California Council for Environmental and Economic Balance
100 Spear Street, Suite 805, San Francisco, CA 94105

Submitted Via Email to <

December 2, 2005

Gerald Secundy, Vice Chair
State Water Resources Control Board
Division of Water Quality
1001 I Street
Sacramento, CA 95814

RE: Comments on the State Water Resources Control Board Implementation of the Federal Clean Water Act Section 316 (b) Regulations

Dear Mr. Secundy,

The California Council for Environmental and Economic Balance (CCEEB) is a non-partisan, non-profit organization of business, labor and community leaders that seeks to achieve the State's environmental goals in a manner consistent with a sound economy. As the only statewide private, nonprofit, nonpartisan association to represent the interests of both industry and labor, CCEEB takes great pride in its ability to achieve results by bringing creative and effective solutions to the forefront of policy debate.

CCEEB's membership includes companies that represent over 75% of the owners of the power generating facilities that utilize once through cooling ("OTC") systems. Such companies will be impacted by the US EPA Phase II 316(b) regulation. CCEEB members also include several owners of facilities that may be impacted by the US EPA Phase III 316(b) regulation, including oil and gas refining operations and offshore oil production. These CCEEB members wish to express their viewpoints associated with the use of OTC systems in California.

Power plants utilizing OTC systems play an extremely important role in powering California and its economy by generating efficient and reliable electricity. In fact, 21 power plants producing approximately 24,000 megawatts utilize this efficient cooling technology in California, which represents approximately 40% of the total electrical generating resources in California. Many of these coastal power plants are also located in the heart of the electrical load centers of California, thereby providing critical local and regional electrical grid reliability services.

CCEEB members that own and operate systems that utilize surface water for cooling in OTC systems support the following comments and recommendations.

Impacts of Once Through Cooling Systems Are Biologically Insignificant

Several staff members of the California Energy Commission and California Coastal Commission have joined with a number of environmental groups advocating the closure of coastal power plants claiming evidence of enormous damage to coastal fisheries and ecology.[1] However, both the facts and findings of recent assessments of California coastal OTC intakes provide strong evidence to the contrary, finding that OTC systems have not damaged coastal fisheries or other resources, and also have demonstrated an absence of risk to California's present and future populations of entrained organisms and to the beneficial uses of California's coastal water.

Every five years the Regional Water Quality Control Boards ("RWQCB") review the NPDES permits for use of the intake water in OTC systems. Initial, and often recurring, impingement and entrainment evaluations were required at facilities utilizing OTCs back in the early 1980's, which demonstrated these systems were not causing significant adverse impacts to marine ecosystems. In recent years, the interest and activities surrounding proposals for the installation of new generating technology for improved efficiency has provided a large amount of contemporary information on the effects of impingement and entrainment at the state's existing OTC intakes. A great deal more of this kind of information is also available as a result of information gathering requirements in EPA's new Phase II 316(b) compliance and performance standards (see Table 1 below).

At every one of the facilities with data from previous intake studies that demonstrated no adverse impacts, the recent studies also demonstrated an absence of present day damage and found the source water communities of entrained fish and invertebrate larvae were remarkably unchanged[2,3]. Independent scientists consulting to the RWQCB made specific findings of this nature in their final review of the Moss Landing 2000 & 2001 316(b) studies of the Elkhorn Slough, Moss Landing Harbor, and Monterey Bay source water in comparing them to their own study findings from 1977, a period of nearly three decades.

The California Department of Fish & Game has stated in its Nearshore Fisheries Management Plan that an over-fished stock is one that has been reduced to 30% of its unfished biomass and that controls would need to be enacted whenever a stock is reduced to 60% of its unfished biomass. The designs of recent entrainment studies are based on similar principles of fishery management and provide estimates of the numbers entrained organisms as a percentage of the total larvae at risk of entrainment (source water populations). In 316(b) studies of OTC systems, the entrained fraction of the source water population of larvae usually averages between 2 and 10 percent of the estimated source

[1] See for example public comments from Mr. Tom Luster (CA Coastal Commission) at the SWRCB workshop in Laguna Beach, September 26, 2005.
[2] Moss Landing Power Plant 316(b) Study
[3] South Bay Power Plant 316(b) Study

populations and is much lower for most species. The 2 to 10 percent average entrained fraction represents very small impacts to adult fish due to the high natural mortality of larval fishes exceeding 99.9 percent.

