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STATE OF CALIFORNIA

State Energy Resources
Conservation and Development Commission

In the Matter of:

THE NOTICE OF INTENTION OF SAN DIEGO GAS & ELECTRIC COMPANY TO FILE AN APPLICATION FOR CERTIFICATION OF A COMBINED-CYCLE ELECTRIC GENERATING FACILITY AND RELATED FACILITIES KNOWN AS THE COMBINED-CYCLE PROJECT	No. 89-NOI-1 PRELIMINARY REPORT OF CITY OF CHULA VISTA

PRELIMINARY REPORT OF

CITY OF CHULA VISTA: (SDG&E) 89-NOI-1

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EXECUTIVE SUMMARY AND CONCLUSIONS

This Preliminary Report responds to the request of the Energy Commission staff for comments from the City of Chula Vista on the proposal of San Diego Gas and Electric Company ("SDG&E") to construct a new 460 MW combined-cycle power plant at any of five alternate locations, one of which is the South Bay site in Chula Vista. This project is one of the largest and most controversial development proposals in Chula Vista's history. Indeed, this power plant is one of the largest such facilities proposed for location anywhere in California in many years. For that reason, Chula Vista has carefully considered the Energy Commission's request for comments and the impact that SDG&E's proposed facility would have on the people and the environment of the City. For the reasons set forth in this report, Chula Vista has concluded that the project as proposed would cause numerous significant adverse environmental impacts. In addition, Chula Vista has concluded that locating the project at the South Bay site would violate local land use ordinances and policies as well as other applicable laws.[1] Based on these conclusions, Chula Vista recommends that the Commission find South Bay an unacceptable site for this project.

As its name suggests, the South Bay site is located at the southern end of San Diego Bay. Notwithstanding the development that has already occurred there, the land and the environment of the Bayfront is an extremely rare and rapidly diminishing resource. Even among the scarce resources of the California coast generally, tidelands and shallow marine environments such as exist at this site are arguably unique and the most valuable of all. The Bayfront supports a wide variety of animals, birds, fish and plants, many of which require the unique features of this type of habitat to survive.

At the same time, the special features of the Bayfront also attract people and development. The natural setting creates a pleasant locale for both residential and visitor-commercial uses. The proximity to the ocean and a major metropolitan area attracts industry, especially industry dependent on transportation.

In balancing these competing interests, Chula Vista seeks to allow development of the Bayfront in a fashion that preserves to the greatest extent possible its natural scenic and environmental value. In this regard, careful scrutiny of the individual and cumulative impacts of development proposals is essential.

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[1] This report does not consider the details of project design and construction, such as utilities, building design and tower placement, since these issues will be addressed by SDG&E at the AFC stage.

This new 460 MW combined-cycle facility, together with the 140 MW augmentation project and the existing power plant, will lend a substantially greater industrial character to the Bayfront area than currently exists. As noted in the Land Use section, such heavy industrial development is not consistent with Chula Vista's plans for the Bayfront.[2] Even more fundamentally, this project is inconsistent with the City's goal of preserving and enhancing this unique environment.

A careful evaluation of the potential environmental impacts of the proposed project reveals significant problems associated with the South Bay site. The impacts identified in this report contrast markedly with SDG&E's assessment of the South Bay site in its Site Screening Analysis, section 5.0 of the NOI. In that analysis, SDG&E's favorable evaluation of the South Bay site rested entirely on the capital cost of the facility. The Site Screening Analysis did not take into account, however, many of the potentially significant environmental impacts of the project, including but not limited to the environmental impacts of the extensive new transmission facilities associated with the South Bay site, and the cumulative impacts of the combined-cycle project in conjunction with the augmentation project and other proposed development. Hence, the Commission cannot rely on SDG&E's evaluation of the South Bay site without the additional information and analysis recommended in this report. Absent such reevaluation, the significant environmental impacts of the project, summarized for the South Bay site by topic below, will not be properly considered.[3]

Summary of Impacts

I. Land Use

SDG&E's South Bay site comprises approximately 152 acres of the 790-acre Bayfront Planning Area. The area is predominately open space, parkland and other environmentally sensitive uses. The proposed power plant would be inconsistent with many of the existing and planned land uses in the vicinity as well as applicable land-use policies of Chula Vista. The specific zoning document for the South Bay site is the Bayfront Specific Plan, which is part of and incorporated by reference into the General Plan. Power plants are not an allowable use for

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[2] Even the apparent advantages of locating a facility within the existing infrastructure of another power plant are questionable at South Bay. Most notably, this project would require approximately 36 miles of new and upgraded transmission lines.

[3] As requested by the Energy Commission staff, this Preliminary Report summarizes the informational requirements of the City of Chula Vista in order to adequately evaluate the proposed project. It is expected that satisfying these requirements will take approximately the same amount of time as preparation of an environmental impact report.

III. BIOLOGY, HYDROLOGY AND THERMAL PLUME ISSUES

A. INTRODUCTION

This section of the City's preliminary report examines five fundamental concerns in the general areas of biology and hydrology. These five concerns, each leading to potentially serious adverse impacts to south San Diego Bay, are as follows:

- Bathymetry and Sedimentation Processes in South San Diego Bay:

  Data describing the bathymetry and sedimentation processes of south San Diego Bay are outdated and inadequate. The bay appears to be slowly filling in (shallowing). This is reducing the water volume in the South Bay and, therefore, has significant implications for potential adverse impacts of the power plant's thermal plume.

- Chemical/Toxic Pollution of South San Diego Bay:

  There is a significant potential for chemical or toxic pollution of south San Diego Bay from power plant operations. Several distinct potential pollution transfer pathways are evident: surficial runoff, subsurface pathways, discharges associated with the thermal plume, and airborne transfer. Any pollutants entering the South Bay may result in direct lethal or non-lethal impacts to local plants and animals. Alternatively, processes such as food chain transfer and biomagnification may lead to significant indirect impacts to broader regional populations.

- Tidal Flushing and Plume Behavior in South San Diego Bay:

  Data describing present tidal flushing in south San Diego Bay, as well as the present and future behavior of the power plant thermal plume, are outdated and inadequate. This is of central concern, for the efficiency of tidal flushing and the behavior of the thermal plume interact to control major adverse impacts to marine populations in the South Bay. This series of concerns relates only to impacts of proposed power plant operations on the physical environment of South Bay. The biological consequences of these adverse physical impacts are dealt with as a separate issue.

  An important related concern is exactly how tidal flushing and plume behavior are being modeled in order to accurately project both present and future proposed power plant operations and physical impacts.

- Biological Impacts of the Thermal Plume:

  The most significant issue raised by the proposed combined-cycle facility concerns potentially serious adverse impacts to South Bay biological populations from changes to the power plant cooling system. These impacts will result from substantial increases in both impingement and entrainment mortality, as well as impacts caused by changes to the plant's thermal plume.

- Cumulative Impacts:

  Finally, cumulative impacts are of very great concern. Viewed from perspectives of extreme biological sensitivity, regional scarcity, and steadily increasing regulatory protection, any incremental reductions in quality, or outright loss, of South Bay habitats or biota must be viewed as unacceptable.

