



CALIFORNIA OCEAN PROTECTION COUNCIL

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Date: January 13, 2006

To: California Ocean Protection Council Members

From: Neal Fishman, Jon Gurish, and Abe Doherty

Re: California Coast Once-through Cooling Systems

The Ocean Protection Council, during its Sept. 23 meeting, asked that issues related to once-through cooling systems (OTCS) be framed by staff to allow further discussion at the January meeting.

In its 2005 Integrated Energy Policy Report to the legislature, the Energy Commission invited assistance from the Ocean Protection Council to coordinate with other local, state and federal agencies to address once-through cooling issues in the broader context of protecting the state's fragile coastal marine ecosystem.¹ OPC staff has reviewed recently released reports by the California Energy Commission, comment letters by the California Coastal Commission and the rule adopted by U.S. EPA in 2004 for the National Pollutant Discharge Elimination System (NPDES) Permitting Program that regulates the use of OTCS at existing power plant facilities (often called the "316(b)" rule). Staff has also consulted with various agency experts on the issues involved.

Background

Twenty-one power plants located on California's coastline, including within bays and estuaries, are cooled with ocean water that circulates through complex heat exchange systems once before being discharged back to the ocean. Most of these systems were built in the 50's and 60's, with a few built within the last 20 years.

At the time these plants were built, the full range of deleterious environmental impacts to ocean and estuarine ecosystems were not known. In fact, they are still not completely understood, but much has been learned in recent years. The harmful ecological impact from power plants using OTCS differs based on plant location, configuration and screening

¹ California Energy Commission, 2005 Integrated Energy Report, available at <http://www.energy.ca.gov/2005publications/CEC-100-2005-007/CEC-100-2005-007-CMF.PDF>

of the intakes, and the volume and velocity of intake water. In addition to the 21 power plants using OTCS, some seawater desalination facilities use OTCS and raise many of the same issues.

Impacts from OTCS

There remains significant disagreement between representatives of the electric utilities, public interest groups, and regulators on both the economic and ecological impacts of OTCS. While recent studies² have characterized entrainment, impingement and thermal losses as significant, very few comprehensive studies on the ecological impacts of OTCS have been completed. The ecological significance of OTCS at particular plants and the cumulative impacts of all OTCS facilities along the coast are still subject to debate and further study. The California Energy Commission, the Coastal Commission and the State Water Quality Control Board are currently working on developing protocols for comprehensively evaluating the impacts of OTCS facilities. These regulatory processes will take a minimum of two years to complete.

There are three main sources of adverse impacts on the marine ecosystem from OTCS: impingement, entrainment, and thermal discharge effects. Impingement is the process whereby marine life, mainly small fish, are trapped in the intake flow and crushed against screens. Entrainment is the process whereby smaller organisms and eggs, larvae and spores pass through screens and are killed by the heat and pressure within the cooling system of the facility. Thermal effects are impacts caused by the discharge of heated water into the ocean, at the end of the cooling cycle.

EPA's record associated with its 316(b) rule-making in 2004 establishes that there are multiple types of environmental impacts that may be associated with facilities with OTCS. These impacts may include damage to important elements of ocean and estuarine food chains; stresses to overall communities and ecosystems as evidenced by reductions in diversity or other changes in system structure and function; reductions in populations of commercial and recreational fisheries; and impacts to endangered and threatened species.

Regulatory Framework

The current regulatory framework for coastal power plant siting raises issues with the effectiveness and efficiency of the existing structure of state and federal law. Some of these inefficiencies have been addressed through memorandums of understanding, such as a recent

² See generally the EPA Proposed 316(b) Rule, published at 69 Fed. Reg. at 41,588, col 2, accessed on 12/11/2005, available at <http://a257.g.akamaitech.net/7/257/2422/06jun20041800/edocket.access.gpo.gov/2004/pdf/04-24913.pdf> and California Energy Commission, *Issues And Environmental Impacts Associated With Once-Through Cooling At California's Coastal Power Plants*, June 2005, available at <http://www.energy.ca.gov/2005publications/CEC-700-2005-013/CEC-700-2005-013.PDF>

one between the Energy Commission and the Coastal Commission regarding filing requirements for re-powering studies³.

Warren/Alquist Act

Under the Warren/Alquist Act, the Energy Commission has jurisdiction for any new or expanded energy facility that is 50 megawatts or greater. This is called re-powering. When these plants are in the coastal zone, the Coastal Commission has an integral role in the review of repowering proposals. The Energy Commission must abide by the Coastal Commission's recommendations, unless it finds that they are infeasible or would result in greater adverse impact on the environment. When plants are constructed or expanded in San Francisco Bay, the San Francisco Bay Conservation and Development Commission provides recommendations to the Energy Commission and the Energy Commission is prohibited from permitting a power plant within a non-siting area, as shown on maps developed by BCDC.

When authorizing the re-powering of a plant, the Energy Commission must take into account the recommendations of BCDC or the Coastal Commission, but must also ensure that the proposal meets any other federal or state laws or regulations. This includes the requirement under the California Environmental Quality Act (CEQA) that feasible mitigation measures must be included in a project design to reduce or eliminate any significant adverse impacts.

