 deadline indicated in the rule. The Regional Board requires Duke Energy to complete its *Comprehensive Demonstration Study* and submit a final report no later than 30 months after adoption of Order No. R9-2004-0154.

Duke Energy is required to submit a *Proposal for Information Collection* prior to submittal of the *Comprehensive Demonstration Study.* The *Proposal for Information Collection* as required by Section 125.95(b)(1) of the rule will be due no later than 12 months after adoption of the Order.

A. CONTACT INFORMATION

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B. FACILITY DESCRIPTION AND BACKGROUND

The Duke Energy South Bay LLC, South Bay Power Plant (SBPP) is a fossil-fueled steam electric power generating station that began operation in 1960. The facility is located at 990 Bay Boulevard, Chula Vista, California, on the southern edge of San Diego Bay. This 150-acre, 737-gross megawatt (MW) plant is located in Section 9, T18S, R2W SBBM.

On January 25, 1985, the Regional Water Quality Control Board, San Diego Region, (Board) adopted Order No. 85-09, National Pollutant Discharge Elimination System (NPDES) Permit No. CA0001368, *Waste Discharge Requirements for San Diego Gas & Electric (SDG&E) Company's South Bay Power Plant, San Diego County.* The Order established waste discharge requirements for the combined discharge of up to 602.2 million gallons per day (MGD) of elevated temperature once-through cooling water and other waste discharges from SBPP to south San Diego Bay.

On June 29, 1989, SDG&E submitted to the Board an application for renewal of NPDES Permit No. CA0001368. SDG&E amended its application on June 1, 1993, and October 26, 1994. The Board adopted Order No. 96-05 on November 14, 1996, which renewed NPDES Permit No. CA0001368.

On April 23, 1999, SDG&E sold SBPP to the San Diego Unified Port District, which concurrently leased the plant to Duke Energy South Bay, LLC. Duke Energy has assumed all responsibility, coverage, and liability in regards to this NPDES permit.

Order No. 96-05 expired on November 14, 2001. Tentative Order No. 2001-283, renewing the NPDES permit for SBPP, was considered by the Regional Board at a public hearing on December 12, 2001. During this public hearing the Regional Board heard oral public testimony, but decided to delay action on the tentative Order until a future meeting.

A revised tentative Order (No. R9-2004-0154) was issued for public review and comment on June 25, 2004. Tentative Order No. R9-2004-0154 incorporated, where appropriate, the comments and recommendations provided by the public on previously issued tentative Orders for the SBPP, including Order No. 2001-283.

Tentative Order No. R9-2004-0154 also addressed, where appropriate, written comments provided by the public on the technical reports provided by Duke Energy on updated studies conducted at SBPP during 2003. The updated studies were conducted pursuant to a CWC Section 13267 letter issued to the Duke Energy to assess the impact of the intake structures and the discharge from the SBPP on the biological resources and beneficial uses of south San Diego Bay and to verify compliance with CWA Sections 316(a) and 316(b). Duke Energy's consultants, *Tenera Environmental* and *Merkel & Associates*, conducted the studies. The Regional Board also provided copies of the technical study reports to USEPA's contractor Tetra Tech for its review and comment. Tetra Tech independently evaluated the results of the studies and provided recommendations to the Regional Board to incorporate specific effluent limitations and monitoring requirements into the renewal NPDES permit.

During its regularly scheduled meeting on September 8, 2004, the Regional Board heard oral public testimony regarding tentative Order No. R9-2004-0154. Because staff was not able to fully address the large volume of written comments received on the tentative Order by the September 8, 2004 meeting date, the tentative Order was not considered for adoption by the Regional Board. During the meeting the Regional Board directed staff to make additional modifications to tentative Order No. R9-2004-054 and bring the tentative Order back for the Regional Board's consideration at a future meeting. The modifications recommended by the Regional Board included changes to the compliance schedules for the power plant to comply with NPDES regulations (relocation of compliance point for thermal limitations to location that complies with NPDES regulations), new CWA Section 316(b) Phase II rule, and new copper limitations pursuant to the California Toxics Rule.

Order No. R9-2004-0154 has incorporated the recommendations made by the Regional Board at its September 8, 2004 meeting. Furthermore, Order No. R9-2004-0154 has also addressed, where appropriate, comments received by the public and resource agencies on the tentative Order. Pursuant to 40 CFR Part 122.46, Order No. R9-2004-0154 renews and updates NPDES Permit No. CA0001368 for another five years.

The SBPP consists of four steam turbine electrical generating units and one gas turbine generator. The gas turbine is not regulated under this NPDES permit since there are no wastewater discharges associated with the unit. Each of the four steam turbine units burns natural gas with the option of burning fuel oil as economic conditions dictate. Each of the units generate electricity independently or in conjunction with one another and their ratings can fluctuate over time. The table below summarizes each unit's current gross megawatt (MW) rating, start-up date, and cooling water flow:

Unit	Date on Line	Capacity	Total Flow per Unit
1	July 1960	152 MW	78,000 gpm
2	June 1962	156 MW	78,000 gpm
3	September 1964	183 MW	124,600 gpm
4	December 1971	232 MW	136,800 gpm
Gas Turbine	October 1966	15 MW	N/A
Total Plant Capacity		738 MW	417,400 gpm

In addition to the generating units, the SBPP industrial complex is composed of 1) five exhaust stacks; 2) three fuel oil storage tanks; 3) separate seawater (cooling water) intake and discharge channels including appurtenant structures; 5) an electrical switchyard; 6) various warehouses and office buildings; and 7) a number of access roads and one railroad siding.

C. DISCHARGE SOURCES AND WASTE CHARACTERIZATION

The primary wastewater discharges from SBPP to San Diego Bay are those associated with its once-through (non-contact) cooling water system. In addition to the waste streams associated with the cooling water system, stormwater runoff from SBPP is also routed to San Diego Bay. The SBPP has the following wastewater stream associated with its cooling water system:

Wastewater Discharge	Maximum Flow (MGD)
Once-Through (Non-Contact) Cooling Water System	601.13

1. Cooling water
2. Cooling water pump lubrication and seal water and pretreatment backwash
3. Traveling screen washwater
4. Condenser pre-filter and ball recirculation system water
5. Forebay cleaning washwater
6. Manual cleaning of encrusting organisms from tunnels and condenser units
7. Chlorination system
8. Tube leak seals
9. Corrosion protection
10. Salt water heat exchanger cooling water
11. Units 1 and 2 circulating water pump station sump water

No wastes produced by or in conjunction with the gas turbine generator are discharged to San Diego Bay. Sanitary wastes produced at the SBPP are discharged to City of Chula Vista's sanitary sewer system. Furthermore, starting December 31, 1997, SDG&E reengineered the waste streams described in Order No. 96-05 as "Low Volume Wastes" and "Metal Cleaning Waste" to discharge these wastes to the City of Chula Vista sanitary sewer system. These operations are now regulated under an Industrial User Discharge Permit (No. 13-0279-01A) issued by the City of Chula Vista Department of Public Works and the San Diego Metropolitan Wastewater Department.

1. DESCRIPTION OF COOLING WATER SYSTEM AND ASSOCIATED DISCHARGES

The primary waste discharges from the SBPP are associated with the once-through (non-contact) cooling water system. The cooling water system is associated with the four steam units, and utilizes San Diego Bay as both source water and receiving water. Each unit utilizes a closed cycle in which high quality feed water is turned to steam in boilers, the steam is passed through turbines to generate electricity, the steam is condensed to water by the cooling water system, and the feed water is returned to the boilers. The elevated temperature once-through cooling water is discharged back to the bay via a discharge channel. The temperature of the discharge may be as much as 23 to 25 degrees F higher than the ambient intake water when the plant is operating at peak load. The power plant transfer approximately 3.40 x 109 Btu/hr of heat to 601.13 MGD of cooling water when the plant is operating at peak load. The power plant may be subject to peak load conditions for as much as eight to ten hours during hot summer days. This may correlate to discharge temperatures as much as 100 degrees F for several hours of the day.

Higher temperatures may also reduce the levels of dissolved oxygen in the discharge. The elevated temperature in the discharge has show to have a detrimental impact on species residing in the Bay. The existing Order No. 96-05 specifies an average daily delta T of 15 degrees F and an instantaneous delta T of 25 degrees F. Order No. 96-05 requires Duke Energy to comply with its thermal limitations at Station S1, which is approximately 1,000 feet downstream of its property line. Order No. R9-2004-0154 requires Duke Energy to take measures to demonstrate compliance with its thermal limitations at the property line instead of Station S1, in order to fully conform with NPDES regulations and to eliminate the benefits of a defacto mixing zone it is not entitled to (see Section F.1, *Federal NPDES Regulations* and Section F.3, *Thermal Plan* of this Fact Sheet).

The flow diagram showing the waste streams from the components and sub-components associated with the once-through cooling water system can be found in Attachment 1. The cooling water components and associated waste streams are described below:

a. <u>Intake Channel</u>

Cooling water is withdrawn from San Diego Bay through a single intake channel that extends in a westerly direction about 5,735 feet from the SBPP property line on the west side of the plant. The intake channel has a bottom width of 200 feet at its widest point, tapers to 50 feet near the Unit 4 intake structure, and is about

15 feet deep. The channel was constructed by dredging and diking operations, and the sides of the channel are composed of natural earth and rock riprap. Variations in channel water surface elevation due to the tide are from a low of about -5.0 feet to a high +5.7 feet (elevation 0 being mean sea level, msl).

b. Intake Structures

The SBPP has three separate intake structures on the north side of the intake channel. Each intake structure is composed of a forebay and a set of traveling screens. Units 1 and 2 share a common structure, Units 3 and 4 are served by individual intake structures. Water flowing in the intake channel (the amount depends on the number of units in operation) approaches the Units 1 and 2 structure first (a distance of about 114 feet east from the property line to the structure), then the Unit 3 structure (about 131 feet east from the Units 1 and 2 structure), and lastly the Unit 4 structure (about 93 feet east from the Unit 3 structure). Floating booms are situated in the intake channel in front each structure to retain large floating material washed in from the bay. Material in front of the booms is collected as needed and disposed in appropriate land disposal sites. Each forebay extends from a trash rack at the intake channel end of the forebay to a set of circulating water pumps. Water entering the forebay supplying each cooling water pump first passes through a single metal trash rack that prevents the passage of large debris into the forebay. The trash racks are cleaned periodically using a trash rake. Debris removed from the trash rack is sent to an appropriate land disposal site.

Forebay Cleaning Washwater
Once or twice each year the forebay walls and inlet pipes are manually washed and scraped using only seawater pumped from the travelling screen wash water supply header. The washed and scraped growth from this process is pumped into the travelling screen washwater discharge trough and empties into the discharge channel. It is estimated that the amount of water pumped to the travelling screen trough for this process is about 1,700,000 gallons per year assuming each forebay is drained and cleaned twice each year.

Traveling Screen Washwater
At the back of each forebay are travelling screens to remove debris not collected and removed on the trash racks. There plant has a total of eight traveling screens. The screens are conventional through-flow, vertically rotating, single entry, band-type screens, mounted in the screen wells of the intake structures. As the cooling water flows through the screen structure, it passes through a 0.5-inch wide stainless steel screen. Each screen starts-up and rotates automatically when debris buildup causes a predetermined level differential across the screen. As the screen revolves, the material is lifted from the water surface by the upward travel of the baskets. A screen wash system in the traveling screen structure provides seawater from the intake to wash the debris from the traveling screen. At the head of the screen, matter is removed from the baskets by the high-pressure spray of water that is evenly

distributed over the entire basket width. The jet spray washes the material into the travelling screen washwater discharge trough that crosses over the intake channel and empties into the discharge channel. Based on the conservative assumption that the screens are washed continuously for 24 hours, 3.16 MGD of wastewater would be generated. About half of this (1.58 MGD) would be returned to the bay through the trough and discharge channel, and half (about 1.58 MGD) would be drained back into the intake in front of the screens and drawn into the cooling water system.

c. Circulating Water Pumps

Each unit has two circulating (cooling) water pumps, one for each condenser half, for a total of eight pumps. Units 1 and 2 have vertical centrifugal pumps that rotate at 400 rpm and Units 3 and 4 have vertical submerged pumps that rotate at 390 rpm.

Cooling Water
Each circulating water pump draws water in through the traveling screen and discharges it into a pipe that transports the water to a condenser. The pumps for Units 1 and 2 discharge into 48-inch diameter concrete pipes and the pumps for Units 3 and 4 discharge into 60-inch diameter concrete pipes.

Lubrication and Seal Water and Pre-Treatment Backwash
The circulating water pumps for Unit 1 and 2 utilize freshwater (i.e., municipal water) for pump lubrication and seal water. Units 3 and 4 use seawater for this purpose. This water is discharged into the pipes downstream of each pump. The maximum combined discharge flow rate from these lubrication and seal systems coupled with the lubrication and seal water pre-treatment backwash is 0.127 MGD.

Chlorination System
The SBPP uses a chlorination system that injects liquid sodium hypochlorite into the pipes immediately upstream of the circulating water pumps for each Unit. This results in total residual chlorine in the discharge. This sodium hypochlorite solution is used intermittently in the cooling water system when the Unit is in operation to minimize formation of algae and slime that may collect in the tubes of the condenser. Each injection point is individually controlled. Sodium hypochlorite is injected upstream of each cooling water pump every four hours on a timed cycle each day. During a 24 hour period, each Unit is subject to up to 6 chlorination cycles a day. During the chlorination cycle, each Unit is chlorinated for 20 minutes. The injection of chlorine is staggered so that only one Unit at a time is chlorinated. Order No. R9-2004-0154 prohibits simultaneous chlorination of multiple Units. The combined cycle time when all four Units are operating does not exceed 80 minutes. The intermittent nature of the chlorination process allows the total residual chlorine to dissipate and reduce impacts to the receiving waters of the Bay.

Approximately 4 to 5 pounds of sodium hypochlorite are added to each operating Unit during a chlorination injection cycle. The effluent limitation for total chlorine residual is not a fixed limitation. The limitation is a function of the duration of uninterrupted chlorine discharge in minutes (see Section F.5, *Federal Regulations for Steam Electric Power Generation, 40 CFR 423*, of Fact Sheet). A longer discharge time would render a lower (i.e. more stringent) effluent limitation for total residual chlorine. The effluent limitation for total residual chlorine when only one Unit is operating (i.e. a 20 minute total discharge time) during a chlorination cycle is 144 μg/l. The effluent limitation for total residual chlorine residual when all four Units are operating (i.e. a 80 minute total discharge time) during a chlorination cycle is 85 μg/l. During the past five years the average concentration of total residual chlorine in the combined discharge has ranged from 40 to 70 μg/l (depending on the number of Units in operation during the chlorination cycle in which the total residual chlorine was measured). The SBPP has not violated it total residual chlorine limitation in the last five years.

Units 1 and 2 Circulating Water Pump Station Sump
Units 1 and 2 circulating water pumps are located in a sump. At the northwest side of this sump are two sump pumps that are utilized for keeping the sump dry. The sump may contain rainwater or municipal water from circulating pump seal leaks. The water is pumped to the discharge channel via the travelling screen washwater discharge trough. The maximum discharge with both sump pumps running continuously during a 24-hour period is 4,320 gallons per day.

d. Condensers

Each unit has a single condenser that is a shell-and-tube arrangement in which heat is transferred from the turbine exhaust steam to the circulating (cooling) water. The tubing material used in the Unit 1 condenser is AL6X, a high performance stainless steel containing alloying elements of chromium, molybdenum and nickel. The condensers of Units 2, 3, and 4 use copper-nickel tubing. The tubing length (exposed) in Units 1, 2, and 3 is 30 feet and in Unit 4 is 38 feet. The four condensers transfer approximately 3.40 x 10^9 Btu/hr of heat to 601.13 MGD of cooling water when the plant is producing at full capacity (i.e. 723 MW).

The condensers on Units 1, 2, 3 and 4 all utilize impressed current (i.e. electrical) cathodic protection to inhibit the corrosion process. The six shell and tube salt water heat exchangers and the two shell and tube condensate coolers utilize zinc waste plates, which serves as an anode to promote the corrosion of zinc in place of other metals. Although the facility uses impressed cathodic protection to reduce corrosion of its condenser tubing, corrosion cannot be completely eliminated. Corrosion of the copper condenser tubing adds copper to the cooling water discharge.

A special copper study was conducted at the SBPP in 1999 to estimate the overall annual loading of copper from the SBPP discharge to south San Diego Bay. The study estimated that the average copper concentration difference between the cooling water intake and discharge was found to be 0.39 ± 0.17 µg/l. This confirmed that the power plant does add an incremental load of copper to south San Diego Bay. The study estimated that the plant at maximum cooling water flow added approximately 710 ± 310 pounds of copper annually to south San Diego Bay.

Encrusting organisms are manually cleaned from the condensers on an as needed basis. Forebays and inlet conduits are manually cleaned once or twice per year and wastes are deposited into the discharge channel via the screen debris trough and this material is washed through the system with normal screen wash. No water is added to or removed from the cooling water flow for this process.
The following auxiliary components and processes associated with the condensers contribute to the cooling water discharges from SBPP to San Diego Bay:

Condensate Coolers
The SBPP uses flow from the circulating water inlet conduits for the purpose of cooling the closed loop (condensate) generator cooling systems on Units 1 and 2. Salt water from the inlet conduit flows or is pumped, depending on generator temperature, through the heat exchangers to the discharge channel via the once-through cooling water discharge conduit.

Condenser Pre-Filter and Ball Re-Circulation System Water
The Unit 1 condenser has a pre-filter and ball recirculation system that takes seawater from each of the circulating water pump pipes immediately before the condenser. This water is used to reduce fouling on the condenser tubes. The water and material collected on the filter is routed to the discharge channel via the once through cooling water discharge conduit.

Salt Water Heat Exchanger Cooling Water
The SBPP uses seawater from the circulating water inlet conduits for the purpose of cooling the closed loop service water system via shell and tube heat exchangers. There are six seawater heat exchangers at SBPP. Units 1 and 2 utilize two heat exchangers, Unit 3 has two heat exchangers and Unit 4 has two heat exchangers. The cooling water discharges from the heat exchanger to the discharge channel via the once through cooling water discharge conduit.

e. Discharge Pipes

The heated water from the condensers passes into four separate concrete discharge pipes, two of which are 72 inches in diameter (Units 1 and 2 pipes) and two of which are 84 inches in diameter (Units 3 and 4 pipes). All of the discharge pipes cross under the Intake Channel into a discharge basin (see Attachment 3). There are no structures such as booms, gates, or screens associated with the discharge pipes.

f. Discharge Channel

Cooling water from the discharge basin is returned to San Diego Bay through a single discharge channel, which runs parallel to and just south of the intake channel. The bottom width of the channel varies from 50 feet near Unit 4 discharge to approximately 1,200 feet at its widest point in the Bay. The depth also varies from -15 feet at the discharge structures and slopes up to meet the existing bottom of the Bay. The channel was constructed by dredging and diking operations. Over the years, some filling-in has occurred, although in the area near the discharge points it has been minimal.