Each of these five areas of concern is addressed in the subsections that follow. Prior to addressing the individual topical concerns identified above, the report first provides a regional perspective on the unique values and sensitivity of south San Diego Bay marine habitats and resources.

B. SOUTH SAN DIEGO BAY - A REGIONAL PERSPECTIVE

San Diego Bay is the largest semi-enclosed marine embayment located on the 900-mile stretch of coast between San Francisco Bay to the north and Scammon's Lagoon, in central Baja California, to the south. San Diego Bay is approximately 14 miles long and 2-1/2 miles across at its widest point. San Diego Bay is a center of trade, shipping, commercial fishing and recreation. Ecologically it is also considered one of the most important embayments of the California coast. San Diego Bay is a major spawning area for ocean and bay fish, and is a significant part of the Pacific flyway for annual migratory birds which use the bay for feed, nesting or resting.

South San Diego Bay is less developed than north or central San Diego Bay, and contains several thousand acres of shallow baywaters, some 600 acres of mudflats, approximately 200 acres of salt marsh, over 1,250 acres of salt ponds, and a riparian corridor along the Otay River. Seven state or federal endangered bird species, including Belding's Savannah sparrow (Passerculus sandwichensis beldingi), California brown pelican (Pelecanus occidentalis occidentalis), California least tern (Sterna albifrons browni), Light-footed clapper rail (Rallus longirostris levipes), Long-billed curlew (Numenius americanus), Peregine falcon (Falco peregrinus anatum), and Western snowy plover (Charadrius alexandrinus nivosus); the Eastern Pacific green/black sea turtle (Chelonia mydas agassizi); and one endangered and one rare plant species, Salt marsh bird's beak (Cordylanthus maritimus) and Palmer's frankenia (Frankenia palmeri), respectively, have all been found in south San Diego

Bay habitats. It is important to stress that all of these sensitive and endangered species occur most frequently, and sometimes exclusively, in south San Diego Bay habitats.

Over the past several years the highest numbers of nesting pairs of endangered California least terns in San Diego Bay have occurred at the Chula Vista Wildlife Reserve, immediately adjacent to the SDG&E plant site, and at the nearby saltworks and Sweetwater Marsh National Wildlife Refuge. The highest individual counts during 1988-89 seasonal surveys were also recorded at the Chula Vista Wildlife Reserve (MBA 1989, Vol. II, §9) (see list of references at end of this section for full citations).

The endangered Belding's Savannah sparrow occurs in all the remaining saltmarsh sites around south San Diego Bay. Highest numbers during 1988-89 seasonal surveys occurred on the Chula Vista Wildlife Reserve, outer edge of the saltworks, and the South Bay Marine Biology Study Area -- all locations impacted by the thermal plume from the South Bay power plant (MBA 1989, Vol. II, § 9).

The Light-footed clapper rail is one of the most endangered bird species in California. Only 177 pairs were recorded, statewide, in 1988, and five of these were recorded from the South Bay Marine Biology Study Area saltmarsh, located immediately across the Bay from the South Bay Power Plant (MBA 1989, Vol. II, § 9)..

The Western snowy plover, a sensitive species evidencing serious population declines, occurred in summer 1988 along the northern border of the saltworks adjacent to the present SDG&E power plant discharge channel. The endangered Long-billed curlew was noted from the same location throughout 1988-89 seasonal surveys (MBS 1989, Vol. II, § 9).

San Diego Bay has experienced major reductions in sensitive shallow-water habitats--saltmarsh, intertidal flats, and shallow (<6 feet below mean lower low water, MLLW) subtidal bay-bottom--over the past 130 years (see Exhibit A; MBA 1989). Further, what remains of these habitats is concentrated in South Bay, south of the Sweetwater River Flood Control Channel (see Exhibit B; MBA 1989). For example, intertidal saltmarsh in San Diego Bay declined from 2,674 acres in 1856 to 203 acres in 1984--a drop of 92 percent; and all 203 acres that remain are in South Bay. Intertidal sand and mudflats declined 81 percent (from 4,057 to 766 acres) over this same period, and 79 percent of what remains is in South Bay; shallow subtidal areas of bay-bottom declined 72 percent (from 6,807 to 1,928 acres), with 81 percent restricted to South Bay.

The special biological values of south San Diego Bay are also reflected in the distribution of eelgrass beds, widely recognized for their role as spawning/nursery areas and protective habitat for small fish. A September 1988 survey

confirmed 299 acres of eelgrass beds in San Diego Bay--some 191 acres of this, or 64 percent, are located in south San Diego Bay (MBA 1989). Historical data clearly document that declines in eelgrass cover result in parallel declines in fish, shellfish, and birds that are dependent upon the eelgrass (Thayer, et al. 1984).

The recently prepared Batiquitos Lagoon Enhancement Plan EIR/EIS (City of Carlsbad 1990) provides approximate figures for total acreages of saltmarsh and tidal shallow-water habitats along the San Diego County coast. Of county totals of 2,080 and 1,020 acres for saltmarsh and mudflat shallows, respectively, some 12 and 75 percent, respectively, occur in south San Diego Bay. Recent National Marine Fisheries Service (NMFS) sponsored research suggests that the dramatic decline in Southern California halibut stocks might directly reflect declining nursery habitat in the region's shallow bays and estuaries.

Many of these same intertidal and shallow-water habitats critical to fish populations are also critical to migratory shorebirds and waterfowl. Ongoing surveys (1988-89) being conducted by the Point Reyes Bird Observatory indicate that south San Diego Bay hosts the largest concentrations of migratory shorebirds of any site within San Diego County (see Exhibit C) or northern Baja California.

In summary, any environmental changes or adverse biological impacts that may result from the proposed construction of the combined-cycle power plant at SDG&E's existing South Bay Power Plant site must be viewed in a regional context. South San Diego Bay contains a substantial proportion of the remaining examples of several critical and sensitive Southern California coastal resources--saltmarsh, intertidal and shallow-subtidal protected embayment habitats, eelgrass beds, fishery and shorebird habitats. Each of these resources has suffered very substantial historical declines, and what remains must be protected from further degradation.

C. BATHYMETRY AND SEDIMENTATION PROCESSES IN SOUTH SAN DIEGO BAY

1. Summary/Overview

Neither the present bathymetry of the bay-floor in south San Diego Bay, nor the sedimentation processes that result in shallowing of South Bay and reduction of its water volume, are well documented. As a result, it is impossible to accurately model and project how either present plant operations (cooling water intake/thermal plume discharge), or future, additional plant operations will impact the physical environment and thus the biological communities of south San Diego Bay.

2. Analysis

a. Environmental Setting

The most recently available navigation charts for south San Diego Bay were published in 1984 and reflect minimum water depths for boating rather than true bay-floor bathymetry. Lack of accurate and more up-to-date depth data has two significant consequences. First, it is impossible to accurately quantify the acreages of specific water-depth-related habitats present within South Bay. Second, it is impossible to accurately quantify the volume of water contained within South Bay under various tidal conditions.

