

## **C. Marine Biological Impact Reduction Plan**

**CAMBRIA COMMUNITY SERVICES DISTRICT  
PROPOSED DESALINATION FACILITY**

**REVISED MARINE BIOLOGICAL IMPACT REDUCTION PLAN**

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## **I. INTRODUCTION**

### **I.A OBJECTIVE OF THE REVISED MARINE BIOLOGICAL IMPACT REDUCTION PLAN**

The objective of the Revised Marine Biological Impact Reduction Plan (MBIRP) is to provide mitigation measures to avoid, reduce, or compensate for adverse environmental impacts to marine resources and habitats as a result of the construction and operation of the proposed Cambria Community Services District (CCSD) Desalination Facility. The plan provides regulatory agencies with specific information on the methods, equipment, and schedule for construction, oceanographic, and biological monitoring, and specific information on the methods to be used for future biological and water quality monitoring to assure compliance to state and federal environmental regulations.

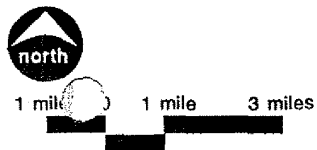
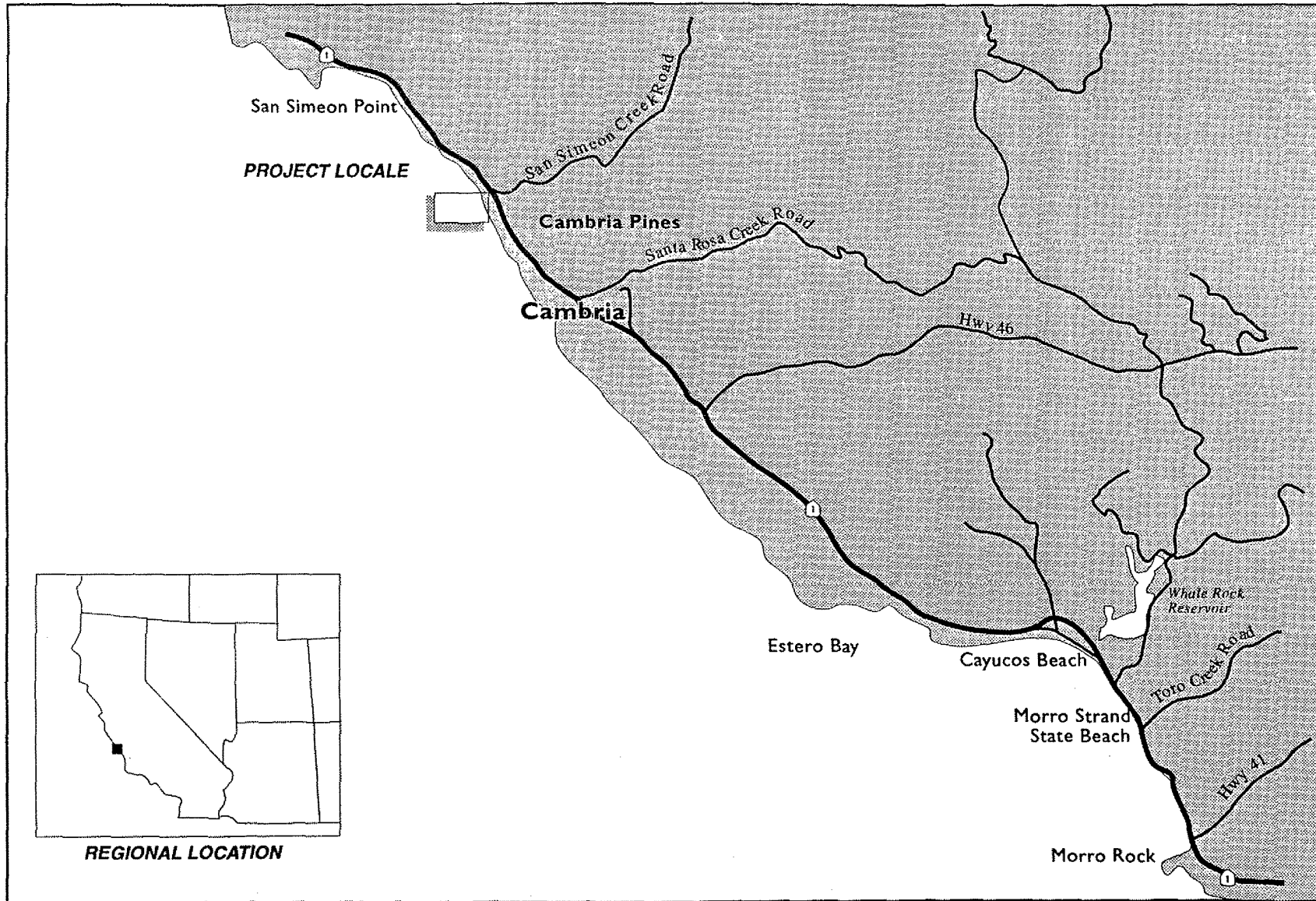
This document is a revision to the MBIRP that was submitted as part of the Final Environmental Impact Report (FEIR) for the Cambria Desalination Facility (State Clearinghouse # 94051042) prepared by Robert Bein, William Frost & Associates (1994) and incorporates updated engineering and design plans for the facility.

### **I.B PROJECT DESCRIPTION**

Cambria Community Services District (CCSD) proposes to construct and operate a reverse osmosis desalination plant and accompanying transmission lines, intake and disposal facilities to provide an reliable source of water for the CCSD's domestic water supply. The projected additional capacity of potable water that would be produced for the CCSD using desalination is 1.08 million gallons per day (mgd), and an additional capacity of 0.144 mgd for the San Simeon Community Services District (SSCSD). As part of the project, seawater intake and brine discharge structures are proposed to be constructed on the seafloor in the nearshore marine environment in the proximity of San Simeon Creek between the communities of Cambria and San Simeon (Exhibit 1).

The overall project location is shown on Exhibit 2. The feedwater (intake) and brine discharge facilities will be located directly offshore of San Simeon Creek. The feedwater intake structure will consist of a concrete base supporting two cylindrical screens. The brine discharge structure will consist of 100 feet of sealed pipeline followed by an additional 100 feet of a diffuser section with 21 diffuser jets.

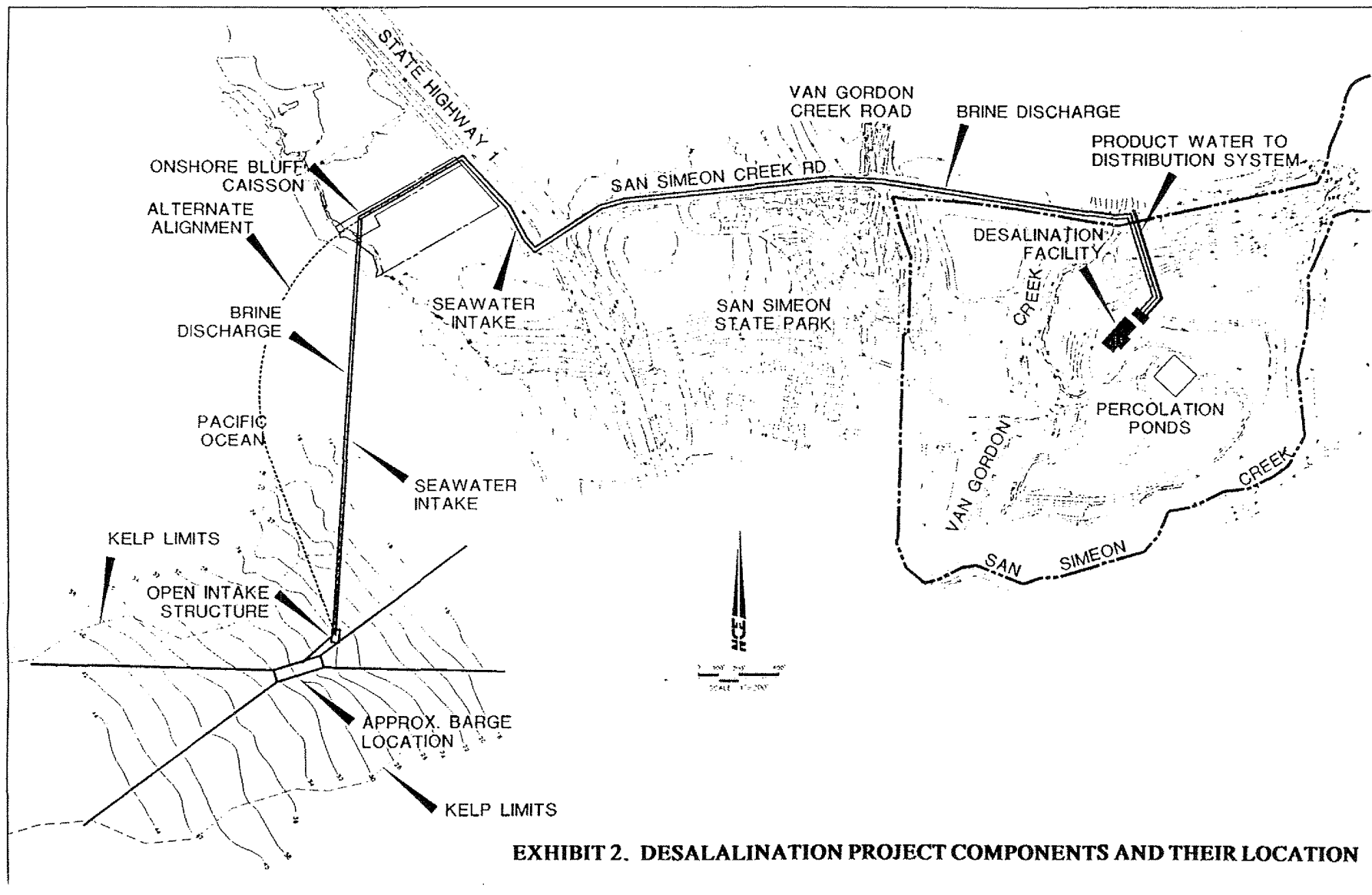
The intake structure will be connected to an onshore bluff caisson with two 10 inch pipes which are contained in an underground tunnel. The same tunnel pipe will house a separate 10 inch pipeline to carry the brine discharge water from shore to the diffuser section. With the exception of the intake structure and the diffuser pipe, the tunnel and the pipelines will be constructed beneath the surface of the ocean floor using horizontal directional drilling techniques (HDD).



