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April 2, 2008

Mr. John Robertus
Executive Officer
California Regional Water Quality Control Board
San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

Via Electronic Mail

RE: Carlsbad Desalination Project
Revised Flow, Entrainment and Impingement Minimization Plan
Environmental Group Supplemental Comments

Dear Mr. Robertus:

The following comments are submitted on behalf of the San Diego County chapter of the Surfrider Foundation and San Diego Coastkeeper. They are intended to supplement the letter submitted by Gabe Solmer (Coastkeeper) and Joe Geever (Surfrider) earlier today.

The Board's consideration of approval of the Revised Flow, Entrainment and Impingement Minimization Plan at its April 9, 2008 board meeting would be both legally inappropriate and logistically imprudent. Porter-Cologne section 13225 and case law **mandate** that the Regional Board coordinate with other agencies similarly charged with responsibility for water quality protection prior to taking action on a matter equally within such other agencies' jurisdictions. As was made clear in the March 20, 2008 comment letter from the California Coastal Commission, significant additional resource agency input is required before Poseidon's mitigation plan can be appropriately considered for final approval by any agency.

As your staff is well aware, the Coastal Commission is attempting to coordinate such a multi-agency meeting in the very near future, and yet for some reason the Regional Board is considering premature approval of Poseidon's plans without the benefit of such input. This makes absolutely no sense, and in fact, would add yet another confusing chapter to the extraordinarily dysfunctional entitlement process that has resulted in the present jurisdictional conflict between agencies.

To put it bluntly, the Regional Board staff does not possess sufficient biological, ecological, fisheries management, wetlands restoration and endangered species expertise to determine whether Poseidon's proposal will sufficiently mitigate long term coastal resource impacts from the intake of 300 million gallons of lagoon water per day. From the record that has been made available, it does not appear that the Regional Board has contracted with consultant experts to review and comment on Poseidon's plan. Therefore,

reliance solely on Regional Board staff for analysis will not suffice.

Only through coordination with staff from the Coastal Commission, California Department of Fish and Game, United States Fish and Wildlife Service, and National Marine Fisheries Service will the Regional Board be able to render an appropriate recommendation on the mitigation proposal. If the decision to approve is made prior to the agency coordination meeting, the record will be insufficient to support such decision, the approval will be subject to legal attack, and the project will be even further delayed. Because the project can not move forward without Coastal Commission approval of the mitigation plan anyway, it makes sense to continue the Board's consideration of the Revised Flow, Entrainment and Impingement Minimization Plan until appropriate resource agency input has been obtained.

Porter Cologne Section 13142.5

Attached please find a copy of Coast Law Group LLP's May 30, 2007 letter to the State Water Resources Control Board comprehensively addressing the application of the *Riverkeeper II decision (Riverkeeper, Inc. v. United States EPA, 475 F.3d 83, 97 (2d Cir. 2007))* to Porter Cologne section 13142.5. To date, no agency, including the Regional Board, has provided rebuttal to the arguments put forth in this letter. When this issue was raised by Regional Board staff in its February 19, 2008 letter, Poseidon completely dodged the issue, opting instead to mischaracterize and/or ignore the clear implication of the statute and *Riverkeeper II's* applicability to the current situation.

Recently, the State Water Resources Control Board articulated an interpretation of the statute's meaning, and did so in a way inconsistent with that put forward by Poseidon in its March 7, 2008 response to the Regional Board's February 19th letter. The State Water Board Scoping Document on its "Water Quality Control Policy on the Use of Coastal and Estuarine Waters For Power Plant Cooling" (dated March, 2008) states:

> Finally, the Water Boards must also consider the legislative directive in Water Code §13142.5 when regulating cooling water intake structures. Under the Clean Water Act, facilities must, at a minimum, comply with section 316(b) requirements and any more stringent applicable requirements necessary to comply with state law. Section 13142.5 has a more limited coverage than section 316(b) in that the former covers only new and expanded coastal facilities. However, section 13142.5 appears to be more stringent than section 316(b) in one respect. **Section 13142.5 requires use of the best available technology feasible "to minimize the intake and mortality of all forms of marine life", without regard to whether these impacts are adverse, in contrast to section 316(b) which focuses on "minimizing adverse environmental impact."**

(Emphasis added) OTC Scoping Document, p. 31.

While Poseidon consistently argues that federal Clean Water Act section 316(b) regulations and policies do not apply to its desalination project proposal, there can be no dispute that Porter Cologne section 13142.5 is applicable to the project's seawater intake. Pursuant to the State Board's interpretation noted above, regardless of whether applied to power plants or desalination plants, the entire legal and scientific framework under which Poseidon has crafted its mitigation proposal is just plain wrong.

A simple review of Poseidon's response on the subject in its March 7th letter shows that Poseidon considered compliance with section 13142.5 to require minimization of project related impacts to marine life, **not minimization of intake and mortality of all forms of marine life.** (See Poseidon's March 7, 2008 Response Letter, response to question no. 1). Yet, the State Board's contrary interpretation of the statute could not be more clear:

> Finally, section 316(b) requires that the technology be the best available for "minimizing adverse environmental impact." Water Code section 13142.5, **in contrast**, requires that new and expanded industrial facilities using seawater for cooling employ the best available technology feasible "to minimize the intake and mortality of all forms of marine life," **irrespective of whether these impacts are adverse.**

(Emphasis added) OTC Scoping Document, p. 42. Given Poseidon's desire to distance itself from *Riverkeeper II* on an argument that cooling water intake regulation does not apply to desalination plants, it is quite ironic that the company in this instance seeks to interpret 13142.5 in the more limited manner expressed in CWA section 316(b). While it is true that 316(b) does not apply to desalination plants, there simply exists no basis in Porter Cologne to interpret 13142.5 differently for cooling water than for desalination source water intake.

Unless the Regional Board believes it is entitled to interpret Porter Cologne in a manner inconsistent with the State Board, and we do not believe this to be so, there is no legal option but to deny Poseidon's proposed mitigation plan as inadequate, and direct that yet another Revised Flow, Entrainment and Impingement Minimization Plan be submitted for agency and public review.

Sincerely,

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VIA FIRST CLASS MAIL
May 30, 2007

Chairwoman Tam Doduc
Members of the Board
California State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95812

RE: Seawater Desalination Intakes, Once-Through Cooling Regulations
Riverkeeper v. EPA, 475 F.3d 83, 97 (2d Cir. 2007).

Honorable Board Members:

Please accept this letter on behalf of the Surfrider Foundation and its more than 50,000 members. The Surfrider Foundation is a non-profit, grassroots environmental organization dedicated to the preservation and enjoyment of the world's oceans, waves and beaches, through conservation, activism, research and education (CARE). Although our name implies the Surfrider Foundation consists of surfers, we are an environmental organization, not a surf club. Our membership includes fisherman, kayakers, divers, birdwatchers and anyone else who is concerned about the coastal and ocean environment.

The purpose of this letter is to:

- Introduce Board members to the issues of "cooling water intakes" for coastal power plants and recent regulatory and judicial actions pertaining thereto;

- Summarize existing regulations on "cooling water intakes" in light of a recent Federal Court of Appeals decision;

- Summarize provisions of the Porter-Cologne Water Quality Control Act dealing with open ocean intakes, and to highlight California's more expansive regulatory protections concerning the use of seawater for any industrial purpose (as opposed to the narrow issue of "cooling water" in the Federal Clean Water Act); and,

- Recommend that the State Water Resources Control Board give guidance to the Regional Boards to properly implement the marine protective mandates of the Porter-Cologne Water Quality Control Act.

I. INTRODUCTION

The Surfrider Foundation has been concerned with the massive impact on marine life caused by coastal power plants using the once-through-cooling (OTC) systems that draw seawater directly from oceans, bays or estuaries. In fact, Surfrider was one of many co-plaintiffs who successfully challenged the U.S. Environmental Protection Agency's regulation of this practice at existing power plants. Currently, 21 coastal power plants in California are permitted to draw almost 17 billion gallons of seawater through their cooling systems each day. This practice has a tremendously adverse, but avoidable, impact on California's fragile coastal ecosystem.

The federal Clean Water Act ("CWA")(33 USC § 1251 et. seq.) and California's Porter-Cologne Water Pollution Control Act ("Porter-Cologne")(Cal. Water Code § 13000 et. seq.) are the laws regulating cooling water intakes and other industrial systems that draw seawater directly from the ocean for industrial uses. Whereas CWA Section 316(b) requires power plants to use the "best technology available" to reduce the impacts on marine life that result from cooling their generators, Section 13142.5(b) of Porter-Cologne extends this marine resources protection to all other industrial installations.

In a recent case decided by the Federal Court of Appeal, Second Circuit, section 316(b) of the CWA was interpreted in a manner that makes it impossible to grant or further extend permits for OTC intakes under the Clean Water Act. (*Riverkeeper, Inc. v. United States EPA*, 475 F.3d 83, 97 (2d Cir. 2007) ("*Riverkeeper II*")). Under California law, the same must be true for any proposed acquisition of seawater through an open ocean intake for industrial purposes.

Consistent with the *Riverkeeper II* court decision, though prior to the ruling, the California State Lands Commission last year passed a resolution recognizing the adverse impacts of OTC systems and resolving not to approve new leases for power plants using OTC systems.[1] In addition, the State Lands Commission resolved that it would not permit extensions or amendments to existing leases for OTC power plants, "unless the power plant is in full compliance...with requirements imposed to implement both Clean Water Act section 316(b) and California water quality law..."

A complicating factor to the phasing out of OTC systems is the proposed co-location of desalination plants intending to use the OTC systems as source water for the desalination process. Virtually every proposed desalination plant under consideration in California is proposed to be co-located with a coastal power plant, including: the Huntington Beach Generator Station, Encina Power Station (Carlsbad), San Onofre Nuclear Generator Station, Moss Landing Power Plant, El Segundo and a variety of smaller plants. As recognized by

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[1] Resolution by the California State Lands Commission Regarding Once-Through Cooling in California Power Plants, adopted April 17, 2006 ("State Lands OTC Resolution"). The Office of Administrative Law found the State Lands OTC Resolution to be an "underground regulation." (2006 OAL determination #2; OAL FILE # CTU 06-0525-01). Nevertheless, the Resolution remains valid unless overturned in court.

the State Lands Commission, the prohibition and phase out of OTC systems necessarily affects the approval of desalination facilities. The State Lands Commission's resolution expressly rejected the idea of permitting these co-located desalination plants:

> WHEREAS, it is premature to approve new leases or extensions, amendments or modifications of existing leases to include co-located desalination facilities or other uses of once-through cooling water systems until first *considering whether the desalination facility would adversely affect compliance by the power plant* with requirements imposed to implement both the federal Clean Water Act Section 316(b) requirements and any additional requirements imposed by the State Water Resources Control Board and appropriate Regional Water Quality Control Board under state law and their delegated Clean Water Act authority[2]

As will be discussed further below, in light of the recent ruling by the Federal Court of Appeals in the *Riverkeeper II* case, **it is no longer permissible to issue permits, extend, amend, or modify existing leases for OTC systems and therefore it is impossible to grant permits to build and operate desalination plants co-located with OTC powerplants**. Further, a proper reading of section 13142.5 of Porter-Cologne, along with the application of the *Riverkeeper II* case, directly prohibits desalination plants from drawing "source water" through open ocean intakes.

The State Water Resources Control Board should affirmatively recognize this regulatory framework and issue a resolution to prohibit any Regional Board from permitting any desalination plant proposing the use of an open-ocean.

II. BACKGROUND

Seawater is more than just salty water. It is habitat for millions of creatures. Fish, crustaceans, phytoplankton (plant species), zooplankton (small animal species) and numerous types of larvae live in the shallow nutrient-rich waters along our coast. These coastal waters support a diverse ocean ecosystem responsible for the maintenance of commercially productive fisheries. Yet, according to recent studies, 60% of the California's fisheries are currently in decline. According to the National Marine Fisheries Service and two "blue ribbon" panels on the state of our coasts and oceans, the US Commission on Ocean Policy and the Pew Ocean Commission, many of our historical fisheries are currently unsustainable or on the verge of collapse. Further, a report prepared for the California Energy Commission found coastal power plants using OTC technology are in part responsible for the decline in states fisheries.

Even given such dire reports on the state of our marine life, more destruction from

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[2] State Lands OTC Resolution (*emphasis* in original).

open ocean intakes for seawater desalination are already in the planning and permitting process. The State Water Resources Control Board must direct all regional boards to deny all applications for renewal, amendment or extension of NPDES permits or waste discharge permits for OTC or open ocean intakes for desalination plants.

A. Coastal Generators' Impact on Healthy Marine Eco-systems.

California currently has 21 coastal power plants permitted to intake nearly 17 billion gallons a day of seawater for once through cooling (OTC). These power plants are acting as giant seawater vacuums, sucking millions of fish and other marine life through the intake systems. As characterized by the CEC:

> These power plants indiscriminately 'fish' the water in these habitats by killing the eggs, larvae, and adults when water drawn from the natural environment flows through the plant (entrainment impacts) and by killing large adult fish and invertebrates that are trapped on intake screens (impingement impacts).[3]

The current state of our science, and our limited understanding of marine physical and ecological processes, makes it difficult to quantify the amount of cumulative damage these 21 power plants are causing to the marine environment. However, the studies from individual power plants demonstrate large scale impacts. For example, studies have shown that fifty-seven tons of fish are killed annually when all units of the San Onofre Nuclear Generating Station are operating.[4] The impingement and entrainment study prepared for the Huntington Beach Generator Station estimates that up to 71,000 anchovies may be killed every four months when the OTC system is running at full capacity.[5] A study of the Morro Bay Generator Station found that for every 1000 cubic meters of seawater drawn into the intake, one million mussel and clam larvae were entrained.[6] Three OTC power plants in Santa Monica Bay (Redondo Beach, El Segundo, and Scattergood Generating Stations) consume 13% of the nearshore waters in the Santa Monica Bay every 6 weeks.[7] With the exception of consultants hired by the power plants themselves, there exists neither in academia nor among regulatory agencies any scientific debate whether direct and cumulative effects of OTC power plants are having a significant adverse impact on California's coastal ecosystem. It is clear that they are.