The statements of significant impacts from OTC systems are often centered on the large numbers of larvae that are entrained as the only evidence needed to assume that there has to be ecological damage. However, as demonstrated by 316(b) studies, these losses of larvae are very small fractions of the source water populations of the larvae, which are present in enormous numbers in the ocean and bays (see Table 1 below). Further, the fractional losses caused by entrainment are insignificant to sustaining the adult populations of the fish relative to the levels used for fishery management, especially when >99.9 percent of the larvae will die naturally before becoming adults with absolutely no affect on the size of the adult fish populations. For many, this scientific fact of population dynamics, which is used to regulate and assure sustainable harvests of natural populations, is difficult to comprehend or is philosophically at odds with their ideas of preservation.

Table 1 – Summary of Entrainment Impacts from Select OTC Studies

Facility Name	Adult Equivalent Losses as a Percentage of Adult Source Water Populations	Average Proportional Entrainment Mortality as a Percentage of Source Water Larval Populations	Study Year
El Segundo	0.10 – 0.76 %	NA	1980
Huntington Beach	NA	0.6 %	2004
Diablo Canyon	NA	8.6 %	1996-1999
SONGS	0.01 – 6.9 %	NA	1979-1986
Moss Landing	NA	13.1 %	1999
Morro Bay	NA	21.0 %	2000
Scattergood	0.001 – 0.2 %	NA	1981
Harbor	0.8 – 1.8%	NA	1981
Haynes	NA	NA	1981
South Bay	NA	13.4 %	2001

The numbers of larvae produced by most fishes during their reproductive years as adults can be enormous, but only two of those larvae need to survive to adult to maintain a stable population level. For example, a single California halibut may release as many as 50 million eggs per year over a period of greater than 20 years, and a single rockfish may release up to one million larvae per year for several years to decades depending on the species. Other species such as gobies produce only a few thousand larvae per year per adult female over a much shorter lifespan, but even in these fishes, the total lifetime survival rate required to maintain the population is less than 0.1%. The incremental losses of larvae due to OTC systems do not have any measurable effect on fish populations

because they are adapted to living and reproducing in highly variable environments where the natural rates of mortality are very high and vary from year-to-year. The arguments presented by the California Energy Commission and California Coastal Commission staff and members of the environmental protest groups ignore the role of compensation (density dependent predation and recruitment) in maintaining these populations.

On the Pacific coast, evidence showing that high numbers of entrained larvae do not result in large impacts includes the following:

- Even though gobies are entrained in greater numbers than any other fish larvae, studies at the South Bay Power Plant showed very little change in annual estimates of goby larvae entrainment between studies in 1979–1980 and studies in 2001 and 2003. The absence of any long-term changes in larval productivity is supported by abundance data on adult gobies that showed increases in the population through time from 1994-1999.
- Although recent studies at the Encina Power Station show that goby larvae are entrained in higher numbers than other fishes, studies on adult gobies in Agua Hedionda Lagoon (where the Encina intake is located) showed much higher adult densities of gobies than similar studies from Batiquitos Lagoon where no power plant is located.
- Long-term monitoring in central California at the Diablo Canyon Power Plant, with an OTC volume of 2.5 billion gallons per day, showed no significant declines in nearshore fish populations over the 20 years of plant operation.

Phase II 316(b) Will Significantly Reduce Impingement and Entrainment at OTCs

Compliance with US EPA's Phase 316(b) performance standards requires reduction in impingement and entrainment at OTC systems even though these systems are not causing significant impacts to fish populations. The target reductions of 80 to 95 percent of impingement mortality and 60 to 90 percent of entrainment at all California's coastal facilities will, with very little uncertainty, assure the future protection of the beneficial uses of the source waters. If we have no evidence of damage on these uses over nearly three decades of operation, and recent assessments have determined that entrainment losses are below the levels allowed for sustainable harvest (as described above), then the significant reductions in these losses required by US EPA's new rule will ensure that OTC systems will have no significant effects on populations of fish, shellfish and other wildlife.

Existing State Policy Encourages the Use of Seawater for Power Plant Cooling

Established policy of the State of California {California Water Code Section 13550 ***et seq***., and State Water Resource Control Board Resolution 75-58} encourages the siting of power plants on the ocean in order to take advantage of the state's abundant seawater as a supply for power plant cooling in order to conserve the state's finite and limited supplies of freshwater for other purposes. Alternative cooling systems to OTC require the use of

substantial quantities of freshwater and/or having impacts to other environmental media, thereby providing many reasons why this remains a good policy for California, including:

- Once-through cooling systems are the most efficient and lowest cost form of cooling for power plants as compared to alternatives, including wet or dry cooling towers. Wet and dry cooling systems have been demonstrated to have moderate to large reductions in power plant thermal efficiency (energy penalty) when compared to OTC. EPA estimates efficiency losses would be approximately 2.4 to 5.3 percent from wet cooling and 8.6 to 10 percent from dry cooling as compared to OTC systems (July 9, 2005 Federal Register, page 41605; and EPA Technical Development Document, Chapter 5);

- The wet/dry cooling energy penalty noted above requires more fuel use to achieve the same number of megawatts of power as OTC systems. This increased fuel use causes associated increases in emissions of air contaminants that are avoided with use of the more efficient OTC systems, as well as increases the cost to produce the power;

- Use of wet cooling towers has been demonstrated to cause emissions of particulates that are not created with use of OTC systems;

- OTC systems avoid the use of large volumes of potable or reclaimed water typically used for wet cooling towers. Use of seawater in OTCs maintains larger available resources of potable and reclaimed water for other important uses and reduces the need to tap into additional potable water sources;

- Not using large volumes of potable water at power plants avoids the many environmental impacts associated with use of such water sources, including the storage of water, water transportation, groundwater pumping, impacts to lake, river, and stream fish and habitats, etc;

- OTC systems are low profile cooling systems and avoid the visual impacts associated with the comparably large-sized wet or dry cooling towers, both from the physical structures themselves and from vapor plumes from wet towers. Because power plants that use OTC systems are often in constrained coastal areas, use of wet or dry cooling towers may be prohibited due to local visual resource issues or unavailability of the necessary real estate;

- OTC systems avoid the significant noise impacts normally associated with wet or dry cooling towers;

- OTC systems make possible the synergies of a co-located desalination plant to utilize a single seawater intake structure to efficiently use seawater for power plant cooling and desalination for production of critically needed additional potable water supplies for California;

These benefits associated with the use of OTC systems are often over-looked when discussing OTC systems. Further, the state's list of approved water quality basin plans for bays and estuaries explicitly recognize the compatible, beneficial use of the water for industrial cooling water. For these reasons, the existing state policies of encouraging the use of seawater for industrial cooling purposes remains a good and environmentally sound policy for California.

Technological Solutions Remain Uncertain and Costly

As part of the Phase II 316(b) regulation, facilities with OTC systems are required to assess the feasibility and effectiveness of intake technological controls that may reduce impingement and entrainment levels. These assessments are still on going, but there remains significant uncertainty about the efficacy and technological feasibility of any of these control systems. The very different attributes of the intake structures and associated oceanographic conditions at the 21 California coastal power plants make it very difficult to engineer impingement and entrainment controls that would work at more than one of the intakes. One successful example is the use of velocity caps on offshore, submerged intake structures at many southern California facilities. US EPA recognizes these velocity caps as effectively reducing impingement by over 80%. These velocity caps are used on approximately six facilities in southern California.

Besides the uncertainty associated with technological feasibility, there is also uncertainty associated with the cost of effectively reducing impingement and entrainment. Many of the possible impingement and entrainment control systems have extremely limited, if not non-existent, commercial applications presently in use on OTCs. Because of this, it is very difficult to determine the cost of meeting the Phase II 316(b) standards. US EPA did estimate costs for many of these facilities as part of the development of the Phase II 316(b) regulation, but not for all.

In its Economic and Benefits Analysis document to the Phase II 316(b) regulation, EPA estimated the <u>total national</u> social costs associated with Phase II 316(b) compliance to be $389.2 million (annualized using a 7% discount rate over a 10 year amortization period and in 2002 dollars). EPA estimated the annualized social costs for the California facilities to be $31.7 million (Economic and Benefits Analysis for the Final Section 316(b) Phase II Existing Facilities Rule, Table D1-4). The EPA annualized estimate equates to approximately $220 million in total capital expenditures ($2002) for the California facilities to comply with the Phase II 316(b) regulation. It should be pointed out that US EPA did not do facility specific cost evaluations, but instead only conducted estimates for general OTC configurations and then applied a national cost average to calculate facility specific costs. Therefore, these estimates do not take into consideration any of the site-specific issues associated with retrofitting the intake structure or any of the oceanographic or locational issues associated with constructing an intake modification.

EPA also compared these costs of compliance with the estimated benefits associated with the Phase II 316(b) regulation. EPA estimated total social benefits to be $82.9 million nationally, and $3 million in California (annualized using $2002). This equates to cost to

benefit ratios of 4.7:1 nationally and over 10:1 in California. It is important to note that the cost to benefit ratio in California is over two times less cost effective as compared to the national average.

