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Capsule Report

Urban Runoff Program Copper and Nickel Activities

Regulatory Background

South San Francisco Bay has long been recognized by the San Francisco Bay Regional Water Quality Control Board (RWQCB) as a unique water body, presenting unusually difficult regulatory problems, owing to its relatively shallow depths and constricted flushing properties. The RWQCB has a long-established program for developing water quality objectives/standards for the South San Francisco Bay and for issuing NPDES permits to the affected point sources (i.e., municipal treatment plants and urban runoff) in the South Bay. That process began with the development and approval of the original 1975 Basin Plan, and has been carried forward through the 1982, 1986, 1992, and 1995 Basin Plans and the various issuances of NPDES permits since the early 1970s.

Past attempts to apply federal, statewide, or even baywide water quality objectives to the South Bay led to concerns on the part of the local communities that such objectives for certain metals which had not been attained in the South Bay were more stringent than necessary to protect designated beneficial uses, and that site-specific water quality objectives for the South Bay alone would be more appropriate. Further, the unique environment of the South Bay itself, including its tributaries, presented serious regulatory challenges in implementing previous water quality objectives.

In 1996 USEPA, consistent with Section 303 (d) of the Clean Water Act (CWA), included the South Bay on the 303 (d) impaired water body list as a high priority impaired water body. Metals were noted as the pollutant of concern and municipal point sources, urban and storm water runoff, and surface mining activities were identified as the sources of pollutants. In 1998 the RWQCB and USEPA updated the list and specifically identified copper, nickel, mercury and selenium as the metal pollutants of concern. That listing triggered a CWA mandate for the State of California, specifically the RWQCB, to establish TMDLs for these pollutants of concern.

Watershed Management Efforts

Since 1995, staff from the Cities of San Jose, Sunnyvale and Palo Alto has been working with the Regional Board staff to develop a strategy and approach for addressing point source permit compliance issues for specific problem metals and for developing an overall regulatory approach for handling problems related to protection of beneficial uses that may arise in the long-term. The goal of that effort was to develop a framework document, the South Bay Plan, for implementing both the federal and state water quality requirements for the South Bay by using approaches available within the existing statutory regulations. The focus was to ensure that the Basin Plan addresses the unique water quality problems in the South Bay in a manner that fully preserves the integrity of the requirements.

At about the same time, State and Regional Board emphasis on developing watershed-based programs to address both short and long-term water quality issues led to the initiation of the Santa Clara Basin-Watershed Management Initiative (WMI) in May 1996. The concepts of the South Bay Plan were incorporated into the larger WMI program. The WMI is a collaborative effort of representatives from business and industrial sectors, professional and trade organizations, civic, environmental, resource conservation and agricultural groups, regional and local public agencies, resource agencies, and the general public. These groups joined forces to address all sources of pollution that threaten the water bodies draining into the South Bay. A major aim of the WMI has been to coordinate existing watershed activities on a basin-wide scale, ensuring that environmental protection efforts are addressed efficiently and cost-effectively.

A subgroup of the WMI (i.e., the Bay Monitoring and Modeling subgroup (BMM)) took the lead to address the water quality issues. The BMM was established to initially develop a scoping document and then a more detailed Work Plan to provide the basic strategy and guidance necessary to address both the water quality technical and related regulatory questions. The mission of the BMM is:

“...to establish a sound scientific and technical basis for future regulatory decisions affecting the Lower South Bay, and for documenting the policies that govern those decisions. In particular, strategies developed by the subgroup will support the assessment of beneficial uses of the Bay and tributary sloughs, as well as water quality objectives and permit conditions (including other potential regulatory options) to protect those beneficial uses. BMM will provide recommendations regarding the implementation of monitoring and modeling strategies that form the scientific basis for assessing the ecological condition of the slough areas and main water mass of the Lower South Bay.”

As part of implementation of the BMM Work Plan a TMDL consultant team was selected and retained by the City of San Jose. A TMDL work group (TWG) was formed, as part of the BMM, to assist and coordinate the TMDL effort. The efforts of the TWG, within the context of the WMI and the BMM, are discussed below.

Copper and Nickel TMDL Project

In January 1998 the City of San Jose initiated a 4-year, \$3.5 million effort to conduct special studies in support of the copper and nickel TMDLs. The TMDL project was one of the most comprehensive, chemical-specific, environmental assessments ever conducted in San Francisco Bay. The City, on behalf of the WMI, contracted with a consultant team to address a number of key

Data Collection and Analysis. An extensive database was developed brought together different types and large volumes of information (over 1.5 million records) focused on the specific issues of TMDL development for copper and nickel in the Lower South San Francisco Bay.