Pursuant to recent regulations for existing power plants promulgated by the EPA for intake structures under the Clean Water Act (Phase II Rules), coastal generators must reduce impingement (the trapping and killing of marine life on intake screens) for all life

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[3] CEC 2005 Report at 1.

[4] State Lands OTC Resolution.

[5] When the intake is using 527 mgd. (Huntington Beach Desalination Facility, Final Draft Intake Assessment at p. T-8).

[6] CEC 2005 Report at 19.

[7] CEC Report at 31.

stages of fish and shellfish by 80 to 95%. (40 CFR 125.94 (a)(1)).[8] Entrainment (the mortality of smaller marine life that passes through the intake screens) must also be reduced under Phase II Rules by 60% to 90%. (40 CFR 125.94(b)(1)). As discussed further below, these ranges for allowable impingement and entrainment impacts were struck down in the *Riverkeeper II* case, with the Court holding that power plants **must** achieve the "best" reduction in impingement and entrainment that they can. (*Riverkeeper II*, *supra*, 475 F.3d at 107-08).

The primary alternatives for OTC systems are closed-cycle recirculating systems and dry cooling systems. Closed-cycle recirculating systems essentially work like giant radiators; the cooling water is circulated around the generators, allowed to cool in towers or other locations such as a reservoir, and then re-circulated. While closed-cycle cooling systems still use water to replace water lost to evaporation, the water intake is significantly less than OTC systems which constantly circulate new water. According to the EPA, closed-cycle cooling systems reduce water use by 72% to 98% over OTC systems. (*Riverkeeper II*, *supra*, 475 F.3d at 104 n. 16).

Dry cooling systems use fans and heat exchangers to cool down the generators, and, as the name implies, do not use a significant amount of new water. Typically, because of costs, such systems have been used in areas where a sufficient water supply is simply not available. Both dry cooling systems and closed cooling systems avoid and eliminate the significant adverse impacts of impingement and entrainment. Closed-cycle water cooling systems are deemed to comply with the CWA. (40 CFR 125.94(a)(1)(i)). Essentially, the EPA has found that closed-cycle cooling systems are the "best technology available." Any alternative cooling technology must demonstrate it can reduce the impacts to marine life commensurate with closed-cycle cooling systems.

B. Seawater Desalination Intake Potential Impact on Healthy Marine Eco-systems.

The most commonly proposed method of desalination entails pre-filtering seawater followed by forcing it at high pressure through a series of membranes to remove impurities in the water. This process is called seawater reverse osmosis (SWRO). The finest membranes are so dense that essentially only water molecules can fit through the membranes. Thus, the pre-filtration system and the membranes filter out all impurities such as salt and other minerals, microscopic organisms, fish eggs, and larvae. The end product is water devoid of all minerals and biological organisms.

Even more so than OTC systems, seawater desalination kills sea life caught within its source water intake through "impingement" and "entrainment." Impingement is caused when marine life, such as fish, sea turtles and even marine mammals, are caught against the intake screens. Entrainment is the mortality caused by small organisms being caught within

[8] These ranges in this rule were struck down in *Riverkeeper, Inc. v. United States EPA*, 475 F.3d 83, 97 (2d Cir. 2007).

the filtering system. 100% of the entrained organisms are killed in the desalination process. While impingement impacts may be mitigated by reducing the velocity of the water intake, there is no proven viable method of reducing entrainment except for avoiding the direct intake of ocean water.

Much like for OTC, there a number of different seawater intake options that would avoid impingement and entrainment of marine life in desalination source water. First and foremost, there is simply no reason to use seawater to produce potable water. Purifying brackish water or recycling waste water uses the same technology, but costs far less because there are fewer minerals in the water. Seawater, on the other hand, contains high concentrations of minerals and salts, which increases the energy demand to force the "source water" through the RO filters, as well as increased maintenance costs of the filters.

There are also environmentally preferable methods of drawing seawater into the desalination system, such as vertical and horizontal beach wells. These wells are either located along the beach, below the water table, or buried beneath the ocean floor, at a sufficient depth to not interact with marine life. Desalination proponents have claimed that such wells are unsightly, expensive and would not produce sufficient water intake. However, a pilot study of slant wells in Orange County demonstrated that beach wells could be completely buried.[9] Furthermore, the results of the Orange County study demonstrated that beach wells could supply 30 million gallons a day (mgd) of seawater.

Obviously, proponents of desalination plants would like to avoid the costs of constructing beach wells or other subsurface intakes. One of the ways desalination plants have been avoiding the issues of impingement and entrainment, is to propose co-locating with existing power plants using OTC systems. According to the desalination proponents, because such co-located desalination plants would use the water after the power plant uses the seawater for cooling, the desalination plants have no additional significant impacts on marine organisms.[10] However, given the ruling in *Riverkeeper II* (*Riverkeeper, Inc. v. United States EPA*, 475 F.3d 83, 97 (2d Cir. 2007), OTC systems are not the "best technology available" and therefore cannot be deemed in compliance with the Clean Water Act. Therefore, proposed desalination plants cannot rely on the continued availability of a power plant's OTC intake system.

Riverkeeper II not only has a direct impact on power plants, but also is directly applicable to California desalination plants. California desalination plants must not only comply with the Clean Water Act, but must also comply with Porter-Cologne. Open ocean seawater intakes for desalination facilities, like OTC systems for coastal generators, cannot comply with the CWA or the Porter-Cologne Act, because they are not the "best technology available." (Cal. Water Code § 13142.5(b)). Intakes which are sub-seafloor (e.g., beach

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[9] "Dana Point Ocean Desalination Project - Engineering Feasibility Report" (March 2007), available at http://www.mwdoc.com/.

[10] *See, e.g.*, Carlsbad Desalination Project (Poseidon) FEIR, 4.3-35 to 4.3-36 (finding no additional significant impact attributable to the desalination plant).

wells or man-made sub-seafloor "galleries") comply with the Clean Water Act and Porter-Cologne.

III. UNDERSTANDING *RIVERKEEPER II* CASE IMPLICATIONS

The *Riverkeeper II* case, decided January 25, 2007, struck down certain aspects of the "Phase II Rules" promulgated by the U.S. EPA on Section 316(b), the regulation of cooling water intake systems. (*Riverkeeper, Inc. v. United States EPA*, 475 F.3d 83 (2d Cir. 2007)). Section 316(b) of the Clean Water Act states:

> Cooling water intake structures. Any standard established pursuant to section 301 or section 306 of this Act [33 USCS § 1311 or 1316] and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact. (CWA § 316(b); 33 USC § 1326(b)).

The comparable section of California's Porter-Cologne Water Quality Control Act states:

> For each new or expanded coastal power plant or other industrial installation using seawater for cooling, heating, or industrial processing, the best available site, design, technology, and mitigation measures feasible shall be used to minimize the intake and mortality of all forms of marine life. (Cal. Water Code § 13142.5(b)).

Thus, cooling water intake structures must be located, designed, constructed, and sized using the best technology available to minimize adverse environmental impacts. The EPA promulgated rules for the governance of cooling water intake structures for large power plants, specifically identifying closed-cycle cooling as the benchmark for "best technology available." (40 CFR 125.94(a)(1)(i)). EPA estimated the reduction of entrainment and impingement from these "closed cycle" systems to establish "performance standards" which allowed alternatives to these systems to meet the same mortality reductions. However, the "Phase II" rules included exemptions to the performance standards through either an individual power plant's cost-benefit analysis of "best technology available" or through the use of restorative measures.

The *Riverkeeper II* Court struck down these alternative considerations for determining whether a power plant complied with CWA section 316(b). The essential implication of the *Riverkeeper II* case is that OTC systems must be phased out in the near future.

A. <u>Cost-Benefit Analysis is not Permitted for Determining Best Technology Available for Cooling Water Intakes.</u>

As discussed in the Code of Federal Regulations remanded by the court, a power plant may comply with 316(b) by using a closed-cycle cooling system, or a system which reduces water intake to a flow commensurate with a closed-cycle cooling system. (40 CFR 125.94(a)(1)(i)). However, the Phase II Rules also allowed the Director to conduct a cost-benefit analysis of employing "best technology available" for a specific power plant. (40 CFR 125.94(a)(5)(i & ii)). In other words, if installing technology that would reduce impingement and entrainment to a level equal to that of a closed-cycle cooling system was more expensive than the estimated value of the marine life saved, the Director could find an inferior, but cheaper technology was the "best technology available" for a particular power plant. The Court in *Riverkeeper II* struck down that provision, finding that such cost-benefit analysis was not permitted under 316(b) of the Clean Water Act. (*Riverkeeper II*, *supra*, 475 F.3d 83, 98-99).

Thus, if the most optimally performing power plant uses closed-cycle cooling, and the technology may be reasonably borne by the industry, then closed-cycle cooling is the benchmark technology. If the technology cannot be reasonably borne by the industry, then such technology is essentially not "available" to the industry. (*Id.* at 99). However, if closed-cycle cooling can be reasonably borne by the industry, then it is the best technology available, regardless of whether it is significantly more expensive than cheaper, but less effective technology.

The court explained a "cost-effective" analysis which is permissible by the EPA. Once the EPA determines the "best technology available" that may be reasonably borne by the industry, the EPA may then accept cheaper technologies which meet the same benchmarks. The Court explained the analysis this way:

> [A]ssuming the EPA has determined that power plants governed by the Phase II Rule can reasonably bare the price of technology that saves between 100 - 105 fish, the EPA, given a choice between a technology that costs $100 to save 99 - 101 fish and one that costs $150 to save 100 - 103 fish (with all other considerations, like energy production or efficiency, being equal), could appropriately choose the cheaper technology on cost-effectiveness grounds. (*Riverkeeper II,sup ra*, 475 F.3d at 100).

However, the Court added that if the industry could reasonably bear the cost of saving 102 fish, the EPA could not accept the cheaper technology. (*Id.*) "The statutory directive requiring facilities to adopt the best technology cannot be construed to permit a facility to take measures that produce second-best results...especially given the technology-forcing imperative behind the Act" (*Id.* at 107-08(citations omitted; emphasis added)). Each power plant must reduce impingement and entrainment to the maximum extent possible using the best technology available.

B. Phase II Rules Must Require Power Plants to Reduce Levels of Entrainment and Impingement to the Maximum Extent Possible, not Solely within a Range of Acceptable Impact.

The Court in *Riverkeeper II* expressed serious concerns over the broad performance

ranges permitted to comply with the "best technology available" requirement. The Phase II required power plant operators to reduce impingement by 80% to 95% and entrainment 60% to 90%. (40 CFR 125.94(b)(1 & 2)). The Court found fault with such ranges, noting that such ranges permitted a power plant which could meet the upper end of the range, to comply with 316(b) by meeting the lower ends of the range. (*Riverkeeper II*, *supra*, 475 F.3d at 100).

The Court did note that the evidence suggests because impingement and entrainment mortality is not entirely within the control of the facility, a range of benchmarks are permissible. (*Id.* at 107). However, the Phase II rule must require a power plant to achieve the maximum reduction in impingement and entrainment it can. (*Id.*) The Court stated:

> Congress's use of the superlative "best" in the statute cannot be read to mean that a facility that achieves the lower end of the ranges, but could do better, has complied with the law. The statutory directive requiring facilities to adopt the best technology cannot be construed to permit a facility to take measures that produce second-best results...especially given the technology-forcing imperative behind the Act. (*Id.* at 107-08 (citations omitted)).

The Court concluded that if the EPA wished to retain the performance ranges, it must ensure that each power plant reduces adverse environmental impacts to the maximum extent technologically possible. (*Id.* at 108).

C. Restoration Methods Unacceptable to Achieve Compliance with CWA Section 316(b).

The final portion of the Phase II Rules for cooling water intakes stuck down by the Court in *Riverkeeper II* was the availability of restorative measures to achieve compliance with 316(b). "Restorative measures" are measures that attempt to improve habitat off-site to offset the adverse environmental impacts caused by cooling water intakes. So, for example, a lagoon restoration which increases juvenile fish habitat could achieve compliance with the mandates of 316(b) if such restorative measures "produce ecological benefits...at a level that is substantially similar the level you would achieve by meeting the applicable performance standards..." (40 CFR 125.94(c)(2)).

The Court categorically rejected "restorative measures" as a means for complying with the requirements of section 316(b) of the Clean Water Act. The Court found that

restorative measures were not part of the location, design, construction, and capacity of cooling intake structures, and therefore permitting compliance by using "restorative measures" violated the plain language of the statute. (*Riverkeeper II*, *supra*, 475 F.3d at 108-09.) The Court, quoting language from its previous *Riverkeeper I* decision, noted, "Restoration measures *correct* for the adverse environmental impacts of impingement and entrainment...but, they do not *minimize* those impacts in the first place." (*Id.* at 109 (quoting *Riverkeeper, Inc. v. United States EPA*, 358 F.3d 174, 189 (2d Cir. 2004) ("*Riverkeeper I*")). Plainly stated, restorative measures cannot be used to achieve compliance with 316(b) of the Clean Water Act.

IV. PORTER-COLOGNE WATER QUALITY CONTROL ACT

A. Porter-Cologne is Broader and More Protective of Marine Resources than the Clean Water Act.

The Porter-Cologne Water Quality Control Act is California's implementation of the Federal Clean Water Act. State water quality plans must meet the requirements of the Clean Water Act, but may be wider in scope and stricter than the requirements outlined in the Clean Water Act. (Cal. Wat. Code § 13170; *See also*, *Lake Madrone Water Dist. v. State Water Resources Control Board*, 209 Cal. App. 3d 163, 173 (1989)). The State Water Quality Control Board may set stricter standards than the Clean Water Act, but cannot set less protective standards. The Federal Clean Water Act sets the minimum water quality standards.

As discussed above, the proper interpretation of the Clean Water Act section 316(b) rules on "best technology available" essentially prohibits once-through cooling systems. Section 316(b) states:

> (b) Cooling water intake structures. Any standard established pursuant to section 301 or section 306 of this Act [33 USCS § 1311 or 1316] and applicable to a point source shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact. (33 USC § 1326(b)).