As shown in Attachment 4, a jetty constructed by SDG&E extends from the northern side of the discharge basin into San Diego Bay. This jetty was constructed to prevent discharged cooling water from being drawn directly back into the intake structures. A narrow dredged channel, from which the material to construct the jetty was obtained, parallels the jetty. This dredged channel terminates at approximately Latitude 32°36'33" N, Longitude 117°06'49" W, at the southwestern most end of the jetty.

For purposes of Order No. R9-2004-0154, the "discharge channel" consists of the waters bounded by the jetty, a line extending from the southwestern most end of the jetty to the eastern side of the mouth of the Otay River, the southern shoreline of San Diego Bay, and the shoreline of the discharge basin (see Attachment 4). Therefore, the discharge channel includes, but is not limited to, the dredged channel referred to above. The discharge channel is a part of south San Diego Bay and waters in the discharge channel are considered waters of the United States.

The U.S. Fish and Wildlife Service (USFWS) obtained a long-term lease from the State of California to manage the salt ponds and marine water of south San Diego Bay in 1999. This area is designated as the South San Diego Bay Unit of the San Diego National Wildlife Refuge (Refuge) and is shown in Attachment 5A. The discharge channel is inside the boundary of this Refuge. Effluent from the SBPP can directly impact the biological resources in this Refuge. By letter dated May 5, 1998, the USFWS notified the discharger that the proposed Refuge would have no negative effect on the operations and maintenance of the SBPP (see Attachment 5B). This includes the use of San Diego Bay water for cooling purposes and any maintenance dredging of the intake and discharge channels of the power plant. The letter did not recommend any curtailment in power generation or modification to the volume or temperature of the SBPP discharge. The letter implied that the operations of the SBPP should not have detrimental impacts on goals and objectives of the Refuge.

2. STORMWATER DISCHARGES

In addition to the waste streams associated with cooling water, the SBPP also has a conveyance system that accommodates stormwater runoff. Storm water discharges from SBPP are regulated pursuant to the *Statewide General Industrial Storm Water Permit (SWRCB Water Quality Order No. 97-03-DWQ NPDES General Permit No. CAS000001, Waste Discharge Requirements for Storm Water Associated with Industrial Activities Excluding Construction Activities*, April 17, 1997). Attachment I of the *Statewide General Industrial Storm Water Permit* includes categories of facilities that must obtain coverage under this general permit. Steam Electric Power Generating Facilities such as SBPP are included in the list of categories (i.e. category number 7) covered under this general permit. Additional stormwater provisions and monitoring requirements are therefore not included in Order No. R9-2004-0154.

The discharger filed a Notice of Intent to comply with the Statewide General Industrial Storm Water Permit on March 17, 1999. A Storm Water Pollution Prevention Plan (SWPPP) was prepared to minimize pollutants in storm water runoff from the site. The SWPPP was updated in March 2000 and again in March 2001. The overall objectives of the SWPPP are to identify sources of pollution that effect the quality of industrial storm water discharges and authorized non-storm water discharges, and implement Best Management Practices (*BMPs*) to reduce or prevent pollutants in storm water discharges. *BMPs* implemented by the SWPPP at SBPP include preventive maintenance and inspections, good housekeeping, spill prevention and response, structural and nonstructural controls for minimizing storm water contamination, sediment and erosion control, and employee training.

The last three industrial stormwater compliance inspections conducted by the Regional Board on January 17, 2002, February 13, 2003, and December 10, 2003 indicated no high risk or contaminated areas that would require diversion of stormwater and additional containment of runoff. The above ground fuel oil and jet oil tanks located at the plant are adequately bermed and served by a locked valve system that allows stormwater to be released only if visual inspections show no oil contamination. The rainwater contained within the berm is usually allowed to evaporate and not released to the storm drain. The secondary containment facilities serving the tanks provide enough capacity to hold 110 percent of the total tank volume plus accumulation of rainfall from a 25-year, 24-hour duration storm event. Most industrial activities at the plant are conducted indoors with no possibility of exposure to rainwater. The low-volume and metal cleaning wastewater treatment plant is composed of fully enclosed unit process tanks (reactivator, coalescer, pH adjustment tanks etc.) with no exposed waste streams. All other storage tanks present in the facility yard (containing sodium hypochlorite, ammonium hydroxide, boiler water condensate, sulfuric acid, caustic soda etc.) are fully enclosed tanks with secondary containment in event of spillage or leakage. Maintenance and repair activities such as painting, sand blasting, and turbine shaft rehaul work are done in fully enclosed booths with filters. Chemicals such as lubricants and biocides are stored in 55-gallon drums and placed in a covered storage room with a secondary sump for spill prevention.

The facility currently monitors stormwater for pH, conductivity, oil and grease, total suspended solids (TSS), and iron. Based on the last three stormwater compliance inspections conducted at the SBPP, the Regional Board does not recommend additional monitoring of pollutants in stormwater.

3. DESCRIPTION OF WASTE DISCHARGE CONVEYANCE SYSTEM

Waste streams associated with the once-through cooling water from the SBPP are discharged to San Diego Bay, through the following conveyances (see Attachment 3):

a. Discharges to the Intake Basin

(1) Separate discharge pipes each for Unit 1, Unit 3, and Unit 4 condenser vacuum pump sealing water;
(2) Separate discharge pipes each for Unit 1, Unit 3, and Unit 4 condenser vacuum water; and,
(3) A separate stormwater discharger pipe which is also used to convey Unit 2 condenser vacuum and condenser vacuum pump sealing water.

b. Discharges to the Discharge Basin

(1) Four individual condenser outlet pipes through which cooling water is discharged (wastewaters discharged to the intake basin and drawn into the intake structures are also discharged through these pipes);
(2) One traveling screen washwater discharge pipe which also functions as a conveyance for backwash water from the pre-filter on the cooling water pump lubrication water supply system, forebay cleaning washwater, and cooling water pump station sump discharge from Unit 1 and Unit 2; and,
(3) One separate discharge pipe for fuel pump motor bearing cooling water.

c. Stormwater Conveyance

There are nine conduits that discharge stormwater into the intake channel. These include 1) six separate stormwater discharge pipes; 2) one discharge pipe for telephone and valve vault drain water ; 3) one stormwater discharge pipe that is also used to convey Unit 2 condenser vacuum and pump sealing water; and 4) one discharge pipe for fuel oil piping containment water. There are four conduits that are used to convey stormwater to the discharge channel, three of which function as a conveyance for fuel oil pump containment water.

D. WASTE DISCHARGE SUMMARY

A summary of monitoring data for pollutants contained in the effluent from the SBPP is shown below in Tables 1 and 2. The data covers the 1998-2003 period and reflects the discontinuation of the low-volume and metal cleaning waste stream to the combined discharge flows on December 31, 1997. These waste streams started being routed to the City of Chula Vista sanitary sewer system at that time.

Table 1: Pollutant Ranges in Effluent (pollutants with effluent limitations in existing Order No. 96-05)

Year	Flow	pH	Total Chlorine Residual	Acute Toxicity	Delta T[3] (Daily)
Discharge Limit	601.13 MGD	6.0 - 9.0	ug/l[1]	% survival[2]	15° F
1998	405 - 592	7.8 - 8.1	40.0 - 46.7	85.0 - 100	6.8 - 12.7
1999	483 - 590	8.0 - 8.3	40.0 - 45.7	90.0 - 100	2.3 - 9.6
2000	363 - 589	7.9 - 8.2	40.0 - 70.0	90.0 - 100	5.2 - 12.8
2001	352 - 584	7.7 - 8.3	40.0 - 50.0	92.5 - 100	7.4 - 11.2
2002	154 - 591	7.9 - 8.2	40.0 - 50.0	92.5 - 100	3.2 - 15.3
2003	210 - 601	7.9 - 8.3	40.0 - 70.0	100	1.7 – 14.4

[1]Total Chlorine Residual limit is a variable discharge limit based on a continuous uninterrupted chlorination cycle of zero to two hours.
[2] The acute toxicity in a 96-hour static bioassay test, using standard test species, shall not produce less than 90 percent survival, 50 percent of the time, and shall not produce less than 70 percent survival, 10 percent of the time.
[3]Average daily incremental temperature of effluent from SBPP above that of the intake water

Table 2: Pollutant Ranges in Effluent (pollutants with no effluent limitations, but requiring monitoring, in Order No. 96-05)

Year	Arsenic	Cadmium	Chlorinated Phenolics	Chromium	Copper	Cyanide	Lead	Mercury	Nickel	Nitrogen, Ammonia	Phenolics	Silver	Zinc	Oil & Grease	TSS
Unit	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l
1998	Nd-1.7	nd	nd	nd-14	nd	nd	nd	nd	nd-8.8	nd	nd	nd	nd-30	.1-3.3	4.9-130
1999	1.7-2.1	nd	nd	2.1-3.4	nd	nd	nd	nd	nd-12	nd	nd	nd-0.7	nd	.5-3.9	4.4-36
2000	1.6-2.6	nd	nd	nd-1.4	nd-7.6	nd	nd	nd	nd	nd	nd	nd	nd	.6-2.0	2.2-19
2001	nd	nd	nd	4.7	nd	nd	nd	nd	nd	nd	nd	nd	nd	.3-2.6	.9-26.1
2002	nd	nd	nd	4.5	nd	nd	nd	nd	nd	nd	nd	nd	nd	.4-7.2	3.1-28.4
2003	1.3	nd	nd	15	3.1	nd	nd	nd	9.5	nd	nd	nd	nd	.9-3.7	5.5-13

E. SUMMARY OF WASTE DISCHARGE IMPACTS

The discharge of once-through cooling water to south San Diego Bay has adversely impacted the Beneficial Uses within the SBPP discharge channel, particularly in the area within 1000-1500 feet of the property line. The 2003 updated 316(a) study report, *SBPP Cooling Water System Effects on San Diego Bay, Volume 1: Compliance with Section 316(a) of the Clean Water Act for the South Bay Power Plant* confirmed that certain areas of the SBPP discharge channel have detrimental impacts that are attributable to the elevated temperatures and high volumetric flow rates associated with the SBPP discharge (see Section F.2.a of this Fact Sheet for a description of the report and its findings). The report indicates that up to 104 acres of critical eelgrass habitat have been lost because of the redistribution of turbidity in the Bay due to the SBPP discharge. Furthermore, the report indicates that the overall diversity of benthic invertebrates residing in the near field stations of the discharge channel is much lower than at reference stations outside the discharge channel. The studies also indicates that certain invertebrate species (including polychaete worms and amphipods) are largely absent in near field stations of the discharge channel. These species were found in abundant quantities in reference stations outside the discharge channel. The absence of these species from the discharge channel demonstrates that these species could not survive under warm thermal regimes and were being adversely impacted.

The Beneficial Uses (as defined by the Basin Plan) that are potentially impaired due to the SBPP discharge include: Estuarine Habitat; Marine Habitat; Wildlife Habitat; Rare, Threatened or Endangered Species; Preservation of Biological Habitats of Special Significance; and Shellfish Harvesting. It is evident that the impacts on Beneficial Uses due to the discharge of once-through-cooling water cannot be eliminated except through termination of the discharge. The adverse impacts are due to the individual and combined effects of the elevated temperature of the discharge and the high volume and velocity of the discharge (redistribution of turbidity).

Duke Energy will be required to take measures to abate the detrimental impacts of the SBPP discharge to the discharge channel. Duke Energy will also have to propose measures to restore the Beneficial Uses of south San Diego Bay and to rehabilitate the damage caused to the biological resources of the Bay. In an action separate from the adoption of the Order, the Regional Board will consider the issuance of a CWC Section 13267 letter to Duke Energy directing it to provide a Workplan that proposes specific abatement and restoration measures. Duke Energy will be responsible for the financial costs associated with the implementation of the abatement and restoration_measures. Duke Energy will be required to develop and implement the abatement and restoration Workplan in consultation with representatives of the USEPA, Department of Fish and Game (DFG), U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), RWQCB/SWRCB, and the California Coastal Commission.

The Regional Board recognizes that the requirement to relocate the discharge temperature compliance point from Station S1 to the SBPP property line in order to comply with NPDES regulations (40 CFR 122.45 and CFR 122.41(j)(1)), may provide for important side benefits. In particular, this relocation may help in abating some of the detrimental thermal impacts to the discharge channel. This change in monitoring location will eliminate any potential mixing or dilution zones for temperature and ensure that less heat is dispensed to the discharge channel. Since there is a direct correlation between DO levels in the discharge channel and temperature, less heat dispensed to the discharge channel may also provide for higher DO levels. Higher DO levels and lower temperature regimes may positively impact the health and survivability of fish, benthic invertebrates, and eelgrass in the discharge channel. The Workplan developed by Duke Energy would, however, have to propose additional measures to reduce the thermal impacts of the discharge on the marine resources of the discharge channel and to fully restore Beneficial Uses. The Workplan would also have to propose measures to abate the impacts of the high velocity and volume of the discharge (redistribution of turbidity) on the discharge channel.

F. BASIS FOR WASTE DISCHARGE REQUIREMENTS

The waste discharge requirements (including effluent and receiving water limitations, prohibitions, and monitoring requirements) contained in Order No. R9-2004-0154 are based on the federal NPDES regulations, the federal technological based standards for steam electric power plant (40 CFR 123), the provisions of Clean Water Act (CWA) Section 316(a)(thermal discharge regulations) and Section 316(b)(power plant intake structure regulations), the State Thermal Plan, the Basin Plan, the *Policy for Implementation of Toxic Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (State Implementation Policy, SIP), and the California Toxics Rule (CTR). Order No. R9-2004-0154 also incorporates, where appropriate, the findings of the updated studies conducted at SBPP in 2003. The studies were conducted to assess the impact of the intake structures and the discharge from the South Bay Power Plant (SBPP) on the biological resources and beneficial uses of south San Diego Bay and to verify compliance with CWA Sections 316(a) and 316(b). The Order also enforces the provisions of a new rule to implement Section 316(b). This rule, 40 CFR 125, Subpart J, *Requirements Applicable to Cooling Water Intake Structures for "Phase II Existing Facilities" Under Section 316(b) of the Act*, establishes location, design, construction and capacity standards, for cooling water intake structures at existing power plants that use the largest amounts of cooling water (i.e. greater than 50 MGD). The new rule went into effect on September 7, 2004.

The applicability and basis of the waste discharge requirements contained in Order No. R9-2004-0154 is discussed below:

1. FEDERAL NPDES REGULATIONS

Section 402 of the federal Clean Water Act (CWA) gives the U.S. EPA the authority to issue NPDES permits for discharges into navigable waters and to prescribe conditions for such permits necessary to carry out the provisions of the CWA. In California, the U.S. EPA has delegated this authority to the State of California. The primary regulations developed by the U.S. EPA to implement and administer the NPDES program are found in 40 CFR 122.

The SBPP is an existing industrial point source as defined in 40 CFR 122.2. The 601.13 MGD (maximum flow rate) of cooling water discharge has impacted the beneficial uses and water quality objectives of south San Diego Bay, in particular the SBPP discharge channel (considered waters of the United States). The power plant is therefore subject to NPDES permitting requirements.

Pursuant to 40 CFR 122.45 of the NPDES regulations, effluent limitations must be met at point of discharge, prior to the effluent entering the receiving waters of the United States. Pursuant to 40 CFR 122.41(j)(1) of the NPDES regulations the samples and measurements taken for the purpose of monitoring shall also be representative of the monitoring activity.

Duke Energy does not fully comply with NPDES regulations 40 CFR 122.45 and CFR 122.41(j)(1) for it thermal effluent limitations.

Since the SBPP discharge channel is a part of south San Diego Bay and is considered receiving waters of the United States, Duke Energy would ideally be required to comply with effluent limitations (including thermal limitations) from end-of-pipe discharges associated with each of its four Units prior to the effluent entering the Bay, as required by 40 CFR 122.45. This would for also provide for a representative effluent sample from each of the four point of discharges, as required by 40 CFR 122.41(j)(1). Order No. R9-2004-0154 and previous NPDES permits issued for the SBPP, however, enforce effluent limitations for the combined discharge from all four Units. For this reason, monitoring of the pollutants in the combined SBPP discharge must be based on a representative sample of the combined discharge.

A representative sample of the combined discharge that would comply with 40 CFR 122.45 and CFR 122.41(j)(1) would be possible if the four discharge pipes at the power plant were manifold into one discharge pipe. This would allow the combined discharges from the four Units to be monitored at one discharge point, prior to entering the receiving waters of the Bay. The SBPP is currently not configured to manifold its four discharges into one discharge pipe. This option may require substantial structural and operation changes at the facility and is not considered feasible.

The other methodology the could be employed to comply with these NPDES regulations would be to monitor pollutants and flows at each of the four discharge points and use flow-weighted modeling to render an expected concentration of the pollutant in the combined discharge. Due to the diurnal variations of pollutant concentrations, flow rates, and other parameters, this approach could introduce an element of uncertainty and trigger potential discrepancies in the predicted value of a pollutant in the combined discharge. This option is therefore not considered very reliable.

The third approach to obtain a representative sample of the combined discharge would be to identify a location in the discharge basin that is in the vicinity of the four discharge points and where the combined discharge can be characterized as adequately mixed and under steady state conditions. This approach appears to be the most appropriate one due to the unreliability and infeasibility of two other methodologies described earlier (i.e. manifolding of pipes into one discharge pipe or using flow-weighted modeling). As indicated in Section C.3 of this Fact Sheet, the individual cooling water discharges from the four Units at SBPP are routed to a discharge basin (see Attachment 3) through condenser outlet pipes. The discharge basin is located east of the property line. The sheer volume and velocity of each discharge (ranging from 112 MGD to 197 MGD) appears to create turbulent mixing conditions. The combined, relatively mixed discharge, from all four Units then makes it way across the SBPP property line into the discharge channel. The property line appears to be a good representative location to monitor the combined discharge from the SBPP and is the appropriate point of compliance.

Order No. 96-05 requires sampling point S2 (see Attachment 2) to be used for determining compliance with the effluent limitations for all parameters <u>except</u> temperature. S2 is located at the at the west end of the discharge basin (at the SBPP property line), halfway across the discharge channel (at approximately Latitude 32° 36' 48", North; Longitude 117° 05' 52", West). Order No. 96-05 requires location S1 (see Attachment 2) to be used for determining compliance with thermal limits only. S1 is located at the weather station location (Latitude 32° 36' 46.6", North; Longitude 117° 06' 04.5", West), approximately 1000 feet downstream of S2, inside the receiving waters of south San Diego Bay.