This latter information is critical to assessing the impact of the present--and proposed--power plant cooling water system and thermal plume on south San Diego Bay. For example, these impacts cannot be analyzed in the absence of information on the proportion of total South Bay water volume that is presently cycled through the power plant, under a given set of tidal and plant operating conditions.

Comparison of recent (1988) low-altitude aerial photographs of south San Diego Bay with maps in SDG&E reports indicates substantial changes in intertidal mudflat distribution over the past 20 years. Annual receiving waters monitoring reports for SDG&E's NPDES permit also refer to changing South Bay sediment distributions, possibly due to runoff from major flooding events in the late 1970s and early 1980s. A recent eelgrass reestablishment site adjacent to the SDG&E intake channel was unexpectedly buried by several inches of sediment (Merkel 1990). These data all indicate a much more dynamic sedimentation regime than has been indicated by SDG&E in the NOI.

These issues all relate to sedimentation processes and possible rates of deposition in South Bay. They are important because continuing sedimentation causes shallowing of the bay and, consequently, a reduction in the total volume of water in South Bay. As noted above, the relationship of power plant cooling water/thermal plume behavior to the total water volume (under given tidal and plant operating conditions) will influence the overall impacts of the thermal plume on the marine habitats and organisms of south San Diego Bay.

Analyses going back to the 1979-80 period, or even earlier in the early 1970s, may now be both incorrect and inappropriate. Accurate, updated information is needed before the question of plume impacts can be adequately addressed--and indeed before the physical oceanography of south San Diego Bay can be accurately modeled.

b. Potentially Significant Adverse Impacts

To the extent that the South Bay has shallowed and its total water volume has declined, impacts of the present flow-through cooling system and thermal plume will be greater and more significant than previously described in the 1980, 316(b) demonstration studies.

Since both the proposed combined-cycle and augmentation projects will each result in major increases to both water intake and thermal plume discharges, these potential impacts cannot be adequately modeled without better bathymetry data. Impact projects, based on presently available but inaccurate data, will substantially underestimate true impacts of the new plant(s). Clearly there is a need for an accurate, updated bathymetric survey of South San Diego Bay. This will provide a baseline for all tidal and hydrological modeling of physical conditions in South Bay, including rates of tidal flushing and exchange, and the potential behavior of the power plant thermal plume under alternative development scenarios.

c. Need for Additional Data

Development of two new data bases can provide the information needed to solve the potential concerns noted above. First, an accurate, detailed, bathymetric survey (one-foot contour interval) must be conducted of the entire South Bay. This will provide depth and volume data for necessary modeling efforts. These same data will also provide a more adequate assessment of present biological habitat distributions within south San Diego Bay.

Second, detailed comparisons need to be made between the new bathymetric data set and previously available data. This would permit a quantitative assessment of sedimentary infilling in the South Bay and of rates of sedimentation. This is critical to assessing future changes that can be expected to occur in the South Bay as a result of sediment input.

In this case data collection and analysis will serve to identify appropriate mitigation measures to solve the problems and concerns noted above.

The following information also is necessary to an adequate assessment of the impacts of the proposed cooling water intake, thermal plume discharge, and plant operation:

(1) Hydrological data regarding the increased sedimentation potential created from the construction of additional transmission facilities, plus a description of the type of construction techniques that will be used to build the new facilities and the mitigation measures that will be implemented to reduce adverse impacts on wetland areas.

(2) A description of when the present intake and outflow channels were constructed, their original widths, depths, and specific bathymetry, how these specific characteristics have changed from initial power plant operation to the present, how frequently depth surveys have been conducted, and what specific quantitative bathymetric information SDG&E has used to confirm that no significant sedimentation has occurred within south San Diego Bay over the past 20 years, including all tests, reports, and other supporting data.

(3) A description of the effects that the present thermal plume has on flocculation processes and settlement rates of fine-grained sediments in south San Diego Bay, and how these effects will change if the thermal plume is increased in temperature, total area, and persistence as proposed for both the combined-cycle project alone and also in combination with the augmentation project. In addition, information is needed regarding how the enlarged thermal plume will affect water turbidity in south San Diego Bay--whether through changes in suspended particulate matter or in plankton concentrations.

(4) A description of how the bathymetry of south San Diego Bay has changed during the past few decades and how the evolution of the bed topography will be affected by the addition of both the combined-cycle project alone and also in combination with the augmentation project, describing in particular how deposition or erosion will affect circulation.

D. CHEMICAL/TOXIC POLLUTION OF SOUTH SAN DIEGO BAY

1. Summary/Overview

A wide range of chemicals and potentially toxic substances are used during routine power plant operations and, in many cases, are stored onsite. There are numerous different transfer pathways--both from routine operating procedures and from unplanned events, such as accidental spills, floods, or other mishaps--that could carry these potentially toxic substances into south San Diego Bay.

The data needed to assess the real potential for Bay pollution, possible impacts to local plants and animals, and the adequacy of proposed mitigation measures, are all incomplete. This precludes accurate risk assessment for both present plant operations and construction of the proposed combined-cycle plant.

2. Analysis

a. Environmental Setting

There is a broad-ranging potential for a wide variety of chemicals and possibly toxic or hazardous substances, present on the power plant site and/or used during plant operations, to enter the sensitive aquatic habitats of adjacent south San Diego

Bay.[1] Development of the proposed combined-cycle facility and augmentation of the existing generating facilities would each result in significant incremental increases in the presence of potential pollutants onsite. Without appropriate mitigating measures, there would also be a significant incremental increase in the risk of accidental spills and possibly pollution of the adjacent Bay.

If pollutants or toxic substances reach the Bay, they may directly impact the physical environment through association with, or burial within, bay sediments. They may directly impact some of the plants and animals that utilize adjacent Bay habitats. In extreme cases, such pollutant impacts might be lethal. In other cases, less obvious effects might include reduced growth rates, disrupted reproductive cycles, or shortened life-spans. Additional indirect impacts to local or bay-wide biological populations could occur through concentration of pollutants due to food-chain transfer and biomagnification.

Several quite different pathways are available for transfer of potential pollutants from the power plant site into south San Diego Bay. These include the following:

(1) Transfer through surficial runoff:

- Plant drainage and surface runoff.
- Runoff during serious flooding events.
- Accidental breaching or overtopping of containment dikes.
- Release of hazardous materials into power plant "waste stream".
- Accidental spills of fuel oil, including pipeline ruptures.

(2) Release of subsurface contaminants:

- During excavation of contaminated soils for plant construction.
- Through release of contaminated groundwater during plant construction.
- Contained within construction dewatering effluent.

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[1] Section VI, Hazardous Materials and Fire Safety, discusses in detail the full spectrum of potential exposures to hazardous materials from the proposed project.

(3) Through release of airborne pollutants:

For further discussion of the potentially significant impacts of airborne releases of hazardous materials, see Section VI, Hazardous Materials and Fire Safety.