Section 316(b) clearly applies to power plants. However, given the unclear language in the Clean Water Act, regulatory agencies have not resolved whether such rules apply to desalination plants. Fortunately, the language in Porter-Cologne leaves no doubt that the regulation of intake structures includes all intake structures, not just power plants.

The Porter-Cologne Act's mandate on intake structures include:

> For each new or expanded coastal power plant or other industrial installation using seawater for cooling, heating, or industrial processing,

> the best available site, design, technology, and mitigation measures feasible shall be used to minimize the intake and mortality of all forms of marine life. (Cal. Wat. Code § 13142.5(b)(emphasis added)).

Thus, the language of California's Porter-Cologne Act is substantially broader than Section 316(b) of the Clean Water Act. Section 13142.5 specifically applies to, not only power plants, but also to seawater desalination plants or any other industrial installations using seawater. The State Water Resources Control Board **must** interpret section 13142.5 in a manner that is consistent with both 316(b) and the plain language of the Porter-Cologne Act. Section 13142.5 **must** be interpreted in a manner which prohibits both OTC systems and direct ocean water intakes for desalination.

B. Section 13142.5 must be read in light of the *Riverkeeper II* case.

The language of California Water Code section 13142.5 parallels the language in section 316(b) of the Clean Water Act in many ways. Section 316(b) requires the "location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact." (33 USC § 1326(b)). Similarly, Section 13142.5 of Porter-Cologne requires, "the best available site, design, technology, and mitigation measures feasible shall be used to minimize the intake and mortality of all forms of marine life." Thus, both acts require "best technology," "design" and "location" or "site" to "minimize" the environmental impact.

Nonetheless, there are some subtle differences in Porter-Cologne. Section 13142.5 includes the phrase "mitigation measures feasible shall be used to minimize intake and mortality..." This raises the question of whether "restorative measures" are mitigation measures which can be used to "minimize the intake and mortality of all forms of marine life." The answer is no. As discussed in *Riverkeeper I* and *Riverkeeper II*, restorative measures cannot be used to achieve compliance with the requirements of 316(b), and therefore cannot be used to comply with Section 13142.5 of the Porter-Cologne Act.

The Court in both *Riverkeeper I* and *Riverkeeper II*, noted that the unambiguous language of Section 316(b) precluded the use of restorative measures to achieve compliance. (*Riverkeeper I*, *supra*, 358 F.3d at 189; *Riverkeeper II*,*sup ra*, 475 F.3d at 108-09). In *Riverkeeper I*, the Court found restorative measures were not the "location, design, construction, and capacity of cooling water intake structures" and therefore "restorative measures" were not a means of complying with 316(b). (*Riverkeeper I*, *supra*, 358 F. 3d at 189). The Court specifically noted that restorative measures "... do not minimize those impacts in the first place." (*Id.*)

The EPA, apparently in an attempt to subvert the ruling in *Riverkeeper I*, attempted to define the word "minimize adverse environmental impacts" as permitting the agency " to minimize adverse environmental impact by compensating for those impacts after the fact,"

(*Id.* at 189 (*quoting* 69 Fed. Reg. 41576, at 41628)). The Court flatly rejected such argument, quoting the dictionary definition of "minimize" is "to reduce to the smallest possible extent," (*Id.* (*citing* Webster's Third New Int'l Dictionary 1438 (1986)).

The importance of this holding cannot be overstated because Section 13142.5 of Porter-Cologne uses the same or similar language to Section 316(b) of the Clean Water Act. Like Section 316(b), Section 13142.5 does not include any language which expressly permits restorative measures. Like 316(b), Section 13142.5 requires power plants and other industrial installations to use the "best available" measures to "minimize the intake and mortality of all forms of marine life." Clearly, under the holding of *Riverkeeper II*, restoration measures cannot be the best available technology to minimize the impacts of impingement and entrainment. Only alternative intake systems, such as beach wells and other subsurface intakes for desalination can comply with Section 13142.5 of the Porter-Cologne Act.

C. Beach Wells and Other Subsurface Intakes are the Best Available Technology for Desalination to Minimize Impingement and Entrainment.

As discussed in the *Riverkeeper II* case, in determining the best available technology which may be reasonably borne by the industry, the EPA must look to the best optimally performing intake systems. (*Riverkeeper II*, *supra*, 475 F.3d at 100.) The identification of the optimally operating plant intake system provides the benchmark for the best technology available. (*Id.*) All other plants must strive to achieve the results of the optimally operating plant. As directed by the Court, second best is not acceptable.

In this case, the State Water Resources Control Board must look to desalination plants which result in the least amount of impingement and entrainment of marine organisms. These optimally performing plants set the benchmark for the best technology available. In terms of desalination, there are existing plants which use beach wells and sub-surface intakes (below ocean floor) to supply water for desalination (e.g., Sand City, California). Also as noted below, Municipal Water District of Orange County's pilot horizontal well in Dana Point has already shown to be a viable alternative that eliminates marine life mortality. In addition, it should be pointed out that reverse osmosis technology used for desalination can purify both brackish and wastewater to a level suitable for drinking.

Desalination plants are simply reverse osmosis water purification plants that are using seawater for the feed or source water. Obviously, the most optimally performing reverse osmosis plants do not experience any impingement and entrainment because they are not located anywhere near the ocean, and do not use seawater. One such plant is located in Orange County, and is called a Groundwater Replenishment System. Such plant reclaims waste water and injects the treated water into the ground water basin. It is scheduled for completion in November of 2007 and is expected to initially produce 70

million gallons a day.[11] Such reclamation plant meets the requirements of Section 13142.5 of the Porter-Cologne Act because it is sited and designed "to minimize the intake and mortality of all forms of marine life." (Cal. Wat. Code § 13142.5(b)).

Another technology currently under study is the feasibility of horizontal slant wells under the ocean floor. The Municipal Water District of Orange County (MWDOC) conducted a pilot study to determine the feasibility of slant wells to provide intake water to a desalination plant.[12] The study concluded it was feasible to operate nine slant wells (7 operating and 2 back-up) for the production of 30 mgd of feed water.[13] The study notes the slant wells are far superior to open ocean intakes because the sea floor acts as a filter preventing the impingement and entrainment of sea life. While the performance of horizontal slant wells is dependent upon the existence of particular sub-strata (much like an on-shore aquifer), this fits the mandate of Porter-Cologne to utilize the best available "site" for seawater desalination intakes. Thus, slant wells are another best technology available which would achieve compliance with Porter-Cologne.

D. The State Water Resources Control Board May not Grant an NPDES Permit for Once-Through Cooling or Open Ocean Intakes for Desalination.

The EPA implements the 316(b) requirements through its control of National Pollution Discharge Elimination System permits (NPDES permit). (33 USC § 1442(a)(1)). Although the NPDES permit specifically states it is intended to control the discharge of pollutants, the *Riverkeeper* case held that the NPDES process is an appropriate method for regulating cooling water intakes. (*Riverkeeper II*, *supra*, 475 F.3d at 123).

In California, the equivalent of the Federal NPDES permits are granted by the Regional Water Quality Control Boards ("RWQCB"). (Cal. Wat. Code § 13370 et. seq.; *City of Burbank v. State Water Resource Control Board*, 35 Cal. 4th 613, 621 (2005)). State issued waste discharge permits must comply with the Federal Clean Water Act. (*Id.* at 626-27). Thus, the RWQCB cannot grant waste discharge permits which do not require the best available technology for cooling coastal power plants or desalination plants which draw seawater from open ocean intakes. The mandate to use "best available technology" would prohibit such a permit.

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[11] More information about Orange County's GWR system can be found at http://www.gwrsystem.com.

[12] "Dana Point Ocean Desalination Project - Engineering Feasibility Report" (March 2007).

[13] Dana Point Feasibility Report, at p. 2-7.

V. CONCLUSION

In conclusion, the State of California must affirmatively recognize that the *Riverkeeper II* case has a significant effect on the continuation of OTC systems for power plants and open-ocean intakes for desalination plants. Such systems can no longer be deemed in compliance with 316(b) of the Federal Clean Water Act, or with Section 13142.5(b) of Porter-Cologne. There are other intake and cooling systems which represent the "best available technology" for the reduction of impingement and entrainment of marine life. The State Water Resources Control Board must direct all regional boards to deny all applications for renewal, amendment or extension of NPDES permits or waste discharge permits for OTC or open ocean intakes for desalination plants.

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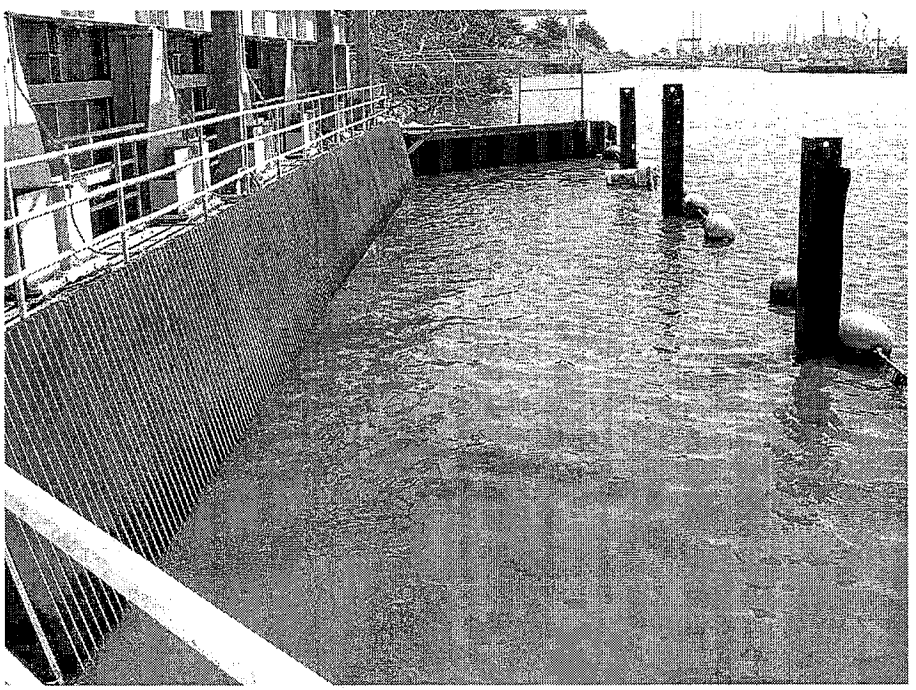
Scoping Document:

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

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Table of Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

BPJ – Best Professional Judgment

BTA – Best Technology Available

CARB – California Air Resources Control Board

CDS – Comprehensive Demonstration Study

CEC – California Energy Commission

CEQA – California Environmental Quality Act

CWA – Clean Water Act

CWC – California Water Code

CWIS – Cooling Water Intake Structure

HPF – Habitat Production Foregone

I/E – Impingement and Entrainment

MW – Megawatts

NPDES – National Pollutant Discharge Elimination System

NPHR – Net Plant Heat Rate

NYCRR – New York State Codes Rules and Regulations

OAL – Office of Administrative Law

OPC – Ocean Protection Council

OTC – Single pass, or "Once-through Cooling"

PIC – Proposal for Information Collection

USEPA – United States Environmental Protection Agency

INTRODUCTION

Background

Annually, thermal electric power plants take in billions of gallons of water for cooling and, in the process, impinge and entrain enormous numbers of fish and aquatic organisms. In California alone, it is estimated that coastal and estuarine power plants impinge 9 million and entrain 79 billion fish and other organisms on an annual basis. Since 1972, the Clean Water Act has required in section 316(b) that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available (BTA) for minimizing adverse environmental impact. To date, however, efforts by the United States Environmental Protection Agency (USEPA) to adopt regulations implementing section 316(b) for existing power plants have been largely unsuccessful. The State Water Resources Control Board (State Water Board) is therefore considering the development of a state policy for water quality control to establish requirements for implementing section 316(b) for existing coastal and estuarine power plants.

Proposed Project and Description

Note that the State Water Board previously released a Scoping Document titled "Proposed Statewide Policy on Clean Water Act Section 316(b) Regulations" on June 13, 2006. However, because USEPA suspended the requirements for cooling water intake structures at Phase II existing facilities on July 9, 2007, the regulatory landscape for section 316(b) has substantially changed.

This scoping document is intended to provide the public with a preliminary proposal for a state policy (draft attached in Appendix A) and supporting documentation. This scoping document will describe the current status and biological impacts of power plants situated along the California coastline and within coastal estuaries. The purpose of the proposed project is to describe the rational and support for a statewide policy to implement section 316(b) of the Clean Water Act.

Statement of Goals

To adopt a statewide policy to implement Clean Water Act section 316(b) that controls the harmful effects of once through cooling water intake structures on marine and estuarine life.

STATUS OF COASTAL POWER PLANTS IN CALIFORNIA

In California, 21 power plants rely on once-through cooling (OTC) for electrical energy production. These coastal plants are situated in ocean, bay, and estuary environments and are permitted to use up to 17 billion gallons of OTC water each day. Table 1 provides a summary of California's OTC power plants.

