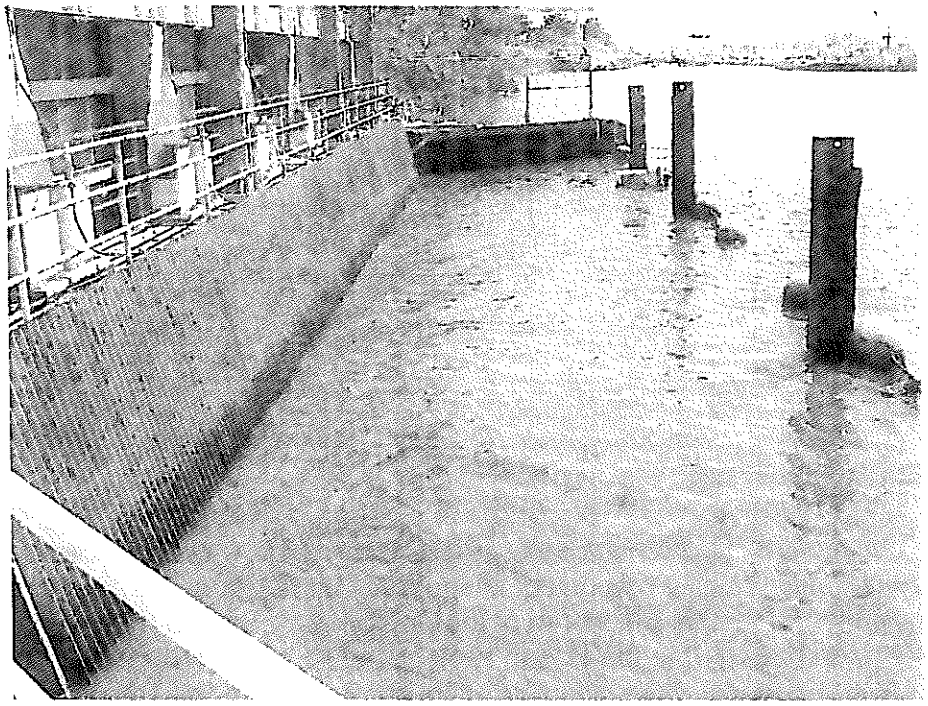
Scoping Document:

Water Quality Control Policy on the Use of Coastal and Estuarine Waters For Power Plant Cooling



State Water Resources Control Board
California Environmental Protection Agency

March 2008

	Greenhouse Gas (tons/yr)	Criteria Pollutants (tons/yr)					
Combined Cycle (540 MW)	790,213	61.10	26.35	176.5	6.18	504.93	55.72

a. carbon dioxide
b. total organic gases
c. reactive organic gases
d. nitrogen oxides
e. sulfur oxides
f. carbon monoxide
g. 2.5 micron particulate matter

BIOLOGICAL AND CUMULATIVE IMPACTS FROM ONCE THROUGH COOLING

Entrainment and Impingement

Impacts associated with OTC include impingement, entrainment, and thermal effects. The biological impacts of OTC may not be adequately known since modern quantitative studies are difficult and costly. Seawater, however, is not just cool water but a highly productive and diverse aquatic habitat.

OTC power plants are generally the largest volume dischargers in the state, ranging from 78 to 2670 MGD. The largest volumes are associated with the active nuclear generating stations, Diablo Canyon and San Onofre, with design flows of 2,670 and 2,587 MGD respectively. The largest volume for a conventional power plant is for the Alamitos power plant, at 1282 MGD (design flow). Discharge volumes roughly correspond to intake volumes. By comparison, the largest wastewater treatment plant with an ocean discharge is the Hyperion wastewater plant (City of Los Angeles), which has a permitted flow of 420 MGD; most ocean dischargers of treated sewage are well below 50 MGD, including the City of San Francisco's Oceanside plant discharge (43 MGD).

The effluent limits for marine and estuarine wastewater discharges under National Pollutant Discharge Elimination System (NPDES) permits (including power plant discharges) are designed to prevent acute and chronic toxicity to marine aquatic life, thereby protecting fish and other marine life from mortality. When spills and industrial discharges do result in fish kills, in violation of the California Water Code and the Fish and Game Code, enforcement actions are typically taken. Ironically, with all of the limitations and prohibitions placed on discharges, impingement and entrainment have essentially constituted a permitted fish kill for power plant intake systems.

There has been an historical emphasis on commercially or recreationally important species, primarily fish. The reality is, however, that a power plant cooling system does not discriminate and instead causes mortality to all aquatic life in the water column

community. Protection of the entire ecological community is essential for promoting a healthy ecosystem.

San Onofre Nuclear Generating Station (SONGS) represents one example of imgingement and entrainment (I/E) impacts. Fish enter the SONGS cooling water system through an offshore cooling water intake, with a velocity cap, and then through a screenwell to the fish return system. Those fish that do not enter the fish return system are impinged on traveling screens. An estimated 3.6 million fish were impinged in 2003 at SONGS. Fish species impinged included northern anchovy, queenfish, Pacific sardine, Pacific pompano, jacksmelt, white seaperch, walleye surfperch, shiner perch, white croaker, bocaccio, jack mackerel, salema, sargo, yellowfin croaker, specklefin midshipman, black perch, California grunion, topsmelt, cabezon, deep body anchovy, and others. No estimates are available for impinged invertebrates at SONGS. Annual entrainment of fish larvae at SONGS is estimated to be nearly 6 billion. This figure does not include invertebrate plankton, which are also entrained (Proposal for Information Collection, San Onofre Nuclear Generating Station, Southern California Edison, prepared by Dave Baily, EPRI Solutions Inc., October 2005).

As another example, the Diablo Canyon Nuclear Generating Station draws seawater directly from an intake cove and through the shore-based intake structure. While impingement mortality is less than at SONGS, due to the difference in structural and environmental systems, entrainment is still significant. Diablo Canyon impacts an average source water coastline length of 74 kilometers (46 miles) out to 3 kilometers (2 miles) offshore, an area of roughly 93 square miles, for nine taxa of rocky reef fish. These rocky reef fish included smoothhead sculpin, monkeyface prickleback, clinid kelpfishes, blackeye goby, cabezon, snubnose sculpin, painted greenling, Kelp/Gopher/Black-and-Yellow (KGB) Rockfish Complex, and blue rockfish. In that 93 square mile source water area, an average estimated proportional mortality of 10.8 percent was calculated for these rocky reef taxa. The rocky reef fish species with the largest calculated coastline impact was the smoothhead sculpin, having an estimated proportional mortality of 11.4 percent over 120 kilometers (75 miles) of coastline during a 1997-98 sampling period (Diablo Canyon Power Plant Independent Scientist's Recommendations to the Regional Water Quality Control Board, Item no. 15 Attachment 1, Sept. 9, 2005 Meeting).

As an example of a conventional power plant, the South Bay Power Plant in San Diego Bay, assuming full operation, has an estimated annual impingement of 390,000 fish, 93 percent of which were anchovies. Impingement of certain invertebrates was also assessed at this plant; an estimated 9,019 crustaceans (shrimps, lobsters, crabs) and cephalopods (octopus and squid) were impinged annually. Annual estimated entrainment for 2003 was 2.4 billion fish larvae. Fish species most represented in the entrainment studies were gobies (arrow, cheekspot, and shadow), anchovy, combtooth blennies, longjaw mudsuckers, and silversides (Tenera, South Bay Power Plant PIC, 2005).