(4) Transfer through the power plant cooling water stream:

- Shock chlorination impacts to minimize biofouling buildup.
- Addition of other chemicals, lubricants and cleaners, either deliberately or accidentally, during "normal plant operations".
- Special conditions that pertain during plant startup and cleanout procedures.
- Addition of materials to the cooling water stream due to dissolution, absorption and chelation, as the water flows through the plant.

Insufficient information is provided in the NOI to evaluate the hydrologic potential for transporting pollutants. For example, it is unclear whether dewatering is undertaken on a routine basis on the site to reduce groundwater pressures on the foundation of existing structures. If so, data on the intrusion of saline groundwater and the method of disposing of the groundwater should be documented.

The proposed plant will require dewatering during construction, and this may lead to a change of groundwater salinity and vegetation patterns in the area. Temporary drawdown of the water table may dry the root zone of existing vegetation, resulting in extensive damage unless preventive measures are taken.

The possibility of flooding from Telegraph Canyon Creek or failure of the peripheral embankment pose potential flood hazards. Section 9.2.3.2 of the NOI states that since the site has not been affected by flooding in the past, the future risk is acceptable. This conclusion is irrational, since flood control systems are usually designed to provide protection against at least the 100-year flood, and a flood of this magnitude has not been experienced since the construction of the existing plant.

SDG&E further states, in Section 9.3.3.2.1 of the NOI, that the flood hazard will be eliminated by enlarging the existing channel to convey the 100-year flood event. Despite the channelization of Telegraph Creek, portions of the South Bay site may still be within a flood hazard area due to tidal influence. Whether or not the 100-year flood is eliminated, there still may be a significant pollution risk in the event of buildings or the site being flooded. If contamination of flood water is a possibility, additional flood protection in excess of the 100-

year flood event may be considered and enhancements to the structural integrity of the embankments warranted. In addition, elimination of flood hazards through drainage channel widening might result in significant sensitive habitat losses. This issue needs to be addressed.

Very little information is available for the drainage channel located at the northern boundary of the site. The potential for bank erosion along this exposed section of embankment should be studied. Section V, Geology and Soils, discusses erosion issues and impacts in detail. Information on the internal drainage system at the site should be provided, and if the runoff or subsurface water is polluted, steps should be taken to treat the water prior to discharge to the South Bay.

Responses from SDG&E to the Data Requests regarding flood control often appear to conflict with statements in the NOI. For example, the response to California Energy Commission Data Request number 145 gives the 100-year flood elevation as 10 feet NGVD and the site elevation as 10 feet NGVD. Section 9.2.3.2 of the NOI gives the flood elevation as 14 feet. NGVD and the site elevation as 13 feet. NGVD.

While limited information on potential pollutants and toxics presently used or stored onsite is available in the NOI and SDG&E's Data Responses, it is generally inadequate to determine either present or potential future environmental impacts. More specific details are needed on the identity and potential concentrations of any possible onsite "pollutants;" the amounts used, released or subject to accidental spills; and perhaps more importantly, documented studies of the potential lethal and sub-lethal (i.e., acute and chronic) effects that any of these substances might have on the plans and animals found in South Bay habitats.

Environmental concerns regarding toxic contamination in marine and estuarine habitats have changed substantially over the past 20 years. An initial concern was sewage disposal with its attendant problems of nutrient enrichment, algal blooms, excessive oxygen depletion and fish kills. Subsequently, agricultural pesticides (especially DDT and its derivatives) and heavy metals were of concern. Within the last few years, concern has been expressed over whole new "families" of contaminants: chlorinated hydrocarbons, such as PCB's, toxic components of petroleum hydrocarbons, and related PAH's, and organometals.

The Mussel Watch Program and NOA's Status and Trends Program have confirmed that these contaminants occur in San Diego Bay, and a recent human health risk assessment study (San Diego Bay Symposium, June 1990) confirmed that fish with pollution-related diseases such as fin rot and liver tumors have been collected from the Bay.

Many of these issues were not of concern during previous studies of the South Bay Power Plant and all of its possible impacts on sensitive marine bay habitats. Even now, sampling for many of these newer toxic substances of concern in San Diego Bay is minimal and virtually no data are available for South Bay sites.

b. Potentially Significant Adverse Impacts.

The data available to date are neither adequate to document existing pollutant/toxics-related impacts to south San Diego Bay biology, nor to access how these risks might increase if the new combined-cycle and augmentation projects are constructed. While critical data are still lacking, the greatest risks of power plant related pollution events impacting south San Diego Bay probably include: 91) accidental spills of hazardous materials, including fuel oil, on or near the power plant site; (2) possible contamination of bay waters during temporary construction dewatering; and (3) chemical-related impacts due to normal cooling water flows through the power plan.

Should a fuel oil spill occur and lead to contamination in South Bay, disastrous biological consequences could result. The saltmarsh habitats of South Bay are particularly vulnerable to longterm impacts from oil pollution and it could take years, even decades, for these impacts to be neutralized. Since waterbird use of all types is especially high in South Bay, a spill could also result in serious bird losses, including to the endangered species associated with saltmarsh habitats (i.e., Light-footed Clapper Rail, Beldings Savannah Sparrow).

A principal concern with dewatering effluent would be any possible contaminant content that might impact the plants, plankton, benthic invertebrates or fish of South Bay. As already noted, some impacts might be fatal, while others might reduce life spans or breeding success, thus changing regional species populations in more subtle ways. Possible toxic contaminant introduction during the power plant flow-through cooling process raises similar concerns.

To date, no field sampling or testing program has addressed these issues in South San Diego Bay, and potentially significant impacts from the South Bay Power Plant remain unknown.

c. Mitigation Measures

SDG&E has proposed a variety of mitigation measures to reduce the amounts of potentially toxic materials used or stored onsite, as well as retaining dikes and other features to reduce the risk of accidentally spilled materials, or contaminated runoff, from reaching south San Diego Bay. Since the data

regarding potential pollutants remains incomplete, it is not yet possible to access the adequacy of the mitigation measures being proposed.

d. Need for Additional Data

The following information is needed to adequately assess pollution related effects on the proposed project. Additional requests for data regarding potentially adverse impacts from hazardous materials can be found in Section VI, Hazardous Materials and Fire Safety.

(1) A description of how industrial and hazardous wastes will be handled and disposed of on and off site should be provided in order to comply with Chula Vista industrial waste discharge regulations, specifically Chapter 13.28 of the Chula Vista Municipal Code, including a description of the type of sewage system proposed to handle the waste stream from both the combined-cycle project alone and also in combination with the augmentation project, and an indication of the expected volumes and types of wastes that will be produced. This should include details on the specific types of pretreatment and other waste treatment that will be conducted.

(2) A description of how the proposed facilities will comply with the City of Chula Vista's NPDES permit requirements for surface water runoff into San Diego Bay, including method of detention, monitoring of water quality and quantity, and pretreatment and other treatment of surface runoff should be provided (see Order No. 90-42/NPDES No. CA 0108758: Waste Discharge Requirements for Stormwater and Urban Runoff from the County of San Diego, the Incorporated Cities of San Diego County, and the San Diego Unified Port District).