It is evident that Order No. 96-05 does not fully conform to NPDES regulations 40 CFR 122.45 and CFR 122.41(j)(1) for temperature monitoring. This is because the temperature is measured at Station S1, which is essentially part of the receiving waters of south San Diego Bay and not representative of the combined discharge of SBPP. Furthermore, the area of discharge channel from Station S2 to Station S1 provides Duke Energy with a defacto mixing zone. Duke Energy has in effect enjoyed the benefits of a mixing zone for temperature for several years, without being entitled to one. Due to the biologically sensitive nature of south San Diego Bay and the low circulatory conditions prevailing therein, the SBPP discharge is not a good candidate for a mixing zone or dilution credits for temperature. Furthermore, pursuant to Section 1.4.2.2 of the *Policy for Implementation of Toxic Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (State Implementation Policy, SIP), a mixing zone shall not be granted if it has the potential of adversely impacting biologically sensitive or critical habitats, including, but not limited to, habitat of species listed under federal or State endangered species laws. As shown in Section F.2.a of this Fact Sheet, the SBPP thermal discharge has clearly impacted some of the critical habitats and species residing in south San Diego Bay (in particular the discharge channel). This reinforces the rationale for not granting a mixing zone or dilution credits for the SBPP discharge.

Based on the above reasons, the point of compliance for temperature needs to enforced at the property line instead of Station S1, in order for Duke Energy to fully comply with NPDES regulations 40 CFR 122.45 and CFR 122.41(j)(1). Order No. R9-2004-0154 requires Duke Energy to take measures to comply with its thermal limitations at the property line (see Section F.3, *Thermal Plan* of this Fact Sheet).

2. CLEAN WATER ACT (CWA) SECTION 316(a) & (b) REGULATIONS

a. *<u>SECTION 316(a) REGULATIONS</u>*

(1) *<u>Section 316(a) Studies - Background:</u>*
Section 316(a) of the CWA requires that States impose an effluent limitation with respect to the thermal component of a discharge (taking into account the interaction of such thermal component with other pollutants) that will assure the protection and propagation of a balanced, indigenous population of shellfish, fish, and wildlife in and on that body of receiving water.

In 1972-73 a thermal effects study (*Thermal Distribution and Biological Studies for the South Bay Power Plant, Ford and Chambers, May 1973*) was completed, to investigate compliance with the *Thermal Plan* and CWA Section 316(a). The study was undertaken to assess the effects of thermal effluent from SBPP on: 1) the physical and chemical environment of the bay, and 2) benthic, marine plants, and invertebrates that inhabit intertidal mudflats and subtidal mud bottom habitats of south San Diego Bay. Sampling was conducted quarterly on 18 subtidal and seven intertidal stations. Evidence regarding the effects of thermal discharge were assessed on the basis of: 1) difference in species composition; 2) number and diversity of species; 3) distribution, abundance and biomass of species and major taxonomic groups; 4) size of individuals, and 5) the quantitative relationship of these to temperature and other environmental factors.
Evidence from both intertidal and subtidal sampling for the 1972 study suggested that elevated water temperatures caused by the thermal discharge had adverse impacts to bay organisms that inhabited the cooling water discharge channel, particularly in late summer and early autumn. These effects were much reduced during the winter and spring periods when ambient water temperature dropped and the temperature of the thermal plume reduced. During all seasons, however, the adverse effects appeared to be confined primarily to the inner portions of the discharge channel. The overall finding was that the thermal effluent from the SBPP had no major adverse effects on the benthic communities beyond the end of the discharge channel.

Subsequent thermal effects studies and monitoring conducted by various environmental and research entities (including: *Lockheed 1977-81, Woodward-Clyde 1982-83, Westec 1984, CH2M Hill 1985, and Kinetic Labs 1986-89*) have confirmed the initial studies conducted by *Ford & Chambers*.

In 1995 the USEPA reviewed 18 years (1977-94) of annual summer benthic studies and concluded that although the benthic community in the discharge channel typically contains somewhat reduced diversity and abundance of species, the community present there is within the range observed at sampling stations outside the discharge channel, and there have been no appreciable long term upward or downward trends in species diversity or abundance. In 1996 the Regional Board concurred with USEPA's review of the benthic community study and findings of previous Section 316(a) compliance investigation studies. The Regional Board adopted Order No. 96-05 in November 19, 1996, renewing the NPDES permit for SBPP and finding the discharger to be in compliance with Section 316(a) at that time.

Additional studies related to Section 316(a) compliance were conducted in the 1997 – 2000 time period. These included the *SBPP Cooling Water Discharge Channel Fish Community Characterization Study (Merkel & Associates, 1997 -2000)*, and the *Eelgrass Distribution Study (Merkel & Associates, 2000)*.

The *1997 - 2000 Fish Study* found that the discharge channel supported a diverse fish community that had a similar density of fish as other areas of San Diego Bay, and maintained, on average, a biomass approximately 270% higher than the Bay as a whole. The discharge channel was found to support an average of nearly ten times the density of slough anchovies than areas outside the channel, suggesting that this species is the principal year-round forage base for the large number of birds, including the California least tern and California brown pelican. No fish captured in the study exhibited abnormalities that can be attributed to either chemical damage or natural physical damage.

The *2000 Eelgrass Distribution Study* was conducted to determine the effects of temperature and turbidity on the distribution of eelgrass in south San Diego Bay. The study results indicated that there are significant and persistent differences between the light environments found within eelgrass habitats and outside of eelgrass habitats in south San Diego Bay. These differences in light environments appear to control the distribution of eelgrass. Temperature was not found to be significant in determining the presence or absence of eelgrass. In fact, the highest temperatures recorded were found within eelgrass beds. Furthermore, the mean daily temperature profiles, for all stations combined, was higher within eelgrass beds than outside of eelgrass habitats. The study concluded that the thermal discharge from the SBPP did not have a significant effect on eelgrass distribution within south San Diego Bay.

Based on a review of current ambient water quality data for south San Diego Bay and further consultations with resource and regulatory agencies, including the USFWS, the DFG, the U.S. EPA, and the National Marine Fisheries Service (NMFS), the Regional Board concluded that that previous studies conducted by Duke Energy to assess the impact of the thermal discharge on water quality objectives and the designated beneficial uses of south San Diego Bay and verification of compliance with Sections 316 (a) of the CWA did not fully represent existing conditions in south San Diego Bay and operational parameters at SBPP and additional updated studies were needed.

(2) <u>*2003 Section 316(a) Compliance Studies - Description:*</u>

Based on the need for updated studies, the Regional Board issued a CWC Section 13267 letter to Duke Energy on May 24, 2002 directing it to conduct six studies to assess the impact of the intake structures and the discharge from the South Bay Power Plant (SBPP) on the biological resources and beneficial uses of south San Diego Bay. The following three studies were directly related to the thermal discharge effects of the SBPP and compliance with CWA 316(a) requirements:

Study No. 1: *Updated Discharge Impact Assessment Study for Compliance with Section 316(a) of the Clean Water Act (CWA).*

Study No. 3: *Updated Eelgrass Study.*

Study No. 4: *Updated Dissolved Oxygen Assessment Study.*

These three studies were combined by Duke Energy and addressed under one technical study report titled "*SBPP Cooling Water System Effects on San Diego Bay, Volume 1: Compliance with Section 316(a) of the Clean Water Act for the South Bay Power Plant*". The final technical study report was submitted in August 2004.

Study No. 2 (Updated Section 316(b) study) was addressed separately under the technical study report titled "*SBPP Cooling Water System Effects on San Diego Bay, Volume II: Compliance with Section 316(b) of the Clean Water Act for the South Bay Power Plant.*" The final Section 316(b) technical study report was submitted in August 2004.

The studies were conducted by Duke Energy's contractors *Tenera Environmental and Merkel & Associates.* The contractors conducting the studies periodically received input from a working group that included representatives of the Regional Board and other resources and regulatory agencies including the DFG, USEPA, USFWS, and NMFS.

The updated 316(a) studies commenced in July 2003 and continued through the summer of 2003. These studies investigated the impacts of SBPP's thermal discharge on the intertidal and subtidal biological communities of south San Diego Bay with an emphasis on the plant's discharge channel. These studies conducted in the summer months enabled monitoring of the impacts of the discharge at time of year when the water temperature in the discharge channel is the highest and conditions most stressful.

The purpose of Study No. 1 was to address the ability of the south San Diego Bay area impacted by the discharge from the SBPP to support a balanced indigenous population of fish, shellfish, and wildlife in that area and to verify compliance with Section 316(a). The purpose of Study No.1 was also to address the chemistry and toxicology of sediment and water column and benthic communities.

Study No. 3 investigated the geographical extent, density, and condition of eelgrass (Zostera) beds in south San Diego Bay impacted by the discharge from the SBPP. Study No. 3 also investigated the impact of the turbidity generated and redistributed by SBPP on the survivability and distribution of eelgrass in south San Diego Bay. The study was designed to supplement and update the information provided in 2000 by Duke Energy in the *Eelgrass Distribution Study (Merkel & Associates, 2000).*

The purpose of Study No. 4 was to determine an appropriate numerical site specific water quality objective for DO in the SBPP discharge channel and other areas of south

San Diego Bay. The purpose of Study No. 4 was also to investigate the impact of the thermal plume from SBPP on naturally occurring DO levels in south San Diego Bay and the saturated DO levels associated with the elevated temperature discharges. Furthermore, the updated DO study was designed to investigate the ability of the south San Diego Bay area affected by the SBPP discharge to support a balanced indigenous population of fish, shellfish, and wildlife in that area.

The results of the studies and written comments provided by the public on the technical study report were considered in the Regional Board's development of the Order.

The Regional Board also forwarded copies of the technical study report to its contractor, Tetra Tech, for its review and comment. Tetra Tech independently evaluated the results of the studies and provided feedback on their validity. Tetra Tech also provided recommendations to the Regional Board to incorporate specific discharge limitations and monitoring requirements into the Order.

(3) *2003 Section 316(a) Compliance Studies – Findings and Conclusions:*

The updated Section 316(a) studies confirm that certain areas of south San Diego Bay (in particular the discharge channel) do have detrimental impacts due to elevated temperatures and high volumetric flow rates associated with the SBPP discharge. These impacts includes a loss of up to 104 acres of critical eelgrass habitat due to the redistribution of turbidity in the Bay due to the SBPP discharge. Furthermore, the studies show that overall diversity of benthic invertebrates residing in the near field stations of the discharge channel is much lower than at reference stations outside the discharge channel. The studies also indicates that certain invertebrate species (including polychaete worms and amphipods) are largely absent in near field stations of the discharge channel. These species were found in abundant quantities in reference stations outside the discharge channel. The absence of these species from the discharge channel demonstrates that these species could not survive under warm thermal regimes and were being adversely impacted.

The significant findings on the impacts of the SBPP thermal discharge on the biological (eelgrass, benthic invertebrates, and fish) and physical/chemical (DO) characteristics of the discharge channel and south San Diego Bay are discussed in greater detail below:

Eelgrass
An eelgrass mapping survey was completed in late May 2003 to obtain updated information on eelgrass in south San Diego Bay. A turbidity monitoring study was also conducted as part of the eelgrass investigation. As part of the study, the observed spatial trends in light attenuation and turbidity in south San Diego Bay were mapped. Furthermore, data was collected to support a modeling approach to

evaluating the role of the SBPP on turbidity and subsequent impact on eelgrass survivability in south San Diego Bay.

Table 4.2-1 and Figure 4.2-7 of the technical study report identify the predicted turbidity effects and combined effects of turbidity and temperature of the SBPP cooling water flows on eelgrass within south San Diego Bay. The predicted turbidity effects of the SBPP cooling water flows suggests that the SBPP, operating at maximum cooling water circulation rates (i.e. 601.13 MGD) would preclude eelgrass from approximately 104 acres of south San Diego Bay. As shown in Figure 4.2-7 of the technical study report, the predicted 104 acres of south San Diego Bay that would lose eelgrass due to the power plant discharge includes the entire discharge channel and areas of south Bay immediately west and north of the Chula Vista Wildlife Island.

The study indicated that while natural turbidity plays a primary role in dictating the distribution of eelgrass in south San Diego Bay, the high flow rate of the SBPP discharge plays a role in distributing naturally generated turbidity and influencing the distribution and of eelgrass. The study also suggests that there are aggregate effects of turbidity and temperature within near-field portions of the thermal plume of the SBPP. These effects may result in either an absence of eelgrass, or seasonal die-off of eelgrass. In the area of the discharge channel nearest the SBPP, it is believed that summer season discharge temperatures alone may limit the occurrence of eelgrass, and turbidity may not be a significant factor in structuring eelgrass habitat within these areas.

Benthic Invertebrates

During the summer of 2003, core samples were collected at 21 subtidal stations and 10 intertidal stations in the SBPP discharge channel and receiving waters of south San Diego Bay. A high total abundance of invertebrates at Station E7 (the station closest to the discharge) was due to high numbers of nematodes and oligochaetes associated with high concentrations of organic debris in the samples. The source of organic debris in the core samples was probably due to marine debris routed to the discharge channel from the periodic rinsing of intake traveling screens at SBPP. Abundant subtidal species with distributions largely absent from the discharge channel included several species of polychaete worms and amphipods. There was trend toward higher biomass values of polychaete worms at stations further away from the discharge.

The mean diversity of benthic invertebrates was lowest at the two stations (SE7 and ST1) closest to the SBPP property line and highest at reference station SR4 near the Chula Vista Marina (Figure 2.3-1b of technical study report shows location of stations). There was trend of increasing diversity (for both subtidal and intertidal conditions) within the discharge channel as distance from the SBPP's property line increased (per Figure 3.3-3 of technical study report).

The study results also demonstrated that there was absence of certain species (including polychaete worms and amphipods) from the discharge channel. Figure 3.3-7 of the technical study report indicated that four taxa (*Leitoscoloplos pugettensis, Scoletoma sp. C, Mediomastus sp., and Acuminodeutopus heteruropus*) were largely absent in the subtidal stations located in the near field region of the discharge channel. Figure 3.3-10 of technical study report indicated that four taxa (*Leptochelia dubia, Scoloplos acmeceps, Euphilomedes carcarodonta, and Fabricinuda limnicola*) were largely absent in the intertidal stations located in the near field region of the discharge channel. The density of these taxa progressively increased at stations away from the near field discharge locations. The highest levels of these taxa were found at reference stations outside the SBPP discharge channel. The absence of these taxa from the near field regions of the discharge channel indicates that these species could not survive under warm thermal regime of the SBPP discharge.

A benthic response index (BRI) was calculated for each sample based on taxa and abundance and associated pollution tolerance indices (p_i). The BRI test for southern California was developed by the *Southern California Coastal Water Research Project* and is used to estimate the chemical pollution tolerance of species found in bottom-dwelling communities. According to Duke Energy's study report, the BRI for the benthic communities residing in south San Diego Bay indicates that these communities are not degraded. Furthermore, the report states that the shifts in faunal composition due to the SBPP discharge are much less significant compared to shifts seen in polluted areas of other bays in southern California. According to *SCCWRP*, the BRI test is designed to reflect toxicity to amphipod test animals based on toxicity gradients to chemicals and does not account for temperature effects. The BRI score should not be used to estimate the health of the benthic communities that are subject to elevated temperatures such as those residing in the SBPP discharge channel. The assertion by Duke Energy that the SBPP discharge is not degrading bottom-dwelling communities, based on the calculated BRI score, cannot be validated.

Fish

The fish study was designed to more closely characterize the fish community in the discharge channel in comparison to a reference site during the warmest months of the year (July – September) with particular attention to their response to DO regimes. A reference site was selected in nearby Sweetwater River channel. To make additional comparisons, several past fish studies conducted in other back-bay environments (including Batiquitos Lagoon, Agua Hedionda Lagoon, and Seal Beach) were reviewed for diversity, density, and biomass data for comparison to the results of the 2003 study.

A total of 20 species, represented by a combined total of 26,672 fish, were captured during the 2003 study. The most abundant fishes were juvenile slough and deepbody anchovy, which represented 96 percent of the total individuals caught. Other commonly captured species included California halfbeak, round stingray, queenfish, barred pipefish, bay pipefish, arrow goby, cheekspot goby, and yellowfin goby.

The SBPP discharge channel had considerably higher fish densities than Sweetwater River during each sampling event, with a mean density over seven times that of Sweetwater River. The large numbers of juvenile anchovy captured in the discharge channel were most responsible for the difference. Nearly three times as many adult anchovy were found in Sweetwater River than in the discharge channel, suggesting anchovy may move out of the channel as they mature, resulting in the differences in demographics between areas.

The discharge channel showed some similarity to other back-bay environments, while also providing conditions that allowed for unusual fish species occurrences, atypical juvenile abundances, and seasonal use patterns. The unique temperature environment of the channel may provide warm water refuge area for several bay species during the winter, but may similarly preclude some species from full use of the area during the hottest portions of the summer months. The site was found to provide habitat for warm-water species not typically found elsewhere in California such as diamond stingray, California halfbeak, California needlefish, bonefish, and shortfin corvina.

Dissolved Oxygen
The *Update Dissolved Oxygen Study* was designed to evaluate whether the SBPP causes a decrease in the concentration of DO in south San Diego Bay to levels below naturally occurring conditions and to determine if any observed declines in DO result in altering biological communities from what might be expected as a balanced indigenous community under natural environmental conditions.

To accomplish the above objectives the study evaluated how the DO environment of the portions of south San Diego Bay that are influenced by the SBPP differ or are similar to reference stations in back-bay environments elsewhere in San Diego Bay and other bays in southern California. The mean hourly DO concentration for both the San Diego Bay open water stations and the SBPP discharge channel fell within ±1 standard deviation of the mean hourly DO concentration of reference stations. In comparison to the mean condition of the combined reference stations, all south San Diego Bay stations had greater levels of DO in the morning and lower levels of DO in the afternoon. The mean daily DO concentrations of 5.38 ± 1.01 mg/l (reference sites), 5.52 ± 0.35 mg/l (open San Diego Bay), and 4.99 ± 0.32 mg/l (SBPP discharge channel) do not substantially differ. Duke Energy's study report claims that these ambient DO levels appear to support fish populations in the SBPP discharge channel and do not appear to limit their distribution or species composition. The study does not recommend a numerical, site-specific, water quality objective for DO for south San Diego Bay.

Although the study claimed that the existing DO levels in south San Diego Bay and the SBPP discharge channel are protective of fish and other marine resources residing therein, a numerical water quality objective for DO is necessary in protecting the beneficial uses of the Bay. Order No. R9-2004-0154 requires Duke Energy to conduct monthly monitoring for DO in the effluent and for 12 receiving water stations throughout San Diego Bay. The DO data from the effluent will be compared to DO levels in the receiving water stations to determine the extent of impact of the thermal effluent from SBPP to DO levels in south San Diego Bay. A DO discharge limitation may be recommended after adequate data has been collected and the Order may be amended at a later date.

The report states that the conditions observed within both the San Diego Bay open water and discharge channel stations were generally reflective of systems with lower primary productivity, larger water volumes, and greater aeration or water turnover. The study also notes that for reference stations as well as both San Diego Bay open water and SBPP discharge channel stations the mean daily DO curves were consistently below the saturation levels for mean temperatures experienced at the stations. This suggests that DO consumption was typically higher than DO production at all locations throughout the study.

b. *SECTION 316(b) REGULATIONS*

(1) ***<u>Section 316(b) Studies - Background:</u>***

Section 316(b) of the CWA requires that the location, design, construction and capacity of cooling water intake structures reflect the Best Technology Available (BTA) for minimizing adverse environmental impact. By letter dated October 30, 1977, the Regional Board requested SDG&E to initiate studies to demonstrate conformance with the requirements of Section 316(b) of the CWA.
Studies pursuant to Section 316(b) to assess the effects of impingement and entrainment were conducted in 1979-80 (cooling water intake system demonstration project). The studies evaluated both impingement and entrainment effects by quantifying the species, number of organisms, and life stages impacted. Entrainment of invertebrate zooplankton and ichthyoplankton were evaluated for different periods of the daily cycle. Impingement and trapping of fishes and larger invertebrates within the intake structure of the power plant were also evaluated. Both entrainment and impingement were evaluated in relation to tidal cycle and season.