October/November, 1994

**EXHIBIT ONE**  
**REGIONAL AND PROJECT LOCALE**  
 Cambria Community Services District Proposed Desalination Facility

Source: Coastal Resources Management



**EXHIBIT 2. DESALALINATION PROJECT COMPONENTS AND THEIR LOCATION**

The only disturbance to the seafloor employing this process is when the drilling head emerges to the surface of the seafloor.

The onshore bluff caisson will serve as the terminus for the offshore and onshore pipelines. It will also function as a pumping station which pumps seawater approximately 4,500 ft inland to the desalination plant. The bluff caisson will be semi-automated and buried, thus reducing physical and visual disturbance impacts on the bluff.

Piping from the bluff will consist of two 12 inch diameter pipes, one for intake water and one for brine reject water. The pipeline to the desalination facility will follow road right-of-way to minimize disturbance to native vegetation.

The desalination building will be a pre-manufactured structure designed to match the agricultural barn structures found in the Cambria area. The desalination equipment, consisting of filters, membranes, pumps, piping and controls, will be completely housed in a single unit. A separate building will be constructed of complementary architectural style to provide disinfection and storage of the potable water produced by the plant. The potable water will be plumbed into one of the District's main transmission lines.

The ocean outfall and its diffuser will transport the brine away from the intake structure and diffuse it into the surrounding seawater. The pipeline will extend offshore of San Simeon Creek to water depth of 26 ft MLLW where it rises to the ocean bottom at the intake structure. For a distance of 100 feet, the pipeline will be sealed and buried beneath the surface. Brine effluent will be discharged through a second 100 ft section of pipe, a 10-inch multiport diffuser pipe located at depths between 27 and 29 ft MLLW. The diffuser will have 21 ports, spaced at regular 1.52 m (5 ft) intervals on alternate sides. Each port will be mounted on a riser approximately 0.9 m (3 ft) off the seafloor, and oriented at a 45 degree angle above the horizontal. The port diameter will be 3.61 cm (1.42 in).

The brine salinity at the point of discharge will be between 54.4 and 65.6 ‰ depending upon the operation mode (Water Engineering & Modeling 1995). To bring the salinity down to 103 percent of ambient salinity (34 ppt), a dilution factor of 26:1 (26 parts ambient seawater to 1 part brine) will be required. Based upon prior toxicity studies of brine on marine animals, this level is considered to be safe for marine organisms. In addition to a salinity of approximately 60 ppt, the brine will contain small amounts of biodegradable polyacrylate antiscalant compound. These materials are approved by the EPA for drinking water treatment and are not harmful to marine organisms.

The open water intake will consist of two intake screens anchored on a 14 ft by 40 ft by 5 ft pre-cast concrete pad, connected to the feedwater pipes. The intake structure will also include other ancillary components, such as valves and a cleaning port. The height of the intake structure is approximately 6 feet, so that the intake feedwater will be collected from a depth of 20 ft. Each of two intake pipes will have a maximum intake rate of 1,000 gpm and an intake velocity of 0.2 ft/sec. Protective, 1/8 inch diameter slotted screens will prevent debris, fish, large invertebrates,

and algae from entering the intake pipes.

Based upon extensive oceanographic and biological data collected in the project area since August 1994 (Marine Resource Consultants, Inc. 1994 and 1995; Coastal Resources Management 1994, Coastal Resources Management [in progress]; Fugro West, Inc. 1995a and 1995b) and updated computer modeling simulations of the brine discharge characteristics (Water Engineering & Modeling 1995), the ocean outfall has been repositioned to be a minimum of 100 meters (328 ft) from the nearest kelp bed resources to avoid damages that could potentially occur as a result of the construction or operation of the desalination facilities.

### I.C. ENVIRONMENTAL SETTING

Several investigations have been undertaken since August 1994 to fill in scientific data gaps concerning the local oceanographic regime and marine biological habitats and communities. These studies include:

- Coastal Frontiers Corporation. 1994. *Bathymetric and geophysical survey. Proposed location, intake and outfall structures. Cambria Desalination Facility, Cambria California.* Appendix F-3 in: Robert Bein, William Frost & Associates. Final Environmental Impact Report. Cambria Desalination Facility. Prepared for: Coastal Resources Management, Corona del Mar, Ca. November 1994. 7 pp. plus maps. Initial geophysical and bathymetric surveys were conducted in the vicinity of the proposed seawater intake and brine discharge structures offshore of San Simeon Creek. This survey provided important information on seafloor habitat types (Coastal Frontiers Corporation, 1994 (Appendix F-3 of the FEIR).
- Coastal Resources Management 1995. *A Synopsis of Southern Sea Otter Issues and Mitigation Measures, Cambria Desalination Facility Project.* Prepared for Cambria Community Services District and the U.S. Army Corps of Engineers. June 30, 1995. 5 pp. This document was prepared as a working paper for a Section 7 Informal Consultation with the U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service held on July 7, 1995. Based upon the results of previous mitigation monitoring surveys of similar offshore construction projects, the ACOE and the USFWS concluded that neither a Section 7 Formal Endangered Species Consultation and construction period monitoring of sea otters was required for this project.
- Coastal Resources Management 1994. *Preconstruction Marine Biological Surveys. Cambria Community Services District Desalination Facility.* Appendix F-4 in Cambria Community Services District. 1994. Final Environmental Impact Report. Prepared by Robert Bein, William Frost & Associates. December 1994. Subtidal marine biological surveys were conducted in the vicinity of the proposed seawater intake and discharge structures and selected sites in kelp beds, reefs, and

sand bottom habitats upcoast and downcoast of the proposed project site. The results are described below.