Conceptual Model Development. A conceptual model was developed that depicts the current understanding of the processes that influence copper and nickel cycling in Lower South San Francisco Bay and adjacent Bay waters was recently produced. (This approach is currently being utilized by the State for TMDLs for mercury, pesticides and PCBs.)

Source Characterization. The major loads of copper and nickel that enter the South Bay are were quantified, based on existing data. The loadings are divided into four major pathways: wastewater discharges, tributary loads, atmospheric deposition to the surface water, and sediment exchange with the water column within the Bay.

Assessment of Beneficial Use Impairment. An Impairment Assessment Report was completed to evaluate whether the beneficial uses of the receiving waters of the Lower South Bay are impaired due to ambient concentrations of copper and nickel. The assessment relied on a “weight of evidence” technical approach, consistent with EPA’s 305(b) guidance regarding the conduct of an “integrated assessment.” All available evidence was reviewed and incorporated in proportion to its applicability,

technical certainty, and statistical robustness in evaluating likely impacts and impairment of designated beneficial uses.

The results of the impairment assessment indicated that impairment to beneficial uses of the South Bay due to ambient copper and nickel concentrations is unlikely. The findings of the impairment assessment for both copper and nickel are not unequivocal. Several uncertainties exist that include: phytoplankton toxicity, biogeochemical processes influencing speciation, and sediment toxicity. How and to what extent these uncertainties need to be addressed as part of the Copper and Nickel Action Plans which is discussed below.

Develop a Scientifically Defensible Range of Site Specific Objectives (SSOs): A range of numeric values site-specific water quality objectives (SSOs) for dissolved copper and nickel in the South Bay were developed. Two key components of the analysis to develop the SSOs included: laboratory-measured toxicity data and laboratory-measured water effects ratios.

Based on the results of the WMI Copper and Nickel TMDL assessments, the San Francisco Regional Water Quality Control Board adopted site-specific water quality objectives for the Lower South Bay (RWQCB Resolution R2-2002-0061). The RWQCB indicated that “The proposed SSOs for copper and nickel in the Lower South San Francisco Bay were derived through USEPA approved methods and are fully protective of the most sensitive aquatic life beneficial uses in Lower South SF Bay.”

Copper and Nickel Action Plans

Copper and Nickel Action Plans were developed as part of an overall non-degradation strategy. The action plans are currently being implemented as part of the municipal and stormwater NPDES permits to ensure that existing water quality is maintained, beneficial uses are protected, and exceedances of the site-specific water quality objectives for copper do not occur in the South Bay.

The Action Plans: 1) identify the current control measures/actions being used to minimize copper releases to the bay, 2) identify “triggers” that would initiate additional measures/actions, and to set forth a proactive framework for addressing increases to future copper concentrations in the South Bay, if they occur. Recommended regulatory actions will be presented by the WMI for RWQCB consideration and action.

Urban Runoff Action Plans: As required by the Urban Runoff permit (and as further defined within the Annual Urban Runoff Workplans) the Program and Co-permittees conduct 21 copper and 7 nickel baseline control activities. The Co-permittees implement 8 copper and 1 nickel baseline control activities as appropriate for their locales. SCVURPPP has led the region in implementing copper control measures since prior to its first NPDES permit in 1990.

To satisfy one specific baseline action item (CB-15 of the Copper Action Plan) the Program developed a prototype web based clearinghouse entitled Copper Sources and Management Strategies Clearinghouse. The clearinghouse describes fifteen copper sources and provides information on potential control measures for POTWs and stormwater programs. It is intended to be a complementary resource to, the BACWA "Pollution Prevention Guidance and Tools for POTWs" project and the Clean Estuary Partnership "Copper Sources in Urban Runoff and Shoreline Activities" report. The website has been designed as a bay-wide resource and can be accessed on the SCVURPPP website at www.scvurppp.org.

In addition, SCVURPPP annually provides resources to support the efforts of the Brake Pad Partnership (BPP). The BPP is a multi-stakeholder effort organized to investigate and understand the impacts on the environment that may arise from brake pad wear debris generated in the use of passenger vehicles. The limited available environmental source loading data point to brake pads as being the largest single source of copper in stormwater. The BPP is conducting a multi-year \$700,000

Proposition 13 funded study to generate better estimates of copper fate, transport, and loadings to the Bay.