In December, 1980, SDG&E submitted the final results of a cooling water intake system demonstration project for the SBPP intended to comply with Section 316(b) of the CWA. SDG&E concluded that "the low and insignificant level of impact demonstrates that the existing SBPP's intake system represents the BTA for this specific site to minimize adverse environmental impacts."

In September, 1993, the USEPA reviewed and concurred with the 1980 SBPP 316(b) demonstration project results which indicated that marine receiving waters in the vicinity of the SBPP contain viable, self-sustaining populations or communities of organisms and that the plant incorporates BTA intake technologies. In 1996 the Regional Board adopted Order No. 96-05 and accepted the 1980 demonstration project for compliance with Section 316(b).

Although the intake structure at SBPP has not been changed since the demonstration project was completed in 1980, the Regional Board, after consulting with the USEPA, concluded that the demonstration study was outdated and needed to be updated. By letter dated March 12, 2002, the California Department of Fish and Game (DFG) also recommended that the Section 316(b) demonstration study be updated. DFG indicated that the 1980 demonstration study was conducted under much different circumstances that we have today. DFG identified the following reasons why the 1980 demonstration study may no longer be applicable to the SBPP and why a new study is warranted: 1) the intake water flow rates through SBPP during the 1980 studies were below the current permitted level of 601.13 MGD, 2) the discharge channel was not evaluated as a part of San Diego Bay, 3) the re-circulation of the elevated temperature discharge plume from the discharge channel back into the intake channel was not considered, and 4) The BTA from 1980 to 2002 has changed. By letter dated February 26, 2002, the U.S. Fish and Wildlife Service (USFWS) also recommended that Duke Energy be required to demonstrate that the current intake structure technologies meet the requirements of Section 316(b) and minimize biological organisms lost by impingement and entrainment.

(2) *2003 Section 316(b) Compliance Studies - Description:*

Based on the need for an updated Section 316(b) study, Duke Energy was directed to develop and implement an updated comprehensive demonstration study to show compliance with Section 316(b) regulations (that were in effect in 2002). The requirement to initiate the updated study (Study No. 2) was included in the May 24, 2002, Section 13267 letter to Duke Energy. The letter directed Duke Energy to conduct a comprehensive demonstration study to characterize impingement and entrainment mortality, the operation of cooling water intake structures, and to confirm that the technologies, operational measures, and/or restoration measures selected and/or implemented at the cooling water intake structure meet the requirement for Best Technology Available (BTA).

The 2003 Section 316(b) study was addressed under the technical study report titled "*SBPP Cooling Water System Effects on San Diego Bay, Volume II: Compliance with Section 316(b) of the Clean Water Act for the South Bay Power Plant.*" The final technical study report was submitted in August 2004.

As with the updated Section 316(a) studies, the progress of the updated Section 316(b) study was reviewed by a working group that included representatives of the Regional Board and other resources and regulatory agencies including the DFG, USEPA, USFWS, and NMFS.

The fish impingement and entrainment sampling associated with the updated 316(b) study was conducted over one complete annual cycle, commencing in December 2002 and concluding in December 2003.

Entrainment effects were assessed using three independent models. Two of the models, *Fecundity Hindcasting (FH)* and *Adult Equivalent Loss (AEL)*, used species life history information to estimate potential numbers of adult fish represented by the entrainment of larval fish losses. The third approach, *Emperical Transport Modeling (ETM)*, compared entrainment larval densities to source water larval densities to calculate effects of larval removal on the standing stock of larvae in south San Diego Bay.

Impingement was studied weekly over a 24-hour period by recording the numbers and weights of all fishes and selected macroinvertebrates that were rinsed from the screens of Units 1 and 2 and Units 3 and 4 of the SBPP.

Alternate technologies, designs, and operational and maintenance features of the intake structures at the SBPP were evaluated in accordance with the USEPA's draft guidance document: *Draft Guidance for Evaluation the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment: 316(b) P.L. 92-500, 05/1977.*

(3) *Findings and Conclusion of 2003 Section 316(b) Compliance Studies*

The entrainment sampling conducted as part of the 2003 Section 316(b) compliance study revealed the following results:

The Section 316(b) technical study report indicates that larval forms of five taxa make up 99 percent of the entrainment impacts. These include a CIQ goby complex (complex made up shadow, arrow and cheekspot gobies), anchovies, silversides, blennies and longjawed mudsuckers. The report indicates that a number of models (fecundity hindcasting [FH], adult equivalent loss [AEL] and empirical transport model [ETM]) were used to determine adult losses as it corresponds to larval entrainment losses. Table 5.4.1 of the report identifies that 13 percent of the anchovies adult population and 15.1 percent of the silverside adult population in the source water would be lost annually due to larval entrainment losses. Table ES-1 of the report indicates that in 2003 approximately 27 percent of the goby complex larval from the source water population was lost and 50 percent of the longjawed mudsucker larval population was lost due to entrainment.

The Regional Board considers these larval and equivalent adult fish losses to be significant. The Department of Fish Game and the National Marine Fisheries Service have both indicated that these larval and equivalent adult fish losses are significant and would have an adverse impact on source water populations in south San Diego Bay.

<u>The impingement sampling conducted as part of the 2003 Section 316(b) compliance study revealed the following results:</u>

The total annual impingement of fish under full operating flow rates was estimated to be 385,588 individuals weighing 556 kg. The 1980 SDG&E study estimated an annual impingement rate of 28,174 fish, with a total biomass of 4,459 kg.

The most abundant taxon both numerically and by weight impinged was anchovies, comprising 93 percent by number and 40 percent by weight of all fishes impinged. Most of the fish impinged, over 96 percent of the total abundance and 87 percent of the total biomass, were not commercially or recreationally fished species. The report claims that estimated impingement effects, under peak operation conditions, are minimal and indicates that SBPP operation represents a low potential risk to taxa populations. The 1980 316(b) demonstration by SDG&E also concluded that impingement effects were not significant.

<u>The alternate technologies, designs, and operational and maintenance features evaluated in the 2003 316(b) study are discussed below:</u>

The alternate technology evaluation analyzed closed-cycle cooling water systems, behavioral barriers, and physical barriers. Wet/dry hybrid cooling towers using untreated wastewater or desalinated water was the only viable closed-cycle cooling system for use at the SBPP. This option was eliminated because of the short-term nature of Duke Energy's SBPP lease with the Port of San Diego, which expires in 2009. There would not be enough time to design, permit, and construct the cooling towers and other water treatment facilities. Furthermore, the report claimed that a cost/benefit analysis conducted for the wet/dry hybrid cooling towers indicated that the costs (amortized over the 5-year, expected, remaining life of the plant) were wholly disproportionate to the environmental benefits gained based on the entrainment/impingement data collected in 2003.

The analyses evaluated eight different behavioral technologies. Of these only sound has been recently proven for a number of similar locations for impinged species. The study indicated that a properly designed ultrasound technology system, although experimental in nature, could reduce SBPP's potential to impinge some pelagic fish species.

Thirteen different physical barrier screen technologies and two different fish diversion systems were evaluated for their potential to reduce entrainment and impingement. Of these, four of the screen technologies and the two fish diversion systems were determined to be proven and available. Once again, a cost/benefit analysis conducted for these systems indicated that the costs (amortized over the 5-year, expected, remaining life of the plant) were wholly disproportionate to the environmental benefits gained based on the entrainment/impingement data collected in 2003. Furthermore, the study concluded that these technologies traded decreases in impingement of larger organisms for increased environmental impacts on other life stages, sizes, or types of organisms and therefore do not represent BTA for the SBPP intake.

The study recommended that the existing fish return system be upgraded to reduce bird predation and that the trough be extended so that it returns impinged organisms into deeper water. The study concluded that the existing shoreline vertical traveling screen represents the BTA. This conclusion is based on the finding of relative insignificant entrainment and impingement effects (including no population-level effects) and consideration of various demonstrated alternative technologies, including potential biological effectiveness for further reducing entrainment and impingement losses, engineering feasibility, and cost-effectiveness, as outlined in the guidance manual (USEPA 1977).

The USEPA has indicated that the 5-year plant life amortization schedule utilized by Duke Energy to conduct a BTA cost analysis is not justified. The SBPP is likely to continue operation after Duke Energy's SBPP lease with the Port of San Diego expires in 2009. The USEPA has recommended that a standard long-term operating (20 years) schedule be used in the BTA analysis. A long-term amortization schedule may render alternate screens and fish return technologies cost effective in reducing entrainment and impingement losses.

As discussed below, Duke Energy will be required to implement the provisions of a new Section 316(b) rule that was promulgated by the USEPA in February 2004. Duke Energy will have to implement technological upgrades and/or take restoration measures to establish BTA for entrainment/impingement losses and comply with the new rule. Duke Energy will be required to conduct a revised BTA cost analysis (based on a 20 year amortization schedule) as part of its implementation of the new Section 316(b) rule. The implementation of the new rule will help minimize impingement and entrainment impacts of the power plant on the standing larval and adult fish populations in South San Diego Bay. Furthermore, the implementation of the new rule will enable Duke Energy to come into full compliance with CWA Section 316(b).

(4) *New Section 316(b) Rule*

On February 16, 2004 the USEPA published a final rule to implement Section 316(b) of the Clean Water Act. This rule, 40 CFR 125, Subpart J, *Requirements Applicable to Cooling Water Intake Structures for "Phase II Existing Facilities" Under Section 316(b) of the Act*, establishes location, design, construction and capacity standards, for cooling water intake structures at existing power plants that use the largest amounts of cooling water (i.e. greater than 50 MGD). The new rule went into effect on September 7, 2004.

Section 125.94(b) of the new rule establishes entrainment and impingement performance standards for intake structures. These performance standards include reducing impingement mortality of all life stages of fish and shellfish by 80-95 percent from the calculation baseline (i.e. without any control in place) and reducing entrainment mortality by 60-90 percent from calculation baseline. The alternatives include using existing technologies, selecting additional fish protection technologies (such as screens with fish return systems), and using restoration measures.

Pursuant to Section 125.94(a) of the new rule (*Compliance Alternatives*), the discharger must select and implement one of five alternatives to comply with the rule. The five alternatives summarized below establish best technology available for minimizing entrainment and impingement impacts:

(a) The discharger may demonstrate that the flow from the power plant will be reduced to commensurate with a closed cycle recirculating system or that the maximum through-screen design intake velocity will be reduced to 0.5 ft/s or less.

(b) The discharger may demonstrate that the existing design and construction technologies, operational measures, and/or restoration measures meet the performance standards specified in Section 125.94(b) of the rule and/or the restoration requirements specified in Section 125.94(c) of the rule.

(c) The discharger may demonstrate it will install and properly operate and maintain, design and construction technologies, operational measures, and/or restoration measures that will, in combination with any existing design and construction technologies, operational measures, and/or restoration measures, meet the performance standards specified in paragraph (b) of this section and/or the restoration requirements in paragraph (c) of this section.

(d) The discharge may demonstrate that it has installed, or will install, and properly operate and maintain an approved design and construction technology in accordance with Sections 125.99(a) or (b) or the rule.

(e) The discharger may demonstrate that it has selected, installed, and is properly operating and maintaining, or will install and properly operate and maintain design and construction technologies, operational measures, and/or restoration measures that the Regional Board has determined to be the best technology available to minimize adverse environmental impact for the power plant (based on a site-specific, best technology available, cost analysis conducted in accordance with Section 125.94 (a)(5)(i) or (ii) of the rule).

The 2003 Section 316(b) compliance study conducted by Duke Energy was not based on the provisions of the new 316(b) rule, since the new rule was promulgated in 2004. Furthermore, the results of the 2003 study indicate that Duke Energy does not meet the impingement and entrainment performance standards for the new 316(b) rule (Section 125.94(b)). Duke Energy must demonstrate compliance with the one of the five alternatives listed above (Section 125.94(a)) in order to comply with the provisions of the new rule.

The new rule requires the discharger to demonstrate compliance with the requirements of the rule no later than January 7, 2008. Pursuant to Section 125.95(b) of the new rule, Duke Energy is required to perform a *Comprehensive Demonstration Study* to characterize impingement mortality and entrainment, to describe the operation of the cooling water intake structures at SBPP, and to confirm that the technologies, operational measures, and/or restoration measures it has selected or installed, or will install, to meet one of the five compliance alternatives listed in Section 125.94(a) of the new rule. As part of its 2003 Section 316(b) study, Duke Energy has already collected a majority of the information required in the *Comprehensive Demonstration Study.* It is therefore reasonable to expect Duke Energy to complete the remaining components (*Technology Installation and Operation Plan* and/or *Restoration Plan* etc. and proposed implementation schedules) of the *Comprehensive Demonstration Study* much earlier than the January 7, 2008 deadline indicated in the rule. The Regional Board therefore requires Duke Energy to complete its *Comprehensive Demonstration Study* and submit a final report no later than 30 months after adoption of Order No. R9-2004-0154.

Duke Energy is required to submit a *Proposal for Information Collection* prior to submittal of the *Comprehensive Demonstration Study.* The *Proposal for Information Collection* as required by Section 125.95(b)(1) of the rule will be due no later than 12 months after adoption of Order No. R9-2004-0154, and must include the following information:

(a) A description of the proposed and/or implemented technologies, operational measures, and/or restoration measures to be evaluated in the Study.

(b) A list and description of any historical studies characterizing impingement mortality and entrainment and/or the physical and biological conditions in the vicinity of the cooling water intake structures and their relevance to this proposed Study. If the discharger proposes to use existing data, it must demonstrate the extent to which the data are representative of current conditions and that the data were collected using appropriate quality assurance/quality control procedures;

(c) A summary of any past or ongoing consultations with appropriate Federal, State, and Tribal fish and wildlife agencies that are relevant to this Study and a copy of written comments received as a result of such consultations.

(d) A sampling plan for any new field studies the discharger proposes to conduct in order to ensure that there is sufficient data to develop a scientifically valid estimate of impingement mortality and entrainment at the site. The sampling plan must document all methods and quality assurance/quality control procedures for sampling and data analysis. The sampling and data analysis methods proposed must be appropriate for a quantitative survey and include consideration of the methods used in other studies performed in the source waterbody. The sampling plan must include a description of the study area (including the area of influence of the cooling water intake structure(s)), and provide a taxonomic identification of the sampled or evaluated biological assemblages (including all life stages of fish and shellfish).

The provisions, compliance requirements, and compliance schedules for the new Section 316(b) rule have been incorporated into Order No. R9-2004-0154

3. THERMAL PLAN

According to *Section 4.A(1) (Existing Discharges)* of the State Water Quality Control Plan for Control of Temperature in Coastal and Interstate Waters and Enclosed Bays and Estuaries of California (*Thermal Plan*), elevated temperature waste discharges shall comply with limitations necessary to assure protection of beneficial uses. The SBPP is an existing discharger and must comply with *Section 4.A(1)* of the *Thermal Plan*. Order No. 96-05 limits the average incremental temperature of cooling water discharge from SBPP above that of the intake water to 15 degrees F, during any 24-hour period (daily Delta T). In addition, the current permit also limits the instantaneous Delta T to 25 degrees F. The daily and instantaneous Delta T limits of 15 degrees and 25 degrees F respectively, will continue to be enforced in Order No. R9-2004-0154.

As discussed in Section F.1 (*Federal NPDES Regulations*) of this Fact Sheet, the point of compliance for temperature needs to enforced at the property line instead of Station

S1 (1,000 feet downstream of property line), in order for Duke Energy to fully comply with NPDES regulations 40 CFR 122.45 and CFR 122.41(j)(1).

The Regional Board recognizes that an immediate change in the thermal discharge compliance location from S1 to the property line, may force Duke Energy to severely curtail power generation operations at SBPP and compromise the reliability-must-run (RMR) status of the power plant, as designated by the California Independent System Operator (ISO). Order No. R9-2004-0154, therefore, requires Duke Energy to establish the compliance point for its Delta T thermal discharge limitations at the property line no later than 36 months after adoption of the Order. In the interim, compliance with thermal discharge limitations shall be enforced at Station S1.

As discussed below, Order No. R9-2004-0154 requires Duke Energy to submit a Workplan on the measures it plans to take in order to comply with its thermal limitations at the property line.

Workplan for Relocation of Thermal Discharge Limitations Compliance Point to the Point of Discharge (Property Line):

Duke Energy shall submit a Workplan that details the measures it will be implementing to enable compliance with its average daily and instantaneous maximum Delta T thermal limitations at the point of discharge (i.e. at or inland of the SBPP property line) and compliance with NPDES regulations 40 CFR 122.45 and CFR 122.41(j)(1). These measures may include, but not limited to, implementing a reduction in power generation output, improving thermal efficiency of its steam turbines, and/or routing waste heat from its turbines to other industrial applications. The Workplan shall also discuss the financial and operational impacts of the relocation of the temperature compliance point on SBPP and on the viability of its power transmission grid. Furthermore, the Workplan shall also identify the impact of this change on the reliability-must-run (RMR) status of the SBPP, as designated by the California Independent System Operator (ISO).

Duke Energy shall be required to submit the Workplan no later than 12 months after adoption of the Order. Progress Reports on the implementation of the Workplan shall be submitted on a semiannual basis after submission of the Workplan. A final Progress Report on the implementation of the Workplan will be due no later than 30 months after adoption of the Order. Compliance of thermal discharge limitations at the property line shall be enforceable no later than 36 months after adoption of the Order.

4. WATER QUALITY CONTROL PLAN FOR THE SAN DIEGO BASIN (9)

The Water Quality Control Plan for the San Diego Basin (9) (Basin Plan) was adopted by the Regional Board on September 8, 1994 and approved by the State Board. Subsequent revisions to the Basin Plan have also been adopted by the Regional Board and approved by the State Board. The Basin Plan identifies the following beneficial uses of the waters of San Diego Bay to be protected:

a. Industrial service supply;
b. Navigation;
c. Contact water recreation;
d. Non-contact water recreation;
e. Commercial and sport fishing;
f. Preservation of biological habitats of special significance
g. Estuarine habitat;
h. Wildlife habitat;
i. Rare, threatened, or endangered species;
j. Marine habitat;
k. Migration of aquatic organisms; and
l. Shellfish harvesting.