Table 1. Information for OTC Power Plants in California

RB [a]	Facility Name	Technology [b]	Agency	Design Flow (MGD [c])	Intake Water Body	Receiving Water Body
1	Humboldt Bay Power Plant [d]	ST	PG&E Company	78	Humboldt Bay	Humboldt Bay
2	Hunters Point Power Plant [e]	ST	PG&E Company	413	San Francisco (SF) Bay	SF Bay
2	Pittsburg Power Plant	ST	Mirant Delta, LLC	676	Sacramento/San Joaquin Delta	Sacramento/San Joaquin Delta
2	Potrero Power Plant	ST/CT	Mirant Potrero, LLC	505	San Francisco Bay	San Francisco Bay
3	Diablo Canyon Power Plant	ST	PG&E Company	2670	Ocean	Ocean
3	Morro Bay Power Plant	ST	LS Power	668	Morro Bay Harbor	Ocean
3	Moss Landing Power Plant	ST/CC	LS Power	1226	Moss Landing Harbor	Ocean
4	Alamitos Generating Station	ST	AES Alamitos, LLC	1282	Los Cerritos Channel	San Gabriel River Estuary
4	El Segundo Generating Station [f]	ST	NRG Energy	607	Ocean (Santa Monica Bay)	Ocean (Santa Monica Bay)
4	Haynes Generating Station	ST/CC	Los Angeles Department of Water and Power (LADWP)	1014	Alamitos Bay	San Gabriel River Estuary
4	Long Beach Generating Station [g]	CT	Long Beach Generation LLC	265	Back Channel, Long Beach Harbor	Long Beach Harbor
4	Harbor Generating Station	CC	LADWP	108	Los Angeles Harbor	Los Angeles Harbor
4	Mandalay Generating Station	ST/CT	Reliant Energy Mandalay LLC	255	Channel Islands Harbor	Ocean
4	Ormond Beach Generating Station	ST	Reliant Energy Mandalay LLC	688	Ocean	Ocean
4	Redondo Generating Station	ST	AES Redondo Beach LLC	1146	Ocean (Santa Monica Bay)	Ocean (Santa Monica Bay)
4	Scattergood Generating Station	ST	LADWP	496	Ocean (Santa Monica Bay)	Ocean (Santa Monica Bay)
5S	Contra Costa Power Plant	ST	Mirant Delta LLC	450	Sacramento/San Joaquin Delta	Sacramento/San Joaquin Delta
8	Huntington Beach Generating Station	ST	AES Huntington Beach, LLC	516	Ocean	Ocean
9	Encina Power Plant [h]	ST	NRG Energy	860	Agua Hedionda Lagoon	Ocean
9	San Onofre Nuclear Generating Station (SONGS) Unit 3	ST	Southern California Edison (SCE)	1287	Ocean	Ocean
9	SONGS Unit 2	ST	SCE	1287	Ocean	Ocean
9	SONGS Unit 1 [i]	N/A	SCE	14	Ocean	Ocean
9	South Bay Power Plant [j]	ST/CT	LS Power	602	San Diego Bay	San Diego Bay
			Total Flow (BGD):	17.1		

a. Regional Water Quality Control Board (Regional Water Board)
b. Technology: ST = Steam Boiler, CC = Combined Cycle, CT = Combustion Turbine Peaker.
c. Million gallons per day
d. Humboldt Bay Power Plant has initiated a re-powering project which will replace the existing units using OTC with new units which do not use OTC.
e. Hunters Point Plant ceased power production on May 15, 2006.
f. NRG Energy has announced its intent to convert the El Segundo Power Plant to closed-cycle cooling (Daily Breeze, March 3, 2007).
g. Long Beach Generating Station ceased power production recently.
h. Planned conversion of plant to CC with dry cooling.
i. SONGS Unit 1 ceased power production in 1992.
j. South Bay Power Plant had initiated a re-powering project which would replace the existing units using OTC with new units which do not use OTC; however, South Bay Power Plant has withdrawn the application for re-powering.

Table 2 summarizes OTC flow in billion gallons per day (BGD) and power production in megawatt-hours (MWh) for California.

Table 2. Flow and Power Production Summary for OTC Power Plants[a]

	2000	2001	2002	2003	2004	2005
OTC Average Flow (BGD)[b]	12.6	13.5	11.0	10.3	10.0	9.4
Gross OTC Power Produced (GWh)[c]	88,099	93,517	67,220	62,833	57,740	56,483
Total Power Generated from all sources (Gigawatt-hours (GWh))[d]	280,496	265,059	272,509	276,969	289,359	287,977
OTC % of CA Power	31	35	25	23	20	20

a. Does not include data for Humboldt Bay, Hunters Point, and Long Beach power plants.
b. For certain power plants, OTC flow data were not obtained for every year. OTC flow data for these power plants were approximated using a long-term average ratio of flow to MWh calculated using all available data. For example, OTC flow data may have only been collected for 2001-2005 for a particular power plant. Year 2000 annual OTC flow for this power plant would be approximated using the average flow/MWh relationship calculated for 2001-2005. Year 2000-2003 flows for SONGS Units 2 and 3 were estimated using the average of 2004 and 2005 flows.
c. Provided by the California Energy Commission (CEC). Downloaded from USEPA's Clean Air Markets website: http://www.epa.gov/airmarkets/emissions/raw/index.html. Power generation data based on gross plant output.
d. Total electrical power use for California from all in-state and out-of-state generation. Source: California Energy Commission website.

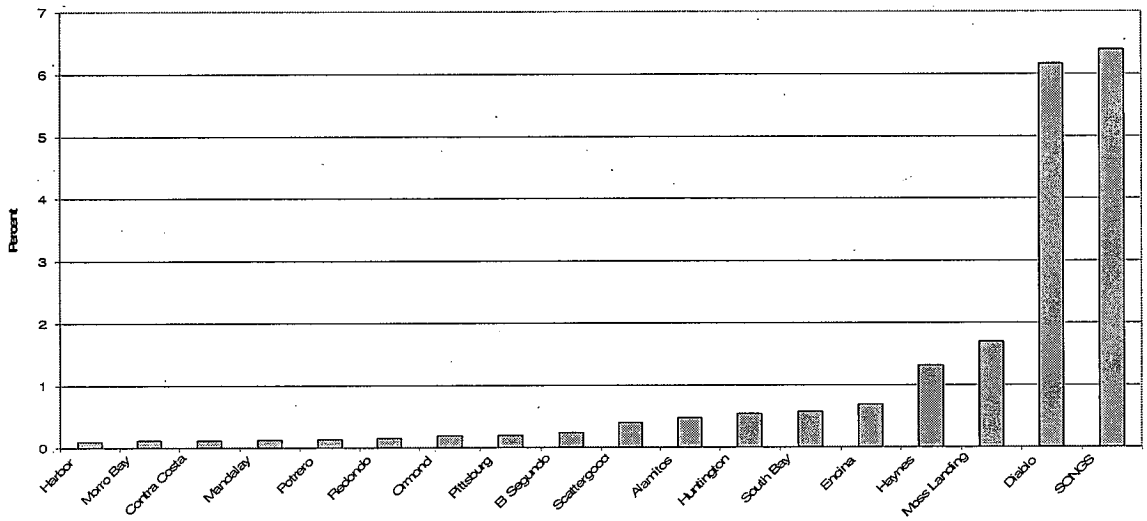
Collectively, the OTC power plants produce a sizable fraction of California's power, as large as 35 percent in 2001. Also shown in Table 2 is that the fraction of State power generated by OTC power plants seem to be trending downward with time, producing only 20 percent in 2005. It is also important to note that the California Independent Systems Operator Corporation (CAISO) forecasts that 1000 megawatts (MW) of new generation must be added each year just to keep pace with the State's increasing demand for electricity[1].

Figure 1 shows the percent each OTC power plant provided towards the total power generated for California in 2005. Note that some OTC power plants provide a small contribution to total power when compared with the total power generated for use by the

State. At first glance, it appears that these power plants may not be essential to the overall reliability of the electrical grid. This assumption may not be true for all cases. For example, some of these power plants provide essential power during peak time periods and/or provide voltage support so that power can be reliably imported from other sources (i.e. hydroelectric, solar, wind, out of state generators, etc.)[a].

The CEC and CAISO have initiated an aging power plant study to determine which of the OTC power plants are essential for grid reliability. The study will also provide a plan for the retirement of the aging/inefficient power plants aligned with the commissioning of new power plants that will help to maintain the reliability of the electrical grid[1]. Even though the OTC power plants did not provide as much power to the grid in 2005 as they have in the past, it is evident from the CAISO comments and similar comments from the CEC[b] that the fleet of OTC power plants are essential to the overall reliability of the grid, especially in light of the fact that the State's demand for electricity is increasing[1].

Figure 1. Percent of Total Power Production, OTC Power Plants in Calif. (2005[a])



a. OTC power generation data based on gross plant output.

Power Plant Utilization

A measure of a power plants' overall utilization is the capacity utilization rate (CUR). USEPA's 316(b) regulations define the CUR as the ratio between the average annual net generation of power by the facility (in MWh) and the total net capability of the facility to generate power (in MW) multiplied by the number of hours during a year. In cases where a facility has more than one intake structure, and each intake structure provides cooling water exclusively to one or more generating units, USEPA states that the CUR

[a] Jim Detmers. CAISO Comment Letter – Proposed Statewide Policy for Once-Through Cooling. September 15, 2006.
[b] Jackalyne Pfannenstiel. California Energy Commission Comments on the State Water Resources Control Board Scoping Document and Proposed Statewide Policy on Clean Water Act 316(b) Regulations. September 26, 2006.

may be calculated separately for each intake structure, based on the capacity utilization of the units it services. USEPA further constrained the CUR definition to only include that portion of the facility that generates electricity for transmission or sale using a thermal cycle with a steam water system as the thermodynamic medium.

In general, the CUR is the ratio of the power generated to the total power that a plant could have generated operating at full capacity. Table 3 summarizes OTC power plant electricity generation capacities by intake structure (e.g., Alamitos units 1 and 2 are served by the same intake structure).

Table 3. OTC Power Plant/Unit Electricity Generation Capacities

Plant Units	Generation Technology[a]	Capacity (MW)[b]
Alamitos 1&2	ST	350
Alamitos 3&4	ST	640
Alamitos 5&6	ST	960
Contra Costa	ST	680
Diablo	Nuc	2269
El Segundo 1&2	ST	350
El Segundo 3&4	ST	670
Encina 1-5	ST	929
Harbor	CC	240
Haynes 1&2	ST	444
Haynes 3&4	ST	444
Haynes 5&6	ST	682
Haynes 9&10	CC	575
Huntington	ST	880
Mandalay	ST	430
Morro	ST	1002
Moss 1-4	CC	1020
Moss 6&7	ST	1509
Ormond	ST	1500
Pittsburg 5&6	ST	650
Potrero	ST	207
Redondo 5&6	ST	350
Redondo 7&8	ST	963
Scattergood	ST	803
SONGS[c] 2	Nuc	1123
SONGS 3	Nuc	1109
South Bay	ST	690

a. Technology: ST = Steam Boiler, CC = Combined Cycle, Nuc = Nuclear.
b. Capacities provided by the CEC.
c. SONGS

For this analysis, USEPA's definition for CUR was used to calculate utilization for all OTC power plants except combined cycle power plants. Also, gross plant output data were used instead of net plant output data to compute the utilization (the difference

between gross and net output have not been considered in this analysis). For combined cycle power plants, USEPA's definition states that the power generated and capacity of the combustion turbine should be neglected (i.e. only use the steam turbine heat recovery power/capacity). However, CEC staff suggested that combined cycle systems should be considered one distinct generating unit. Thus, in this analysis, the capacity and power generated by a combined cycle system are considered the sum of the capacity and generation of both the steam and combustion turbines.

USEPA defines a peaker plant as a power plant with an annual CUR of less than 0.15, or 15 percent[c]. Per USEPA's definition, CURs were averaged among units served by the same intake structure. For example, the CUR for Alamitos Units 1 and 2 is the MWh weighted average of the CUR of each unit taken separately.

Table 4 summarizes the 2005 annual average and the 2000-2005 long-term average percent CURs for the OTC power plants. Note that the 2000-2005 average CURs are much higher than the 2005 average annual CURs. In 2005, 14 plants/units (as determined by intake structure) had a CUR of 15 percent or less, while for the 2000-2005 period only four plants/units fell into this category.

Table 4. 2000-2005 Percent Capacity Utilization Rates of OTC Power Plants[a]

Plant/Units	2005 CUR(%)	2005 USEPA Peaker[b]	2000-2005 CUR(%)	2000-2005 USEPA Peaker[b]
Alamitos 1&2	3	Y	9	Y
Alamitos 3&4	8	Y	30	N
Alamitos 5&6	10	Y	30	N
Contra Costa	6	Y	28	N
Diablo	89	N	85	N
El Segundo 1&2	--	--	10	Y
El Segundo 3&4	12	Y	27	N
Encina 1-5	24	N	36	N
Harbor	14	Y	26	N
Haynes 1&2	21	N	31	N
Haynes 3&4	--	--	9	Y
Haynes 5&6	10	Y	18	N
Haynes 9&10	47	N	47	N
Huntington	20	N	21	N
Mandalay	10	Y	34	N
Morro Bay	4	Y	23	N
Moss 1-4	49	N	38	N
Moss 6&7	4	Y	30	N
Ormond	4	Y	22	N
Pittsburg 5&6	10	Y	29	N

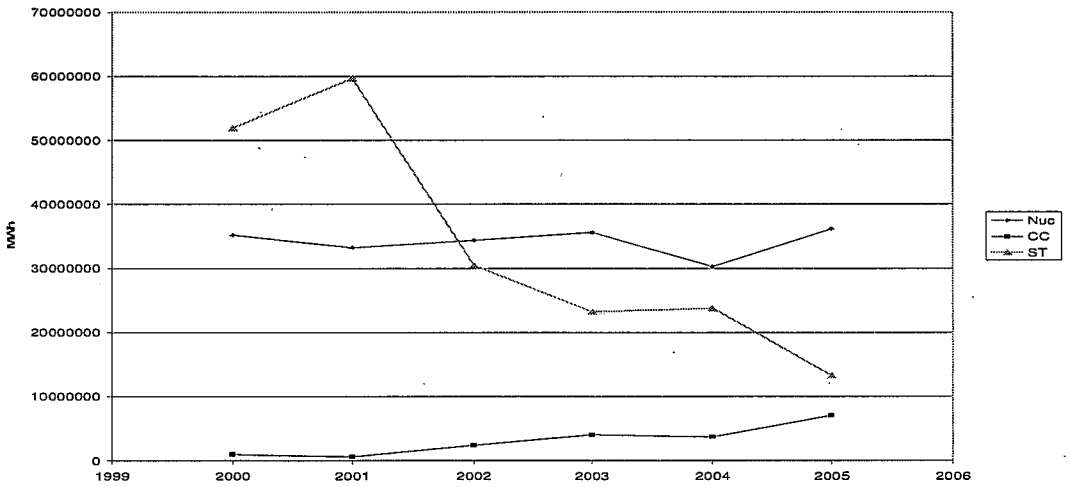
[c] Federal Register/Vol. 69, No. 131/Friday, July 9, 2004/Rules and Regulations, page 41616.

