

INFORMATIONAL DOCUMENT

Public Scoping Meeting for Proposed Amendments to the Water Quality Control Plans for Ocean Waters and Enclosed Bays and Estuaries of California

DESALINATION FACILITIES AND BRINE DISPOSAL

March 2012

**DIVISION OF WATER QUALITY
STATE WATER RESOURCES CONTROL BOARD
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY**

PURPOSE

The purpose of the public scoping process is to seek input from public agencies and members of the public on the scope and content of the substitute environmental documentation that will be prepared in support of an amendment to the *Water Quality Control Plan for Ocean Waters of California* (Ocean Plan) to address issues associated with the intakes and discharges from desalination facilities and the disposal of brine from other sources. A similar amendment is being contemplated for the *Water Quality Control Plan for Enclosed Bays and Estuaries of California* (Enclosed Bays and Estuaries Plan).

This informational document describes options proposed by the State Water Resources Control Board's (State Water Board's) staff to develop such an amendment, and presents factors that could be considered in the analysis of potential significant environmental effects under the California Environmental Quality Act (CEQA). State Water Board staff is holding a scoping meeting to get input from stakeholders in identifying relevant issues to consider during the environmental review process¹.

This document is not intended to fulfill the State Water Board's formal planning requirements under the Porter-Cologne Water Quality Control Act, the Federal Clean Water Act, or the California Environmental Quality Act. A draft staff report, substitute environmental document, and draft water quality control policy (policies) will be prepared and circulated at a later date to fulfill the State Water Board's formal water quality planning obligations.

PROJECT DESCRIPTION

The planned amendment(s) would aim to control potential adverse impacts to aquatic life and other beneficial uses of California's bays, enclosed estuaries, and ocean waters associated with (1) the intakes for desalination facilities; (2) the brine discharges from desalination facilities; and (3) other brine discharges from sources such as groundwater desalting plants.

The planned amendment is currently envisioned to contain the following elements: (1) provisions to minimize adverse impacts to aquatic life associated with the intakes for desalination facilities; (2) a narrative water quality objective for salinity to ensure that brine discharges from desalination facilities and other sources do not cause adverse impacts; (3) implementation provisions.

BACKGROUND

This issue has long been identified as a very high priority for the State Water Board to address because several large desalination facilities have been planned along the California coast to augment existing, and increasingly scarce, water supplies. Plants

¹ See Cal. Code Regulations, title. 14, §15083.

are being considered in Carlsbad, Camp Pendleton, Huntington Beach, Dana Point, Long Beach, El Segundo, Playa Del Rey, Oceano, Cambria, Marina, Sand City, Ocean View Plaza, Santa Cruz, Moss Landing, Montara, San Rafael, East Bay, and Crockett, with the largest of the proposed plants located in Southern California.

In contrast, existing desalination facilities are much smaller, and many operate only intermittently. Existing plant locations include Santa Catalina Island, San Nicolas Island, Morro Bay, Hearst San Simeon State Historical Monument, Monterey Bay Aquarium, Gaviota, Santa Barbara, Moss Landing Power Plant, and Diablo Canyon Nuclear Power Plant. The reverse osmosis plant at Diablo Canyon is the largest, continuously operating plant, capable of producing 0.576 million gallons of fresh water a day for the power plant's operational needs.

Impacts from desalination facilities and brine disposal were discussed as Issue No. 4 in the 2011-2013 Triennial Review Workplan for the Ocean Plan² and identified as a very high priority. The issue was also listed as a high priority in earlier triennial review workplans. The planned amendment to the Ocean Plan is in progress, based on direction given by the State Water Board at a November 2, 2005 workshop, and the issue was discussed at the 2007 Scoping Meeting. Delays with the amendment were associated with the unavailability of staff resources.

As traditional sources of fresh water are depleted or degraded, communities are increasingly considering desalination as an option for obtaining additional, reliable municipal supplies. Desalination is a process by which dissolved minerals are removed from brackish or salt water to produce fresh water suitable for human use. Various desalination methods, such as reverse osmosis or evaporation, have been used for decades in arid areas around the world, but are relatively expensive and energy-consuming. However, recent advances in membrane technology have brought costs down, while costs from obtaining fresh water from conventional sources have escalated. More fresh water has been allocated to supporting threatened and endangered species in rivers and lakes, further limiting supplies.

Unfortunately, desalination facilities can adversely impact the environment in several ways. Intakes from desalination facilities may cause direct harm to aquatic life by trapping fish and larger organisms against intake screens when withdrawing water (impingement) or by killing smaller organisms that pass through the initial intake screens (entrainment). Indirect impacts may include less available food for wildlife dependent on these aquatic organisms.