The discharge of once-through cooling water to south San Diego Bay has adversely impacted the Beneficial Uses within the SBPP discharge channel, particularly in the area within 1000-1500 feet of the property line. The 2003 updated 316(a) study, *SBPP Cooling Water System Effects on San Diego Bay, Volume 1: Compliance with Section 316(a) of the Clean Water Act for the South Bay Power Plant,* confirmed that certain areas of the SBPP discharge channel have detrimental impacts due to elevated temperatures. The detrimental impacts include a loss of eelgrass habitat and a lower density of benthic invertebrates residing within the discharge channel. The potentially impacted Beneficial Uses include Estuarine Habitat; Marine Habitat; Wildlife Habitat; Rare, Threatened or Endangered Species; Preservation of Biological Habitats of Special Significance; and Shellfish Harvesting.

The impacts on Beneficial Uses due to the discharge of once-through-cooling water cannot be eliminated except through termination of the discharge. The adverse impacts are due to the individual and combined effects of the elevated temperature of the discharge and the high volume and velocity of the discharge (redistribution of turbidity).

The Basin Plan water quality objectives applicable to the SBPP discharge, including toxicity and dissolved oxygen, are discussed below:

(1) ***Toxicity Objectives***

The Basin Plan includes the following narrative water quality objective for toxicity:

> *All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration, or other appropriate methods as specified by the Regional Board.*
> *The survival of aquatic life in surface waters subjected to a waste discharge or other controllable water quality factors, shall not be less than that for the same water body in areas unaffected by the waste*

discharge or, when necessary, for other control water that is consistent with requirements specified in U.S. EPA, State Water Resources Control Board or other protocol authorized by the Regional Board. As a minimum, compliance with this objective as stated in the previous sentence shall be evaluated with a 96-hour acute bioassay

In addition, effluent limits based upon acute bioassays of effluents will be prescribed where appropriate, additional numerical receiving water objectives for specific toxicants will be established as sufficient data become available, and source control of toxic substances will be encouraged.

The SBPP discharge may cause or has the reasonable potential to cause or contribute to an excursion above the narrative objective of toxicity stated in the Basin Plan. Therefore, in accordance with 40 CFR 122.44(d)(1)(v), existing Order No. 96-05 contains effluent limitations for whole effluent toxicity (acute toxicity).

Order No. 96-05 specifies that in a 96-hour static or continuous flow (acute toxicity) bioassay test, using standard test species, the undiluted discharge from the SBPP shall not produce less than 90 percent survival, 50 percent of the time, and shall not produce less than 70 percent survival, 10 percent of the time. Order No. R9-2004-0154 requires compliance with this acute toxicity limitation. Order No. R9-2004-0154, however, eliminates intake credits for acute toxicity tests, since previous studies have demonstrated that the location of the discharge point and thermal nature of the SBPP discharge generates a thermal plume that wraps around the dyke (that separates the intake/discharge channels) and may entrain pollutants back into the plant's intake. This potential entrainment makes SBPP an undesirable candidate for intake credits for toxicity.

Over the last five years, the discharger conducted over 20 acute toxicity tests each at the intake and discharge locations at SBPP. There were no violations noted. The survival rate of species was in the 90 – 100 percent range for all tests conducted for intake water and effluent.

Order No. 96-05 does not specify the time period for which bioassay tests and associated percent survival rates should be based. Order No. R9-2004-0154 will require that compliance with the acute toxicity limitation be based on bioassay tests conducted during each individual quarter.

(2) <u>*Dissolved Oxygen Objective*</u>

The Basin Plan specifies the following water quality objective for dissolved oxygen (DO) in inland surface waters:

> *DO levels shall not be less than 5.0 mg/l in inland surface waters with designated MARINE or WARM beneficial uses. The annual mean DO concentration shall not be less than 7 mg/l more than 10% of the time.*

Enclosed bays such as San Diego Bay may or may not fall under the classification of *"Inland surface waters with designated MARINE beneficial uses"* as implied in the Basin Plan. Furthermore, the Basin Plan does not explicitly designate a DO objective for San Diego Bay.

A review of DO sampling data for the year 2001, compiled by the San Diego Unified Port District *(Port of San Diego, Bay-Wide Water Quality Monitoring Program, 2001),* for five stations dispersed around San Diego Bay shows that the ambient DO levels in San Diego Bay do not meet the above objective. The annual mean DO at only one station, that was close to the open ocean waters and the mouth of north San Diego Bay, exceed 7.0 mg/l (i.e. 7.02 mg/l at Station 1, Shelter Island). The annual mean DO values at the other four stations, in the inner Bay locations, were in the 5.57-6.32 mg/l range.

An analysis of the 2001 weekly mean DO sampling data, obtained from the Port of San Diego, for the station located in south San Diego Bay (i.e. Station 5, at the mouth of Chula Vista Marina; to the north of the SBPP intake channel) showed that 20.5 percent of ambient DO values were less than 5.0 mg/l and 94.8 percent of ambient DO values were less than 7.0 mg/l. An analysis of DO sampling data taken at half hour intervals during the summer of 2001 (May through October) at Station 5, showed that 28.5 percent of ambient DO values were less than 5.0 mg/l and 98.2 percent of ambient DO values were less than 7.0 mg/l.

Order No. 96-05, required the discharger to prepare a proposed Basin Plan amendment for DO water quality objectives in south San Diego Bay (*Reporting Requirement F.18*). The 1998 study submitted by *Applied Science Associates*, on behalf of the discharger, proposed the following narrative water quality objective for DO in south San Diego Bay:

> *The DO concentrations of south San Diego Bay shall not be depressed to levels that adversely affect beneficial uses as a result of controllable water quality objectives.*

This proposed DO objective appears to be vague and unenforceable. The Regional Board has not adopted an amendment to the Basin Plan to include water quality objectives for DO in San Diego Bay.

Staff, in consultation with the UFWS and the DFG, concluded that a DO receiving water limitation for south San Diego Bay is desirable since DO is a good indicator of the overall health and viability of fish species and other marine communities. Historic temperatures up to 95 or 96 degrees F have been measured at the eastern end of the

SBPP discharge channel during summer months. Under extreme conditions of elevated temperature and lowered DO, fish and other mobile organisms could loose the ability to find cooler waters and could become trapped in the cooling water discharge channel. Recent fish surveys indicate a diverse community of certain species of fish now resides in the cooling water channel during winter months; however, the effects of additional discharges of heat on south Bay's beneficial uses are unknown.

In the absence of a representative numerical Basin Plan objective for DO in south San Diego Bay, staff reviewed the following DO objective applicable to Ocean Waters as listed in *Section D.1 (Chemical Characteristic)* of the 2001 Ocean Plan:

> *The dissolved oxygen concentration shall not at any time be depressed more than 10 percent from that what occurs naturally, as the result of the discharge of oxygen demanding waste materials*

This objective was developed for well-mixed ocean waters where DO levels are spatially uniform and typically near saturation levels. The waters of south San Diego Bay are shallow and DO levels are impacted greatly by minor changes in temperature, biological respiration and oxidation, and tidal inflow. There is a great deal of natural spatial and temporal variability of DO in south San Diego Bay. It is, therefore, difficult to accurately define the naturally occurring or ambient DO levels in south San Diego Bay. For this reason, the Ocean Plan objective for DO is not applicable to south San Diego Bay.

Historical studies and monitoring data have concluded that the receiving waters in SBPP's discharge channel have the highest temperatures and lowest DO concentrations relative to other areas of south San Diego Bay. Currently there is no reliable numeric DO water quality objective applicable to south San Diego Bay. It is clear that the thermal discharge from SBPP does influence the DO levels in the discharge channel and other locations in south San Diego Bay that are in close proximity to the plant. The 1998 proposed Basin Plan amendment DO study by *Applied Science Associates* did not address the impacts of thermal discharges from SBPP on the ambient levels of DO in south San Diego Bay. The 1998 study also did not consider the impact of elevated thermal discharges on the saturated DO levels in the discharge channel. Although studies have been conducted to investigate SBPP's impact on ambient DO levels in the past, these studies were conducted in the early 1970s (*Thermal Distribution and Biological Studies for the South Bay Power Plant, Ford and Chambers, May 1973*) and are probably obsolete because the operating conditions at the plant in the 1970s were quite different from current conditions. These include power generating capacity, volume of cooling water discharged, and configuration of the discharge channel. The DO studies in the 1970s also did not consider the discharge channel to be part of south San Diego Bay.

In the absence of valid water quality objectives and conclusive studies regarding DO in south San Diego Bay, Duke Energy was directed to conduct an updated study (as discussed in Section F.2(a)(2), *2003 Section 316(a) Compliance Studies* of this Fact Sheet) to determine a site specific numerical DO water quality objective for the discharge channel and south San Diego Bay.

As discussed in Section F.2(a)(3) of this Fact Sheet (*2003 Section 316(a) Compliance Studies – Findings and Conclusions*) the *Updated DO Study* indicated that the mean hourly DO concentration for both the San Diego Bay open water stations and the SBPP discharge channel fell within a ±1 standard deviation of the mean hourly DO concentration of other comparable back-bay reference stations in southern California. The mean daily DO concentrations of 5.38 ± 1.01 mg/l (reference sites), 5.52 ± 0.35 mg/l (open San Diego Bay), and 4.99 ± 0.32 mg/l (SBPP discharge channel) do not substantially differ. The study concluded that these ambient DO levels appear to support source water fish populations in the SBPP discharge channel and do appear to limit their distribution or species composition. The *Updated DO Study*, however, did not recommend a numerical DO limitation for south San Diego Bay that would ensure protection of its biological resources.

As discussed in Section F.1 *(Federal NPDES Regulations)* and Section F.3 *(Thermal Plan)* of this Fact Sheet, Duke Energy will be required to comply with its thermal discharge limitations at the property line, 36 months after adoption of Order No. R9-2004-0154. The existing thermal discharge limitations compliance point is at monitoring station S1, 1000 feet into the discharge channel. This change will enable Duke Energy to fully comply with NPDES regulations 40 CFR 122.45 and CFR 122.41(j)(1). The side benefit of this change in monitoring location is that it will eliminate any potential mixing or dilution zones for temperature and ensure that less heat is dispensed to the discharge channel. Since there is direct correlation between DO levels in the discharge channel and temperature, less heat dispensed to the discharge channel will provide for higher DO levels. It is clear that the relocation of the discharge temperature monitoring compliance point will ensure that the mean DO in the discharge channel exceeds the existing level of 4.99 ± 0.32 mg/l. Higher DO levels may positively impact the health and survivability of fish, benthic invertebrates, and eelgrass in the discharge channel.

Although there is currently no discharge limitation for DO, Duke Energy will be required to conduct monthly monitoring for DO in the effluent and for 12 receiving water stations throughout San Diego Bay. The DO data from the effluent will be compared to DO levels in the receiving water stations to determine the extent of impact of the thermal effluent from SBPP to DO levels in south San Diego Bay. A DO discharge limitation may be recommended after adequate data has been collected and the Order may be amended at a later date.

5. FEDERAL REGULATIONS FOR STEAM ELECTRIC POWER GENERATION (40 CFR PART 423)

The federal regulations contain technological limits for steam electric power generation. These limits are found in 40 CFR Part 423. Effluent limitations exist for best practicable control technology currently available (BPT), best available technology economically achievable (BAT), and best conventional pollutant control technology (BCT). The Clean Water Act (CWA) requires compliance with all levels of technological limits. Order No. 96-05 applied the most stringent limits to the cooling water, low-volume, and metal cleaning wastes discharged to San Diego Bay. Order No. R9-2004-0154 updates the effluent limitation from these processes, subject to 40 CFR 423, as follows:

> The SBPP eliminated its low-volume and metal cleaning discharges to San Diego Bay, starting December 31, 1997. These wastes were routed to the City of Chula Vista sewer system from that date. Therefore, Order No. R9-2004-0154 does not include 40 CFR 423 pollutant effluent limitations applicable to the low-volume and metal cleaning discharges and associated in-plant waste streams.

Total Chlorine Residual in Cooling Water

Pursuant to 40 CFR 423.12, the BAT limit for total chlorine residual for once-through cooling water is 0.20 mg/l. Order No. 96-05 also has a water quality based limit for total chlorine residual in the discharge. This limit was developed on behalf of the discharger using data on the effects of chlorine on marine organisms species and genera which occur in San Diego Bay using statistical regression techniques. Such analysis provides a scientifically sound means of relating chlorine toxicity to the concentration of chlorine and time of exposure. The federal BAT limit was compared to the water quality based limit and the lowest value was selected. Order No. R9-2004-0154 continues to use this approach in selecting the most stringent total chlorine residual limit in the combined discharge. Order No. R9-2004-0154, also uses the same approach for setting a receiving water limitation for total residual chlorine for south San Diego Bay and the SBPP discharge channel.

The following linear regression derived equation is used in determining the water quality based total chlorine residual limit in the combined discharge and receiving water:

$$\log y = (ax + b) - t_{0.90}S_y.S_X \{1 + 1/n + (x - X)^2 / \Sigma(x_i - X)^2\}^{0.5}$$

Where:

y	=	residual chlorine limit (mg/l);
x	=	log (base 10) of the duration of uninterrupted chlorine/bromine discharges in minutes;
a	=	slope of linear regression line = -0.404;
b	=	intercept of linear regression line = 0.383;
$t_{0.90}$	=	"t" statistic (alpha = 0.10, n-2 degrees of freedom) = 1.685;
S_yS_x	=	standard deviation about regression line = 0.393;
n	=	number of toxicity measurements available for regression = 41;

X	=	mean log exposure time = 3.058; and
$\Sigma(x_i - X)^2$	=	sum of squares about X = 33.947

As shown in the above equation, the effluent limitation for total chlorine residual is not a fixed limitation. The limitation is a function of the duration of uninterrupted chlorine discharge in minutes. A longer discharge time would render a lower (i.e. more stringent) effluent limitation for total residual chlorine.

The maximum duration of uninterrupted chlorine discharge at the SBPP is 80 minutes (i.e. 20 minutes per Unit per cycle). Based on the above equation, the total chlorine residual effluent limitation associated with the maximum chlorine discharge time (based on an 80 minute combined cycle time, when all four Units are operating) is 85 μg/l. When only one Unit is operating the effluent limitation is less stringent at 144 μg/l (20 minute cycle time). The effluent limitation is 111 μg/l when two Units are operating (40 minutes combined cycle time) and 95 μg/l when three Units are operating (60 minute combined cycle time).

6. BAYS AND ESTUARIES POLICY

The State Board adopted the *Water Quality Control Policy for Enclosed Bays and Estuaries of California* (*Bays and Estuaries Policy*) on May 16, 1974. The *Bays and Estuary Policy* establishes principles for management of water quality, quality requirements for waste discharges, discharge prohibitions, and general provisions to prevent water quality degradation and to protect the beneficial uses of waters of enclosed bays and estuaries. These principles, requirements, prohibitions, and provisions have been incorporated into this Order.

The Bays and Estuaries Policy contains the following principle for management of water quality in enclosed bays and estuaries, which includes San Diego Bay:

> *The discharge of municipal wastewaters and industrial process waters (exclusive of cooling water discharges) to enclosed bays and estuaries shall be phased out at the earliest practicable date. Exceptions to this provision may be granted by a Regional Board only when the Regional Board finds that the wastewater in question would consistently be treated and discharged in such a manner that it would enhance the quality of receiving waters above that which would occur in the absence of the discharge. For the purpose of this policy, treated ballast waters and innocuous nonmunicipal wastewater such as clear brines, washwater, and pool drains are not necessarily considered industrial process wastes, and may be allowed by Regional Boards under discharge requirements that provide protection to the beneficial uses of the receiving water.*

The Bays and Estuaries Policy also prohibits the discharge or by-passing of untreated wastes. This Order prohibits the discharge and by-passing of untreated waste except for non-contact cooling water.

The Bays and Estuaries Policy also contains the following principle for management of water quality in enclosed bays and estuaries, which includes San Diego Bay:
The following policies apply to all of California's enclosed bays and estuaries:

a. Persistent or cumulative toxic substances shall be removed from the waste to the maximum extent practicable through source control or adequate treatment prior to discharge.

b. Bay or estuarine outfall and diffuser systems shall be designed to achieve the most rapid initial dilution practicable to minimize concentrations of substances not removed by source control or treatment.

c. Wastes shall not be discharged into or adjacent to areas where the protection of beneficial uses requires spatial separation from waste fields.

d. Waste discharges shall not cause a blockage of zones of passage required for the migration of anadromous fish.

e. Nonpoint sources of pollutants shall be controlled to the maximum extent practicable.

The terms and conditions of Order No. R9-2004-0154 are consistent with the above policies.

7. OCEAN PLAN

The SWRCB adopted a revised Water Quality Control Plan for Ocean Waters of California (2001 Ocean Plan) on December 3, 2001.

In order to protect the above beneficial uses, the Ocean Plan establishes water quality objectives (for bacteriological, physical, chemical, and biological characteristics, and for radioactivity), general requirements for management of waste discharged to the ocean, quality requirements for waste discharges (effluent quality requirements), discharge prohibitions, and general provisions. The Ocean Plan is not applicable to discharges to enclosed bays (including San Diego Bay), estuaries or inland waters.

Although the Ocean Plan is not applicable to enclosed bays such as San Diego Bay, the salinity and beneficial uses of San Diego Bay are similar to those of the ocean waters of the State. Since the *Policy for Implementation of Toxic Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (Implementation Policy) had not been yet been adopted in 1996, Order No. 96-05 established discharge limitations for selected pollutants by utilizing the calculations and procedures found in the 1990 Ocean Plan. These discharge limitations were incorporated into Order No. 96-05 on an interim basis. The pollutants included: arsenic, cadmium, chromium (hexavalent), copper, lead, mercury, nickel, silver, zinc, cyanide, ammonia (as N), phenolic compounds (non-chlorinated) and chlorinated phenolics, bis(2-chloroethoxy) methane, bis(2-ethylhexyl) phthalate, chloroform, chromium (III), di-n-butyl phthalate, halomethanes, and PAHs. All discharges of these pollutants were attributed to the in-plant waste streams generated from low-volume wastes and metal cleaning operations. Order No. 96-05 authorized the elimination of these discharge limitations once all metal cleaning and low-volume wastes were routed to the City of Chula Vista sanitary sewer system effective December 31, 1997.

Order No. 96-05 continued to maintain final receiving water limitation for: arsenic, cadmium, chromium (hexavalent), copper, lead, mercury, nickel, silver, zinc, cyanide, total chlorine residual, ammonia (as N), acute toxicity, phenolic compounds (non-chlorinated) and chlorinated phenolics, and radioactivity, even after the cessation of metal cleaning and low-volume wastes to San Diego Bay. Order No. R9-2004-0154 requires receiving water limitation for only those parameters attributable to once-through cooling water discharges, such as acute toxicity and total residual chlorine.
On March 2, 2000, the SWRCB adopted a *Policy for Implementation of Toxic Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (Implementation Policy).* This Implementation Policy sets specific requirements and numerical limitation for metals and priority pollutant discharges to enclosed bays such as San Diego Bay, as required by the California Toxic Rule (CTR). Order No. R9-2004-0154 will utilize this Implementation Policy, rather than the Ocean Plan, for establishment of discharge and receiving water limitation of metals and other priority pollutants to San Diego Bay. The incorporation of the provisions of this Implementation Policy into Order No. R9-2004-0154 is discussed in Section G *(California Toxics Rule Compliance)* of this Fact Sheet.