- Coastal Resources Management. (in progress). *Spring 1995 Marine Biological Surveys*. Marine biological surveys of sand bottom and kelp bed habitats offshore of San Simeon Creek and an upcoast control area (Pico Creek) were conducted in May 1995. A final marine biological resources report will be prepared following a late-summer 1995 field survey. Additional kelp bed aerial survey photographic results for March and June 1995 are also included in the FEIR Addendum appendices; an additional aerial survey will be flown in mid August 1995. The November 1994 kelp bed areal photograph was included in Appendix F-4 of the FEIR.
- Coastal Resources Management and Marine Resource Consultants, Inc. 1995. *Cambria Community Services District Proposed Desalination Facility. Marine Geological Investigation: Jet-Probe Survey Offshore of San Simeon Creek, San Luis Obispo County, California*. Prepared for Cambria Community Services District. April 21, 1995. 6 pp. This investigation was undertaken to define the thickness of unconsolidated sediments in the area where the CCSD desalination plant intake and discharge structures are proposed to be sited. The geological investigation preceded a more intense coring analysis conducted in June 1995 by Fugro West, Inc. (see below).
- Fugro West, Inc. 1995a. *Subbottom Profile Survey. Cambria Desalination Plant Intake and Outfall Structures Proposed Installation Site Offshore of Cambria, California*. Prepared for Oceaneering Technologies, Inc. Ventura, California. March 1995. This study was conducted on January 29, 1995 to determine the sediment and rock characteristics for tunneling and burial of the proposed intake and discharge structures and to obtain an updated bathymetric profile of the project area since the last survey was conducted in October 1994.
- Fugro West, Inc. 1995b. *Geotechnical Engineering Report. Seawater Intake Structure and Pipeline. Cambria Community Services District Desalination Facility. Cambria, California*. Prepared for Oceaneering Technologies, Inc. Ventura, California. 22 pp plus appendices and maps. The purpose of the geotechnical evaluation was to explore and evaluate soil conditions within the sand channel offshore of San Simeon Creek. On the basis of their evaluation, Fugro West Inc. provided recommendations for the design of the seawater intake system. Soil samples were collected using boring and vibracoring techniques. In addition, new bathymetric data were collected and compared to the results of surveys conducted in October 1994 and January 1995. Sediments were deposited shoreward of the 30 ft contour between October 1994 and January 1995 and were partially removed between January 1995 and late June 1995. Other tasks completed were laboratory testing of selected soil samples; evaluations of local and

regional geological conditions; evaluating, comparing, and assessing historical and new field and laboratory test data; conducting engineering evaluations; and preparing the project report.

- Marine Resource Consultants. 1995. *Oceanographic Environment Near Cambria, San Luis Obispo County, California*. Prepared for Cambria Community Services District. August 9, 1995. 8 pp plus tables and figures. Oceanographic surveys were conducted in the project area for the period of August 1994 through July 1995. Data collected included time-series measurements of bottom currents, waves, and sea water temperatures, and periodic vertical profiles of salinity and temperature at several repetitive oceanographic stations in the sandy area offshore of San Simeon Creek. The essential results of that data collection program are:

(1). Physical oceanographic data collected offshore of San Simeon Creek between August 29, 1994 and August 1, 1995 indicated that current speeds were very weak and were generally within a range of 2 and 7 cm/sec (0.07 and 0.23 ft/sec); more than 73 % of the observations were under 5 cm/sec (0.16 ft/sec.) Current speeds up to 40 cm/sec (1.3 ft/sec) were recorded during heavy storm activity.

(2). Current flow is predominantly downcoast with more than 85% of all measurements directed into the southeast and southwest quadrants.

(3). The water column in the site area is generally well mixed and lacks persistent density stratification. Both storm-related events and seasonal variations in salinity were observed. Fresh water runoff from streams during heavy rainfall events that occurred in the data collection period affected the entire nearshore water body out to water depths of 100 ft.

(4). Sea water temperatures ranged from about 11-15 °C at the surface and about 9-13 °C at the seafloor. Salinity at the sea surface ranged from less than 30 psu (practical salinity units, which are equivalent to parts per thousand) during times of storm runoff to 33.7; bottom water salinity ranged from 32.9 to 33.8 psu. Lower temperature and higher salinity were observed at the site in the springtime and are indicative of upwelling conditions along the California coastline.

- Water Engineering & Modeling. 1995. *Cambria Desalination Plant Brine Discharge: Dilution Modeling*. Prepared for Coastal Resources Management and the Cambria Community Services District. August 2, 1995. 8 pp. Brine discharge computer modeling studies were conducted in July 1995 that integrated site-specific oceanographic study results of Marine Resource Consultants, Inc. (1995) and updated engineering designs for the desalination facility. Previous plume modeling studies were performed by Jones & Stokes (1994) and subsequently updated in a reply to Response to the Regional Water Quality Control

Board Comment #10 in the FEIR. The most important conclusions reached as a result of the studies conducted by Water Engineering & Modeling are:

- (1). The Zone of Initial Dilution (ZID) may be 14 meters wide (46 ft) under worst-case conditions. This zone would be within sand bottom habitat and not impinge upon reefs or kelp beds.
- (2). Modeling of the discharge brine suggested that above-ambient salinities (higher than 32.9 ‰ to 33.8 ‰) would be present at least 200 m (656 ft) away from the diffusers under worse-case conditions. Higher-than-ambient salinities would be present within the upcoast kelp bed should current reversals occur.

Despite the present of above-ambient salinities in the sand channel and nearby kelp beds, the range of salinities expected during worse-case operating conditions (101 % to 105 % of ambient salinity) is within the tolerance limits of giant kelp, sea urchins, sand dollars, benthic amphipods, and olive snails for fertilization, growth and development, and survival. This conclusion is based on laboratory bioassay toxicity tests conducted over periods of 2 to 10 days (ABA Consultants, Inc. 1992, Southern California Coastal Water Research Project 1993).

The reader is also referred to the FEIR, Section 5.4 (Marine Resources) which describes the general oceanographic and marine biological conditions for the central California coastal region, the Project Description of the FEIR Addendum, and Section 3.6 of the FEIR Addendum (Marine Resources) which includes an updated impact analysis on marine resources based upon revised engineering designs and additional site-specific oceanographic and marine biological data.

### **Marine Flora and Fauna**

**Rocky Intertidal.** Rocky intertidal organisms occupy exposed intertidal rocks on the headlands at Point Piedras Blancas, San Simeon Point, and on the headlands at the south end of Santa Rosa Creek Beach. Between these outcrops, sand beach overlays bedrock which is seasonally exposed during winter and buried during summer. These sand-influenced and less stable boulder habitats support fewer species and individuals than permanently exposed rocky habitat.

Rocky intertidal reconnaissance surveys of the Santa Rosa Creek rocky headlands were conducted in May 1994 (Jones & Stokes Inc. 1994). While an exhaustive study was not conducted, a total of 21 plant and animal taxa were identified. Fifteen were marine algae. The algal species composition was dominated by low-lying turf, filamentous algae, and small to large leafy forms such as green algae (*Ulva* and *Cladophora*), red algae (*Endocladia*, *Iridaea*, and *Gigartina*), and brown algae (*Egregia*). Lower tidal areas were colonized by surfgrasses (*Phyllospadix scouleri* and *P. torreyi*). Seven invertebrate taxa of cnidarians, polychaete worms, crustaceans, mollusks, and echinoderms were also present. Higher intertidal areas were covered with balanoid barnacles (*Balanus* sp.), and mid-tide habitat was dominated mussels (*Mytilus californianus*), gooseneck barnacles (*Pollicipes polymerus*), and anemones (*Anthopleura elegantissima* and *A. xanthogrammica*). Dominant motile invertebrates included limpets (*Acmaea*

*spp.*) and black turban snails (*Tegula funebris*). Seastars (*Pisaster ochraceus*) were also observed.

All of these species are common components of the central California intertidal community and they are found throughout the central California coast in areas such as Montana de Oro, Cayucos State Beach, Morro Strand State Beach, Atascadero State Beach, Morro Bay State Park (California Polytechnic State University San Luis Obispo 1986) and farther north in the Monterey Bay National Marine Sanctuary rocky intertidal habitat (NOAA 1992).

Between the rocky headlands, the intertidal habitat is a mixture of occasional rock outcrops and wide stretches of sandy beach. An example of this habitat type is the beach adjacent to San Simeon Creek mouth (San Simeon State Beach). This shoreline is a high energy, open coastal sandy beach that is seasonally breached from the flow of the San Simeon Creek. During the winter months when steep, short-period waves strike the beach and there is a high run off from the beach, the sand is generally moved offshore and deposited outside the surfzone to depths exceeding -30 ft MLLW (Fugro West, Inc., 1995). Sands are usually moved back on to the beach during the summer months under the influence of longer period waves. Beach sand is moved along the shoreline and primarily to the southeast by the dominant approach of waves and swells from the northwest.

**Sandy Intertidal.** No site-specific information on the sandy intertidal habitat of the project area is available. However, the sandy intertidal community is probably not much different than other high energy open coastal sandy beaches along the central California coast where there are data that describes this community. Organisms living in sandy beaches (burrowing species) are less abundant and diverse than those of rocky shores because of the seasonal nature of the shifting sands and extreme changes in temperatures over the course of a tidal cycle and seasons. Common beach fauna along the San Luis Obispo County coastline include beach hoppers (*Orchestoidea*=*Malorchestoidea californica*), isopods (*Exocirolina linguifrons*), and sand crabs (*Emerita analoga*) in the upper zones; polychaetes (*Nephtys californiensis* and *Euzonus mucronata*) and nemerteans in the mid-to-low tide zones; pismo clams (*Tivela stultorum*), purple olive snails (*Olivella biplicata*), sand crabs (*Blepharipoda*) and several other genera of polychaete worms (*Eteone*, *Dispio*, *Glycera*, *Hempipodus*, *Lumbrineris*, *Magalona*, and *Scolelepis*) and amphipod crustaceans (*Grandifoxus* and *Eohaustorius*) within the lower-intertidal to shallow-subtidal zones (Cal Poly San Luis Obispo 1986; Straughan (no date). These species are likely to occur in the local sandy beach habitat.