Plant/Units	2005 CUR(%)	2005 USEPA Peaker[b]	2000-2005 CUR(%)	2000-2005 USEPA Peaker[b]
Potrero	22	N	44	N
Redondo 5&6	1	Y	7	Y
Redondo 7&8	5	Y	26	N
Scattergood	16	N	25	N
SONGS 2	90	N	89	N
SONGS 3	98	N	89	N
South Bay	27	N	30	N

a. Power generation based on gross plant output.
b. Federal Register/Vol. 69, No. 131/Friday, July 9, 2004/Rules and Regulations, page 41616. USEPA defines a peaker plant as a plant with less than 15 percent overall utilization.

Figure 2 shows the annual OTC power produced by generation technology for 2000-2005 [steam boiler (ST), nuclear (Nuc), and combined cycle power (CC) plants]. The steam boiler MWh are trending downward, combined cycle MWh are trending upward, and nuclear MWh are relatively constant for the time period.

Figure 2. OTC Power Generation by Technology[a]



a. Technology: ST = Steam Boiler, CC = Combined Cycle, Nuc = Nuclear. Power generation based on gross plant output. Does not include data for Humboldt Bay, Hunters Point, and Long Beach Power Plants.

Power Plant Efficiencies

While steam boilers are generally less efficient than combined cycle systems, they are typically more efficient than stand alone combustion turbines (typically used as peaker plants)[d]. However, the steam boiler systems require a cold source to reject heat from the steam cycle, which in the case of OTC power plants is the ocean, bay, or estuary that the cooling water is drawn from and discharged to.

[d] USEPA Section 316(b) Phase II Technical Development Document, Section 5.2.1.

One measure of the plant thermal efficiency used by the power industry is the Net Plant Heat Rate (NPHR), which is the ratio of the total fuel heat input (BTU/hr) divided by the net electric generation (kW). The net electric generation includes only electricity that leaves the plant. The total plant energy efficiency can be calculated from the NPHR using the following formula[4]:

$$\%eff = \frac{3413}{NPHR} \times 100$$

Table 5 presents the NPHR and plant efficiency numbers for different types of power plants[4].

Table 5. Heat Rates and Plant Efficiencies of Steam Powered Plants[a]

Plant Type	NPHR (BTU/kWh)	% Efficiency
Steam Turbine - Fossil Fuel[b]	9,355	37 to 40
Steam Turbine – Nuclear	10,200	34
Combined Cycle – Gas	6,762	51
Combustion Turbine	11,488	30

a. Source: Analyzing Electric Power Generation under the CAAA. Office of Air and Radiation U.S. Environmental Protection Agency. April 1996 (Projections for year 2000-2004).
b. Data are for coal fired plants.

Installation of alternative cooling systems (cooling towers or dry cooling) would likely lower the average efficiencies of the State's OTC power plants. USEPA estimates the overall energy penalty for a steam boiler fossil fuel power plant with OTC versus cooling towers/dry cooling to be on the order of 1.7/8.6 percent of plant power output, while for a combined cycle power plant the estimated energy penalty for OTC versus cooling towers/dry cooling is 0.4/2.1 percent[e].

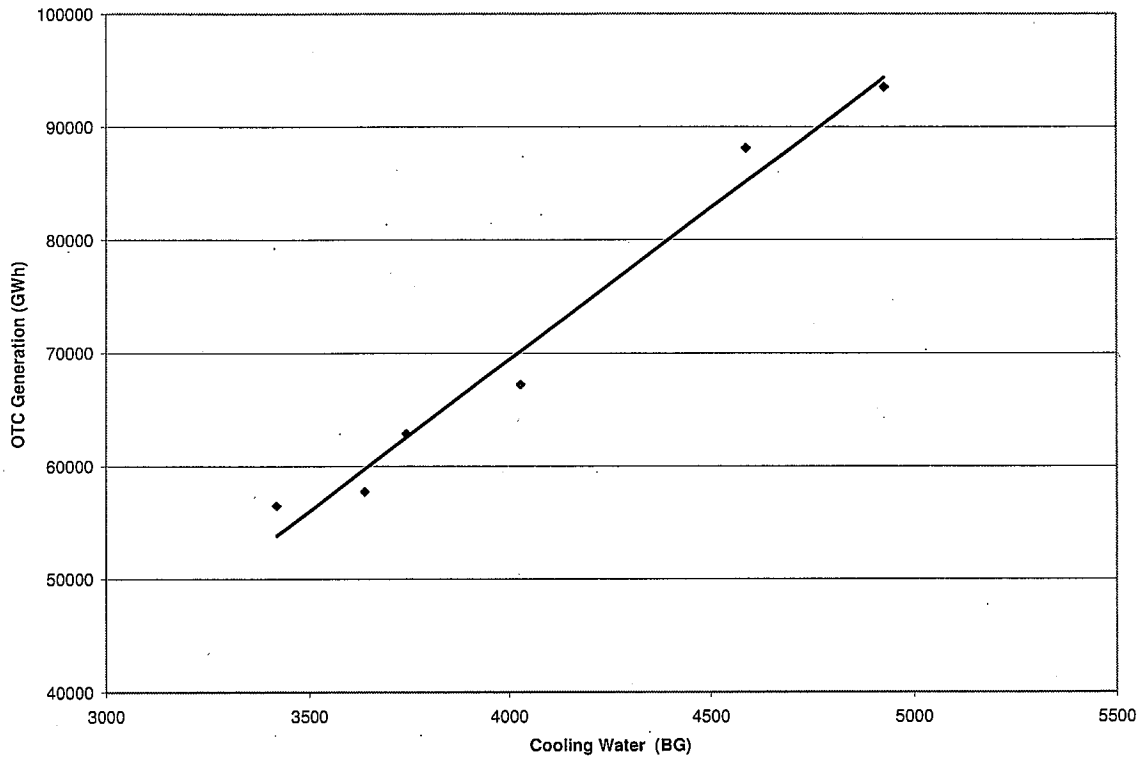
Cooling Water Flows

As shown by the flow and power generation data in Table 2, OTC power plants utilize a significant amount of cooling water. In Figure 3, the 2000–2005 combined annual cooling water flows versus power generation are plotted. Figure 4 shows that the total OTC power generation and cooling water flow are linearly correlated.

While Figure 3 shows that significant OTC water is used for the generation of electricity and that overall cooling water flow and power generation are directly correlated, it does not show that the amount of OTC water used per MWh produced can be dramatically different from one power plant to another. Figure 4 shows the long-term average ratio of OTC flow to power generated for power plants in California. The lower the flow to power generation ratio, the less cooling water is used per MWh generated.

[e] National average, mean-annual energy penalty, USEPA Section 316(b) Phase II Technical Development Document, Section 5.1.

Figure 3. 2000-2005 Combined Annual Cooling Water Flow Data Versus Total Power Generated[a]

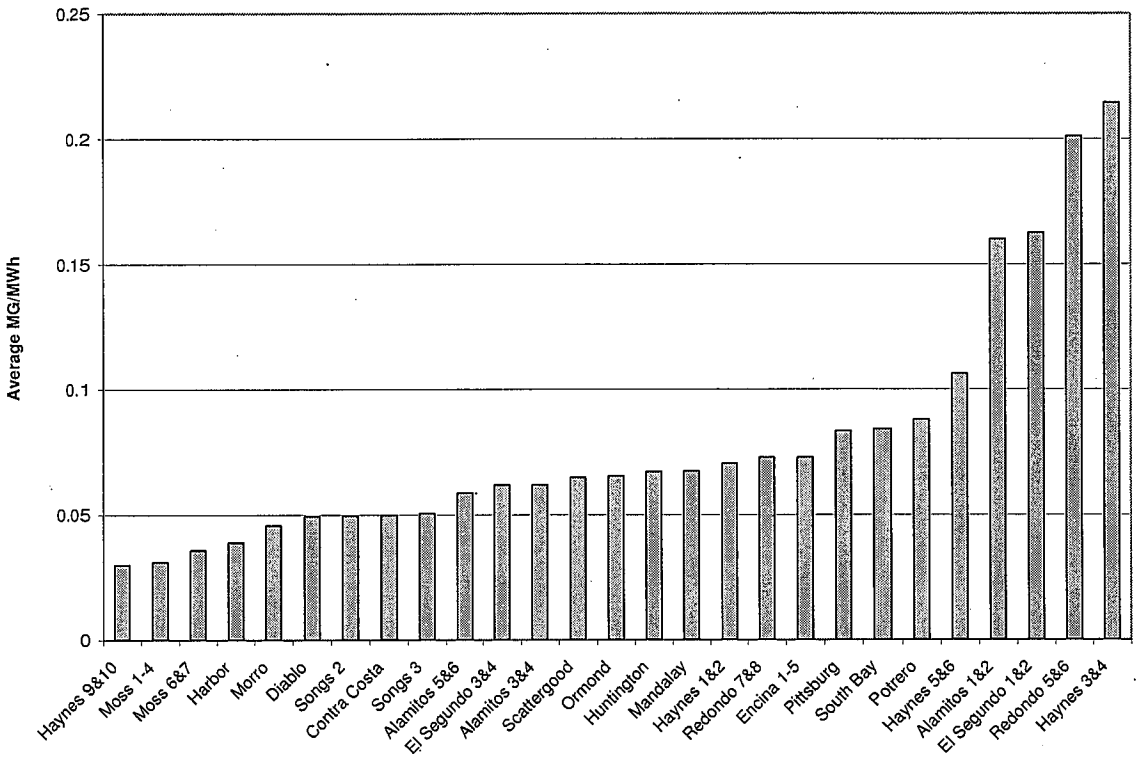


a. Power generation based on gross plant output. Does not include data for Humboldt Bay, Hunters Point, and Long Beach power plants.

Figure 4 shows that the volume of cooling water required per MWh generated is highly variable between power plants and that, in general, combined cycle power plants use less cooling water per MWh generated than steam boiler systems (Haynes 9&10, Moss 1-4, and Harbor power plants/units have some of the lowest MG:MWh ratios). In some cases, cooling water flow to MWh ratios are elevated because of cooling water system operation without the production of power.

In order to determine the actual cooling water flows at each OTC power plant, it is important to consider that some of these plants are being operated more heavily during peak power demand periods. Table 6 presents the 2001 (highest dataset annual OTC power generation) and 2005 (lowest dataset annual OTC power generation) monthly median cooling water flows for OTC power plants during summer (June-September) and winter conditions (October – May).

Figure 4. Average Cooling Water Flow: Power Generation Ratios for OTC Power Plants[a]



a. Based on OTC flow and generation data for 2000-2005. Power generation is based on gross plant output.

Table 6. Monthly Median Cooling Water Flows

Plant/Units	2001 Median Monthly Flows (MG)		2005 Median Monthly Flows (MG)	
	October-May	June-September	October-May	June-September
Alamitos 1&2	3214	6324	1326	1518
Alamitos 3&4	12059	11865	6117	6418
Alamitos 5&6	20892	20555	2696	10212
Contra Costa	8877	10144	1288	5468
Diablo	74743	75823	75823	75538
El Segundo 1&2	3987	1234	1543	1580
El Segundo 3&4	6287	10472	5175	6279
Encina 1-5	17919	21462	16915	15022
Harbor	2136	1936	1507	1666
Haynes 1&2	5751	7619	5990	8321
Haynes 3&4	7392	8280	--	--
Haynes 5&6	9254	12682	10865	11372
Haynes 9&10	--	--	6422	6891

Plant/Units	2001 Median Monthly Flows (MG)		2005 Median Monthly Flows (MG)	
	October-May	June-September	October-May	June-September
Huntington	a	a	7487	13643
Mandalay	7729	7729	7145	6985
Morro	15160	18004	453	5004
Moss 1-4	--	--	9958	10151
Moss 6&7	18902	22697	103	5212
Ormond	20591	20937	4772	13100
Pittsburg	21884	29786	914	6452
Potrero	6348	6838	2344	6447
Redondo 5&6	a	a	605	1335
Redondo 7&8	a	a	128	6612
Scattergood	8177	11389	7609	10818
SONGS 2	a	a	37269	37167
SONGS 3	a	a	37776	37167
South Bay	12468	13491	11927	11585

a. Flow data for these power plants were not obtained for this year.

Many of the power plants have greater cooling water flows during the months of June-September as compared with October-May flows (see Table 6).

State Water Board staff examined graphs of cooling water flow versus power generation for most of the OTC power plants. For many power plants, cooling water flow increases with power generation; however, many of the relationships are not correlated very well.

Baseline Air Emissions

The California Air Resources Control Board (CARB) has evaluated baseline air emissions from two types of hypothetical power plants, a 300 MW steam turbine power plant unit and a 540 MW combined-cycle power plant unit, both fueled by natural gas[f].

Table 7 shows the baseline emissions inventory for the hypothetical 300 MW steam turbine power plant unit and the hypothetical 540 MW combined-cycle power plant unit cooled by OTC.

Table 7. Estimated Baseline Air Emissions from OTC Power Plants

Technology	**Greenhouse Gas (tons/yr)**	**Criteria Pollutants (tons/yr)**					
	CO_2[a]	TOG[b]	ROG[c]	NOX[d]	SOX[e]	CO[f]	$PM_{2.5}$[g]
Steam Turbine (300 MW)	235,196	18.19	7.84	52.55	1.84	150.29	16.59

[f] California Air Resources Control Board 6/1/07 memo to State Water Board.

	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).

Using various data sources, State Water Board staff estimated the total impingement and entrainment from power plants using once-through cooling. Table 8 shows estimates of actual numbers and biomass of aquatic life impinged and entrained from California's coastal and estuarine power plants. The values in Table 8 are absolute annual estimates and were not adjusted to adult equivalents.

Table 8. Estimates of Annual Impingement and Entrainment at California's Coastal and Estuarine Power Plants.