(3) A description of any impacts associated with the Telegraph Canyon Creek flood control project, including changes in the 100-year flood plain (including a site plan, as-built drawings, design flood profiles and discharges relating to the channel improvements), a description of any adjustments to FEMA flood plain boundaries that will be required, and a description and map of the portions of the South Bay site that are still within the 100-year flood plain.

(4) A description of the adequacy of the existing plant site drainage system and any plans to cure deficiencies and inconsistencies with current LORS.

(5) A statement of whether process waters in the existing facility have been tested for their ability to pick up metals or other chemical compounds from the generation process, including the results of all tests, studies, reports, and other data.

(6) A statement of whether the cooling water from the South Bay plant is mixed with any other industrial waters prior to discharge to the bay, including all studies, tests, reports, and

other data describing the chemical composition of the cooling water and process water.

(7) A diagram showing the proposed location for the "diked retention area" where construction wastewaters will be retained, and a description of the precautions that will be undertaken to preclude any of these wastewaters from spilling, seeping or flowing into San Diego Bay.

(8) A description of the water sampling and analytical programs that are and will be performed to test the water quality of flow-through cooling water leaving the plant. A list of all materials, and their approximate concentrations, that are added to cooling waters as they pass through the power plant, such as direct additives and products added through dissolution, chemical reactions, cleaning or hydraulic fluids, and a description of the documented effects of these substances on species similar to those found in South San Diego Bay. Information regarding whether bioassay and/or toxicological tests have been performed on any local organisms using effluents from the south San Diego Bay Power Plant and, if so, the test results. A description of how the above issues will change with addition of both the combined-cycle project alone and in combination with the augmentation project, and supporting documentation.

e. Likelihood of Compliance with Laws, Ordinances, Regulations, and Standards (LORS)

Chapter 18.54 of the Chula Vista Municipal Code, the City's Floodplain Regulations, would apply to the portions of the SDG&E site within a flood hazard area. A building permit is required for any construction, improvements, enlargement, or other similar modification in a flood hazard area. CVMC § 18.54.040(A). The following standards apply to any such construction: (1) the site must have adequate drainage (§ 18.54.040(C)); (2) No change is allowed that would increase flood levels (§ 18.54.040(H)); (3) all new water and sewer lines must be designed to eliminate or minimize infiltration from or discharge into floodwaters (§ 18.54.080); and (4) all nonresidential structures must be built one-foot above the regulatory flood elevation (§ 18.54.060(C)). The City Engineer must review all land development (grading) permits in the coastal zone for compliance with the Floodplain Regulations. CVMC § 18.54.040(I).

E. TIDAL FLUSHING AND PLUME BEHAVIOR IN SOUTH SAN DIEGO BAY

1. Summary/Overview

The extent and variability of the thermal plume under different tidal and wind conditions entail some of the most significant potential adverse impacts of the proposed plant on South San Diego Bay.

Intensive studies were undertaken by SDG&E in 1972-73 and 1980, and a field monitoring program has been implemented. However, it is necessary to show that the hydrologic conditions have not altered since 1972 and whether this data is valid of predictions in 1990. Additional monitoring stations further from the outfall channel would provide verification of the location of the 4°F differential temperature contour and the influence of the thermal plume in the intermediate and far field.

When the existing operating conditions have been verified and approved by the Regional Water Quality Control Board, it will be possible to make predictions of the behavior of the increased thermal discharge. The characteristics of the thermal plume and the influence of the circulation patterns on tidal flushing can be evaluated by analytical methods, mathematical models, or the physical model of San Diego Bay. The precise methodology adopted by SDG&E should be provided.

2. Analysis

a. Environmental Setting

The hydrodynamic characteristics of San Diego Bay govern the mixing and circulation of waters adjacent to the South Bay Power Plant. Mixing processes determine the spatial and temporal variation of salinity, temperature, nutrients, and pollutants which influence the distribution of organisms that can exist at various locations in the South Bay. The mean detention or flushing time of the Bay gives an indication of the potential accumulation of pollutants or nutrients in a particular region. These concepts are important for the entire Bay and also for the exchange between wetlands and tributaries to the Bay. Section 9.3.3.2 of the NOI, and Ford and Chambers (1974) in the Thermal Distribution and Biological Structures for SDG&E show that tidal flushing is inefficient in San Diego Bay, except for the Outer Bay. Only limited data on tidal flushing of marshes and wetlands in the South Bay exist, and these have been studies independent of SDG&E.

The mixing processes in South Bay are caused by the wind, the tide, freshwater inflows, and the operation of the South Bay Power Plant cooling system. The current pattern established within San Diego Bay governs the mixing processes and are affected by the bathymetry (refer to Subsection C, Bathymetry and Sedimentation Processes in South San Diego Bay).

The natural mixing processes and circulation pattern have been modified by the existing power plant operation, and this has been partially documented in the mapping of the thermal plume between 1972-1973 by SDG&E and the Cooling Water Intake System 316(b) Demonstration by SDG&E (1980) for the California Regional Water Quality Control Board (RWQCB). The thermal plan arising from this demonstration has not been approved by RWQCB and will be reviewed in 1990. The existing thermal plume has

been monitored each summer (usually August) at a number of fixed stations in South San Diego Bay. The RWQCB will review the adequacy of the existing monitoring stations which are clustered in the near-shore region and area therefore unsuited for monitoring a larger plume or impacts on the periphery of the Bay. RWQCB will also decide whether significant demonstrated environmental impacts within the outlet channel need to be considered. At low water, the outlet channel is confined to a narrow channel adjacent to the jetty, whereas at higher water the plume could extend between the jetty and the south shoreline. If an exemption is to be applied, a precise definition of the outlet channel should be stated.

SDG&E presently maintains that the cooling water outflow channel (the discharge channel, which is identified in the Draft NPDES Permit as varying form 50 feet to 1,200 feet in width) is "a part of the Power Plant" and thus exempt from impact considerations. Whether or not this is appropriate from a RWQCB regulatory perspective remains to be confirmed during the RWQCB approval process. From the broader perspective of the biological values and sensitivity of South Bay marine habitats, such an exemption is clearly <u>not</u> appropriate, however. This discharge channel area incorporates many acres of prime biological shallow water and intertidal habitat. The warm-water discharge substantially reduces both species diversity and biomass of organisms living within this area, and probably also significantly impacts fish and bird populations. If the thermal plume is to increase in size, temperature, and permanence, as appears likely, then the magnitude of all of these impacts <u>both within and beyond</u> the discharge channel need to be quantified and documented.

It is important to establish the existing hydrodynamic characteristics of South San Diego Bay and the influence of the existing thermal plume and how it may have changed since 1973. From the information provided thus far, the City of Chula Vista believes that insufficient information is available to make an objective evaluation of the existing 1990 conditions.

b. <u>Potentially Significant Adverse Impacts</u>

The combined-cycle project would increase the maximum discharge through the cooling plant from 981 CFS to 1,281 cfs. To put this figure in perspective, if the Otay River were to discharge at this rate, it would create a channel 100 feet wide and 3 feet deep and flow at an average velocity of 4.2 feet per second. These figures do not take into account the additional increased discharge from the augmentation project. Furthermore, the total volume of water passing through the cooling system in one day is approximately 20% of the mean tidal prism for the entire South Bay. These figures suggest that the cooling plant exerts a very significant influence on the hydrodynamics of the South Bay, which may result in adverse biological impacts.