Clean Bay Pollution Prevention Plan (City of Palo Alto). The City of Palo Alto annually publishes a pollution and prevention plan. A key section of the plan, produced on behalf of all three South Bay local agencies, covers a summary of copper and nickel indicators. Data are provided that track the following indicators: copper in brake pads, total population in Santa Clara Basin, auto/truck vehicle miles traveled in Santa Clara Basin, water supply copper levels and copper sulfate application to the South Bay Aqueduct, copper sulfate sales in Santa Clara Basin, and the copper content in clam tissue, reproductive index and benthic community assemblage at San Point. The annual plan and indicator information is available on the City's website at www.cityofpaloalto.org/cleanbay.

Receiving Water Monitoring

Two receiving water monitoring programs are being conducted in the Santa Clara Basin and Lower South Bay.

Watershed Monitoring. Consistent with Urban Runoff permit (Provision C.7.b and C.9), SCVURPPP developed and has been implementing a Multi-Year Receiving Waters Monitoring Plan (Multi-Year Plan) in Santa Clara Basin Watersheds. The Multi-Year Plan provides a framework for conducting watershed characterization, screening-level monitoring, watershed assessment, and investigative monitoring and management action implementation. SCVURPPP is currently in the third monitoring year of an eight-year plan. The Multi-Year Plan relies on a rotating watershed approach to sampling water quality in Santa Clara Valley creeks, which is similar to the State's Surface Water Ambient Monitoring Program (SWAMP). Under the Multi-Year Plan, sampling occurs at a variety of creek sites in multiple watersheds during sampling events representing three hydrological cycles (dry, wet and spring season) for two consecutive years.

SCVURPPP submits an Annual Monitoring Program Plan (Annual Plan) on March 1 of each year that identifies specific monitoring activities planned for the following year. The Annual Plan includes information on the type of monitoring parameters and the frequency of sampling events for each watershed. Rapid bioassessments using benthic macroinvertebrate assemblages and visual assessments of physical habitat are conducted during the spring season at a majority of sampling sites. Water grab samples are collected from specific sites during the summer and winter season and are analyzed for metals, organics (e.g., pesticides, PCBs), nutrients, anions, and suspended sediment concentrations. At selected sites, the water samples are analyzed for acute and chronic toxicity using three aquatic species. Field measurements of physical water quality are taken during each sampling event.

The Multi-Year Plan was initiated during the summer of 2002. The first year (FY 02-03) of receiving waters monitoring was conducted in Lower Penitencia Creek Watershed and major tributaries to Coyote Creek (i.e., Upper Penitencia and Lower Silver-Thompson Creek Subwatersheds). The second year (FY 03-04) of receiving waters monitoring was conducted in the Adobe Creek and San Tomas Aquino Creek Watersheds. During FY 04-05, monitoring is being conducted at sites in the Calabazas Creek, Matadero Creek and Barron Creek Watersheds and both Sunnyvale East and West Channels, as well as a second year of monitoring in the Adobe Creek and San Tomas Aquino Creek Watersheds. The monitoring results have thus far not identified any major water quality issues and/or impacts on designated beneficial uses.

Planned activities for FY 05-06 include a second year of receiving waters monitoring at selected sites within Calabazas Creek, Matadero Creek and Barron Creek Watershed and both Sunnyvale East and West Channels and the first year of monitoring will be conducted in Stevens and Permanente Creek Watersheds.

Lower South Bay Monitoring. In February 1997, the City of San Jose, on behalf of all local agencies in the South Bay, began sampling total and dissolved copper and nickel concentrations at ten stations in the Lower South San Francisco Bay (LSSB). In October 1997, two fresh water stations were added, one each in the lower reaches of Coyote Creek and the Guadalupe River, bringing the total number of stations to twelve (Figure 1). The sampling design from the Copper and Nickel Action Plans requires monthly compliance sampling. Ten locations in South San Francisco Bay are monitored to compare mean dry season dissolved copper and nickel concentrations to respective trigger levels.

Results from monthly monitoring at 10 stations show ambient concentrations continuing to be well below the adopted site specific water quality objectives of 6.9 ug/L and 11.9 ug/L for copper and nickel respectively. Ambient concentrations have remained consistent (no upward or downward trend) and below the stringent Action Plan trigger values (established as NPDES permit requirements in 2000) of 4.0 ug/L and 6.0 ug/L for copper and nickel respectively. The monitoring results are located at the City of San Jose web site. www.sanjoseca.gov/esd/pub_res.htm

Figure 1 Map of monitoring station locations in Lower South SF Bay. (City of San Jose)