Power Plant	Group	Impinge-ment Count (#/year)	Impinge-ment Mass (kg/year)	Entrainment Count (#/year)	Notes/Data Source
Humboldt Bay Power Plant	fish	n/e	n/e	n/e	Will repower with dry cooling
Hunters Point Power Plant	fish	n/e	n/e	n/e	Ceased power production on May 15, 2006
Pittsburg Power Plant	fish	381,515	2,191	468,220,000	E-PIC 2006 Tbl 4-1
Pittsburg Power Plant	inverts	3,089,908	2,577	12,095,100,000	I- PIC 2004 Tbls 4-2
Pittsburg Power Plant	eggs	n/e	n/e	1,970,000	E-PIC 2006 Tbl 4-1
Potrero Power Plant	fish	7,515	190	291,942,194	E-Potrero PIC 2006, Tbl 4-1
Potrero Power Plant	inverts	199,686	255	n/e	I - PIC Tbl 4-2 for Unit 3 only. Mar '78-79. Invert count incl. jellyfish via PIC appx Tbl 2
Diablo Canyon Power Plant	fish	402	504	1,833,010,000	DC Entrainment Findings, Steinbeck et al 2006 - Tbl 3-18
Diablo Canyon Power Plant	inverts	n/e	184	n/e	DC Impingement from 3/1/00 316(b) Demo Report * - actual number collected, kg is estimated total for the year;
Diablo Canyon Power Plant	tetrap	1	n/e	n/e	Ca Sea Lion 2001, 2004, 2005 from J. Cordaro, NMFS, Long Beach, CA 8/15/06
Morro Bay Power Plant	fish	73,825	1,144	508,296,000	E-Steinbeck 2006, Tbl 3-6
Morro Bay Power Plant	inverts	52,949	360	n/e	I-Findings Section 316(b) Modernized Morro Bay Power Plant Tables 4-2 and 4-3 values for estimated totals. Note that invertebrates only include crabs, shrimps, octopus, and squid
Moss Landing Power Plant	fish	176,332	1,194	345,000,000	I - from '05-'06 Study - Units 1, 2,6, 7 Note that invertebrates only include crabs, shrimps, octopus, and squid; E-est based on fish density in CECreport and 2005 flow
Moss Landing Power Plant	inverts	146,270	413	210,700	E - est based on crab density in CECreport and 2005 flow
Alamitos Generating Station	fish	28,082	503	1,686,757,809	May 2007 LA DWP meeting material
Alamitos Generating Station	inverts	11,338	462	4,329,954	May 2007 LA DWP meeting material
Alamitos Generating Station	eggs	n/e	n/e	606,607,376	May 2007 LA DWP meeting material
El Segundo Generating Station	fish	945	174	n/e	May 2007 LA DWP meeting material
El Segundo Generating Station	inverts	49,793	94	n/e	May 2007 LA DWP meeting material

Power Plant	Group	Impinge-ment Count (#/year)	Impinge-ment Mass (kg/year)	Entrainment Count (#/year)	Notes/Data Source
Haynes Generating Station	fish	6,694	73	3,645,939,849	May 2007 LA DWP meeting material
Haynes Generating Station	inverts	2,682	37	14,845	May 2007 LA DWP meeting material
Haynes Generating Station	eggs	n/e	n/e	1,684,934,099	May 2007 LA DWP meeting material
Long Beach Generating Station	fish	n/e	n/e	n/e	Ceased power production recently
Harbor Generating Station	fish	1,290	189	65,297,999	May 2007 LA DWP meeting material
Harbor Generating Station	inverts	1,014	37	18,901,336	May 2007 LA DWP meeting material
Harbor Generating Station	eggs	n/e	n/e	99,884,894	May 2007 LA DWP meeting material
Mandalay Generating Station	fish	124,721		2,268,000,000	Mandalay Revised PIC
Mandalay Generating Station	inverts	210	n/e	n/e	Mandalay Revised PIC
Ormond Beach Generating Station	fish	24,424	n/e	1,925,000,000	Mandalay Revised PIC
Ormond Beach Generating Station	inverts	9,493	n/e	n/e	Mandalay Revised PIC
Ormond Beach Generating Station	tetrap	2	n/e	n/e	J. Cordaro, NMFS, Long Beach, CA 8/15/06
Redondo Generating Station	fish	340	38	245,467,974	May 2007 LA DWP meeting material
Redondo Generating Station	inverts	367	42	27,049,393	May 2007 LA DWP meeting material
Redondo Generating Station	eggs	n/e	n/e	2,860,520,400	May 2007 LA DWP meeting material
Scattergood Generating Station	fish	87,845	3,989	365,258,133	May 2007 LA DWP meeting material
Scattergood Generating Station	inverts	24,296	316	27,322,839	May 2007 LA DWP meeting material
Scattergood Generating Station	eggs	n/e	n/e	4,919,422,026	May 2007 LA DWP meeting material
Scattergood Generating Station	tetrap	5	n/e	n/e	J. Cordaro, NMFS, Long Beach, CA 8/15/06
Contra Costa Power Plant	fish	110,359	1,666	95,110,000	PIC, data for Units 6&7 only
Contra Costa Power Plant	inverts	200,371	226	3,493,830,000	PIC, data for Units 6&7 only
Contra Costa Power Plant	eggs	n/e	n/e	12,800,000	PIC, data for Units 6&7 only
Huntington Beach Gen. Station	fish	51,082	1,292	254,877,299	PIC Attch B, 2003-2004 study
Huntington Beach Gen. Station	inverts	70,638	168	473,628,497	PIC Attch B, 2003-2004 study
Encina Power Plant	fish	79,662	3,076	26,200,000,000	PIC p. 3-6, 1979-80
Encina Power Plant	inverts	4,862	n/e	n/e	PIC p. 3-6
Encina Power Plant	eggs	n/e	n/e	4,710,000,000	PIC p. 3-6, 1979-80
Encina Power Plant	tetrap	2	n/e	n/e	J. Cordaro, NMFS, Long Beach, CA 8/15/06

Power Plant	Group	Impinge-ment Count (#/year)	Impinge-ment Mass (kg/year)	Entrainment Count (#/year)	Notes/Data Source
San Onofre – Songs Unit 2&3	fish	3,564,433	21,924	5,668,000,000	I-PIC Attch A, 2003 study, E-CEC June2005
San Onofre – Songs Unit 2&3	tetrap	47	n/e	n/e	J. Cordaro, NMFS, Long Beach, CA 8/15/06
South Bay Power Plant	fish	385,588	556	2,420,528,000	I - SB PIC, p. 28 E- Steinbeck et al 2006, Tbl 3-1 2001 study
South Bay Power Plant	inverts	9,019	23	n/e	I - SB PIC, p. 28 E- Steinbeck et al 2006, Tbl 3-1 2001 study

"n/e" indicates no estimate available
"tetrap" indicates a tetrapod impingement (i.e., seals, sea lions, or sea turtles)

Table 9 shows a summary of the combined impingement and entrainment for all California coastal and estuarine power plants. In summary, each year California power plants impinge about 9 million biological specimens having a mass of approximately 44,000 kg (97,000 lbs). California power plants also annually entrain about 80 billion biological specimens, of which approximately 60 percent (48 billion) are larval fish. In addition, 57 marine tetrapods (seals, sea lions, or sea turtles) are impinged annually. Of these tetrapods, roughly 50 percent are killed.

Table 9. Total Annual Impingement and Entrainment from all Coastal and Estuarine Power Plants in California.

Biological Group	Impingement Count (#/year)	Impingement Mass (kg/year)	Entrainment Count (#/year)
fish	5,105,054	38,703	48,286,705,257
invertebrates	3,872,896	5,194	16,140,387,564
aquatic life eggs	n/e	n/e	14,896,138,795
tetrapods	57	n/e	n/e
All Groups Combined	8,978,007	43,898	79,323,231,616

"n/e" indicates no estimate available

Cumulative Impacts

A study performed by MBC and Tenera in 2005 estimated that, for 12 coastal power plants in the Southern California Bight, there is an overall cumulative entrainment mortality of 1.4 percent. In the same study, for eleven coastal power plants in the Southern California Bight the estimated cumulative impingement was approximately 3.6 million fish. Considering only recreational fish species, impingement was somewhere between 8-30 percent of the number of fish caught in the Southern California Bight (CEC, Issues and Environmental Impacts Associated with Once-Through Cooling at California's Coastal Power Plants, 2005).

The cumulative effects of closely situated power plants withdrawing cooling water from a water body is an area in need of research. If OTC continues to be used by plants in close proximity on the same water body, a cumulative ecological study should be considered. This is especially important in the Southern California Bight where many

power plants are situated within several miles from each other. Plant-specific impacts associated with the use of OTC occur in conjunction with other anthropogenic impacts in a regional area. A cumulative impact analysis will consider the presence and impacts of other power plants in a regional area. Closely situated facilities may wish to coordinate their monitoring studies in order to better evaluate broad cumulative effects. Generally, individual effects of several power plants can be expected to be additive. However, multiple reductions in the population of a sensitive species may produce species population declines greater than the simple sum of each facility's impact.

As an example, a reduction in the numbers of a particular aquatic fish species due to mortality at a single power plant may be small. A nearby power plant may also cause a small mortality. However, the combined effect of mortality at both plants may exceed a threshold needed for sustained, long-term populations of the species.

Threatened, Endangered, and Protected Species

Threatened, endangered, and protected species in the source water body of a power plant pose special considerations. Fish and wildlife agencies, such as the National Oceanic and Atmospheric Administration (NOAA), National Marine Fisheries Service (NMFS), US Fish and Wildlife (USFW), and the California Department of Fish and Game, often participate in the permitting process and attempt to determine if the facility will cause or contribute to an adverse impact on essential habitat for threatened or endangered species.

Under the Endangered Species Act, the term "take" is defined to mean harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Under the Marine Mammal Protection Act (MMPA), the term "take" means to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal. Incidental taking is defined as an unintentional, but not unexpected, taking. Harassment under the 1994 Amendments to the MMPA is statutorily defined as any act of pursuit, torment, or annoyance which *(Level A Harassment)* has the potential to injure a marine mammal or marine mammal stock in the wild; or, *(Level B Harassment)* has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering but which does not have the potential to injure a marine mammal or marine mammal stock in the wild.

Marine mammals such as sea otters, sea lions, and harbor seals, and even marine reptiles (endangered sea turtles), have become trapped in power plant intake structures. After extraction, marine mammals do not always survive. For this reason some power plants have applied for incidental take permits from the USFW and NMFS.

Impingement at power plants has the potential to directly cause mortality or takes of endangered fish species. As an example, the Contra Costa Power Plant has been known to entrain Chinook salmon and Delta smelt [316(b) PIC for Mirant Contra Costa Power Plant, Tenera Environmental, April 2006]. Site-specific impacts such as these must be minimized and ultimately mitigated.

LEGAL AND REGULATORY REQUIREMENTS

California Water Code and Current State Water Board Policy

The Porter-Cologne Water Quality Control Act (Porter-Cologne)[g], enacted in 1969, is the primary water quality law in California. 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. The state is divided into nine regions, each governed by a Regional Water Quality Control Board (Regional Water Board).

The State Water Board oversees and guides the Regional Water Boards through several activities, including the adoption of statewide water quality control plans[h] and state policy for water quality control[i]. The State Water Board-adopted California Ocean Plan, for example, designates ocean waters for a variety of beneficial uses, including rare and endangered species, marine habitat, fish spawning and migration and other uses, and establishes water quality objectives to protect those uses.[j] The State Water Board is also charged with adopting state policy for water quality control, which may consist of principles or guidelines deemed essential by the State Water Board for water quality control.[k]

In addition to State Water Board-adopted policies, Porter-Cologne contains state law for the coastal marine environment. Like section 316(b), Water Code section 13142.5, requires that any new or expanded coastal powerplant using seawater for cooling to use "the best available site, design, technology, and mitigation measures feasible . . . to minimize the intake and mortality of all forms of marine life."

The Regional Water Boards adopt water quality control plans for all waters, including coastal waters, bays, and estuaries, if appropriate, within their regions. These plans must conform to state policy for water quality control.

Under Porter-Cologne, the State and Regional Water Boards regulate waste discharges that could affect water quality through waste discharge requirements.[l] In addition, the state is authorized to issue NPDES permits to point source dischargers of pollutants to navigable waters. In 1972, the California Legislature amended Porter-Cologne to provide the state the necessary authority to implement an NPDES permit program in lieu of a USEPA-administered program under the Clean Water Act.[m] To ensure consistency with Clean Water Act requirements, Porter-Cologne requires that the Water Boards issue and administer NPDES permits to ensure compliance with all applicable

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[g] Wat. Code §13000 et seq.
[h] See *id.* §13170.
[i] See *id.* §13140 et seq.
[j] California Ocean Plan (2005), chs. 1 & 2.
[k] Wat. Code §13142.
[l] See *id.* §§13263, 13377.
[m] Wat. Code, div. 7, ch. 5.5.

requirements of the Clean Water Act.[n] The State Water Board is designated as the state water pollution control agency under the Clean Water Act and is authorized to exercise any powers delegated to the state by the act.[o] [p]

To date, the State Water Board has not adopted any state policies for water quality control or plans to implement §316(b) or Water Code §13142.5. Over 30 years ago, the State Water Board adopted a policy on the use of fresh inland surface waters for power plant cooling. The policy in Resolution No. 75-58, titled "Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Powerplant Cooling,"[q] was intended to discourage the use of inland water resources for once-through cooling. The 1975 policy favors the use of treated wastewater as cooling water or OTC with seawater in order to conserve fresh inland water resources. The 1975 policy does not address § 316(b) and is significantly out-of-date.

NPDES Permit Status

Table 10 shows the current status of the National Pollutant Discharge Elimination (NPDES) permit for California power plants. Currently, 11 power plants are operating with expired permits. Two plants, Potrero and Harbor, will require renewal in 2008. Four plants are planning to convert to dry cooling: Humboldt, El Segundo Units 1-4, Encina, and South Bay. The Contra Costa Unit 8 plant is a new facility that will employ dry cooling. Two plants, Long Beach and Hunter's Point, are no longer in operation.