**Sandy and Hard Bottom Habitats.** The sandy intertidal low-tide terrace transitions into a shallow subtidal zone that is influenced by the seasonal flow of sediments from San Simeon Creek. Sediments consist of a mixture of sand, cobble, and bedrock to depths of approximately 20 ft below MLLW. This zone is not well defined, but observations of aerial photographs and the results of shallow subtidal diver mapping surveys indicate that there may be hard bottom habitat in this region.

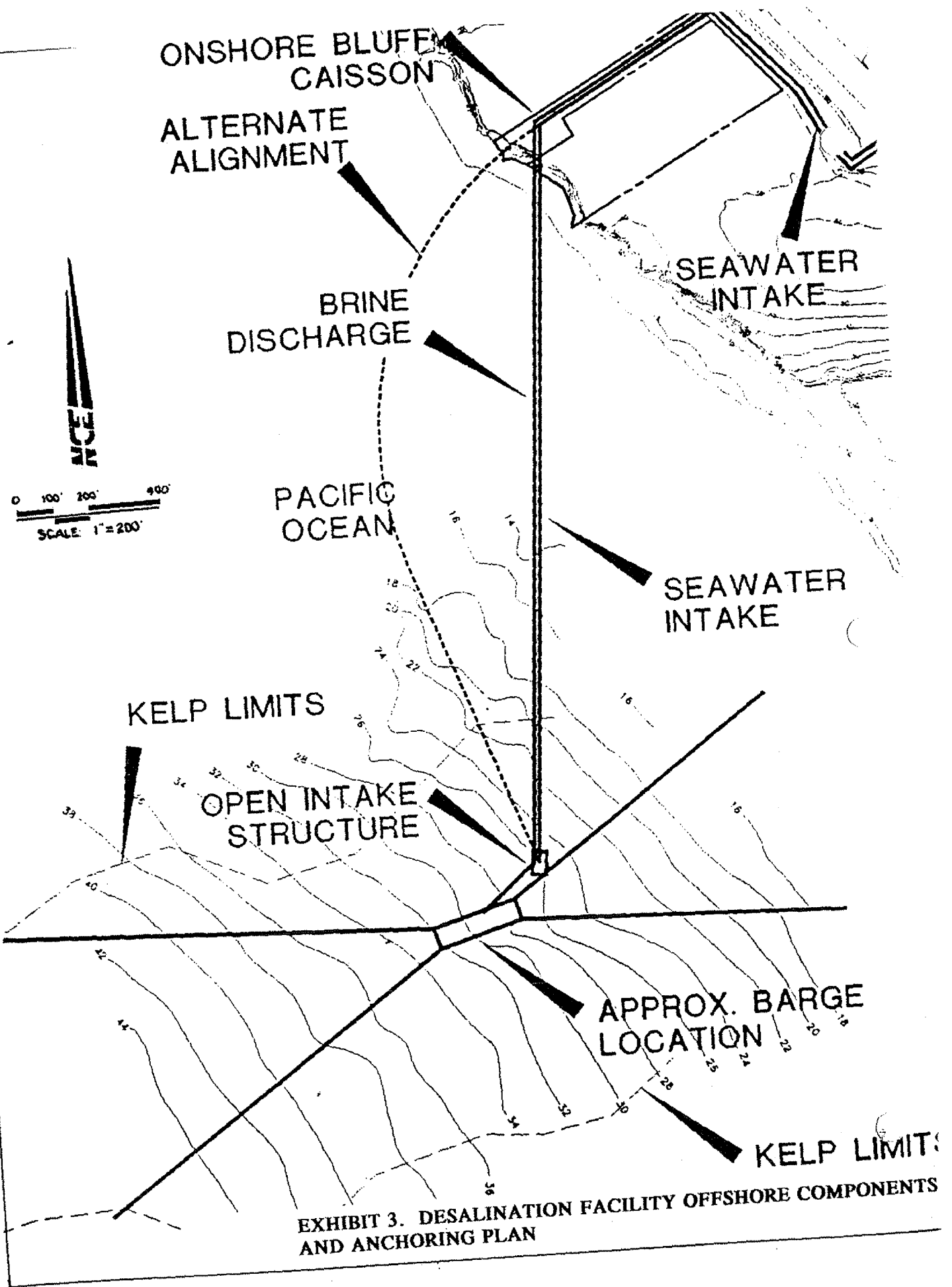


EXHIBIT 3. DESALINATION FACILITY OFFSHORE COMPONENTS AND ANCHORING PLAN

Seafloor mapping, subbottom profiling, and bathymetry surveys were conducted by Coastal Frontiers Corporation, Inc. (1994) and Fugro West, Inc. (1995a, 1995b) in the sand channel seaward of San Simeon Creek at depths between 24 and 62 ft (MLLW). Additional inshore habitat mapping surveys were conducted by Coastal Resources Management (1994) using divers. The purpose of these surveys was to provide a detailed seafloor habitat map in the area where the proposed desalination seawater intake and discharge structures may be located. The upper layer of seafloor in the channel is sand which is underlain by a deeper reflective horizon that is composed of alternating layers of unconsolidated sediments typical of relic streambed environments. The sand channel is evident between approximately -23 and -62 ft MLLW. Inshore of 23 ft, the seafloor is irregular and appears to transition from sand to a mixture of sand, cobble, boulder, and some high relief reef. The channel is fringed on the north and south by rock reef and kelp beds.

**Marine Biological Resources-Site Survey.** Coastal Resources Management (1994) conducted marine biological surveys in October and November 1994. Ninety-nine species of benthic marine plants, invertebrates, and fish were identified. Ten species of seabirds, the harbor seal, the California sea lion, and the southern sea otter were also present. Of the 99 species, the density and distribution of 64 species of plants, invertebrates, and fishes were quantified in subtidal diver surveys using band transect observational techniques.

The sand dwelling epifaunal community offshore of San Simeon Creek was composed of nine invertebrate and three fish species. The numerically dominant animals were the ornate tube worm *Diopatra ornata*, the tube building polychaete *Pista pacifica*, the hermit crab *Isocheles pilosus*, the sand dollar *Dendraster excentricus*, and the short-spined seastar *Pisaster brevispinus*. This species association was also present at the upcoast control located offshore of Pico Creek and at the downcoast control site located offshore of Santa Rosa Creek. The most abundant and most frequently occurring fish in the sand channel habitat was the Pacific sand dab *Citharichthys sordidus*. Single specimens of California halibut *Paralichthys californicus* and Pacific angel shark *Squatina californica* were also seen.

Species richness (numbers of species) was substantially higher in transects that were located in kelp bed habitat with a heterogeneous mixture of sand, cobble, and reef substrates. The giant kelp community was composed of subadult and adult plants; no new recruits or juveniles were observed. Giant kelp density generally increased with distance away from the San Simeon sand channel. Densities at upcoast and downcoast control areas (Pico Creek and Santa Rosa Creek) were slightly lower than kelp densities at the fringes of the San Simeon sand channel.

Numerically dominant understory macrophytes in the kelp bed and hard bottom habitats included the phaeophyte *Pterygophora californica* and several red algal taxa such as the crustose *Lithothamnion/Lithophyllum* complex, the articulated coralline algae *Bossiella* sp., and a complex of foliose upright species (*Botryoglossum farlowianum*, *Polyneura latissima*, *Rhodoglossum affinae*, and *Gigartina corymbifera*).

The invertebrate community within the kelp bed and hard bottom habitats included a wide range of sessile and motile macroinvertebrates. Reef invertebrate species composition was dominated by gastropods, echinoderms, and tunicates. However, densities were dominated by ornate tube worms colonizing the sands around reef bases, strawberry anemones (*Corynactis californica*) and orange cup corals (*Balanophyllia elegans*) that live on the vertical walls of mid-to-high relief reefs. The dominant reef predators were sea stars (*Pisaster brevispinus*, and *P. ochraceous*), and the bat star *Patiria miniata*.

The reef fish community included 14 species of which included several species of rockfish (*Sebastes* spp.). Other species included lingcod, cabezon, striped surfperch, painted greenling, pile perch, and sculpin.