It is difficult to assess the change in conditions between the existing and proposed thermal plume from the information provided in the NOI.[2] A detailed analysis should be provided to justify the anticipated increase in thermal plume (Section 9.3.3.3 of the NOI), since the plume may be expected to be more persistent, larger and warmer. The flow would exhibit a more pronounced stratification, and the width of the plume would increase more rapidly than the existing condition. If the plume is larger, there will be an increase in temperature over a larger distance of shoreline, which affects sensitive mudflats, marshes, and wetlands. This may create a significant adverse impact on the biological resources (refer to Subsection F, on Biological Impacts of the Thermal Plume); therefore, the magnitude and period of temperature fluctuations at various points in the plume and along the South Bay shoreline must be evaluated. These fluctuations can be caused by diurnal tides, the variations in tidal action between spring and neap tides, storm winds, diurnal variations in the wind, variations in freshwater inflow, and the operation of the plant.

If the plume is warmer and covers a larger area, it is possible that the rate of evaporation will increase, and higher salinities could be observed in the South Bay during dry months. The effect of an increase in salinity on the biological resources should be evaluated.

The NOI (Section 9.3.3.1) states that the wave action in the shallow south San Diego Bay increases turbidity, which may exert an adverse effect on marine organisms. The increased plume may prolong periods of turbidity in areas adjacent to the inlet and outlet channels. The potential adverse biological impacts should be discounted during the detailed analysis phase of this project.

The larger plume increases the probability of recirculation through the cooling system. These potential adverse impacts should be studied further at this time in order to determine the full environmental impacts of the increased plume.

No mitigation measures are proposed by SDG&E in the NOI, since the Thermal Plan for operating the plant has not been approved formally by the RWQCB.

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[2] The stratification of the receiving waters in the region of the discharge requires clarification. Section 9.3.3.2.5.1.1 of the NOI, Existing Conditions, states that "Vertical water temperature profiles taken in conjunction with the surveys virtually always show a uniform temperature with depth." This appears to conflict with statements in the "South Bay Power Plant Cooling Water Intake System Demonstration," by SDG&E (December 1980). See, e.g., Section 5.3.2.2.4 of the latter study.

If the analyses recommended by the City of Chula Vista to establish existing conditions show that significant turbidity is created by the outfall, a more diffuse inlet or outlet could be developed.

If the thermal plume is found to be unacceptable for either the existing conditions or the proposed future plant, a thermal outfall discharging into the Pacific Ocean would be technically feasible, although the economic feasibility is unknown. This outfall would improve circulation and flushing at South San Diego Bay from the hydrodynamic viewpoint, but may result in undesirable biological ramifications. To avoid biological impacts within the Bay, the intake and outfall could both be located in the Pacific Ocean. These mitigation alternatives require further study.

Training berms may afford wetlands and marshes some protection and may warrant consideration if the thermal fluctuations are determined to be significant.

c. Need for Additional Data

Sufficient data should be provided to define the existing 1990 characteristics of the thermal plume over a range of tidal cycles. Additional monitoring stations should be established to provide data in sensitive regions along the shoreline of the Bay and in the far field where the 4°F differential temperature contour is likely to be located.

A physical or mathematical model validated by the field data should be used to evaluate the effect on circulation, flushing, and temperature distribution. The results of the model could be used to evaluate the effects on sediment transport, turbidity, salinity structure, retention time, and recirculation of cooling water adjacent to the inlet and outlet channels. The potential adverse biological impacts should be discounted during the detailed analysis phase of this project. Specifically, the data needed to assess the thermal plume impacts are as follows:

(1) Quantitative estimates describing the impact -- under the present regime in comparison to that being proposed for both the combined-cycle project alone and also in combination with the augmentation project -- that 1-foot of shoaling throughout south San Diego Bay would have on: a) the volume of water available over an average 24-hour tidal cycle for mixing and dispersion of the thermal plume; b) possible re-entrainment by the system's intake of cooling waters already released from the outflow channel; and c) the total area of the "4°^F differential temperature" region during average summer (August) and winter (January) conditions.

(2) Quantitative estimates for the efficiency of tidal flushing and replacement (i.e., the time period required for "local" bay water to be flushed out of San Diego Bay and completely replaced by "fresh" ocean water) for "parcels' of

water at each of the following locations: a) south of the Chula Vista Wildlife Reserve adjacent to the outflow channel; b) in the center of the bay, north of the Chula Vista Wildlife Reserve; c) immediately off the old Sweetwater River Channel; and d) immediately off Coronado Cays.

(3) A description of the exact methodology used to evaluate the effects of the increase in the thermal plume due to the proposed new facilities; specifically, whether a computer model, a physical model, or a combination of both was used to develop the conclusions in the NOI and the responses to data requests.

(a) If a computer model was developed or used for the study, a brief description of the model, including the mathematical formulation should be provided including a description of how the model was calibrated, which field measurements were used to validate the model, what assumptions were made in applying the model (for example, tidal conditions and freshwater inflows), how sensitive the model was to these assumptions, and for how many tidal cycles the model was run.

(b) If the physical model of San Diego Bay was used, all information documenting the study should be provided, including the assumptions used in the study (for example, tide conditions, freshwater flows, roughness).

(c) Data sets for the physical and numerical models, including bathymetric data, freshwater inflows, tidal conditions, wind and wave conditions, and the period of simulation should be provided.

(4) A description of: (a) the regions of South Bay which exhibit significant stratification and under what conditions; (b) the criterion used to define "significant" in this context; and (c) the likely effects of stratification on mixing, circulation, and biological resources should be provided.

(5) In order to evaluate the relative sizes of the plumes before and after the additional discharge from the combined-cycle project alone and also in combination with the augmentation project, comparative plots showing the existing and proposed plumes in the same hydrodynamic conditions should be provided. Information regarding how these differences vary at different times in the tidal cycle and from spring to neap tide should also be provided.

(6) A quantification of the effects of the warmer water from the thermal plume on evaporation and, hence, salinity in south San Diego Bay, including analyses and assumptions supporting the conclusions.

(7) Velocity plots comparing the existing and proposed hydrodynamic conditions should be provided in order to demonstrate how the circulation patterns in south San Diego Bay

are affected by the proposed increase in thermal discharge, both as a result of the combined-cycle project alone and also in combination with the augmentation project.

(8) A description of whether and for how long the increase in discharge velocities, both from the combined-cycle project alone and also in combination with the augmentation project, is likely to prolong turbid conditions in the Bay.