Detailed EPA Review Concluded that Wet and Dry Cooling Retrofits are not Economically Practicable for Existing OTC Systems

During the September 26, 2005, State Water Board OTC Workshop, several public comments urged the Board to require retrofit of OTC systems to wet or dry cooling technology. While these technologies are certainly good methods of cooling for newly constructed power plants, they have serious and significant technical hurdles associated with being retrofitting onto existing power stations. Some of those issues can be summarized as:

- Since each of the 21 California power plants using OTC systems are located on, or in close proximity, to the coast (either ocean, bay, or canal), the very large required space for installing wet or dry towers is often not available at these locations;

- As pointed out earlier, retrofitting to wet or dry cooling towers can cause new and different environmental impacts. For example, wet cooling towers directly emit particulate matter emissions to the air, which can impact ambient air quality. Secondly, wet or dry cooling reduces the thermal efficiency (energy penalty) of a power plant, thereby requiring it to combust more fuel and emit more air emissions in order to generate the same amount of power as an OTC. The same holds true for dry cooling, which even has an even greater reduction in thermal efficiency associated with its use than wet towers;

- Wet and dry cooling towers tend to not meet coastal development requirements by causing potentially significant adverse impacts to visual resources and increase the noise footprint compared to facilities that utilize OTC systems;

- Wet cooling towers require the use of significant volumes of freshwater, which puts additional strain on the already severely limited freshwater sources for California. Even using reclaimed water for wet towers has an impact on freshwater sources, as then that reclaimed water cannot be used to offset some other more appropriate freshwater user;

- Wet and dry cooling retrofits at existing OTC facilities are very expensive. For example, the San Onofre Nuclear Generating Station (“SONGS”) evaluated retrofit costs to these two cooling methods and found retrofit costs of dry cooling to be approximately $500 million and wet cooling to be $370-450 million, depending on the type of wet cooling utilized. These represent just the capital and construction costs associated with these technologies. EPA estimated the average cost of retrofitting to wet cooling to range from $130 to 200 million for higher flow facilities, but noted the estimates did not fully incorporate costs associated

with acquiring land needed for these large cooling structures (July 9, 2004 Federal Register, page 41605). As noted before, there are additional and substantial costs associated with de-rating the generating units, reduction in thermal efficiency, higher operations and maintenance costs, etc. that are not included in these estimates.

Assuming wet or dry cooling retrofits were required at all 21 California facilities currently operating with OTC systems (approximately 24,000 megawatts), and using the above noted retrofit cost estimates and average estimated thermal efficiency losses, would result in the following impacts to the state's power generation capacity:

- Total capital costs for wet or dry cooling retrofits would be $1.1 to 4.2 billion;

- Retrofit to wet cooling would create thermal efficiency penalties roughly equivalent to 925 megawatts of lost power generating capacity (approximately two large scale combined cycle power plants);

- Retrofit to dry cooling would create thermal efficiency penalties roughly equivalent the 2200 megawatts of lost power generating capacity (approximately one of California's nuclear power plants or four to five large scale combined cycle power plants).

US EPA recognized these significant and serious costs and issues and concluded that it would not require Phase II 316(b) facilities to have to consider retrofitting to wet or dry cooling as part of the Phase II 316(b) regulation (July 9, 2004 Federal Register, pages 41605 and 41608). CCEEB believes California should apply the robust set of EPA's information and findings to come to the same conclusion and not require wet or dry cooling alternative evaluations for these OTC facilities.

Restoration is a Good Option for California

Because of the uncertain nature of technological solutions, maintaining the option for restoration measures as a means of achieving compliance with Phase II 316(b) is extremely important for California. Restoration has many benefits, including:

- Restoration almost always proves more feasible, cost-effective, and ecologically beneficial than the filtering and flow reduction alternatives identified in the rule;

- Habitat restoration, such as wetlands enhancement, will provide concurrent ecological benefits that will exceed those from directly minimizing intake impingement mortality and entrainment losses, and provide collateral environmental benefits such as floodwater storage, water filtration and wildlife habitat;

- The overall benefits from restoration projects can be expected to extend well beyond the remaining life of the Phase II facility;

- Restoration measures can achieve a net increase in fisheries populations, whereas cooling water intake structure control measures may only avoid losses to larval populations;

- Even in cases where there are equivalent benefits (i.e. no net increase), restoration measures can be more cost effective than engineering control alternatives. This helps mitigate cost increases to electric power consumers.

