

Chapter 1. General Introduction

INTRODUCTION

The South Bay Ocean Outfall (SBOO) discharges treated effluent originating from two sources: the City of San Diego's South Bay Water Reclamation Plant (SBWRP), and the International Boundary and Water Commission's (IBWC) International Wastewater Treatment Plant (IWTP). Discharge from the SBWRP began on May 6, 2002 and is performed under NPDES Permit No. CA0109045, Order No. 2000-129. Discharge from the IWTP began on January 13, 1999 and is performed under the terms and conditions set forth in Order No. 96-50, National Pollutant Discharge Elimination System (NPDES) Permit No. CA0108928 and Cease and Desist Order No. 96-52. These NPDES permits define the requirements for monitoring receiving waters around the SBOO, including the sampling plan, compliance criteria, laboratory analyses, statistical analyses and reporting guidelines.

Receiving waters monitoring for the South Bay region with respect to the above referenced permits is performed by the City of San Diego. Prior to the initiation of discharge through the SBOO, the City conducted a 3½-year baseline monitoring program in order to characterize background environmental conditions surrounding the discharge site (City of San Diego 2000a). The results of this baseline study provide background information against which the post-discharge data may be compared. In addition, the City has conducted annual region-wide surveys off the coast of San Diego since 1994 (see City of San Diego 1999, 2000b, 2001, 2002, 2003). Such regional surveys are useful in characterizing the ecological health of diverse coastal areas and may help to identify and distinguish reference sites from those impacted by wastewater discharge, stormwater input or other sources of contamination.

Finally, the City of San Diego and the IBWC also contract with Ocean Imaging Corporation (Solana Beach, CA) to conduct a remote sensing program for the San Diego/Tijuana region as part of the

ocean monitoring programs for the Point Loma and South Bay areas. Imagery from satellite data and aerial sensors produces a synoptic look at surface water clarity that is not possible using shipboard sampling alone. The major limitation of aerial and satellite images, however, is that they only provide information about surface or near-surface waters (~0-15 m) without providing any direct information regarding the movement, color, or clarity of water in deeper layers. In spite of these limitations, one objective of this multi-year project is to ascertain relationships between the various types of imagery data and field-collected data. With public health issues a paramount concern of ocean monitoring programs, any information that helps to provide a clearer and more complete picture of water conditions is beneficial to the general public as well as to program managers and researchers. Having access to a large-scale overview of surface waters within a few hours of image collection also has the potential to bring the monitoring program closer to real-time diagnosis of possible contamination conditions and add predictability to the impact that different oceanographic events (e.g., heavy rains) may have on shoreline water quality. In February 2005, Ocean Imaging Corporation and the City attempted a study designed to investigate the survival and dispersion characteristics of bacteria discharged through the SBOO. Unfortunately, poor weather conditions and turbid waters prevented a successful outcome. This bacteria dispersion study was rescheduled for winter 2006.

This report presents the results of monitoring conducted at fixed sites around the SBOO from January through December 2005. However, pursuant to an agreement with the Regional Board, offshore monthly water quality sampling was not conducted in February in exchange for participation in the above referenced bacteria dispersion study (see City of San Diego 2005b). Results of the 2005 remote sensing surveys have also been considered and integrated into interpretations of oceanographic and water quality data (e.g., bacteria levels, total

suspended solids, oil and grease). Comparisons are also made to conditions during previous years in order to assess any outfall related changes that may have occurred. The major components of the monitoring program are covered in the following chapters: Oceanographic Conditions, Water Quality, Sediment Characteristics, Macrobenthic Communities, Demersal Fishes and Megabenthic Invertebrates, and Bioaccumulation of Contaminants in Fish Tissues. The results of the 2005 regional survey off San Diego are presented in two subsequent chapters describing sediment conditions and macrobenthic communities from a set of randomly selected stations. Detailed information concerning station locations, sampling equipment, analytical techniques, and quality assurance procedures are included in the Environmental Monitoring and Technical Services Division Laboratory Quality Assurance Project Plan for the City's Ocean Monitoring Program (City of San Diego in prep). General and more specific details of these monitoring programs and sampling designs are given below and in subsequent chapters and appendices.