(9) A description of how far the thermal plume from both the combined-cycle project alone and also in combination with the augmentation project is likely to extend into tributaries of San Diego Bay, for example, the tidal reaches of the Otay River, whether this increase in temperature will change the vegetation pattern or aquatic resources in the channel, and what the nature and extent of such changes will be.

(10) An analysis of how ocean-warming El Nino events impact the South Bay water temperature regime at different seasons of the year, and a description of how such impacts/interactions will change with addition of both the combined-cycle project alone and also in combination with the augmentation project.

(11) The statements in the NOI regarding possible mitigation measures for thermal plume impacts are vague. SDG&E should describe its specific plans for reducing the temperature of the outflow plume and reducing the total amount of flow-through cooling waters. It should describe in quantitative terms the potential effects (on both water temperature and biology) of such proposals.

F. BIOLOGICAL IMPACTS OF THE THERMAL PLUME

1. Summary/Overview

Development of the proposed combined-cycle facility at the site of the existing South Bay Power Plant will result in substantial adverse biological impacts to south San Diego Bay species assemblages. Incremental increases in impingement and entrainment of larval and adult invertebrates and fish will result in substantially higher mortalities. A wide range of changes in the nature of the South Bay physical environment are also likely to have a broad range of adverse biological impacts.

To date, SDG&E has not provided adequate information to accurately assess the environmental changes and biological impacts that might be expected from plant expansion. Until the extent of these impacts has been accurately defined, it is not possible to propose adequate mitigation measures to address the inevitable impacts.

2. Analysis

a. Environmental Setting

South San Diego Bay, consisting principally of broad expanses of shallow-water and intertidal habitats, has already been substantially impacted by the cooling water system of the South Bay Power Plant. Indeed, it appears totally inappropriate that a major power plan should take its cooling water from the shallow interior end of a 14.5 mile-long enclosed bay. It would be much more preferable that the cooling water be directly recycled from the open ocean.

The present power plant cooling system has three major areas of adverse impact to Bay organisms: (a) direct mortality of organisms due to impingement on the water intake screens; (b) direct mortality due to entrainment through the power plant and resulting thermal shock; and (c) both lethal and non-lethal impacts due to the thermal plume as it exits the plant and spread across south San Diego Bay. These latter impacts are obviously most pronounced within the thermal discharge channel, which represents a significant portion of the available shallow-water habitat of south San Diego Bay, and abuts the extremely valuable habitats of both the South Bay salt ponds and the man-made Chula vista Wildlife Preserve. Studies of the biological resources of San Diego Bay (Macdonald, et al., 1989, South San Diego Bay Enhancement Plan, unpublished report prepared for the San Diego Unified Port District and the California Coastal Conservancy, 3 vols.) indicate that a number of birds utilize the San Diego area near the thermal plume outfall.

If the total flow passing through the enlarged power plant facilities is increased, as anticipated, then all three of the adverse impacts identified above would increase substantially. It is likely that this would have a serious adverse impact on the overall biology of south San Diego Bay; the habitats and many associated plants and animals typical of the South Bay area are widely regarded as both sensitive and scarce resources.

b. Potentially Significant Adverse Impacts

As described in the materials provided by SDG&E, both the combined-cycle facility and augmentation of the present generating systems will require substantial incremental increases in the volume of cooling water flowing through the proposed power plant facilities. This will result in a substantially larger thermal plume, which may also exhibit relatively higher water temperatures, over longer periods of time. These new plume characteristics may change the physical environment of south San Diego Bay in the following significant ways:

- Increase local current velocities.
- Result in redistribution of bay-bottom sediments.
- Prolong periods of increased water turbidity due to

sediment resuspension.

- Increase South Bay water temperatures.
- Prolong periods of exposure to increased water temperatures at a given location.
- Result in changes to evaporation rates and the local salinity regime.
- Increase the range of temperature extremes experienced at a given South Bay location.

Each of these physical changes has the potential for a wide range of impacts upon the large numbers of different species of plants, invertebrates, and forage fish that are known to inhabit south San Diego Bay (MBA 1989). As noted below, these various impacts to smaller bay organisms will be reflected "up the food chain" in impacts to larger fish and the wide variety of birds represented in South Bay.

Any redistribution of bottom sediments will result in changes to the species composition of the bottom-dwelling (benthic) organisms -- some species favoring coarser-grained sediments, others finer. Prolonged periods of turbidity are likely to negatively impact shallow-water eelgrass resources which depend on adequate light penetration to promote active photosynthesis and growth. Loss of eelgrass will reduce important protective habitat sought out by small fishes and also result in loss of eelgrass-related suite of benthic animals (various worms, clams, and snails, for example).

Under present thermal plume conditions in south San Diego Bay, the numbers of benthic species present and their total biomass (live body weight per unit area) changes along a gradient of increasing temperature from central San Diego Bay towards the cooling water discharge channel (see for example SDG&E receiving waters monitoring reports and MBA 1989). As the thermal plume changes with the new power plant facilities, so these responses of organisms to the more broadly distributed, warmer waters will also change.

Warmer waters have the potential to adversely affect the growth of some species. Critical spawning cycles, often keyed to light and water temperatures, may be impacts. Populations of smaller forage fish and intertidal mudflat invertebrates are likely to be negatively impacted by changes in plume characteristics. If these species are adversely impacted, then many of the water-related birds -- including several endangered species -- that use South Bay and feed upon these species, will suffer. For example, South San Diego Bay is one of the major coastal nesting sites on the west coast of North America for several species of terns and Black skimmer. These species, which nest during the months of March through August on the Western Salt evaporator ponds just south of the warm water discharge, require dependable populations of bay and inshore fish in order to raise their young. The proposed facility may adversely affect the ability of these birds to find adequate fish for their young due to the thermal discharge from both the

addition of the combined-cycle plant along and also in combination with the augmentation project.

The SDG&E report (December 1980, South Bay Power Plan, cooling water intake system demonstration, in accordance with section 316(b) Federal Water Pollution Control Act Amendment of 1972, prepared from California Regional Water Quality Control Board, San Diego, California) ("316b report") indicates on page 4-10, Table 4.3-1, that critical taxa for the South Bay Power Plant, Icthyoplankton and adult fin fish, indicate major food fishes for nesting terns are found in south San Diego Bay, particularly Anchoa compressa, A. delicantissima, Engaulis mordax, Atherinops affinis, and A. californiensis. An earlier study (Schaffner, Fred Charles Jr. 1982, Aspects of the reproductive ecology of the Elegant tern (Sterna elegans) at San Diego Bay. Master of Science Thesis, Biology Dept., San Diego State University, San Diego, California. 185 pp.) indicates that Engraulis, Anchoa, Atherinops, and Leuresthes made up from 87 to 98% of the food fish used by Elegant terns nesting in south San Diego Bay. The other species of terns, Caspian tern, Royal tern, Gull-billed tern, Forster's tern, and California least tern, and the Black skimmer feed on similar species of fish. The addition of the combined-cycle project alone and in combination with the augmentation project may have significant adverse impacts on these species and their critical food species.