8. ANTIDEGRADATION POLICIES

Pursuant to 40 CFR 131.12 and State Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California" (collectively referred as "antidegradation policies"), the Regional Board shall ensure that any increase in pollutant loading to a receiving water is consistent with antidegradation policies. Order No. R9-2004-0154 does not authorize any new discharges. Furthermore, effluent concentration and mass emission rate limitations in this Order are the same or more stringent than those in Order No. 96-05. Therefore, the requirements of Order No. R9-2004-0154 are consistent with antidegradation policies.

G. CALIFORNIA TOXIC RULE (CTR) COMPLIANCE

The U.S. EPA promulgated the final California Toxic Rule (CTR) on May 18, 2000, as required by Section 303(c)(2)(B) of the federal Clean Water Act. The CTR regulations, codified in 40 CFR 131, establish water quality standards for inland surface waters. The water quality criteria established in the CTR is legally applicable in the State of California for inland surface waters, and enclosed bays and estuaries for all purposes and programs under the Clean Water Act.

On March 2, 2000, the State Board, in Resolution No. 2000-15, adopted a *Policy for Implementation of Toxic Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (State Implementation Policy, SIP). The SIP implements the provisions promulgated by the U.S. EPA in the CTR and establishes the following:

1. Implementation provisions for 126 priority pollutant criteria promulgated by the U.S. EPA through the National Toxic Rule (NTR) and the CTR, and for priority pollutant objectives established in the Basin Plan.

2. Monitoring requirements for 2,3,7,8-TCDD (tetrachlorodibenzo-p-dioxin) equivalents.

3. Chronic toxicity control provisions.

On May 4, 2001, Duke Energy submitted concentration data for the CTR priority pollutants contained in the intake and effluent cooling water from the South Bay Power Plant (SBPP), as part of its NPDES permit renewal application. This data was submitted pursuant to Section 1.2 of the Implementation Policy. The data for all priority pollutants except dioxins, polychlorinated biphenyls (PCBs), and pesticides, was based on effluent and intake sampling conducted on December 12 and 13, 2000. Supplemental data for dioxins, PCBs, and pesticides was submitted in August 2001, based on sampling conducted on June 27 and 28, 2001. All priority pollutants except arsenic, selenium, copper, nickel, chromium (total), lead, and silver were found to be in non-detectable levels in both effluent and intake.

Pursuant to Section 1.3 of the Implementation Policy, a reasonable potential analysis (RPA) of data is required to determine which priority pollutants would require effluent limitations. Duke Energy indicated in its NPDES renewal application (EPA Form 2C introduction) that it is likely that choppy water conditions and runoff from various storm drain channels, during sampling conducted on December 12 and 13, 2000, caused the bottom of the discharge channel to be disturbed and contribute to unusually high results for metals such as copper and nickel. Duke Energy also indicated that historical sampling for these metals has revealed much lower or non-detectable results. Based on this assertion by Duke, the results for the copper and nickel sampled on December 12 and 13, 2000 were considered inadequate in conducting a complete and conclusive RPA.

An RPA for all pollutants, except copper, nickel, and chromium (hexavelent) and chromium (trivalent), was conducted using the SWRCB's California Permit Writer and Training Tool (CPWTT) computer model. Based on the results of this analysis (see Attachment 6) in conjunction with the use of Best Professional Judgement (BPJ), staff concluded that effluent limitation will not be required for any of the applicable metals, volatiles, semi-volatiles, pesticides, polychlorinated biphenyls (PCBs), and 2,3,7,8-TCDD (dioxin), listed in the CTR. Since the data submitted by Duke Energy for copper and nickel was found to be inadequate in conducting an RPA, additional sampling for these pollutants was needed. Additional monitoring was also required for chromium (hexavalent and total), since results were only submitted for chromium (total).

Pursuant to Section 13267 of the Clean Water Code (CWC) and in accordance with Section 2.2.2 (Interim Requirements for Providing Data) of the Implementation Policy, the Executive Officer issued a letter to Duke Energy on February 28, 2003 directing it to conduct additional discharge, intake, and background CTR monitoring at the SBPP for copper, nickel, chromium (hexavalent and total) and 17 chlorinated dibenzodioxins and chlorinated dibenzofurans congeners.

Pursuant to the Section 13267 letter, Duke Energy conducted 24-hour composite intake and discharge sampling for copper and nickel over a two-week period in April 2003. Monthly grab sampling for copper and nickel was also conducted during April, May, and June of 2003 at 12 receiving water stations dispersed around San Diego Bay. A total of 51 ambient and 15 discharge and intake samples for copper and nickel were collected. As required by the Section 13267 letter, Duke Energy also conducted one-time intake and discharge sampling for total and hexavelent chromium in April 2003. Duke Energy submitted the additional CTR monitoring data for copper, nickel, and chromium (hexavalent and total) on July 22, 2003.

An RPA was conducted for copper and chromium (hexavalent and total) using the CPWTT model. An RPA was not needed for nickel since the concentrations of nickel in the discharge, intake, and ambient samples were all found to be in non-detectable levels. The RPA indicated that copper in cooling water discharges from the SBPP has a reasonable potential to cause or contribute to the exceedance of the CTR water quality criteria of 3.1 µg/l (dissolved) and is therefore subject to effluent limitations (see Attachment 6).

The Implementation Policy requires that discharge effluent limitations for copper be specified as total recoverable concentrations. The Implementation Policy (p. 12, Section 1.4.1, *Translators for Metals and Selenium*) specifies the use of a conversion factor to adjust a criterion expressed as a dissolved form to a total recoverable form. The CTR specifies the use of a default conversion factor of 0.83 for saltwater (in the absence of a site-specific translator for copper in south San Diego Bay). To calculate the total recoverable concentration the dissolved criterion is divide by the conversion factor.

Dissolved concentration criterion/0.83 = Total recoverable concentration.

Based on the algorithms contained in Section 1.4 (Calculation of Effluent Limitations) of the Implementation Policy and a default conversion factor for copper of 0.83, the CPWTT model calculated the Maximum Daily Emission Limit (MDEL) and Average Monthly Emission Limit (AMEL) for total recoverable copper concentrations. The calculated MDEL value of 4.44 µg/l and AMEL value of 3.53 µg/l for total recoverable copper are specified in Order No. R9-2004-0154 (see Attachment 6 for sample calculations).

Ambient background, influent, and effluent monitoring data submitted by Duke Energy for copper clearly shows that the SBPP adds an incremental load of copper to the influent. Furthermore, a Special Copper Study, conducted in 1999 estimated that the power plant added approximately 0.39 ± 0.17 ug/l of copper to the cooling water, prior to discharge to the discharge channel. According to Section 1.4.4 (*Intake Credits*) of the SIP, the Regional Board may establish intake credits by allowing a facility to discharge a mass and concentration of a pollutant that is no greater than the mass and concentration found in the facility's intake water. It is clear, that the SBPP will not be able to meet this requirement for copper, since the copper concentrations in the discharge periodically exceed that in the intake. The SBPP is not a viable candidate for intake credits. As such, Order No. R9-2004-0154 does not include provisions for intake credits.

In its letter date August 18, 2004, Duke Energy has indicated that it cannot immediately comply with the new copper limitations and has requested that the Regional Board allow additional time to achieve compliance with the new copper limitations. Duke Energy has stated that it has already taken various measures to reduce copper in its effluent. This includes eliminating the discharge of all industrial process waste streams to the SBPP discharge channel and the use of "impressed current" cathodic protection to minimize corrosion of the copper-alloy condenser tubes through which the cooling water passes.

The Regional Board recognizes that Duke Energy cannot comply with the new copper limitations immediately, since that would require major upgrades to the condenser tubings of the power plant or installation of treatment technologies. Based on the fact that Duke Energy has taken previous measures to lower its copper loading to its discharge in and that south San Diego Bay already has level of ambient levels of copper that exceed the CTR criteria, the Regional Board will grant Duke Energy additional time to comply with the new copper limitations. Order No. R9-2004-0154 includes a time schedule for Duke Energy to comply with its CTR limitations for copper. Duke Energy will be required to develop and implement a Workplan for additional source control measures, pollutant minimization actions, or waste treatment to control copper in its discharge. The Workplan may also include proposals to conduct Water Effect Ratio or translator studies that could be used to develop site-specific objectives for total recoverable copper in south San Diego Bay. The Workplan will estimate the concentration and mass of copper that will be reduced in the discharge due to the proposed measures. Duke Energy will be provided 12 months to develop the Workplan. Duke Energy will be required to fully implement the Workplan and comply with its final CTR limitations for copper no later than 36 months after adoption of the Order. At that time, the Regional Board may consider granting intake credits for copper (pursuant to Section 1.4.4 of the SIP), if Duke Energy can demonstrate that it has completely eliminated sources of copper discharges in its operations and the loading of copper to the SBPP discharge is zero.

Order No. R9-2004-0154 includes interim limitations for copper that would remain in effect until the facility is subject to the final CTR limitations, 36 months after adoption of the Order. The interim limitation would require the maximum daily concentration of copper in the discharge to not exceed the concentration of copper in the intake water by more than 2.5 μg/L. This interim limitation was based on best professional judgment (BPJ) in conjunction with historical data that shows that the concentration of copper in the discharge may exceed that in the intake by as much as 2 μg/l.

The Monitoring and Reporting Program (MRP) No. R9-2004-0154 requires Duke Energy to conduct 24-hour composite sampling for copper in the effluent, intake, and receiving water on a monthly basis, in order to demonstrate compliance with its copper limitations. Monthly effluent and receiving water monitoring for other priority metals (cadmium, lead, mercury, arsenic, chromium, silver, and zinc) have been added to the MRP, in order to comply with CTR and SIP provisions. Although the Reasonable Potential Analysis (RPA) conducted for these metals suggests that effluent limitations are not required, the RPA was based on just one sampling event. Since these metals have frequently been found in the discharge in detectable quantities, the Regional Board feels that it is necessary to closely monitor the seasonal variation in the concentrations of these metals in the discharge over an annual cycle and periodically conduct an RPA. If an RPA conducted in the future indicate that effluent limitations are needed for these metals, the NPDES permit will be amended to incorporate these limitations.

Pursuant to Section 1.3 of the Implementation Policy, the MRP requires Duke Energy to resample for all 126 priority pollutants listed in the CTR six months prior to the expiration of Order No. R9-2004-0154.

Section 3 of the Implementation Policy requires effluent monitoring for 17 congeners of chlorinated dibenzodioxins (2,3,7,8-CDDs) and chlorinated dibenzofurans (2,3,7,8-CDFs) for all major industrial dischargers such as SBPP. These congeners and corresponding toxic equivalency factors (TEFs) are listed in Table 4 of the Implementation Policy. The purpose of the monitoring is to assess the presence and amounts of the congeners being discharged to inland surface waters, enclosed bays, and estuaries for the development of a strategy to control these chemicals in a future multi-media approach.

Pursuant to the February 28, 2003, Section 13267 letter and in accordance with Section 3 of the Implementation Policy, the discharger was required to monitor its effluent for each of the 17 chlorinated dibenzodioxins and chlorinated dibenzofurans congeners listed in Table 4 of the Implementation Policy. The discharger was required to report for each congener the analytical results of the effluent monitoring, including the quantifiable limit and the method detection limit (MDL), and the measured or estimated concentration. In addition, the discharger was required to multiply each measured or estimated congener concentration by its respective Toxicity Equivalency Factor (TEF) value for 2,3,7,8 TCDD (listed in Table of Implementation Policy) and report the sum of these values. The monitoring for the congeners was required once during wet weather (January - March) and once during dry weather (June – August) for each year, for a three-year period starting June 2003. Pursuant to the Section 13267 letter, monitoring results are required to be submitted to the Regional Board by May 1 of each year. Duke Energy has already submitted results of congener monitoring for the June – August 2003 dry weather period, on April 8, 2004. All congeners were found in non-detectable concentrations.

H. MONITORING AND REPORTING REQUIREMENTS

In an effort to standardize the monitoring and reporting requirements and to support the electronic data submittal of the discharger's self-monitoring reports, the reporting units, definitions, and deadlines specified in the MRP for Order No. R9-2004-0154 have been written in accordance with the State Water Resource Control Board's *Water Quality Permit Standards Team Final Report.*

Monitoring frequency and constituent analysis for the discharge is comparable or more stringent than Order No. 96-05 and other power plant permits. Constituents monitored in effluent samples are derived from *Development Document for Effluent Limitations Guidelines and Standards and Pretreatment Standards for the Steam Electric Point Source Category, EPA-440/1-82/029.* This document contains extensive data on the frequency at which certain chemicals were detected in power plant waste streams. This information, an assessment of the plant's self-monitoring reports, and best professional judgement were used to determine the monitoring requirements.

Order No. 96-05 requires total chlorine residual in the effluent to be monitored twice a month. Although monitoring data for the last two years has not indicated any violations in the total chlorine residual discharge limitation, this monitoring regimen may be insufficient due to the intermittent nature of chlorination cycles (i.e. 6 cycles per day, 20 minutes per Unit per cycle). Monitoring and Reporting Program (MRP) No. R9-2004-0154 has, therefore, increased the monitoring frequency for total residual chlorine to weekly. The MRP will also required to discharger to conduct total chlorine residual monitoring between noon and 6:00 p.m. This time period will enable monitoring to be conducted when the power plant is operating at peak load conditions. The discharger will also be required to specify the number of Units that were operating (and total cycle time) when total chlorine residual monitoring was conducted. Furthermore, the MRP also requires the discharger to maintain and provide logs on the daily amounts of chlorine injected into the system and the duration of the injections.

Although, Order No. 96-05 has a receiving water limitation for total residual chlorine (see Section F.5 of Fact Sheet), it does not require any receiving water monitoring. MRP No. R9-2004-0154 will require Duke Energy to start monitoring for receiving water levels of total residual chlorine monitoring at two stations in the SBPP discharge channel, that are closest to the property line. Since chlorine dissipates very quickly as the cooling water from the SBPP travels further away from the property line, the two stations closest to the property line will exhibit the highest levels of total residual chlorine in the receiving water. Intake water monitoring for total chlorine residual has also been included in the MRP.

Order No. 96-05 requires bioassay tests for acute and chronic toxicity in the effluent and intake to be conducted on a quarterly basis. Although monitoring data for the last two years has not indicated any violations in effluent limitations, the quarterly tests may be inadequate in assessing possible seasonal variations in discharge water toxicity. MRP No. R9-2004-0154 has therefore increased the monitoring frequency for acute and chronic toxicity from a quarterly to monthly basis.

Order No. 96-05 does not require dissolved oxygen (DO) to be monitored in the discharge. Order No. 96-05 only requires DO to be monitored for 12 receiving water stations around the vicinity of the plant. Although there is currently no discharge limit for DO, MRP No. R9-2004-0154 requires a monthly DO monitoring requirement for discharges from the SBPP. The DO data from the discharge, at station S2 (i.e. property line), will be compared to DO levels in the receiving water stations to determine the real extent of impact of the thermal effluent from SBPP to DO levels in south San Diego Bay. A DO discharge limit may be recommended after adequate data has been collected and the NPDES permit may be amended at a later date.

The effluent monitoring requirements in MRP No. R9-2004-0154 for other constituents with limitations, including flow, temperature, and pH are the same or more stringent than those contained in Order No. 96-05. Flow and temperature will be monitored continuously and pH will be monitored on a monthly basis. Monitoring will be required concurrently for intake and discharge for temperature, DO, pH, total chlorine residual, copper, and acute and chronic toxicity.

Monitoring of metals and other priority pollutants will be conducted in accordance with the SWRCB's Implementation Policy, as discussed in Section 9 (CTR Compliance) of this Fact Sheet.

Pursuant to Section B of MRP No. 96-05, the discharger was required to annually measure bar rack approach velocity and sediment accumulation at the intake structure and submit an annual summary describing any operational difficulties at the intake structure or the bar rack. Order No. 96-05 indicates that this monitoring requirement may be deleted if the discharger demonstrates to the satisfaction of the Regional Board that no substantive changes in bar rack approach velocity and sediment accumulation have occurred since monitoring was initiated and the likelihood of future changes is remote. Bar rack approach velocity and sediment accumulation data for 1996 to 1999 were evaluated for significant changes over the four-year period using regression analysis. Three out of the four intake structures showed no significant changes in sediment accumulation or approach velocity for the four-year period. One structure showed a decreasing trend in accumulation and approach velocity. Based on these results the bar rack approach velocity and sediment accumulation monitoring requirements were not included in MRP No. R9-2004-0154.

The receiving water monitoring requirements in MRP No. R9-2004-0154 includes monitoring for temperature, salinity, DO, and transparency monitoring, on a monthly basis, at 12 stations dispersed throughout San Diego Bay. This is consistent with the receiving water monitoring requirements of Order No. 96-05. MRP No. R9-2004-0154 requires additional monthly receiving water monitoring for copper and other selected CTR metals including cadmium, lead, mercury, arsenic, chromium, silver, and zinc.

I. NPDES RATING AND FEES

Pursuant to the *NPDES Permit Rating Worksheet*, the discharge from the SBPP site was found to have a point score of 600. Pursuant to U.S. EPA guidance, facilities with a point score greater than 80 are designated as NPDES *Major* dischargers. The SBPP has been classified as an NPDES *Major* discharger.

Pursuant to *Title 23, Section 2200* of the California Code of Regulations, the discharger has been identified as having a *Threat to Water Quality and Complexity* (TTWQ/CPLX) rating of 1/A. Furthermore, pursuant to *Subdivision (b)(6) of Section 2200*, the discharger will be subject to an annual fee of $100,000 based on a permitted NPDES maximum discharge flow of 601.13 MGD.

J. EFFECTIVE AND EXPIRATION DATES OF ORDER NO. R9-2004-0154

Order No. R9-2004-0154 becomes effective ten (10) days after its adoption provided the Regional Administrator, USEPA, has no objection. If the Regional Administrator objects to its issuance, this Order shall not become effective until such objection is withdrawn.

K. WRITTEN COMMENTS

Interested persons are invited to submit written comments upon these draft waste discharge requirements. Comments should be submitted either in person or by mail, during business hours, to:

John H. Robertus, Executive Officer
Regional Water Quality Control Board, Region 9
9174 Sky Park Court, Suite 100
San Diego, California 92123
Attn: Industrial Compliance Unit

Written comments regarding tentative Order No. R9-2004-0154 must be submitted no later than October 27, 2004. Oral comments will be received during the hearing on November 10, 2004.

L. PUBLIC HEARING

In accordance with 40 CFR 124.10, the RWQCB must issue a public notice whenever NPDES permits have been prepared, and that the tentative permits will be brought before the RWQCB at a public hearing. The public notice has been published in The San Diego Union-Tribune newspaper no less than 30 days prior to the scheduled public hearing.

Duke Energy, ten government agencies, and seven known interested parties were notified directly by mail at least 30 days prior to the meeting.