SBOO MONITORING

The South Bay Ocean Outfall is located just north of the border between the United States and Mexico. It terminates approximately 5.6 km offshore at a depth of about 27 m. Unlike other southern California outfalls that are located on the surface of the seabed, the SBOO pipeline begins as a tunnel on land and then continues under the seabed to a distance of about 4.3 km offshore. From there it connects to a vertical riser assembly that conveys effluent to a pipeline buried just beneath the surface of the seabed. This pipeline then splits into a Y-shaped multiport diffuser system, with the two diffuser legs extending an additional 0.6 km to the north and south. The outfall was designed to discharge and disperse effluent via a total of 165 diffuser risers. These include 1 riser located at the center of the outfall diffusers and 82 others spaced along each of the diffuser legs. However, low flow since outfall operation began has required closure of all ports along the northern diffuser leg as well as many of those along the southern diffuser leg. These closures are necessary

to maintain sufficient back pressure within the drop shaft so that the outfall can operate in accordance with the theoretical model. Consequently, discharge during 2005 and previous years has been generally limited to the distal end of the southern diffuser leg, with the exception of a few intermediate points at or near the center of the diffusers.

The regular SBOO sampling area extends from the tip of Point Loma southward to Playa Blanca, Mexico, and from the shoreline seaward to a depth of about 61 m. The offshore monitoring sites are arranged in a grid spanning the terminus of the outfall, and are monitored in accordance with NPDES permit requirements. Sampling at these fixed stations includes monthly seawater measurements of physical, chemical and bacteriological parameters in order to document water quality conditions in the area. Benthic sediment samples are collected semiannually to monitor macrofaunal communities and sediment conditions. Trawl surveys are performed quarterly to monitor communities of demersal fish and large, bottom-dwelling invertebrates. Additionally, analyses of fish tissues are performed semiannually to monitor levels of chemical constituents that may have ecological or human health implications.

RANDOM SAMPLE REGIONAL SURVEYS

In addition to the regular fixed grid monitoring centered around the SBOO, the City typically conducts a summer benthic survey of sites distributed throughout the entire San Diego region as part of the monitoring requirements for the South Bay outfall. These annual surveys are based on an array of stations randomly selected each year by the United States Environmental Protection Agency (USEPA) using the USEPA probability-based EMAP design. Surveys conducted in 1994, 1998, and 2003 involved other major southern California dischargers, were broader in scope, and included sampling sites representing the entire Southern California Bight (SCB), from Cabo Colnett, Mexico to Point Conception, USA. These regional surveys were the Southern California Bight 1994 Pilot Project (SCBPP), the Southern California Bight 1998 and 2003 Regional Monitoring Programs (Bight'98

and Bight'03, respectively). Results of the SCBPP and Bight'98 surveys are available in Bergen et al. (1998, 2001), Noblet et al. (2002), and Ranasinghe et al. (2003), while data from Bight'03 are currently being analyzed. A regional (random) survey was not conducted in 2004 in order to conduct a special strategic process study pursuant to an agreement with the SDRWQCB and USEPA (see City of San Diego 2005a,c). The results from Phase I of the San Diego Sediment Mapping Study are currently being analyzed (see Stebbins et al. 2004).

The 2005 survey of randomly selected sites off San Diego covered an area from Del Mar south to the United States/Mexico border and extending offshore from depths of 12 m to about 190 m. All sampling was conducted during the month of July. In order to compare conditions over a 10-year span, the 2005 survey revisited the 40 randomly selected sites sampled in 1995 (see City of San Diego 1999). Although 40 sites were initially selected, only 36 were successfully sampled for benthic infauna and sediments in 2005. Sampling at 4 sites was unsuccessful due to the presence of rocky reef, which made it impossible to collect samples.

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