The State Water Board has contracted with the Moss Landing Marine Laboratories to establish an expert review panel to address issues associated with minimizing and

² The 2009 California Ocean Plan, the Triennial Review Workplan, and supporting documents are available on the State Water Board's Web site at:
http://www.waterboards.ca.gov/water_issues/programs/ocean/index.shtml.

mitigating intake impacts from desalination facilities and power plants. The panel took input from the public and is producing a final report on their findings in March 2012.

The salt, minerals, and other compounds left over from the desalination process are disposed of as a concentrated brine solution that may be more than twice as saline as the ocean. Brine disposal methods include disposal to landfills, groundwater injection wells, waste water treatment facilities, and discharge to a waterbody such as the ocean.

The concern is that discharging untreated brine waste to the ocean may adversely affect marine life, because of increased salinity, decreased oxygen, higher temperatures, and possibly higher turbidity. In addition, desalination facilities may add chemicals to recondition membranes and during the water treatment process, which may be toxic to marine life if released to ocean waters.

Brine is much more salty and therefore denser and heavier than ocean water and, depending on the discharge methods, may settle on the ocean bottom. Accumulation of brine on the seafloor may have an adverse impact on bottom-dwelling (benthic) organisms in the vicinity of the discharge. A study conducted by the Southern California Coastal Water Research Project (SCCWRP) in 1992 investigated the toxic effects of waste brine on the giant kelp (*Macrocystis pyrifera*), an amphipod (*Rhepoxynlus abronius*), and the purple sea urchin (*Strongylocentrotus purpuratus*). The study indicated that elevated salinity significantly affected purple sea urchin development at as little as 36.5 parts per thousand (ppt). The control salinity was 33.5 ppt, which is typical ocean water salinity in southern California.

More research is needed on determining the ecological impact of concentrated brine discharges to benthic communities. The State Water Board has commissioned a study by the Granite Canyon Marine Laboratory to determine the tolerance of Ocean Plan test species to various concentrations of hyper-saline brine. Toxicity tests will also be conducted using a brine effluent sample from a desalination facility. These studies are estimated to be completed by the end of April 2012. A study report will be finalized in May 2012.

More research is also needed on predicting the behavior of a negatively buoyant brine waste plume and the movement of a brine waste plume co-mingled with effluent from a waste water treatment facility. The State Water Board has contracted with SCCWRP to establish a panel of experts in the fields of oceanography, plume modeling, ecotoxicology, and marine ecology to assist with recommending disposal strategies, models, and monitoring for concentrated brine discharges. Several public meetings have been held to provide input to the panel. The panel's final report is due at the end of March 2012.

Other types of brine discharges include the scenario where brine from groundwater recovery facilities are co-mingled with effluent from waste water treatment facilities before being discharged into the ocean.

EXISTING REGULATORY STRUCTURE

The California Porter-Cologne Water Quality Control Act³ (Porter-Cologne) of 1969 is the primary water quality law in California. The State Legislature, in adopting Porter-Cologne, directed that California's waters "shall be regulated to attain the highest water quality which is reasonable". Porter-Cologne addresses two primary functions: water quality control planning and waste discharge regulation. Porter-Cologne is administered regionally, within a framework of statewide coordination and policy.

Porter-Cologne authorizes the State Water Resources Control Board (State Water Board) to adopt statewide water quality control plans and directs each of the nine Regional Water Quality Control Boards (Regional Water Boards) to adopt water quality control plans that provide the basis for protecting water quality in each Region. When the State Water Board adopts a water quality control plan, the state plan supersedes regional plans for the same waters, to the extent of any conflict. Porter-Cologne specifically requires the State Water Board to formulate and adopt the Ocean Plan⁴ to protect the State's ocean waters.

All water quality control plans must list "beneficial uses" of waters which need to be protected; establish "water quality objectives" necessary to achieve protection for those beneficial uses; identify areas where discharges are prohibited, and set forth a program of implementation to ensure that water quality objectives are met. The program of implementation describes the actions necessary to achieve objectives, includes a time schedule for these actions to be taken, and describes the monitoring to be performed to determine compliance with the objectives.

The Ocean Plan designates ocean waters for a variety of beneficial uses, including rare and endangered species, marine habitat, fish spawning and migration and other uses (including industrial water supply), and establishes water quality objectives to protect those beneficial uses. The Ocean Plan provides the basis for regulation of wastes discharged into California's coastal waters. The State Water Board, in conjunction with the six coastal Regional Water Boards, implements and interprets the Ocean Plan. Coastal Regional Water Boards consist of the North Coast, San Francisco Bay, Central Coast, Los Angeles, Santa Ana and San Diego Regions.

Both statewide and regional plans are subject to review every three years, which may lead to periodic updates. Triennial reviews are comprehensive and include a public hearing to identify issues to be addressed. The State or Regional Water Board evaluates all available information at the hearing to determine whether revisions to the plans are needed and the nature of any necessary revisions.