The Regional Board will hear oral testimony and consider written comments associated with tentative Order No. R9-2004-0154, at a public hearing beginning at 9:00 am on November 10, 2004. The location of this meeting is as follows:

Regional Water Quality Control Board
Regional Board Meeting Room
9174 Sky Park Court, Suite 100
San Diego, California 92123

The written comment period regarding the tentative Order will end on October 27, 2004.

M. ADDITIONAL INFORMATION

For additional information, interested persons may write the following address or contact Mr. Hashim Navrozali of the Regional Board staff at (858) 467-2981 or by email at navrh@rb9.swrcb.ca.gov:

Regional Water Quality Control Board, Region 9
Attn: Industrial Compliance Unit
9174 Sky Park Court, Suite 100
San Diego, California 92123

Copies of the applications, tentative NPDES waste discharge requirements, and other documents (other than those that the Executive Officer maintains as confidential) are available at the RWQCB office for inspection and copying according to the following schedule (excluding holidays):

Monday and Thursday:	1:30 pm to 4:30 pm
Tuesday and Wednesday:	8:30 am to 11:30 am
	1:30 pm to 4:30 pm
Friday:	8:30 am to 11:30 pm

An electronic copy of the Fact Sheet and tentative Order can be accessed on the Regional Board website: http://www.swrcb.ca.gov/rwqcb9/.

N. REFERENCES FOR WASTE DISCHARGE REQUIREMENTS

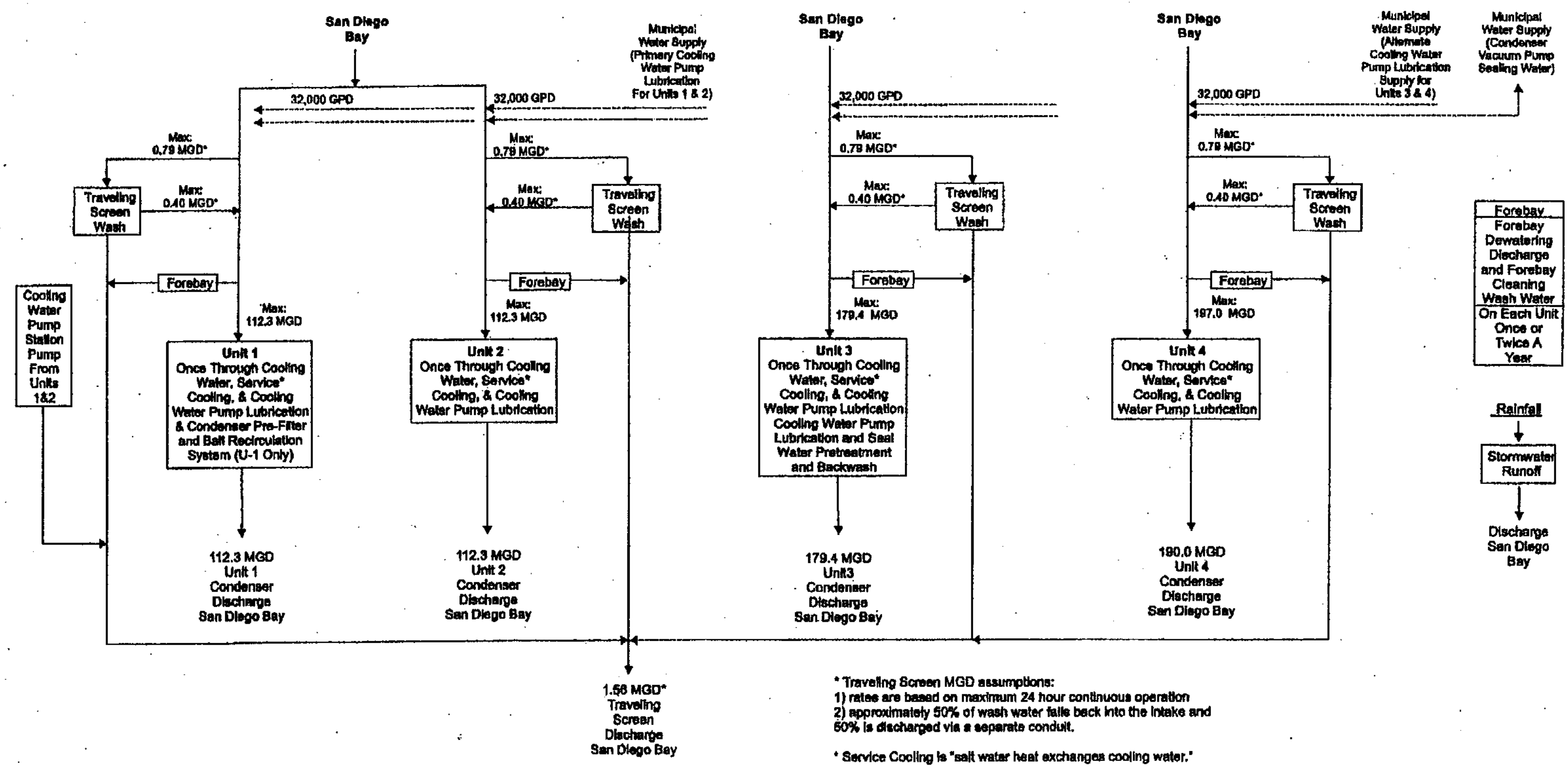
The following documents provide the necessary references for the basis of this NPDES permit:

1. *State Water Quality Control Plan for Control of Temperature in Coastal and Interstate Waters and Enclosed Bays and Estuaries of California* (Thermal Plan).
2. Order No. 96-05, Waste Discharge Requirements for San Diego Gas and Electric Company, South Bay Power Plant, San Diego County.
3. The Water Quality Control Plan for the San Diego Basin (9) (Basin Plan), 1994.
4. Water Quality Control Plan, Ocean Waters of California, California Ocean Plan (Ocean Plan), 1997.
5. The Code of Federal Regulations Part 40, Section 122, 136, and 423.
6. The Clean Water Act; Sections 208, 301, 302, 303, 304, 306, 307, 402, 403, and 405.
7. The California Code of Regulations, Title 23, Division 3 and 4.
8. Application for the Renewal of the NPDES Permit for the Duke Energy, LLC, South Bay Power Plant, May 4, 2001.
9. SWRCB *Policy for Implementation of Toxic Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (Implementation Policy, 2000)
10. California Toxics Rule, Federal Register Section 31682-31719, 40 CFR 131.38, May 18, 2000.
11. *Thermal Distribution and Biological Studies for the South Bay Power Plant*, Ford and Chambers, May 1973.
12. *SBPP Cooling Water System Effects on San Diego Bay, Volume 1: Compliance with Section 316(a) of the Clean Water Act for the South Bay Power Plant,* Tenera Environmental and Merkel & Associates, 2004.
13. *SBPP Cooling Water System Effects on San Diego Bay, Volume II: Compliance with Section 316(b) of the Clean Water Act for the South Bay Power Plant,* Tenera Environmental and Merkel & Associates, 2004.
14. 40 CFR 125, Subpart J, *Requirements Applicable to Cooling Water Intake Structures for "Phase II Existing Facilities" Under Section 316(b) of the Clean Water Act,* 2004.

ATTACHMENT 1

Once-through Cooling Water System Components and Associated Waste Streams

South Bay Power Plant
(NPDES Permit No. CA0001368)



* Traveling Screen MGD assumptions:
1) rates are based on maximum 24 hour continuous operation
2) approximately 50% of wash water falls back into the intake and 50% is discharged via a separate conduit.

* Service Cooling is "salt water heat exchanges cooling water."

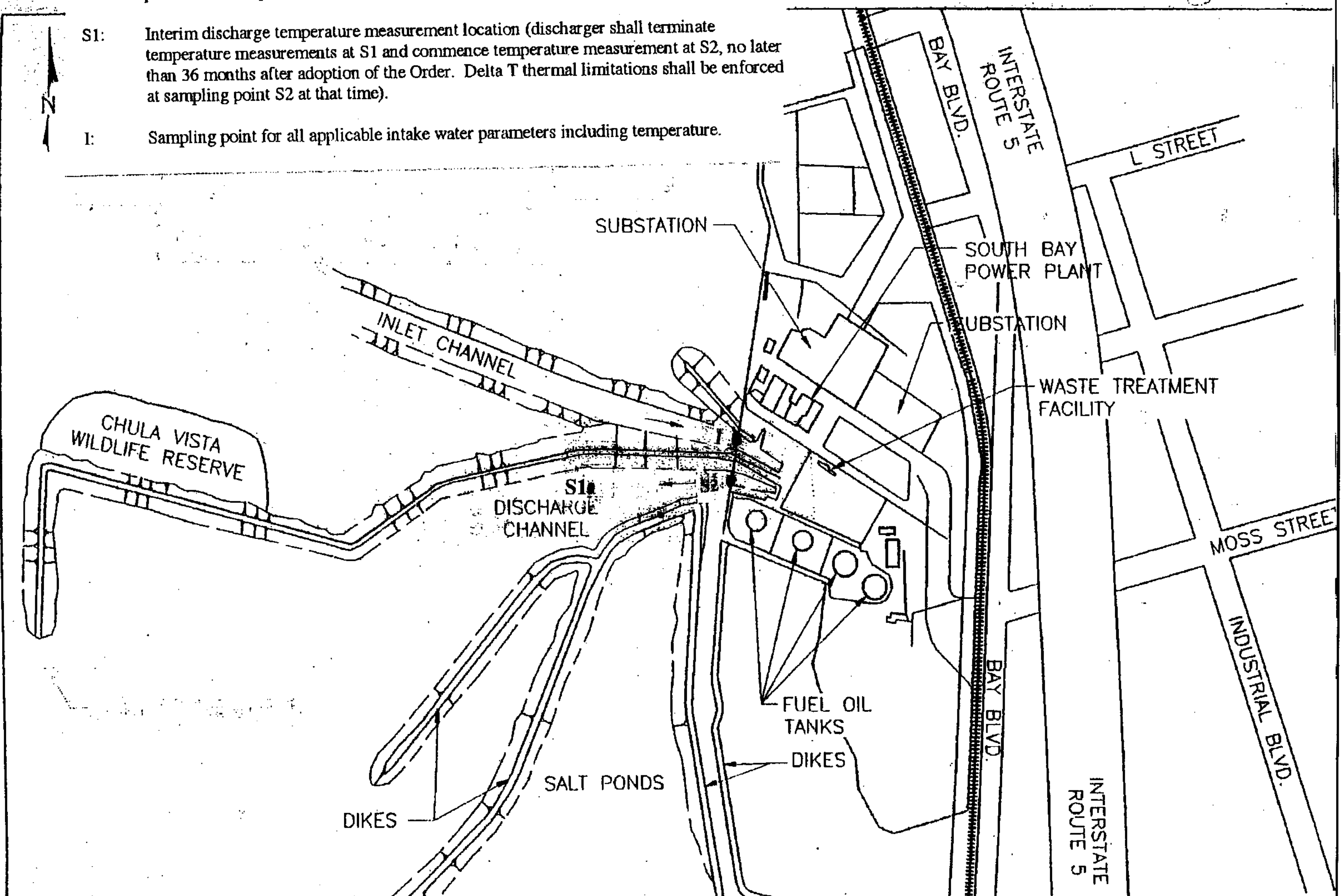
ATTACHMENT 2

South Bay Power Plant Facility Diagram

S2: Sampling point (property line) for verification of compliance with all discharge parameters except Delta T thermal limitations.

S1: Interim discharge temperature measurement location (discharger shall terminate temperature measurements at S1 and commence temperature measurement at S2, no later than 36 months after adoption of the Order. Delta T thermal limitations shall be enforced at sampling point S2 at that time).

I: Sampling point for all applicable intake water parameters including temperature.



EARTH TECH
A tyco INTERNATIONAL LTD. COMPANY

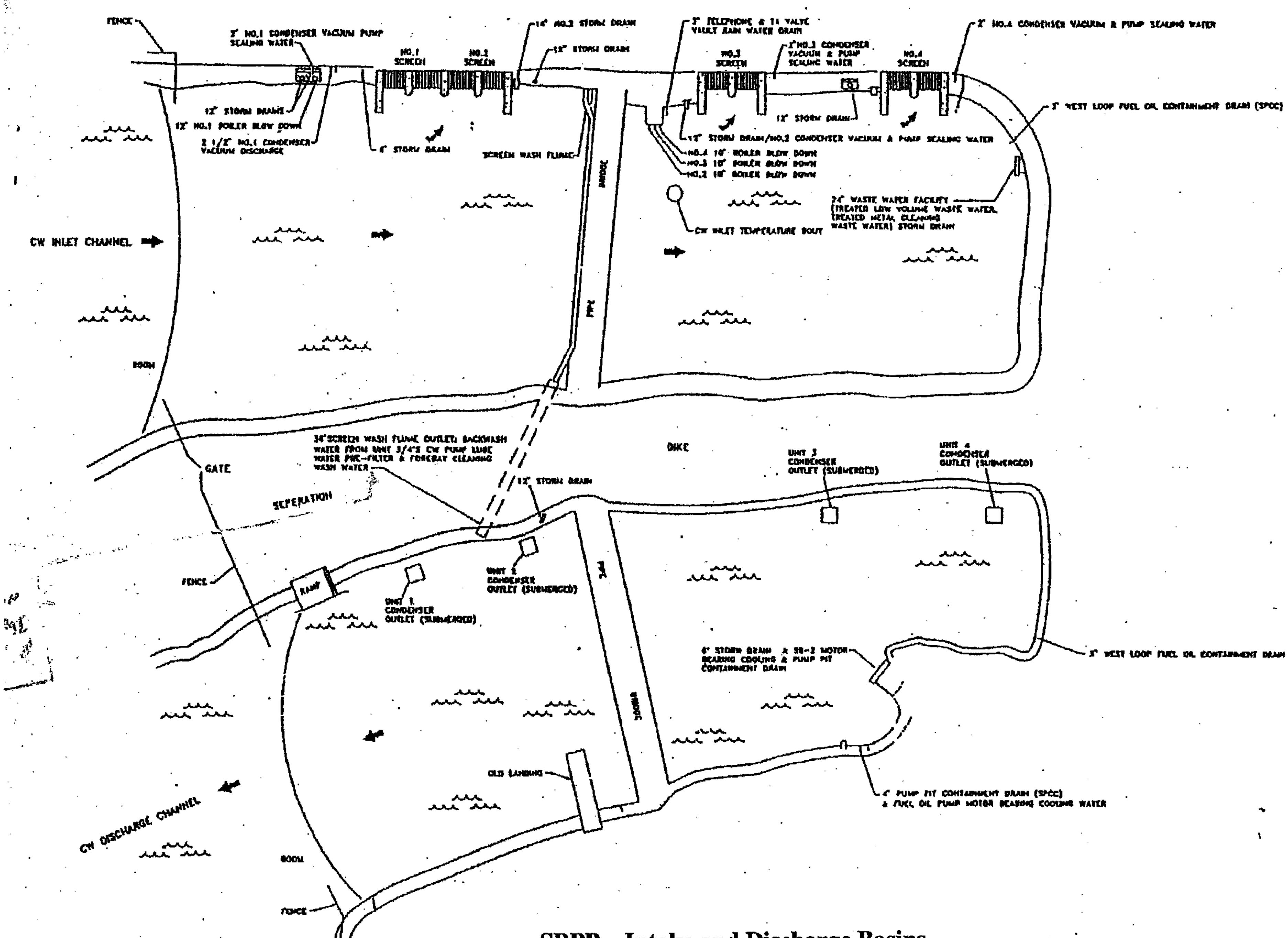
0 500 1000 2000
SCALE: 1" = 1000'

SOUTH BAY POWER PLANT

work\projects\43031_KH\deliverables\drawings\site_map.dwg

ATTACHMENT 3

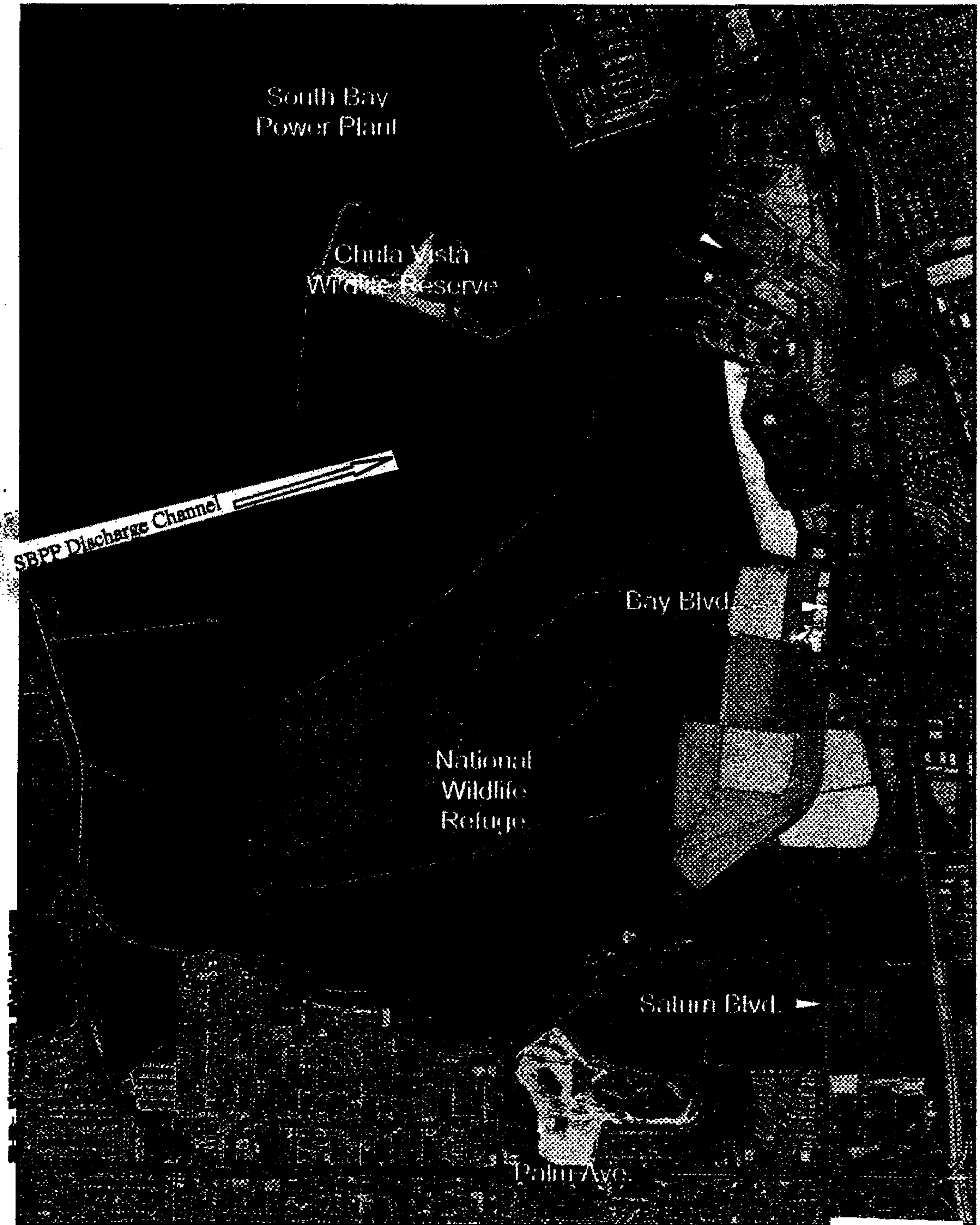
South Bay Power Plant Intake and Discharge Basins