Table 10. NDPES Permit Status of Power Plants

RB	Facility Name	Agency	NPDES Permit Adoption Date	NPDES Permit Expiration Date	Permit in Review ?	Notes
3	Diablo Canyon Power Plant	PG&E Company	11-May-90	11-May-95	Y	Pending lawsuit.
3	Morro Bay Power Plant	LS Power	10-Mar-95	10-Mar-00	Y	
2	Hunters Point Power Plant	PG&E Company	18-May-94	18-May-04	N	Permit administratively extended, May 18, 1999. Ceased power production on May 15, 2006.
4	Alamitos Generating Station	AES Alamitos, LLC	29-Jun-00	10-May-05	Y	
4	El Segundo Generating Station	El Segundo Power LLC	29-Jun-00	10-May-05	Y	Will likely file (re-power) for dry cooling
4	Haynes Generating Station	LADWP	29-Jun-00	10-May-05	Y	
4	Redondo Generating Station	AES Redondo Beach LLC	29-Jun-00	10-May-05	Y	
4	Scattergood Generating Station	LADWP	29-Jun-00	10-May-05	Y	
3	Moss Landing Power Plant	LS Power	27-Oct-00	27-Oct-05	Y	

[n] *Id.* §13377; see also Cal. Code Regs., tit. 23, §2235.2.
[o] *Id.* §13160.
[p] *Id.* §§13372, 13377. EPA's permit regulations are contained in 40 C.F.R. parts 122, 123, and 124.
[q] State Water Board Resolution No. 75-58.

RB	Facility Name	Agency	NPDES Permit Adoption Date	NPDES Permit Expiration Date	Permit in Review ?	Notes
4	Mandalay Generating Station	Reliant Energy Mandalay LLC	26-Apr-01	10-Mar-06	Y	
5S	Contra Costa Power Plant	Mirant Delta, LLC	27-Apr-01	1-Apr-06	Y	
4	Long Beach Generating Station	Long Beach Generation LLC	24-May-01	10-Apr-06	N	Ceased power production recently.
1	Humboldt Bay Power Plant	PG&E Company	26-Apr-01	26-Apr-06	Y	has filed (re-power) for dry cooling
4	Ormond Beach Generating Station	Reliant Energy Mandalay LLC	28-Jun-01	10-May-06	Y	
2	Pittsburg Power Plant	Mirant Delta, LLC	19-Jun-02	31-May-07	Y	
4	Harbor Generating Station	LADWP	10-Jul-03	10-Jun-08	N	
2	Potrero Power Plant	Mirant Potrero, LLC	10-May-06	31-Dec-08	N	
9	South Bay Power Plant	NRG Energy	10-Nov-04	10-Nov-09	N	has filed (re-power) for dry cooling
9	San Onofre - SONGS Unit 1	Southern California Edison	09-Feb-00	9-Feb-05	N	Ceased power production in 1992.
9	San Onofre - SONGS Unit 2	Southern California Edison	11-May-05	11-May-10	N	
9	San Onofre - SONGS Unit 3	Southern California Edison	11-May-05	11-May-10	N	
8	Huntington Beach Generating Station	AES Huntington Beach, LLC	14-Oct-06	1-Aug-11	N	
9	Encina Power Plant	NRG Energy	16-Aug-06	1-Oct-11	N	

USEPA CWA Section 316(b) and Federal Regulations

The Clean Water Act (CWA), 33 U.S.C. §1251 et seq., prohibits pollutant discharges from point sources to waters of the United States unless they are regulated under an NPDES permit.[r] Permits are issued by the USEPA or states, such as California, with approved permit programs.[s] The NPDES permit system provides for a two-step process for establishing effluent limitations in permits to regulate pollutant discharges. First, permits must require compliance with technology-based effluent limitations implementing CWA section 301 and section 306.[t] Second, permits must include any more stringent water quality-based limitations necessary to meet water quality standards.[u]

In addition, a permittee with a cooling water intake structure must comply with a separate technological standard established in CWA § 316(b) for the intake structure.[v] CWA section 316(b) states: "Any standard established pursuant to section [301] of this title or section [306] of this title and applicable to a point source shall require that the

[r] 33 U.S.C. §§1311, 1342.
[s] See *id.* §1342.
[t] *Id.* §§1311, 1316.
[u] *Id.* §§1311(b)(1)(C).
[v] *Id.* §1326(b).

location, design, construction, and capacity of cooling water intake structures reflect the BTA for minimizing adverse environmental impact."

In April 1976, USEPA issued a final rule implementing § 316(b).[w] Utility companies successfully challenged the rule in court on procedural grounds, and USEPA withdrew the relevant portions of the rule in 1977. In the absence of federal standards, USEPA and states with approved permit programs, including California, implemented § 316(b) on a case-by-case basis pursuant to CWA section 402(a)(1)(B) using best professional judgment (BPJ).[x]

In 1993, a coalition of environmental groups and individuals sued USEPA over its failure to adopt regulations implementing section 316(b).[y] USEPA eventually entered into a consent decree to settle the litigation and established a timetable to issue rules in three phases. USEPA completed the first phase on November 9, 2001, by promulgating a final rule governing cooling water intake structures for new power plants (Phase I).[z] On July 23, 2004, USEPA promulgated intake regulations for existing power plants (Phase II).[aa] On July 9, 2007, however, USEPA suspended the Phase II rule in response to a remand decision by the United States Court of Appeals for the Second Circuit in *RiverKeeper, Inc. v. USEPA (2nd Cir. 2007) 475 F.3d 83 (RiverKeeper II).*[bb] USEPA completed the third phase on June 16, 2006.[cc] The Phase III rule addresses new offshore oil and gas extraction facilities.

Phase I Rule

The Phase I rule applies to new electric generating plants and manufacturers that withdraw more than two MGD from waters of the U.S. and use 25 percent or more of their intake water for cooling.[dd] New facilities with smaller cooling water intakes will still be regulated on a site-by-site basis.[ee]

In the Phase I rule, USEPA determined that the BTA for minimizing adverse environmental impacts from cooling water intake structures at new power plants is closed-cycle wet cooling. The Phase I regulations establish a two-track approach for regulating the intake structures.[ff] Track I establishes national intake capacity and velocity requirements based on closed-cycle wet cooling technology, as well as location- and capacity-based requirements to reduce intake flow below certain proportions of certain water bodies (referred to as "proportional-flow requirements"). It also requires the discharger to select and implement design and construction

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[w] 41 Fed. Reg. 17387 (April 26, 1976).
[x] 33 U.S.C. §1342(a)(1)(B).
[y] See *Cronin v. Browner* (S.D.N.Y. 1995) 898 F.Supp. 1052.
[z] 66 Fed. Reg. 65338 (December 18, 2001), codified at 40 C.F.R. pt. 125, subpt. I.
[aa] 69 Fed. Reg. 41683 (July 9, 2004), codified at 40 C.F.R. pt. 125, subpt. J.
[bb] 72 Fed. Reg. 37107.
[cc] 71 Fed. Reg. 35040, codified at 40 C.F.R. pt 125, subpt. N.
[dd] 40 C.F.R. §125.81.
[ee] *Id.* §125.80(c).
[ff] *Id.* §125.84.

technologies under certain conditions to minimize impingement mortality and entrainment.[gg] Under Track II, a facility may use any technology as long as the facility can show, in a demonstration study, that the alternative technologies will reduce impingement mortality and entrainment for all life stages of fish and shellfish to levels that are comparable to what would be achieved under Track I.[hh] Alternatively, a facility could comply with Track II through restoration measures designed to address impacts, other than impingement and entrainment, provided that the measures would maintain fish and shellfish in the water body at substantially similar levels to that which would be achieved under Track I.

The Phase I rule also includes a variance provision, which authorizes the permitting agency to impose less stringent requirements than those contained in the rule under two circumstances.[ii] These are: (1) facility-specific data indicates that compliance with the rule would result in compliance costs wholly out of proportion to the costs USEPA considered in establishing the rule; and (2) compliance would result in significant adverse impacts on local air quality, water resources, or energy markets.

Both environmental and industry groups sued USEPA over the validity of the Phase I rule in the Second Circuit Court of Appeals. In 2004, the appellate court issued a decision that largely upheld the Phase I rule but remanded those aspects that authorized a facility to comply with section 316(b) through restoration methods [RiverKeeper, Inc. v. USEPA (2d Cir. 2004) 358 F.3d 174 (RiverKeeper I)]. The court held that the restoration option was clearly inconsistent with Congress' intent that intake structures be regulated directly, based on BTA, and without resort to water quality measurements. In a similar vein, the court rejected industry's challenge to USEPA's assumption that all impingement and entrainment are adverse. Industry had argued that USEPA should only have sought to regulate impingement and entrainment where they have deleterious effects on the overall fish and shellfish populations in the ecosystem. The court ruled that USEPA's approach was eminently reasonable and consistent with Congress selection of a technology-based, rather than a water quality-based approach, for regulating adverse impacts from intake structures.

Phase II Rule

The Phase II rule applied to existing electric generating plants that are designed to withdraw at least 50 MGD and use at least 25 percent of their withdrawn water for cooling purposes.[jj]

In the Phase II rule, USEPA did not select closed-cycle cooling as the BTA for minimizing adverse environmental impacts for existing power plants. Rather, USEPA determined that a "suite of technologies" constituted BTA and established performance standards for reductions in impingement mortality and entrainment based on these

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[gg] *Id.* §125.84(b) & (c).
[hh] *Id.* §125.84(d).
[ii] *Id.* §125.85.
[jj] See 40 C.F.R. §125.91.

technologies. The technologies included fine-and wide-mesh wedgewire screens, aquatic filter barrier systems, barrier nets, fish return systems, and others. The performance standard for impingement required an 80 to 95 percent reduction in the number of organisms pinned against parts of the intake structure from uncontrolled levels.[kk] Similarly, the entrainment standard required a 60 to 90 percent reduction in the number of aquatic organisms drawn into the cooling system from uncontrolled levels.[ll]

The Phase II rule set forth five compliance alternatives for achieving BTA, four of which were based on meeting the performance standards. The fifth compliance alternative allowed a site-specific determination of BTA under two circumstances.[mm] These were: (1) where compliance costs would be significantly greater than the costs considered by USEPA (cost-cost); or (2) where compliance costs would be significantly greater than the benefits of meeting the performance standards (cost-benefit). The rule allowed a facility to meet the performance standards through design, construction technologies, operational measures, or restoration measures, or any combination of these.

On January 25, 2007 the Second Circuit Court of Appeals issued its *RiverKeeper II* decision, remanding several significant provisions of the Phase II rule. The major remanded provisions included USEPA's determination of BTA, the performance standard ranges, the site-specific BTA alternatives based on cost considerations, and the restoration provisions.

- The court remanded USEPA's determination of BTA because it was unclear whether USEPA had improperly engaged in a cost-benefit analysis. USEPA had interpreted BTA as "best technology available commercially at an economically practicable cost" and had stated that an important component of economic practicability was the relationship between the costs of control technology and the associated environmental benefits. The court, however, held that section 316(b) requires that facilities adopt the BTA and that a cost-benefit analysis is not authorized. The court further held that USEPA can consider costs in two limited ways: (1) to determine whether the costs of a technology can reasonably by borne by the industry; and (2) to engage in a cost-effectiveness analysis in determining BTA. The court further held that, in making the initial determination, the most effective technology must be based not on the average Phase II facility, but on the optimally best performing facility.

- The court concluded that USEPA can set performance standards as ranges under certain circumstances. However, the court remanded the regulations because they did not require facilities to achieve the high end of the performance ranges, where possible. The regulations were inadequate because they failed to require facilities to choose technologies that permit them to achieve as much reduction of adverse environmental impacts as is technologically possible.

[kk] *Id.* §125.94(b)(1).
[ll] *Id.* §125.94(b)(2).
[mm] *Id.* §125.94(a)(5).

- As it had in *RiverKeeper I,* the court again ruled that the restoration provisions in the Phase II rule were plainly inconsistent with section 316(b) and its technology-forcing principle.

- The court remanded the cost-cost site-specific alternative, or variance, on procedural grounds. Nevertheless, the court expressed discomfort with the "significantly greater than" standard in the Phase II rule, given the use, historically and in the Phase I rule, of a "wholly disproportionate standard." The court noted that the "significantly greater than" standard posed substantial concerns because cost is not supposed to be a paramount consideration in determining BTA.

- The court remanded the cost-benefit compliance alternative, or variance, because section 316(b) does not authorize a site-specific determination of BTA based on a cost-benefit analysis. The court restated its conclusion in *RiverKeeper I* that the Clean Water Act does not permit USEPA to consider water quality, i.e. wildlife levels in the water body, in making BTA determinations.

Finally, the court reiterated its conclusion in *RiverKeeper I* that USEPA correctly interpreted section 316(b)'s directive to minimize adverse environmental impact to require a reduction in the number of aquatic organisms lost as a result of water withdrawn in intake structures. The court rejected industry arguments that removing large numbers of aquatic organisms from water bodies is not in and of itself an adverse impact. The court characterized industry's argument as urging a water quality standard that focuses on fish populations and consequential environmental harm, a position rejected by Congress in enacting section 316(b).

As stated previously, USEPA suspended the Phase II rule after the *RiverKeeper II* decision.[nn] USEPA did not suspend, 40 CFR §125.90 (b), however. This regulation retains the requirement that permitting authorities, in the absence of nationwide standards, use BPJ to implement CWA section 316(b) on a case-by-case basis.

Current Status

Since 1972, the states have been required to implement section 316(b) for existing facilities with cooling water intake structures on a case-by-case basis. This responsibility has been made more difficult because section 316(b) does not specify any particular technology that facilities must use nor the criteria or methods the states should employ to determine BTA. Over 30 years ago, USEPA issued draft guidance that describes recommended studies for evaluating the impact of cooling water structures on the aquatic environment and recommends a basis for determining BTA.[oo] Likewise, several USEPA General Counsel opinions from the 1970's address

[nn] 72 Fed. Reg. 37107 (July 9, 2007)

[oo] *Draft Guidance for Evaluating the Adverse Impact of Cooling Water Intake Structures on the Aquatic Environment: Section 316(b) P. L. 92-500* (May 1, 1977).

interpretation of section 316(b).[pp] None of these administrative documents is binding on the states, however.