³ See Wat. Code, §13000 et seq.

⁴ See Wat. Code, §13160 et seq.

The State Water Board first adopted the Ocean Plan in 1972, and has since periodically revised the Plan. The Ocean Plan was last updated in 2009⁵. A hearing was held on September 22, 2010 in Sacramento to seek input from the public on potential revisions to the Ocean Plan, including proposed amendments and unresolved issues from prior triennial reviews. A work plan for 2011-2013 was adopted at a State Water Board meeting on March 15, 2011, which identifies issues of high-priority to the State Water Board, directs staff resources towards those issues, and projects a timeline for amending the Ocean Plan to address the issue.

Controlling impacts from desalination facilities and brine discharges was discussed as Issue No. 4 in the 2011-2013 Triennial Review Workplan for the Ocean Plan. The Ocean Plan does not currently address impacts to marine life from possible intakes for desalination facilities, although the State Water Board adopted a policy to control intake impacts from power plants using once-through cooling in 2010⁶. Currently, there are no water quality objectives in the Ocean Plan that apply specifically to brine waste discharges from desalination plants or groundwater desalting facilities. Intakes for desalination facilities are also not specifically regulated in the Ocean Plan, although the State Water Board adopted a policy to control intake impacts from power plants using once-through cooling in 2010. The Ocean Plan also does not contain an objective to control elevated salinity from brine discharges, nor does it specifically describe how brine discharges should be regulated.

This project would also similarly amend the Enclosed Bays and Estuaries Plan. Currently the Enclosed Bays and Estuaries Plan only contains provisions for sediment quality, but this amendment would add provisions for an elevated salinity objective, implementation provisions for brine discharges, and provisions to control entrainment and impingement from intakes.

Under Porter-Cologne, the Water Boards regulate waste discharges that could affect water quality through waste discharge requirements, waivers or prohibitions. In addition, the Water Boards are authorized to issue federal National Pollution Discharge Elimination System (NPDES) permits to point source dischargers of pollutants to navigable waters. Issued NPDES permits must implement all applicable state and federal standards, whether numeric or narrative.

Permits contain technology-based effluent limitations (reflecting the pollution reduction that is achievable through technology) and any more stringent limitations necessary to meet water quality standards. NPDES permits are usually renewed (and expire) on a five-year schedule. Regional Water Boards are generally responsible for issuing the NPDES permits, which include self-monitoring and reporting programs. Consideration

⁵ See http://www.waterboards.ca.gov/water_issues/programs/ocean/docs/2009_cop_adoptedeffective_usepa.pdf

⁶ See http://www.waterboards.ca.gov/water_issues/programs/ocean/desalination/

of the terms and conditions of NPDES permit requirements must occur at a public hearing. Regional Water Board staff also conducts periodic inspections of each permitted discharge to monitor permit compliance.

Porter-Cologne contains a provision addressing coastal facilities that withdraw water for industrial purposes, although the provision only applies to “new or expanded facilities.” Porter-Cologne⁷ requires each new or expanded coastal power plant or other industrial installation using seawater for cooling, heating or industrial processing to use “*the best available site, design, technology, and mitigation measures feasible . . . to minimize the intake and mortality of all forms of marine life.*”

It is currently left to the Regional Water Boards’ discretion to decide what constitutes the “best available site, design, technology, and mitigation measures feasible” for a proposed desalination facility when issuing NPDES permits for plants within their jurisdiction. However, the issues are complex and require significant staff resources and expertise to evaluate the most appropriate technology-based solution. Absent a statewide policy, permits for new desalination plants are likely to be delayed and challenged repeatedly by industrial and citizen petitioners. The planned amendment to the Ocean Plan would provide statewide consistency in controlling impacts from desalination plant intakes.

NEXT STEPS

Additional alternatives may ultimately be considered as a result of the CEQA scoping process. After receiving comments on this CEQA scoping document, the State Water Board will prepare substitute environmental documentation including a draft staff report, a CEQA checklist and a draft amendment to the Ocean Plan. Similar documents will be prepared for an amendment to the Enclosed Bays and Estuaries Plan. These documents will be circulated for public comment. The process will follow state and federal requirements for public participation and for environmental and economic consideration. The scientific basis for the amendments will be peer reviewed.

The planned amendment(s) is scheduled to be considered for adoption by the State Water Board in January of 2013 and regulatory provisions of amendments must further be approved by the State Office of Administrative Law (OAL). Any amendments to surface water quality standards must also be approved by the U.S. Environmental Protection Agency (USEPA) in order to be effective. The amendment(s) would be implemented through individual NPDES permits.

⁷ See Wat. Code, §13142.5(b)