Ten species of seabirds were identified; cormorants and grebes constituted the majority of individuals. Harbor seals, California sea lions, and southern sea otters were sighted near the San Simeon sand channel and kelp beds. No sea otters transited across or foraged in the sand channel during the autumn surveys although some were sighted moving from the upcoast kelp beds to the downcoast kelp beds in March 1995 (Coastal Resources Management, unpublished data). No clams or other food resources that might be utilized by sea otters were found in the sand channel. Other major forage food items for otters (such as abalone and urchins) were not present within the transects or the immediate areas located outside the limits of the transects.

## **II. CONSTRUCTION METHODS AND SCHEDULE**

### **II.A NEARSHORE CONSTRUCTION METHODS**

This section describes proposed construction methods for the open seawater intake and the brine outfall based on updated design plans for the project as described in the Addendum to the FEIR. Avoidance, reduction, and mitigation measures to reduce potential impacts to marine biological resources are discussed in Section III.

Changes in the design of the intake and outfall system since the submittal of the FEIR include:

- constructing the offshore components of the desalination facility in a construction window beginning as early as May 1997 rather than in August 1996;
- constructing an open water intake system instead of a buried infiltration gallery;
- installing the seawater piping systems for the intake and the discharge via a horizontal directional drilling method (HDD) instead of using microtunneling techniques; and

- relocating the brine outfall and diffuser system farther away from the upcoast kelp bed.

These design changes are incorporated into the revised MBIRP.

Construction activity will be limited to blufftop areas and the nearshore shallow marine areas. No construction activities will take place on the local beaches. All tunneling activity will be completed using the HDD process from the blufftop and from offshore using work barge platforms. These methods preclude direct impacts to sandy and rocky intertidal habitat and associated plant and animal communities. Therefore, the discussion of construction methods, associated potential impacts and mitigation measures focuses solely on the nearshore marine environment. "Nearshore", for purposes of this document, includes the waters below the Extreme Low Low Water Mark (-2.2 ft MLLW) to a depth of -65 ft (MLLW).

Nearshore construction involves the following major tasks over an expected 29 day period:

- conducting a initial mooring buoy and anchoring survey (1 day);
- mobilizing and transiting of dive barge and diving equipment (2 days);
- conducting dive barge support activities for directional drilling (7 days)
- mobilizing and transiting of the derrick barge (5 days);
- mooring the derrick barge (0.25 day);
- excavating sediments for the installation of intake structures (0.75 day);
- fusing and pulling casing and pipes (7 days);
- sealing casing annulus (0.5 day);
- installing the intakes and diffuser (1 day);
- installing auger anchors/piles (1.25 days);
- making templates/fabricating spools (1.25 days);
- installing spools (0.75 day);
- remove moorings (1.25 days);
- demobilizing derrick barge and transiting back to Long Beach (3 days);

- offloading excess excavation material (1 day); and
- disposing the excavated sand material (1 day).

## **II.B DETAILED DESCRIPTION OF CONSTRUCTION METHODS**

### **II.B.1 Anchoring Plans and Methods**

The anchoring and mooring program is designed to: provide safe and effective anchoring for the construction barge while minimizing the number of anchor handling operations; minimize seafloor area affected by anchor displacement setting and retrieving and; reduce the area affected by the anchor line sweep. Specifications of the vessels assisting in these processes are provided below.

#### **Conduct An Initial Mooring Buoy and Anchoring Survey**

A survey boat will mark the mooring locations in the sand channel (Exhibit 3). Moorings will be set in locations agreed upon by the Contractor's marine superintendent and the District's marine biologist. Four or five moorings are required for the construction barge. Two or three moorings are required for the material barges. Stockless anchors (16,000 lbs each) or Danforth anchors (30,000 lbs each) will be used in the operation. The stern of the barge will be oriented towards shore during all operations.

It is intended that all four of the construction barge moorings will be set in the sand channel to avoid damage to reefs or kelp beds. Depending on conditions at the time of construction, a fifth mooring may be set directly off the bow of the barge in the sand channel leading to the work site.

The two or three moorings required for the materials barges will be set offshore of the construction area and kelp beds. These moorings will not impact reefs or kelp bed habitats.

#### **Set Mooring Marker Buoy**

The position of this buoy will be agreed upon by the District's marine biologist and the contractor's marine superintendent. Standard marine anchoring practices will be followed for maximum and minimum scope and fleet angle of anchor wire.

The mooring will be carried into position suspended from the stern of the anchor boat. When in position, it will be lowered onto the seabed. A diver will check that it is properly located.

The anchor boat will carry the starboard bow anchor wire of the construction barge to the location of the anchor buoy. The bitter ends of each wire will be connected with a shackle. The anchor wire is kept off of the seabed during this operation. This anchor cable will extend

approximately 1,200 feet. This cable will sweep an arc of 5 degrees during construction. Chain will be used if the chain extends over low relief bedrock habitat along the periphery of the sand channel to the possibility of chafing which could damage the cable. Moorings will not be moved once they are set. The construction barge will move by adjustment of the four anchor winches.

Materials barges will tie up to the construction barge and will be moored out of the construction areas while waiting to be on-or-off loaded.

### **Remove Moorings and Anchors**

At the end of the construction period, the anchor boat will attach the bitter ends of the mooring pennant wire and barge anchor wire to its winch. The mooring will be lifted clear of the seabed to the level of the anchor boat's bottom and the barge reels in the anchor wire. Vessels will transit to-and-from the construction area through the sand channel between the northern and southern kelp beds.

## **II.B.2 Mobilization**

### **Mobilize Barges and Diving equipment**

Mobilizing the barges and diving equipment will require two days. Materials to be loaded will include the components for the intake system, outfall diffuser, wyes, valves, risers, caissons, and connector pipe. Fabrication will take place in Long Beach, CA. prior to project commencement, on the barge, or in place on the seabed. Beach construction or seabed laydown in other areas will not be required. The transit of the dive barge and materials barges to the construction site will take two days.

## **II.B.3 Construction Tasks**

### **Horizontal Directional Drilling (HDD)**

A tunnel will be drilled from the bluff caisson to the offshore intake and discharge facilities using the HDD process, which allows the drill rig operator (located on shore) to control the horizontal and vertical alignment of the drilling head to bore a tunnel under the ocean floor. The tunnel will be lined with a 30 inch diameter pipe which will house the two 10 inch pipelines and the single 10 inch brine reject water pipeline. Both the casing pipe and the main transport pipes will be constructed of non-toxic, non-corrosive pipeline.

The tunnel will be aligned in a straight line, connecting the onshore bluff caisson to the offshore facilities. Once the tunnel is bored to the proper size, the casing pipe and the three main internal will be pulled into the hole from the derrick barge. The pipelines will be connected to the bluff caisson. From the caisson at a diagonal distance of about 2,000 ft, the tunnel will curve upwards and daylight through the seafloor sediments. At this location, the intake and discharge junction structure will be constructed.

During the HDD process, the drill head will be lubricated with a dense, biodegradable non-toxic polymer drilling fluid (IDP-135) produced by Baroid Drilling Fluids, Inc. This product is a combination of two non-toxic, non-hazardous compounds: *Barazan* (xanthum gum) and *Impermex* (pregelatinized corn starch). Product safety and transportation information of these materials is provided in the appendices to the FEIR Addendum.

The HDD process will impact the project area seafloor at an approximate depth of -26 ft MLLW when the drilling head daylights where the intake and discharge junction structure will be located. Seafloor sediments will be disturbed from the effects of drilling disturbance and the introduction of the non-toxic drilling fluid into the surrounding sediments. Disturbances associated with the actual construction of the intake and discharge junction structure are discussed in Section 3.4.7 of the Addendum to the EIR.

#### **Install Intake Structure**

Divers will install the junction box at the terminus of the directional drilling tunnel and the open water intake structure. The concrete pad for the intake structure will be pre-manufactured on shore and barged to the site. To resist wave, current, and sediment transport forces, the base must be buried into the bottom sediments approximately six feet and will be constructed of a weight and size to insure stability during turbulent ocean conditions. Excavation will consist of about 125 yards for the pre-cast structure with an additional 105 yards of excavation necessary for laying back slopes adjacent to the pre-cast structure, for a total excavated volume of 240 yards. To secure the foundation and reduce the potential for scour, the over-excavated area adjoining the base will be backfilled with approximately 100 cubic yards of concrete. The concrete backfill will be poured into an elevation lower than the pre-cast section, so that native backfill can be used to re-establish existing bottom contours adjacent to the structure. Anchoring blocks attached to the intake structure, auger anchors, and fluidization techniques will secure and anchor the intake structure to the seafloor. For added safety, concrete piles may be driven in to support the pre-cast structure.