SBPP – Intake and Discharge Basins

ATTACHMENT 4

Discharge Channel of the South Bay Power Plant

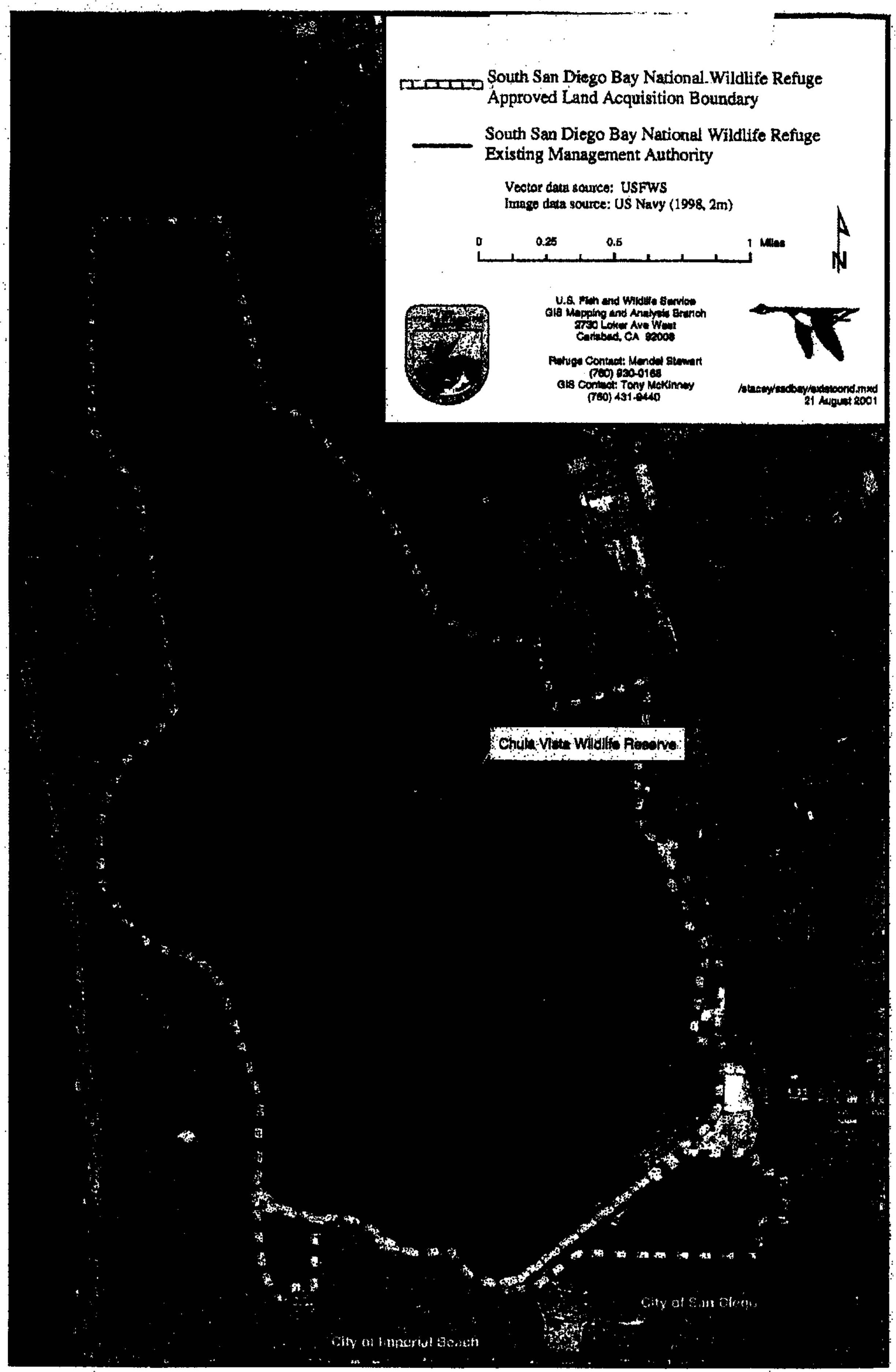


EARTH TECH
A tyco INTERNATIONAL LTD. COMPANY

SBPP Discharge Channel
South San Diego Bay

ATTACHMENT 5A

South San Diego Bay National Wildlife Refuge Boundary



South San Diego Bay National Wildlife Refuge Approved Land Acquisition Boundary
South San Diego Bay National Wildlife Refuge Existing Management Authority
Vector data source: USFWS
Image data source: US Navy (1998, 2m)
0 0.25 0.5 1 Miles
N
U.S. Fish and Wildlife Service
GIS Mapping and Analysis Branch
2730 Loker Ave West
Carlsbad, CA 92008
Refuge Contact: Mendel Stewart
(760) 930-0168
GIS Contact: Tony McKinney
(760) 431-9440
21 August 2001
Chula Vista Wildlife Reserve
City of San Diego
City of Imperial Beach

ATTACHMENT 5B

USFWS Letter to Discharger Regarding the
South San Diego Bay National Wildlife Refuge

HN

United States Department of the Interior

FISH AND WILDLIFE SERVICE
911 N.E. 11th Avenue
Portland, Oregon 97232-4181

IN REPLY REFER TO:

May 5, 1998

Ms. Kathryn Frost
Division Manager
Administrative Services
San Diego Gas & Electric Company
101 Ash Street
San Diego, CA 92101

RE: SOUTH BAY GENERATING STATION

Dear Ms. Frost:

Thank you for meeting with Dean Rundle, Refuge Manager for the San Diego National Wildlife Refuge Complex, on April 27, 1998 regarding the U.S. Fish and Wildlife Service's (Service) proposal for the South San Diego Bay Unit of the San Diego National Wildlife Refuge.

Mr. Rundle relayed to me San Diego Gas & Electric Company's (SDG&E) concerns about the potential impact of the proposed South San Diego Bay Unit on SDG&E's South Bay Generating Station. I understand that the plant is a "must-run" facility that is needed to ensure system reliability pursuant to a directive from the California Independent System Operator. As such, your concern lies in the perception that once approved and established, the proposed Refuge might affect the ability of SDG&E or a successor to operate the power plant in the future.

I want to assure you that the proposed Refuge would have no negative effect on the ability of SDG&E to operate and maintain its South Bay Generating Station now or in the future. The existing use of San Diego Bay water for cooling and the maintenance dredging of the existing intake and discharge channels would not be affected by the proposed Refuge.

Please note the following:

- The selection and approval of the proposed Refuge acquisition boundary, as described in the January 1998 draft environmental assessment, would not establish or create the South San Diego Bay Unit. The approved acquisition boundary would only provide the Service with the authority to acquire land for the Refuge from landowners that are willing sellers.

- The South San Diego Bay Unit would be established once land is acquired by the Service. No new or additional regulatory or land use controls are created on lands that are within the approved Refuge acquisition boundary or on lands that are adjacent to an established National Wildlife Refuge.

- Approving the acquisition boundary would not obligate the Port of San Diego to enter into any agreements with the Service that could extinguish easements or other leaseholds currently possessed by SDG&E. Any land acquired by the Service would be subject to existing easements and leaseholds.

- Once the Refuge is established, Refuge management plans would be prepared in a public process involving landowners, local jurisdictions, community groups, user groups, and citizens. We would welcome the participation of SDG&E in the Refuge management planning process.

The South Bay Generating Station, including its appurtenant support facilities such as the intake and discharge channels and the dike separating the two channels, would not be impacted by the proposed South San Diego Bay Unit. Those existing uses and facilities would continue to operate within the Refuge under the jurisdiction and authority of the primary trustee of State of California tidelands and existing regulations.

I hope this letter addresses your concerns regarding the potential impact of the proposed South San Diego Bay Unit on the operation of the South Bay Generating Plant. If you have any questions, please call me at 503/231-6118 or Dean Rundle at 760/930-0168.

Sincerely,

Michael J. Spear
Regional Director

ATTACHMENT 6 to FACT SHEET FOR TENTATIVE ORDER NO. R9-2004-0154

DUKE ENERGY - SOUTH BAY POWER PLANT
3. REASONABLE POTENTIAL (RP) ANALYSIS RESULTS FOR CTR POLLUTANTS

Pollutant Name	Criteria (ug/l)	Max. Effluent Concentration (ug/l)	Max. Background Concentration (ug/l)	RP
1,1,1-Trichloroethane	None	ND	ND	NO Criteria
1,1,2,2-Tetrachloroethane	11	ND	ND	BPJ
1,1,2-Trichloroethane	42	ND	ND	BPJ
1,1-Dichloroethane	None	ND	ND	NO Criteria
1,1-Dichloroethylene	3.2	ND	ND	BPJ
1,2,4-Trichlorobenzene	None	ND	ND	NO Criteria
1,2-Dichlorobenzene	17000	ND	ND	BPJ
1,2-Dichloroethane	99	ND	ND	BPJ
1,2-Dichloropropane	39	ND	ND	BPJ
1,2-Diphenylhydrazine	0.54	ND	ND	BPJ
1,2-Trans-Dichloroethylene	140000	ND	ND	BPJ
1,3-Dichlorobenzene	2600	ND	ND	BPJ
1,3-Dichloropropylene	1700	ND	ND	BPJ
1,4-Dichlorobenzene	2600	ND	ND	BPJ
2,4,6-Trichlorophenol	6.5	ND	ND	BPJ
2,4-Dichlorophenol	790	ND	ND	BPJ
2,4-Dimethylphenol	2300	ND	ND	BPJ
2,4-Dinitrophenol	14000	ND	ND	BPJ
2,4-Dinitrotoluene	9.1	ND	ND	BPJ
2,6-Dinitrotoluene	None	ND	ND	NO Criteria
2-Chloroethylvinyl Ether	None	ND	ND	NO Criteria
2-Chloronaphthalene	4300	ND	ND	BPJ
2-Chlorophenol	400	ND	ND	BPJ
2-Methyl-4,6-Dinitrophenol	765	ND	ND	BPJ
2-Nitrophenol	None	ND	ND	NO Criteria
3,3-Dichlorobenzidine	0.077	ND	ND	BPJ
3-Methyl-4-Chlorophenol	None	ND	ND	NO Criteria
4,4'-DDD	0.00084	ND	ND	BPJ
4,4'-DDE	0.00059	ND	ND	BPJ
4,4'-DDT	0.00059	ND	ND	BPJ
4-Bromophenyl Phenyl Ether	None	ND	ND	NO Criteria
4-Chlorophenyl Phenyl Ether	None	ND	ND	NO Criteria
4-Nitrophenol	None	ND	ND	NO Criteria
Acenaphthene	2700	ND	ND	BPJ
Acenapthylene	None	ND	ND	NO Criteria
Acrolein	780	ND	ND	BPJ
Acrylonitrile	0.66	ND	ND	BPJ
Aldrin	0.00014	ND	ND	BPJ
alpha-BHC	0.013	ND	ND	BPJ
alpha-Endosulfan	0.0087	ND	ND	BPJ
Anthracene	110000	ND	ND	BPJ
Antimony (Sb)	4300	ND	ND	BPJ
Arsenic (As-III)	36	5.5	5.93	BPJ
Asbestos	None	ND	ND	NO Criteria
Benzene	71	ND	ND	BPJ
Benzidine	0.00054	ND	ND	BPJ
Benzo (a) Anthracene	0.049	ND	ND	BPJ
Benzo (a) Pyrene	0.049	ND	ND	BPJ
Benzo (b) Fluoranthene	0.049	ND	ND	BPJ
Benzo (g,h,i) Perylene	None	ND	ND	NO Criteria
Benzo (k) Fluoranthene	0.049	ND	ND	BPJ
Beryllium (Be)	None	ND	ND	NO Criteria
beta-BHC	0.046	ND	ND	BPJ
beta-Endosulfan	0.0087	ND	ND	BPJ
Bis (2-Chloroethoxy) Methane	None	ND	ND	NO Criteria
Bis (2-Chloroethyl) Ether	1.4	ND	ND	BPJ
Bis (2-Chloroisopropyl) Ether	170000	ND	ND	BPJ
Bis (2-Ethylhexyl) Phthalate	5.9	ND	ND	BPJ
Bromoform	360	ND	ND	BPJ
Butylbenzyl Phthalate	5200	ND	ND	BPJ

*BPJ = Best Professional Judgement (may be used to establish RP)

Pollutant Name	Criteria (ug/l)	Max Effluent Concentration (ug/l)	Max Background Concentration (ug/l)	RP
Cadmium (Cd)	9.3	ND	ND	BPJ
Carbon Tetrachloride	4.4	ND	ND	BPJ
Chlordane	0.00059	ND	ND	BPJ
Chlorobenzene	21000	ND	ND	BPJ
Chlorodibromomethane	34	ND	ND	BPJ
Chloroethane	None	ND	ND	NO Criteria
Chloroform	None	ND	ND	NO Criteria
Chromium-III (Cr-III)	None	1.7	1.2	NO Criteria
Chromium-VI (Cr-VI)	50	ND	ND	BPJ
Chrysene	0.049	ND	ND	BPJ
Copper (Cu)	*3.1*	*4.37*	*35.2*	*YES*
Cyanide (CN)	1	ND	ND	BPJ
delta-BHC	None	ND	ND	NO Criteria
Di-n-Butyl Phthalate	12000	ND	ND	BPJ
Di-n-Octyl Phthalate	None	ND	ND	NO Criteria
Dibenzo (a,h) Anthracene	0.049	ND	ND	BPJ
Dichlorobromomethane	46	ND	ND	BPJ
Dieldrin	0.00014	ND	ND	BPJ
Diethyl Phthalate	120000	ND	ND	BPJ
Dimethyl Phthalate	None	ND	ND	NO Criteria
Endosulfan Sulfate	240	ND	ND	BPJ
Endrin	0.0023	ND	ND	BPJ
Endrin Aldehyde	0.81	ND	ND	BPJ
Ethylbenzene	29000	ND	ND	BPJ
Fluoranthene	370	ND	ND	BPJ
Fluorene	14000	ND	ND	BPJ
gamma-BHC	0.063	ND	ND	BPJ
Heptachlor	0.00021	ND	ND	BPJ
Heptachlor Epoxide	0.00011	ND	ND	BPJ
Hexachlorobenzene	0.00077	ND	ND	BPJ
Hexachlorobutadiene	50	ND	ND	BPJ
Hexachlorocyclopentatadiene	17000	ND	ND	BPJ
Hexachloroethane	8.9	ND	ND	BPJ
Indeno (1,2,3-cd) Pyrene	0.049	ND	ND	BPJ
Isophorone	600	ND	ND	BPJ
Lead (Pb)	8.1	1.25	1.02	BPJ
Mercury (Hg)	0.051	ND	ND	BPJ
Methyl Bromide	4000	ND	ND	BPJ
Methyl Chloride	None	ND	ND	NO Criteria
Methylene Chloride	1600	ND	ND	BPJ
N-Nitrosodi-n-Propylamine	1.4	ND	ND	BPJ
N-Nitrosodimethylamine	8.1	ND	ND	BPJ
N-Nitrosodiphenylamine	16	ND	ND	BPJ
Napthalene	None	ND	ND	NO Criteria
Nickel (Ni)	8.2	2.8	2.8	BPJ
Nitrobenzene	1900	ND	ND	BPJ
PCBs	0.00017	ND	ND	BPJ
Pentachlorophenol	7.9	ND	ND	BPJ
Phenanthrene	None	ND	ND	NO Criteria
Phenol	None	ND	ND	NO Criteria
Pyrene	11000	ND	ND	BPJ
Selenium (Se)	71	7.65	8.02	BPJ
Silver (Ag)	1.9	1.48	1.54	BPJ
TCDD	1.4E-08	ND	ND	BPJ
Tetrachloroethylene	8.85	ND	ND	BPJ
Thallium (Tl)	6.3	ND	ND	BPJ
Toluene	200000	ND	ND	BPJ
Toxaphene	0.0002	ND	ND	BPJ
Trichloroethylene	81	ND	ND	BPJ
Vinyl Chloride	525	ND	ND	BPJ
Zinc (Zn)	81	ND	ND	BPJ

*BPJ = Best Professional Judgement (may be used to establish RP)

b. Summary of calculations for copper (total recoverable) effluent limitations to comply with the *California Toxics Rule* (pursuant to equations contained in the *State Implementation Policy*, SIP, and ambient and discharge data for copper, based on CTR monitoring conducted at SBPP in March 2003):

Reasonable Potential Analysis
Per Section 1.3 (*Determination of Priority Pollutants Requiring Water Quality-Based Effluent Limitations*) of the SIP, effluent limitations for copper from the SBPP discharge are required, since both the maximum observed background (B = 35.2 μg/l) and effluent (MEC = 4.37 μg/l l) exceed the most stringent total recoverable water quality criteria for copper in seawater (C = 3.73 μg/l l).

Effluent concentration allowance (ECA)

Per Section 1.4, page 6 of the SIP, the ECA is set to the criteria since $C \leq B$.

ECA_{acute} = 5.783 μg/l (4.8 μg/l dissolved acute criteria converted to total recoverable using EPA default conversion factor of 0.83 for seawater)
$ECA_{chronic}$ = 3.73 μg/l (3.1 μg/l dissolved chronic criteria converted to total recoverable using EPA default conversion factor of 0.83 for seawater per Appendix 3 of SIP)

ECA multipliers (see page 6 and 7 (Table 1))

CV = coefficient of variation = σ/mean = 0.16 (σ is 0.52 and mean for 15 data points is 3.30 μg/l)
$ECA_{acute\ multiplier99}$ = 0.7 (Interpolating data in Table 1 for a CV of 0.16)
$ECA_{chronic\ multiplier99}$ = 0.833 (Interpolating data in Table 1 for a CV of 0.16)

Long Term Averages (see page 8)

$LTA_{acute} = ECA_{acute} \times ECA_{acute\ multiplier99} = 5.783 \times 0.7 = 4.04\ \mu g/l$
$LTA_{chronic} = ECA_{chronic} \times ECA_{chronic\ multiplier99} = 3.73 \times 0.833 =$ **3.11 μg/l** $\Rightarrow$ most stringent

AMEL and MDEL Multipliers (see page 8 and 9 (Table 2))

$AMEL_{multiplier95}$ = 1.137 (Interpolating data in Table 2 for a CV of 0.16, and n = 4 (i.e. minimum default sampling frequency))
$MDEL_{multiplier99}$ = 1.428 (Interpolating data in Table 2 for a CV of 0.16)

$AMEL_{aquatic\ life} = AMEL_{multiplier95} \times LTA_{most\ stringent} = 1.137 \times 3.11 =$ **3.53 μg/l**
$MDEL_{aquatic\ life} = MDEL_{multiplier99} \times LTA_{most\ stringent} = 1.428 \times 3.11 =$ **4.44 μg/l**