For these reasons, California should work with electricity generators to create a more holistic and rational approach to addressing impingent and entrainment losses, diverting resources to those activities that have the greatest net benefit to the environment. CCEEB believes that California should have the flexibility to review a 316(b) restoration proposal and make a sound decision as to whether restoration is an appropriate compliance alternative for that facility. Therefore, CCEEB recommends that the State Water Board and other state agencies support the US EPA in its effort to retain the restoration option in the regulation.

State Guidance on the Federal Rule is Needed, Not a New or Different State Policy

Several members of CCEEB attended the State Water Board workshop on September 26, 2005 regarding OTC systems utilized by power plants in California. CCEEB understood the workshop was organized to hear comments on whether or not a state policy needs to be developed regarding OTC systems. CCEEB provided oral testimony stating that CCEEB believes the answer to that question is no. CCEEB members provided several very strong justifications for that position, the first and foremost of those reasons are repeated below.

First, US EPA spent nearly a decade developing the Phase II 316(b) regulation that now applies to power plants utilizing OTC systems. The rule targets very substantial reductions in impingement and entrainment levels at power plants, while also retaining the needed flexibility to meet the reductions in a feasible and cost effective manner. The hue and cry being raised that OTCs are a significant source of adverse impacts to California's coastal marine biology and ecology is inconsistent with the data that has been collected during almost three decades of operations of these facilities. The section of this letter entitled "Impacts of Once Through Cooling Systems are Biologically Insignificant" described the evidence from recent and historical impingement and entrainment studies, from which the weight of the findings show that OTCs are not causing significant impacts to fish populations. It is therefore premature to decide that this regulation is not the right balance of environmental protection and cost effective power production, as its full implementation is not yet realized. California should only consider a different regulatory approach if the Phase II 316(b) is proven to be insufficient for California's needs or goals.

Second, compliance with the Phase II 316(b) regulation in full swing, with many of the mandatory steps already being completed by the regulated facilities. Those steps include

recent and comprehensive impingement and entrainment studies at each of the facilities and an evaluation of the Phase II 316(b) compliance options, including the feasibility of technological solutions to meeting the impingement and entrainment standards. The section of this letter entitled “Technological Solutions Remain Uncertain and Costly” described some of those challenges. For these reasons, a new or different state policy at this stage will only serve to provide uncertainty and delay implementation of the federal regulation and most likely delay the desired end result, which is to see reductions in impingement and entrainment.

While CCEEB does not support formal state policy development, we do believe that the State Water Board can, and should, provide valuable oversight and authority in the state's implementation of the federal 316(b) regulation. CCEEB believes the most appropriate way to do that is through specific guidance on key provisions of the regulation. In that way, the State Water Board can ensure implementation of the regulation is carried out in a consistent and efficient manner throughout the state. However, such guidance should be developed to stay within the bounds of the federal 316(b) regulation and to not limit compliance flexibility for the facilities.

In the absence of the expected future federal guidance, CCEEB suggests that the State Water Board develop guidance to aid in assuring an appropriate level of conformity in implementation among the Regional Boards. Such guidance should be developed in an open and transparent process on key topics and would serve to clarify federal rule definitions and requirements as they would apply to California OTC systems. Some suggestions for key topics that California could provide guidance to include:

- Calculation Baseline, including alternatives for establishing appropriate credit for existing I&E controls such as velocity caps, offshore intakes, fish handling and return systems, fish diversion systems, etc.;

- Compliance implementation alternatives, including CEQA compliance, issues regarding construction in the coastal zone, project permit approvals, etc.;

- Benefits Valuation alternatives for cost-benefit analysis;

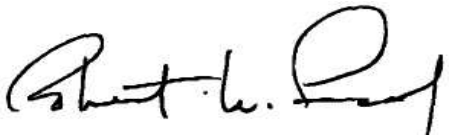
- Restoration Measures – alternatives for facilities to develop restoration plans that meet the I&E standards;

- Definition of “not significantly greater than” for purposes of establishing compliance cost caps in the cost-cost and cost-benefit site specific assessments;

CCEEB thanks the State Water Board for its thoughtful consideration of CCEEB’s viewpoints and recommendations. If you have any questions do not hesitate to call me for further discussion.

Thank you for your consideration of this matter. If you would like to discuss it further, please contact me at (916) 444-7337.

Sincerely,



Robert W. Lucas

cc: Tam Doduc, Chair, SWRCB
Art Baggett, Board Member, SWRCB
Richard Katz, Board Member, SWRCB
Celeste Cantu, SWRCB
D. Gregorio, SWRCB
Victor Weisser, CCEEB
William Quinn, CCEEB
Jackson Gualco, CCEEB