The bottom sediments will be excavated with a clam shell dredge operating from the crane barge. The 230 cubic yards of material will be placed on a barge, transported back to Long Beach, and disposed at an approved onshore disposal site.

#### **Lay 100 foot Outfall Diffuser and 100 foot Outfall Connector Pipe on the Seabed and Connect By Divers**

The preferred method of construction for the brine outfall uses a lay barge technique. A diver from the barge will connect the outfall line from the bluff tunnel to the junction box. From this bulkhead, a spool piece, riser, and elbows will be lifted into place and installed to get the outfall line up to the top of the junction box. The outfall pipeline will be laid upon the seafloor in sections along the planned route using the barge's crane. The diffuser sections will be installed in a similar manner. The diffuser will be 100 ft long with 21 jet ports spaced along its length.

A diver will connect the flanged sections of the pipeline and diffuser together. The gap between the inshore end of the diffuser pipeline and the junction box will be templated and a closing spool will be fabricated and installed. With the outfall pipeline and diffuser complete, divers will jet the pipeline below the natural grade and install auger anchors and pipe saddles. The recommended material for the outfall pipe and diffuser is high density polyethylene (HDPE) with a concrete weight coat. HDPE is easy to fabricate and install, is free from corrosion concerns, and is highly fault tolerant.

Jetting is a methods that fluidizes the seabed to allow an object such as the outfall pipeline or intake junction structure to sink. The liquification is effected by using a nozzle through which 500 to 800 gpm of water is forced at a pressure of 200 psi. The operation creates a hemispherical bubble of sand which will vary in size depending on the type of material and the pressure and water volume used. A typical bubble might be 30 feet in diameter. Once the flow is stopped, the sediment settles to its original state.

#### **II.B.4 Construction Equipment and Specifications (Source: Oceaneering Technologies, Inc. 1994)**

The following specifications for equipment are representative of each vessel type. The exact dimensions, etc. of vessels will not be known until specific vessels are chartered.

- **Survey Vessel**
  - Length: 76 ft
  - Beam: 25 ft
  - Draft: 5 ft
  - Engine: 500 hp
  
- **Anchor Vessel**
  - Length: 85 ft
  - Beam: 35 ft
  - Draft: 7 ft
  - Engine: 4,500 hp
  
- **Materials Tugs**
  - Length: 85 ft
  - Beam: 35 ft
  - Draft: 10 ft
  - Engine: 4,500 hp
  
- **Construction Barge**
  - Length: 250 ft
  - Beam: 80 ft
  - Draft: 10 ft
  - Crane: 100 tons

Bucket: 2 C.Y. and 9 C.Y  
Production  
Rate: 200 C.Y. per hour

- **Materials Barges**

Length: 200 ft  
Beam: 54 ft  
Draft: 10 ft (max)  
Capacity: 2,000 C.Y.

## **II.C CONSTRUCTION SCHEDULE**

The schedule for the installation of the seawater intake and discharge structures is given in Table 1. Construction activity will occur over a 29 day period with the projected construction window commencing no sooner than May 1, 1996 and ending no later than October 15, 1996. The first activities will be the mooring location surveys, followed by equipment and personnel mobilization and transit of the barges to the site. The moorings for the barges will be set and then the construction activities will commence. All work will be completed in 29 days precluding adverse weather conditions or equipment failure.

Cambria Community Services District will all notify all permitting agencies 10 days prior to the start of the construction and within 10 days of completion of those activities.

Pre-construction oceanographic, marine biological, and geophysical monitoring surveys were initiated in August 1994. These surveys will be conducted again just prior to construction (pre-construction geophysical surveys, kelp bed/hard bottom surveys, and sand channel epifaunal surveys). A marine biological monitor will be on-site during the construction period and will monitor mooring and anchor setting activities, vessel transits into and out of the project area, seafloor excavation, and be on-site to assist the construction manager relative to environmental issues.

Operational monitoring surveys (salinity, temperature, and conductivity) will be conducted for a period of two years after the completion of the post-construction surveys. Aerial surveys of kelp beds will be conducted quarterly for a period of two years. Additional marine biological surveys will be conducted twice yearly for a period of two years following the startup of the desalination facility if it is determined that substantial impacts related to the operation of the discharge have occurred.

## **II.D SCHEDULE EXTENSION**

Should it become necessary to revise the schedule while construction activities are occurring, the District will notify permitting agencies and contingencies for the extension can be formulated.





## II.E UPSET CONDITIONS

The potential for construction operations being upset through equipment failure, weather conditions, or an act of God is always a possibility. The District's contractors will design the construction operations to reduce those chances to the greatest extent possible. Backup equipment is available if necessary; offshore moorings will be available to vessels to rideout storm waves; recover vessels are available for retrieving damaged vessels; and the District can initiate cleanup operations in the event of an oil release from construction vessels. Vessels providing support or resupply equipment to the construction barge will transit through established corridors and will utilize preestablished offshore mooring facilities, thus minimizing impacts to surrounding habitats.

## III. IMPACT REDUCTION AND MITIGATION PLANS

### III.A GENERAL METHODS

#### III.A.1 Construction Scheduling to Avoid Adverse Impacts

Construction activities are scheduled so that:

- construction does not commence until the Revised Marine Biological Impact Reduction Plan has been approved by regulatory agencies;
- the construction period optimizes the use of equipment and personnel while maintaining safe working conditions, and minimizes the potential impacts to marine resources in the project; and
- all construction equipment, anchors, and mooring buoys will be removed upon completion of construction;

Uncontrollable or anticipated factors, such as prolong or recurrent periods of inclement weather may extend the proposed construction period beyond the anticipated 30 days.

### III.B TURBIDITY CONTROL PLAN

The local project area is subject to waters that vary from being slightly to highly turbid as a result of large waves, bottom surge, run off from San Simeon Creek, and plankton blooms. During current meter installation and retrieval and marine biological surveys conducted between August 29 and August 1, 1995, visibility was always less than 10 ft, and was usually between 3 and 5 ft in the sand channel. Between the period of March 15 to August 1, 1995, turbidity was measured to be between 0.6 to 32 NTUs (Coastal Resources Management, unpublished data).

### **III.B.1 Construction Activities That May Increase Turbidity**

Construction activity will incrementally add to locally turbid waters by resuspending sands, silts, and clays, which in turn, will be transported away from the site by tidal and nearshore currents. Construction practices that may increase turbidity include:

- installing and jetting the intake structure and junction box on the seafloor;
- installing and jetting the ocean outfall on the seafloor;
- setting and removing moorings;
- pulling pipelines and cable conduits across the seafloor;
- mixing approximately 1 barrel of biodegradable drilling fluid into the sediments as the drilling head emerges from the seafloor;
- excavating the seafloor;
- spilling sediments using a clamshell bucket; and
- spilling dredge spoils when filling barges.

### **III.B.2 Best Management Practices (BMPs) To Reduce Turbidity Through Engineering Or Construction Methods:**

- decreasing the total amount of time required for constructing the intake structure will reduce the amount of time waters will be turbid and sediments are disturbed.
- ensuring the efficiency of the clam shell dredge relative to optimal bucket size and number of buckets required to excavate the sediments.
- excavating an approximate area of 80 ft<sup>2</sup> of sediments that will be mixed with the biodegradable drilling fluids and taking them offsite along with the other excavated materials.

## **III.C MARINE RESOURCES ELEMENT**

### **III.C.1 Kelp Bed Resources**

Giant kelp (*Macrocystis pyrifera*) and bull kelp (*Nereocystis leutkeana*) occur in large beds along the project area coastline. The densities of these plants are high enough to form thick forests with surface canopies that can cover several hectares. Giant kelp is a perennial form, growing all year (North 1971; Foster and Schiel 1985). Bull kelp has a more northern distribution and

occurs along the Pacific Coast from Alaska to San Luis Obispo County (Dawson 1966). Unlike giant kelp, bull kelp rejuvenates itself annually. It grows on rocky substrates in nearshore waters between 18 ft and 50 ft.

Along the central California coastline, kelp beds are generally continuous between Cambria north and Ano Nuevo, excluding the area from Santa Cruz to Monterey where the sand substrate is unsuitable for holdfast attachment (NOAA 1992; Ecoscan 1989).

The California Department of Fish and Game identifies kelp beds with a numbering system for management purposes. Kelp Bed 208 extends between Point Estero to Von Helm Rock, off of South Cambria. Kelp Bed 209 extends upcoast of Kelp Bed 208 to San Simeon Point, and Kelp Bed 210 extends upcoast of Kelp Bed 209 to Point Piedras Blancas.