In the past five years, there have been five re-powering cases in California involving plants using OTCS. In each case, the Energy Commission required mitigation for the impacts from the OTCS, including one-time payments for studies or projects. These re-powering cases were controversial and took from six months to more than four years to complete the regulatory process.

Clean Water Act

The federal government has delegated enforcement of the Clean Water Act to California. Under the Clean Water Act and Porter-Cologne Water Quality Control Act, National Pollution Discharge Elimination System (NPDES) permits are required for OTCS. Each plant has to have its NPDES permit renewed every five years by the appropriate Water Quality Control Board, following any rules or procedures adopted by the State Water Resources Control Board. These rules, specific to OTCS, are often in dispute.

In 2004, the EPA adopted new rules for Section 316 (b) of the Clean Water Act that require the best technology available be used in OTCS plants to reduce impingement losses by 80 to 95 percent and to reduce entrainment losses by 60 to 90 percent. EPA rules allow habitat restoration in lieu of the specified reduction in impingement and entrainment losses, if the reduction is infeasible. These rules are being challenged in federal court.⁴

The State Water Resources Control Board has been developing its own rules for how the state will implement the new section 316(b) standards for NPDES permits relating to OTCS. Until

³ *Memorandum of Agreement Between the California Energy Commission and the California Coastal Commission Regarding the Coastal Commission's Statutory Role in the Energy Commission's AFC Proceedings*, April 14, 2005.

⁴ *Surfrider, et al. v. EPA*, Civ. No. 04-6692-ag(L) (2nd Cir., July 6, 2005).

these rules are adopted in the next few years, the state and regional water boards must assess site-specific impacts on a case-by-case basis under the existing regulatory framework.

Other Laws

Numerous other laws involve expanding or re-licensing power plants and other facilities that use OTCS. For example, CEQA, the federal and state endangered species acts and the Magnuson-Stevens Fishery Management and Conservation Act are frequently used in regulatory decisions.

Regulatory Options

Either in reviewing re-powering proposals, or in issuance of NPDES permits, regulatory agencies may consider a wide range of options. The following are examples: design and operational modifications, including the reduction in the volume or velocity of cooling water, conversion of a plant to a dry or mixed wet/dry cooling system, specific habitat mitigation measures, and payment of a fee to be used for mitigation.

A recent Energy Commission report⁵ on OTCS found that entrainment and impingement reduction methods such as changes in intake location or physical or behavioral barriers have not proved to be feasible or effective for most power plants. Generally, environmental advocates have demanded and sued to require the greatest possible compliance with the Clean Water Act reduction requirements.

The State Water Resources Control Board held a recent workshop where representatives of electric utilities expressed opposition to alternative cooling technologies due to costs, and in some cases, technical infeasibility.⁶ They believe the cost of retrofitting plants is not commensurate with the value of the fish saved. Many of the plants are older and less efficient and would not justify additional retrofit costs, especially in a de-regulated energy market.

Ongoing Studies

Studies are now being undertaken by Regional Water Quality Control Boards to better determine the losses from specific plants with OTCS.⁷ There is an immediate need for the development of standard protocols for the studies on the ecological impacts of OTCS, including cumulative impacts. Studies are being conducted through the Energy Commission's Public Interest Energy Research Program to better understand the ecological impacts of OTCS. The State Water

⁵ *Issues and Environmental Impacts Associated with Once-through Cooling at California's Coastal Power Plants: In Support of the 2005 Environmental Performance Report and 2005 Integrated Energy Policy Report*, California Energy Commission staff report, June 2005.

⁶ Hearing on OTCS held December 7, 2005 at Oakland, CA.

⁷ For example, studies are currently being required by the Los Angeles Regional Water Quality Control Board, at the following power plants: Alamitos (Long Beach), El Segundo (El Segundo), Encina (Carlsbad), Harbor (Los Angeles), Haynes (Long Beach), Long Beach (Long Beach), Mandalay (Ventura), Ormond Beach (Ventura), Redondo Beach (Redondo Beach), San Onofre (Orange/San Diego Counties), Scattergood (Los Angeles). See generally http://www.waterboards.ca.gov/losangeles/html/permits/316b_Issues.html. Recently completed studies at Diablo Canyon (1998-99), Morro Bay (2002), Moss Landing (2002), Potrero (2002) and South Bay (2004) provide significant data on impacts from this technology.

Quality Control Board held public hearings in September and December of 2005 and will consider policies related to implementing the 316(b) rules for the issuance of NPDES permits, while it awaits rulings on lawsuits relating to the EPA's rules.

Potential OPC Roles

OPC has had meetings and discussions with some of the regulatory agencies involved in permitting or licensing plants with this system. OPC may wish to consider continuing these discussions to determine what, if any, specific measures they may facilitate. This might include any of the following:

- Sponsor meetings with regulatory agencies or their staffs to identify ways to share knowledge, improve the efficiency and effectiveness of regulatory processes, and provide information useful for the development of policy by the OPC, particularly those that focus on reducing the impacts of OTCS.
- Identify all existing studies and examine the possibility of developing a protocol to comprehensively evaluate OTCS adverse impacts.
- Analyze the economics of OTCS and the potential for developing economic incentives to encourage conversion to alternative technologies. Incentives for plant owners to modify these systems voluntarily or funding sources to mitigate for them, outside of the regulatory process, could be a means to reduce potential long-term ecological impacts to the ocean in the near term.