Other potential adverse impacts from the proposed combined-cycle project include the inability to locate wetland restoration sites in South San Diego Bay. At present, several agencies have indicated an interest in restoring viable salt marsh wetlands at the following sites; along the Otay River; Emery Cove; the salt ponds adjacent to the Otay River; and expansion of the Chula Vista Wildlife reserve. The effects of the proposed project on the South Bay may eliminate these sites from further consideration.

Expansion of the thermal plume is likely to increase the frequency and significance of the shoreline impacts. Warmer waters may alter the ecology of intertidal flats and also impact the distribution, growth rates and establishment of algae, eelgrass and saltmarsh plants. These changes may, in turn, impact endangered bird species such as the Light-footed clapper rail and Belding's Savannah Sparrow that are highly dependent on saltmarsh habitats and their invertebrate food supplies.

Significant thermal impacts may also be noted to young-of-the-year California halibut, which already appear much less common in South habitats than would be expected (Kramer and Hunter, 1988). Obviously other fish species may be adversely impacted by proposed changes to thermal plume characteristics and increases in the total area of marine habitat permanently or intermittently effected by the plume.

In addition to the potential negative impacts that relate to warm-water discharges of the thermal plume, there will

be very significant increases in both impingement and entrainment mortality of plankton, invertebrate larvae, and juvenile fishes that will be trapped at the water intake system. Section 4.4.1 Impingement Impact, Table 4.4-1, Entrainment Impact Matrix, from SDG&E's 316(b) report indicate that the impingement and entrainment loss of fishes is likely to be insignificant. However, the 316(b) Demonstration performed in the late 1970's (SDG&E 1980) indicates that very large numbers of animals -- larvae, juveniles and adults -- die during the water intake and flow-through process. As the new power plant is added, the need for cooling water will increase, and these associated mortality rates will rise substantially.

3. Mitigation Measures

The materials provided by SDG&E to date do not include any extensive substantive discussion of mitigation measures to reduce the impacts noted above. The most obvious mitigation measure, though clearly a difficult and expensive one, would be to relocate the power plant cooling water intake and discharge on the open coast. Other measures, such as reducing the size and temperature differential of the thermal plume, do not appear to be in keeping with either the expansion of the present facilities or the construction of a new combined-cycle facility; thus, associated impacts could not be mitigated.

4. Need for Additional Data

The following information is needed to adequately assess potentially serious biological problems associated with the proposed combined-cycle facility.

(1) All tests, reports, studies, and other data should be provided to demonstrate whether there will be any adverse effects on the ability of the several species of terns and Black Skimmers that nest in south San Diego Bay to find adequate fish for their young due to the thermal discharge from both the addition of the combined-cycle plant alone and also in combination with the augmentation project.

(2) All tests, studies, reports, and other data should be provided to demonstrate whether there is likely to be any adverse effect on the various species of terns found in south San Diego Bay and their critical food species from both the addition of the combined-cycle project alone and also in combination with the augmentation project.

(3) A description of the potential impacts of the loss of fishes on endangered species of birds inhabiting south San Diego Bay due to the following: (a) addition of the combined-cycle project alone; (b) addition of the combined-cycle project in combination with the augmentation project; and (c) both projects together with the loss of fish from other causes, such as increased heavy metal pollution, pollution by marine boats, urban/industrial runoff.

(4) A description of any direct or indirect effects the new power plant facilities will have on the federally listed Light-footed clapper rail (Rallus longirostris levipes), which is known to historically inhabit the mouth of the Otay River.

(5) All tests, reports, studies, and other data should be provided to demonstrate whether there is any adverse impact on the following species: western grebe, snowy plover, brown pelican (federally listed), brat, surf scoter, willet, marbled godwit, red knot, western sandpiper, short-billed dowitcher, and Belding's Savannah sparrow (California listed as endangered), including a description of precisely how these species will be adversely affected by the addition of the combined-cycle project alone and also in combination with the augmentation project.

(6) Several local, state, and federal agencies are attempting to locate wetland restoration sites. Most of these sites are in the South Bay, as identified by Michael Brandman Associates (1989). Potential sites include, but are not limited to:

a. Expansion of the Chula Vista Wildlife Reserve
b. Sites along the Otay River
c. Emery Cove
d. Salt ponds adjacent to the Otay River

SDG&E should analyze the impacts of the proposed combined-cycle project on opportunities to restore viable salt marsh wetlands at the above sites, including all studies, reports and other supporting data.

(7) All published research studies available describing specific or potential impacts of increased water temperatures/thermal plumes on San Diego Bay species of saltmarsh plants, eelgrass and intertidal algae should be provided, as well as a description of the types of impacts that these studies indicate could occur to these sensitive habitats and species in south San Diego Bay from the addition of both the combined-cycle project alone and in combination with the augmentation project.

(8) Information should be provided, from San Diego Bay or elsewhere, describing what types of impacts both the existing and future thermal plumes -- from the addition of both the combined-cycle project alone and in combination with the augmentation project -- are likely to have on species growth rates, reproductive behavior and success, and species life expectancies. This information should relate the significance and magnitude of any such impacts to the level of temperature elevation experienced at inner (hotter) versus outer (less hot) regions of the thermal plume, and should specify the temperatures assumed.

(9) Taking into account the addition of both the combined-cycle project alone and in combination with the augmentation project, the following should be provided: a quantification of

the impacts of present and projected impingement and entrainment within the power plant cooling system upon young-of-the-year halibut; identification of the impacts that the existing and proposed thermal plume does/will have on various growth stages of halibut in south San Diego Bay; since halibut appear dependent on protected shallow-water habitats for their early growth and development, a description of the quantitative impact of the existing power plant as compared to the existing plus new plant facilities on Southern California halibut stocks; plus study references to substantiate the conclusions presented.

(10) The value of the information obtained from SDG&E's NPDES receiving waters monitoring studies is diminished due to: a) apparent taxonomic differences applied by different contractors performing the biological sampling; and b) no long-term summary of species population trends having been performed. Since these data represent the only long-term record of possible power plant thermal plume impacts, these two issues need to be addressed more adequately; therefore a summary table or explanation of taxonomic difference, any additional studies, reports, tests or other data, and a long-term summary of population trends should be provided.

(11) Updated information should be provided on the Green Sea Turtle population, its uses of south San Diego Bay habitats and how it may be impacted by proposed changes in the power plant thermal plume, taking into account the addition of both the combined-cycle project alone and also in combination with the augmentation project.

(12) Updated/current species lists for terrestrial plants, animals and birds.

(13) Identification and description of any potential, specific impacts on key bay species, taking into account changes due to the addition of both the combined-cycle project alone and also in combination with the augmentation project.

(14) The long-term history, colony size and reproductive success of the California least tern and Snowy plover at their nesting sites near the proposed project should be described, including a diagram showing their exact location(s) relative to existing site features and proposed construction.

(15) Quantitative data from south San Diego Bay regarding the fish species present should be provided in order to demonstrate whether or not fish populations have measurably changed over the past 20 years as a direct result of increasing power plant thermal plume impacts, including a description of the conclusions and results of these data, and the quantitative, statistical basis for drawing any such conclusions.