The proposed desalination intake and discharge structure site is located on sandy bottom habitat between stands of kelp in Kelp Bed 209. This gap appears to be permanent feature, based upon a comparison of historical aerial photographs from the site as well as comparisons of long-term kelp bed mapping data. Giant kelp is the dominant type form in Bed 209.

Giant kelp was present upcoast and downcoast of the sand channel in autumn 1994, while bull kelp was absent. Giant kelp canopy disappeared during the winter of 1995 but recently started to expand. These beds are not currently being commercially harvested by Kelco, because sufficient tonnage is present south of Point Conception (Dale Glantz, Kelco; pers comm).

### **III.C.1.a Impact Reduction and Mitigation Methods**

Exhibit 3 illustrates the potential anchoring plan for the project which will use a 4-point anchoring system. Construction activities that have a potential to affect kelp beds include:

- conducting geotechnical and marine biological surveys before, during, and after construction;
- conducting the anchor mooring survey;
- deploying the anchor from the anchor barge;
- retrieving the anchor at the completion of construction; and
- movement of the anchor cable and chain through a five-degree arc during construction to reposition the construction barge.

Based upon geotechnical, oceanographic, and biological studies conducted for the project in 1995, the anchoring plan has been relocated relative to the original plans described in the Draft MBIRP so that the anchors or anchor chains will not impinge upon the kelp beds.

However, there is a slight chance that the anchors might impinge upon low relief boulder habitat at the fringes of the sand channel.

All anchoring, mooring, and vessel transit activities will be carried out with the full cognizance of the kelp forest ecosystem. Work vessels other will not transit through kelp bed habitat. The existing sand channel will be used to transit to and from the project site. Vessel masters will be required to maintain vessels in established corridors in the sand channel and will be provided with charts showing the kelp beds and transit corridors. The vessel masters will also have listings of Loran-C and Lambert Zone 5 coordinates for endpoints and turning points of the corridors. In addition, lighted range markers will be erected on the shoreline to provide visual guidance for vessel operates to allow them to stay within the prescribed corridors.

### **III.C.1.b Pre-Construction and Post-Construction Survey Plans**

In the event that either kelp beds or the boulder habitat along the fringes of the sand channel are impacted during construction, these habitats will be re-surveyed as part of marine biological monitoring program. These surveys will document and map kelp bed conditions in areas potentially disturbed by anchors and anchor chains, document recruits, assess potential damage caused by construction activities, and determine the need for resurvey and restoration.

There are two elements to the program: (1) aerial photographic surveys and (2) diver surveys.

Pre-and-post construction aerial surveys will be flown to provide controlled low-altitude infrared photography for mapping of near-surface kelp canopy. Aerial photography will be conducted at times optimal for photography, such as low tide, low current flows (so that kelp is as erect as possible) and early morning hours (to avoid the reflective wave activity that tends to build during the afternoon. Aerial surveys will be conducted within one month prior to and following the completion of construction to characterize the surface canopy of the local kelp beds, and quarterly for two years following the completion of the construction.

Diver surveys will be conducted in two locations; the area where anchor chain and/or cable may impinge on kelp plants and an upcoast control area. Based on recent marine biological surveys conducted in the kelp beds, kelp density increased with distance away from the sand channel (Coastal Resources Management 1994). Since the anchor chains will be near the channel/kelp interface, control sites should have this same characteristic. Pico Creek (upcoast control) was selected as the control area. The kelp habitat on the fringe of the San Simeon sand channel and the kelp habitat in the vicinity of Pico Creek were surveyed during autumn 1994 surveys and spring 1995 surveys; they will again be surveyed in late-August 1995.

Diver surveys will consist of a pre-and-post construction quantitative assessment of the density distribution and size category of kelp plants, including newly recruited kelp plants (minimum size 2 cm), juvenile kelp (less than 40 cm), subadult (between 40 cm and 2 m) and adults (greater than 2 m). Observations will be conducted along the anchor line corridor using a three meter (9.9 ft) wide band transect the length any of the anchor chain that impinges on hard substrate.

Within 20 permanently established 1 meter sq quadrats that contain small (< 40 cm) plants, the number, size, morphology, and general state of health of kelp will be described, measured, and photographed. Each quadrat will be examined in the post-construction survey and new recruit and/or mortality will be noted and described. Statistical comparisons will be made to determine if there was had been a significant change in the number of kelp plants prior to and after the construction project.

Should none of the anchors impinge on hard substrate, the kelp bed habitat monitoring will not be required.

### **III.C.1.c Kelp Bed Restoration**

In the unlikely event that kelp density declines as a result of construction activities, restoration of the lost kelp plants will be made at a ratio of not more than 2 plants replaced to one plant lost. The techniques to be used to replant kelp will be determined based upon consultation with the California Department of Fish and Game and successes of recent transplant programs in southern and central California.

### **III.C.2. Hard Bottom Habitat**

Hard bottom habitat exists in the nearshore pipeline zone along the fringes of the sand channel and the inshore edge of the sand channel at a depth of approximately 20 ft. The extent and nature of inshore rock habitat is not fully known but it appears to be a mixture of sand, cobble, low relief boulder and higher reef that extends nearly the width of the sand channel. Anchor chains will cross this inshore hard bottom seafloor as well as the upcoast hard seafloor along the periphery of the northern kelp bed.

#### **III.C.2.a Impact Reduction and Mitigation Methods**

Impact Reduction and Mitigation Methods are described in Section II.B.1 and III.C.1.b. related to anchoring plans and impacts to kelp bed resources. They are incorporated into mitigation for hard bottom resources by reference. Every attempt will be made by the District to avoid impacts to hard bottom habitat using anchor laying BMPs as described and conducting thorough onsite dive inspections.

#### **III.C.2.b Pre-Construction and Post-Construction Survey Plans**

A combination of geophysical and diver surveys will be conducted to map subtidal hard bottom in the vicinity of proposed anchoring chain locations based upon methods employed for the geophysical and bathymetry survey which are described in Appendix F-3 and F-4 of the FEIR (Coastal Frontiers, 1994; Coastal Resources Management, 1994). These surveys will be conducted one month prior to construction and one month after construction has been completed. Divers will use video to assist in documenting findings.

Reef macrobiota will be inventoried in a post-construction survey and then for two consecutive years (1997 and 1998) if needed. These surveys will be conducted in the vicinity of anchor and chains that cross over hard bottom habitat. An upcoast control area (Pico Creek) will be used as a spatial control. Temporal controls will be data collected during autumn 1994 and pre-construction surveys to be conducted in 1996.

### **III.C.2.c Hard Bottom Restoration**

Anchoring locations have been relocated such that the potential for adverse impacts on hard bottom habitat and associated marine life is minimal. No hard bottom habitat restoration is recommended. In the event of disturbance, there will be no long-term loss of habitat; organisms in this high energy environment will recolonize the hard bottom areas when the construction process has been completed. This process will be monitored during the post-construction surveys.

### **III.C.3 Sand Bottom Habitat**

The sand bottom habitat in the project area is low in diversity compared to nearby reef and kelp bed habitat. Dominant organisms of the sand bottom include tube worms, hermit crabs, and sand dollars. Comparatively speaking, these species are not a sensitive marine resource like kelp or its hard bottom substrate. However, the sand bottom habitat is foraging area for concentrations of sea otters that may utilize crabs and mollusks.

The HDD process will result in the mortality of some sessile or slow-moving sand bottom invertebrates in a 6 to 12 ft<sup>2</sup> area around the hole. No fish mortality will occur. Approximately 1 barrel of the non-toxic and biodegradable drilling mud will initially be mixed into the sediments impacting about 80 ft<sup>2</sup> of sand bottom habitat around the drilling hole (Ken Gluck, Oceaneering Technologies, Inc, pers comm). Some of the drilling fluid will be dispersed into the water column as a result of local bottom currents, wave turbulence, and other mixing processes. It should be noted that all of the sediments in the vicinity of the hole will be immediately excavated (including sediments mixed with the drilling fluid) and will then be transported to an approved onshore disposal area. Therefore, only an insignificant amount of drilling fluid will likely remain in the marine sediments or in the water column in the vicinity of the junction box and intake structure. Drilling fluids that do remain in the sediment are biodegradable and non-toxic and will not harm marine life.

#### **III.C.3.a Impact Reduction and Mitigation Methods**

- Disturbances to sand bottom habitat and organisms will be minimized by using efficient clam shell methods and conducting the excavation over the shortest time period possible;

- sediments mixed with biodegradable drilling fluids will be excavated and removed along with other sediments where the pre-fabricated concrete pad will be installed and;
- disturbances to sand bottom habitat shall be minimized when the intake structure and the ocean outfall are constructed using the jetting process.

### **III.C.3.b Pre-Construction and Post-Construction Survey Plans**

- Pre-construction dives shall be conducted along the proposed ocean outfall corridor and at the site of the intake structure to determine the abundance and diversity of the sand bottom epifauna community. The results of these surveys will be compared to post-construction surveys to determine what, if any, changes in the community have occurred relative to construction activities. These surveys will be conducted for a period of two years following construction.

### **III.C.3.c Sand Bottom Restoration**

- The reduction of sand bottom habitat as a result of the installation of the intake structure (560 ft<sup>2</sup>) was determined to be a less than significant biological impact. No mitigation for this loss is recommended.

## **III.D PROTECTED AND ENDANGERED SPECIES ELEMENT**

### **III.D.1 Occurrences of Marine Mammals and Endangered Species**

Information on the protected and endangered species that might occur in the vicinity of the construction activity is presented in Section 5.4 (Marine Resources) of the FEIR. Tables 2 and 3 list the species that occur in the central California region. The species indicated on the table as "endangered" are protected by the federal Endangered Species Act of 1973, from death, injury, or harassment due to human activities. All marine mammals are further protected by the Marine Mammal Protection Act of 1972.

The nearshore construction zone offshore of San Simeon Creek contains a well established and highly productive range of the Southern sea otter. Late summer through fall is the time of year when the number of otters is highest. Should dredging be required, there is a potential for the population to shift to adjacent areas that may be near carrying capacities for the animals (T. Jackson, Monterey National Marine Sanctuary; Response to Comments/FEIR).

### **III.D.2 Impact Reduction and Mitigation Measures**

Based upon a review of previous construction projects with similar attributes and a review of sea otter biology in the project area, the U.S. Army Corps of Engineers and the U.S Fish and Wildlife determined that the Cambria desalination facility construction project will not

significantly impact sea otters and that a Formal Section 7 Endangered Species Consultation is not required for the project (Tiffany Welch, ACOE, pers. comm. July 7, 1995).

### **III.E CONSTRUCTION MONITORING**

#### **III.E.1 Mooring Setting**

Moorings will be set in locations agreed upon by the Contractor's marine superintendent and the District's marine biologist. The District's marine biologist will be on-site during the anchor mooring survey, during the mooring setting to inspect and monitor the laying of the anchor chain, and the setting of the mooring to ensure that adverse impacts to sensitive habitats are avoided or minimized. The marine biologist will keep a daily log of events and will submit a copy of the log to the District on a daily basis, with recommendations, if necessary for avoiding or minimizing ecological impacts. The biologist will have the authority to halt operations at any time should the potential for significant ecological disturbances are present; i.e., damage to kelp, reefs, or injuries to marine mammals.

#### **III.E.2 Vessel Transits and Movements**

The marine biologist will be present when the construction barge transits to-and-from the project site and when the barge is relocated. The marine biologist will assist the marine superintendent during these periods to provide advise and suggestions on how to minimize ecological impacts. The marine biologist will keep a daily log of events and will submit a copy of the log to the District on a daily basis, with recommendations, if necessary, for avoiding or minimizing ecological impacts. The biologist will have the authority to halt operations at any time should the potential for significant ecological disturbances are present; i.e, extensive damage to kelp, reefs, or marine mammals.

**TABLE 2.  
SENSITIVE, THREATENED, AND ENDANGERED MARINE ORGANISMS  
IN THE PROJECT REGION**

Common Name	Genus/Species	Legal Status
<b>FISHES</b> Tidewater goby California halibut	<i>Eucyclogobius newberryi</i> <i>Paralichthys californicus</i>	FE none; important fishery resource
<b>BIRDS</b> California brown pelican  Western snowy plover California least tern Elegant tern Long-billed curlew	<i>Pelecanus occidentalis californicus</i>  <i>Charadrius alexandrinus nivosus</i> <i>Sterna antillarum browni</i> <i>Sterna elegans</i> <i>Numenius americanus</i>	FE, SE  FT, ST FE, SE FC2, CSSC FC2, CSSC
<b>MARINE MAMMALS</b> (Reference Table 3)	(Reference Table 3)	
<b>REPTILES</b> Leatherbacked sea turtle Loggerhead sea turtle Green sea turtle Olive Ridley sea turtle	<i>Deremochelys coriacea</i> <i>Caretta caretta</i> <i>Chelonia mydas</i> <i>Lepidochelys olivacea</i>	FE FT FT FT

**KEY:**

**R = Rare (California State designation)**  
**FT = Threatened (Federal)      ST = Threatened (State of California)**  
**FE = Endangered (Federal)      SE = Endangered (State of California)**  
**FC1 = Federal Candidate 1 to be Listed as Endangered or Threatened**  
**FC2 = Federal Candidate 2 to be Listed as Endangered or Threatened**  
**CSSC = California Species of Special Concern**

**Source: Bureau of Land Management, 1980; NOAA, 1992;**



### **III.E.3 Sediment Excavation and Other Construction Activities**

While sea otter monitoring surveys will not be required during the construction period, construction crews will be educated as to the laws and regulations applicable to the incidental take of sea otters (and other marine mammals) and appropriate mitigation measures to avoid and reduce the potential of injury to marine mammals.

A marine biologist will be on-site during the HDD process to monitor the impact of the drilling fluids as the fluids mix with the local sediments, the jetting process for installation of the diffuser pipeline, and the seafloor excavation process for the intake structure. The monitor will videotape the seafloor, keep a daily log of events, and will submit a copy of the log to the District with recommendations for avoiding or minimizing ecological impacts to the seafloor. The biologist will have the authority to halt operations at any time should the potential for significant ecological disturbances be present (i.e., damage to kelp, reefs, or injuries to marine mammals).

### **III.F OPERATIONAL MONITORING**

Post-construction marine biological monitoring programs were identified in Section III.E that solely address construction-related effects on marine resource groups. While some of these programs extend for a period of two years into the operational phase (1997-1998), the programs are not to be considered part of the California Regional Water Quality Control Board, Central Coast Region Monitoring and Reporting Program.

NPDES monitoring programs will be developed through the regulatory permitting process with the Regional Water Quality Control Board. The water quality monitoring program will address the issue of maintaining the beneficial uses of the receiving waters in the project area making sure that the beneficial uses are protected for marine resources and the public.

An ancillary monitoring program is proposed that addresses the transport of brine away from the ocean outfall. The field study shall be conducted in association with the operation of the Desalination facility and can be incorporated into the conditions of the NPDES permit.

Conductivity, temperature, and density measurements will be collected in a grid arrangement between the north and south kelp beds (an approximate 1,000 ft distance) and between the 20 ft and 50 ft depth contour. Stations will be evenly spaced to ensure adequate coverage taking into account local current and tidal circulation. At each station, water column profiles will be taken at 3 ft (1 m) depth intervals. Measurements will be collected monthly for a period of two years following the normal operation of the Desalination plant. Stations will also be set inside the kelp bed at depths in-line with the diffuser and at a control station along the same isobath at Pico Creek. Measurements will be made with an internally recording CTD unit, following the procedures used during pre-construction ocean monitoring surveys (Marine Resource Consultants, Inc, 1995).

Aerial surveys will also be flown to provide controlled low-altitude infrared photography for mapping of near-surface kelp canopy. Aerial photography will be conducted four times a year at times optimal for photography, such as low tide, low current flows (so that kelp is as erect as possible) and early morning hours (to avoid the reflective wave activity that tends to build during the afternoon).

Should these studies suggest that significantly elevated concentrations of brine (above 35 ‰) are being transported into reef or kelp beds, or that the kelp canopy in the vicinity of the diffusers is receding, then both reef and kelp bed habitats will be monitored by biologists for a period of two years employing the methods described below.

Diver surveys will be conducted in kelp beds adjacent to the diffuser system and at the Pico Creek upcoast control area. The survey will consist of a quantitative assessment of the density distribution and size category of kelp plants present, including newly recruited kelp plants (minimum size 2 cm), juvenile plants (less than 40 cm), subadults (between 40 cm and 2 m) and adults (greater than 2 m).

Biologists will survey a kelp corridor using replicated 50 meter (150 ft) by three meter (9.9 ft) wide band transects at the control and treatment areas. Within 20 permanently established 1 meter sq quadrats that contain small (<40 cm) plants, the number, size, morphology, and general state of health of kelp will be described, measured, and photographed. Each quadrat will be examined for the number of new recruits and/or mortality. Statistical comparisons will be made to determine if there is a significant difference in the number of kelp plants between the treatment area (near the diffuser pipe) and the upcoast control site. The communities will also be documented with the use of underwater video and/or underwater still photographic techniques.

#### IV. LITERATURE CITED

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