The *RiverKeeper* decisions provide some guidance in interpreting section 316(b). In both decisions, the court held that the cross-reference in section 316(b) to sections 301 and 306 "is an invitation" to look at those sections for guidance in determining what factors USEPA can consider in determining BTA. Based on its analysis of these sections, the court in *RiverKeeper II* held that USEPA cannot base its determination of BTA on a cost-benefit analysis, but that USEPA can consider costs in a limited fashion. The court also cited energy efficiency and environmental impacts as permissible factors in determining BTA. Both *RiverKeeper* decisions conclude that restoration measures are inconsistent with section 316(b).

Recently, a California appellate court upheld the Central Coast Regional Water Board's case-by-case determination of BTA in a permit issued for the Moss Landing Power Plant [*Voices of the Wetlands v. California State Water Resources Control Board* (2007) 157 Cal. App. 4th 1268 (69 Cal. Rptr. 3d 487)]. The permit authorizes the facility to use once-through cooling for two new combined-cycle generating units. The permit required the permittee to upgrade the existing intake structure to minimize impingement impacts. In addition, the permit found that adverse impacts due to the intake system on the watershed will be minimized through environmental enhancement projects in the watershed.

Relying on decision law interpreting section 316(b) on a case-by-case basis, the Central Coast Regional Water Board had determined that the costs of other technologies were wholly disproportionate to the environmental benefits. The appellate court upheld this approach. In addition, the court concluded that the Central Coast Regional Water Board did not improperly use the environmental enhancement plan in lieu of technology to implement section 316(b). Rather, the court found that the Central Coast Regional Water Board had used the plan only as a means to monetize environmental impacts and benefits under the wholly disproportionate test.

Finally, the Water Boards must also consider the legislative directive in Water Code §13142.5 when regulating cooling water intake structures. Under the Clean Water Act, facilities must, at a minimum, comply with section 316(b) requirements and any more stringent applicable requirements necessary to comply with state law. Section 13142.5 has a more limited coverage than section 316(b) in that the former covers only new and expanded coastal facilities. However, section 13142.5 appears to be more stringent than section 316(b) in one respect. Section 13142.5 requires use of the best available technology feasible "to minimize the intake and mortality of all forms of marine life", without regard to whether these impacts are adverse, in contrast to section 316(b) which focuses on "minimizing adverse environmental impact."

[pp] See, e.g., Op. EPA Gen. Counsel (Jan. 17, 1973), stating that the authority to regulate under §316(b) was not dependent on the prior issuance of thermal effluent limitations and that cooling water intake limitations could be imposed under §402(a)(1); Op. EPA Gen. Counsel 63 (July 29, 1977).

Other California State Agencies

The California Energy Commission (CEC) has authority under the Warren-Alquist Act to license thermal power plants with a capacity of 50 megawatts (MW) or more.[qq] The California Coastal Commission is required under the California Coastal Act to participate in the CEC licensing process with the goal of protecting coastal resources and preventing potential adverse environmental effects on fish and wildlife and their habitats.[rr]

The California Coastal Commission has the authority to issue coastal development permits for power plant projects in the coastal zone. The California State Lands Commission has authority over, and is responsible for leasing, state tidelands to coastal power plants.

The California Ocean Protection Council (OPC or Council) has heard testimony on the damaging environmental effects of OTC at power plants. The Council is committed to improving coordination among the various state agencies to ensure that the environmental effects of the use of OTC water are minimized. On April 20, 2006, the Council adopted a Resolution regarding the use of OTC technologies in coastal waters. Among other things, the Resolution called for the following: the formation of a technical review group for reviewing each plant's Clean Water Act § 316(b) study designs, and a study of the technical feasibility of converting to alternative cooling technologies at coastal power plants. In a later decision the OPC decided to partner with the State Water Board in funding the grid reliability study.

Cooling Water Intake Policies of other States

Maryland

Title 26, Subtitle 08, Chapter 03 of the Code of Maryland Regulations requires that "The location, design, construction, and capacity of cooling water intake structures shall reflect the BTA for minimizing adverse environmental impact."

For Phase II facilities, Maryland is including intake structure requirements in NPDES Permits based on BPJ. The BPJ requirements implementing BTA for cooling water intake structures are derived from USEPA's suspended Phase II 316(b) regulations.

New York

There are approximately 30 power plants within the State of New York that are classified as Clean Water Act §316(b) Phase II facilities. These power plants are situated at rivers, lakes, and estuaries, but not on New York's Atlantic coastline. To implement federal 316(b) requirements for Phase II existing facilities, New York is including intake structure requirements in State Pollutant Discharge Elimination System

[qq] Pub. Resources Code §25500 et seq.
[rr] *Id.* §30413(d).

(SPDES) permits (New York equivalent to California NPDES Permits). New York has its own cooling water intake structure regulation at Title 6, New York State Codes Rules and Regulations (NYCRR), Section 704.5, which reads:

"The location, design, construction and capacity of cooling water intake structures, in connection with point source thermal discharges, shall reflect the best technology available for minimizing adverse environmental impact."

The New York State Department of Environmental Conservation's cooling water intake structure regulations give broad discretion to the permitting agency in the determination of BTA. New York's intake requirements included in discharge permits will be at least as stringent as those of USEPA's Phase II 316(b) regulations. Additionally, the following requirements are imposed under 6 NYCRR 704.5:

a. *Restoration.* Restoration plans are not considered an appropriate or acceptable BTA alternative for any facility, new or existing.

b. *Site-specific alternative BTA determination.* The suspended Phase II minimum performance standards (i.e. 80 percent reduction in impingement and 60 percent reduction in entrainment) represent the minimum allowed, and the permitting authority (New York) will seek to impose the higher end of these ranges.

To determine whether a facility is meeting or will meet impingement and entrainment reduction standards, New York compares the estimated number of organisms impinged and entrained after deployment of technologic or operational reduction measures with a baseline when the facility is operating at full flow and full generation capacity.

The New York State Department of Environmental Conservation has not issued new correspondence to USEPA regarding the regulation of Phase II facilities since USEPA announced intentions to suspend the Phase II regulations. Department of Environmental Conservation staff has indicated that they will continue to regulate Phase II facilities under state authority and that they will seek to impose the highest achievable reduction in entrainment and impingement as BTA.

Wisconsin

Chapter 283.31(6), Wisconsin Statutes, allows the Wisconsin Department of Natural Resources, Bureau of Watershed Management, to require that the location, design, construction, and capacity of cooling water intake structures reflect the BTA for minimizing adverse environmental impact.

The Director of the Bureau of Watershed Management issued a guidance memo to Wisconsin permit writers on February 22, 2005 that provides direction for implementing state statute and the federal Phase II regulations. The guidance memo indicates that the state intends to implement the federal 316(b) regulations for the determination of state and federal BTA for cooling water intake structures. Wisconsin's Director of the

Bureau of Watershed Management has not issued new guidance regarding the regulation of Phase II facilities since USEPA announced intentions to suspend the Phase II requirements.

At this time Wisconsin is including intake structure requirements in NPDES Permits based on BPJ.

Michigan

The State of Michigan developed guidance for CWA 316(b) intake studies in 1975. Michigan's 1975 guidance, titled *Thermal and Intake Studies – Guidance Manual*, provides information for:

- Conducting CWA 316(a) Thermal Discharge Demonstrations
- Conducting CWA 316(b) Intake and Entrapment Demonstrations
- Representative and Important Species

Michigan's comprehensive guidance manual is available online for reader review at: http://www.deq.state.mi.us/documents/deq-wb-permits-316bguidance.pdf.

ALTERNATIVES TO OTC

Alternative technologies are available that can reduce or eliminate the impacts of OTC. The CEC evaluated alternatives to OTC in Chapter 6 of its June 28, 2005 report. The CEC identifies the following alternative technologies:

- Dry Cooling
- Closed Cycle Wet Cooling Towers
- Using alternative cooling water sources – recycled wastewater

Details regarding the above alternative technologies can be found in the CEC's June 28, 2005 report, which is available at: http://www.energy.ca.gov/2005publications/CEC-700-2005-013/CEC-700-2005-013.PDF.

Four of the coastal power plants are completely or partially ceasing the use of OTC and re-powering with dry cooling (Humboldt Bay, Encina, Long Beach, and El Segundo, which is planning to install dry cooling on the portion of its plant). Depending on the water source and waste disposal infrastructure available, dry cooling may not involve an intake or discharge of water and therefore may not require an NPDES permit.

The use of wastewater as a direct cooling water medium (i.e., a direct substitution for ocean or estuarine waters) is limited by geographic, business, and regulatory constraints. This potential strategy is dependent on local conditions, including the relative locations of the sewage treatment and power plant, the land use between the

treatment plant and the power plant, the quantity and quality of the treated wastewater, and the location, or depth and structural attributes of the outfall. The movement of treated wastewater to a power plant would require significant engineering and construction pipelines. In most cases, where candidate wastewater and power plants are not adjacent, the intervening land use is also a consideration. Heavily urbanized areas may require underground pipes to connect the treatment plant to the power plant. If deep-water ocean discharge would be necessary, then pipelines in both directions would be required.

Cooling water flows are typically much larger than treated wastewater volumes. In addition, wastewater may not be as cold as ocean or bay water, thereby reducing the efficiency of heat transfer. Therefore, there are likely only limited or no situations in which wastewater could completely substitute for ocean water, but there may be some cases where treated wastewater may be used to reduce the amount of water withdrawn for OTC.

Power plant outfalls are often in shallow water. If treated wastewater is used for cooling at a power plant, a discharge of heated, treated waste water to a beach or shallow outfall may pose unacceptable risks to beneficial uses such as contact recreation or protection of marine aquatic life (e.g., kelp forests).

A nearly ideal situation would be one in which a wastewater treatment plant is located in very close proximity to a power generating facility, and in which both facilities are owned or operated by the same municipality. One example of such a circumstance is the City of Los Angeles Hyperion Wastewater Treatment Plant and the Scattergood generating facility, operated by the Los Angeles City Department of Water and Power. Hyperion discharges approximately 420 MGD of secondary treated wastewater, while Scattergood's flow is approximately 496 MGD, so the volumes are roughly similar. Hyperion discharges its wastewater far from shore at a depth of 187 feet below sea level, while Scattergood discharges at a depth of only 15 feet near shore. If treated wastewater were used to partially substitute or even replace OTC marine water, the wastewater may need to be returned to Hyperion for deep-water discharge. Heating the wastewater would increase the buoyancy of the plume, thereby modifying the initial dilution characteristics.

According to the CEC's 2005 report "Issues and Environmental Impacts Associated with Once-through Cooling at California's Coastal Power Plants," a re-powering project was proposed and approved by the Energy Commission for the El Segundo generating plant site in Los Angeles County. The El Segundo power plant is located within 1.25 miles of the Hyperion Wastewater Treatment Plant. The Energy Commission staff estimated the Hyperion plant as having a capacity of 450 MGD, whereas the El Segundo re-powering facility proposed to use 207 MGD ocean water for cooling. Due to concerns about entrainment impacts of OTC, Energy Commission staff proposed that the El Segundo power plant use the Hyperion wastewater for cooling and return the water to the waste treatment facility after use. Capital costs were estimated to be $12 million. Operation cost was expected to be slightly greater due to efficiency loss, at a cost of $1 - 2 million

dollars per year. It was expected that some cost would also be incurred to purchase the wastewater, but this was not negotiated with the City of Los Angeles. Apparently the City did not indicate a willingness to sell the treatment plant wastewater to the power plant at that time.

OPC ALTERNATIVE COOLING SYSTEM ANALYSIS

The Alternative Cooling System Analysis OPC study conducted by Tetra Tech (February 2008) evaluates the logistical, regulatory, and economic factors that arise when a facility modifies its cooling water system by implementing technology-based measures designed to achieve the OPC performance benchmark. The report moves beyond a model-based approach by using facility-specific data to develop comprehensive cost and engineering profiles that are unique to each of California's affected facilities. It is not, however, intended to be exhaustive in terms of the many obstacles that may exist and the different technology configurations that can be evaluated, nor can it be considered a substitute for the more rigorous engineering assessment that would be conducted prior to the implementation of one of the evaluated options. Instead, the intent is to establish a more precise understanding of the associated costs of a once-through cooling system retrofit, and the factors that influence those costs, in order to assist state agencies in the regulatory development process as it moves forward.

The Tetra Tech study shows that retrofitting with wet cooling systems could be *technically and logistically feasible* at 12 of the 15 active coastal power plants. Twelve plants where wet cooling towers (retrofits) were considered technically and logistically feasible by Tetra Tech were: Alamitos, Contra Costa, Diablo Canyon, Harbor, Haynes, Huntington Beach, Mandalay, Morro Bay, Moss landing, Pittsburg, SONGS, and Scattergood. The three plants where wet cooling towers (retrofits) were considered technically and logistically infeasible by Tetra Tech were Redondo, Ormond Beach, and El Segundo.

Retrofitting to wet cooling towers is not feasible at Redondo Beach because of its immediate proximity to office buildings and residential areas. Compliance with local use requirements would be unlikely. For two other facilities – El Segundo and Ormond Beach – the preferred option could not be configured to meet the minimum site constraints. At both locations, interference from a wet cooling tower's visible plume with nearby flight operations made it probable that plume-abated towers would be required. An acceptable configuration could not be designed for either location due to limited space availability and potential interference with other major structures. In addition, at El Segundo, the cooling towers would be located immediately adjacent to the beach, which may conflict with the requirements the California Coastal Act to protect visual resources.

Likewise, Ormond Beach is infeasible given the limited space at the site. While it appears that there is sufficient space for conventional towers, the Tetra Tech analysis

suggested plume-abated towers because of the proximity to the Naval Air Station (~2 miles downwind) and the potential for significant impact from a visible plume. However, plume abated towers require more room for placement than conventional towers, and there may not be sufficient space at that location. The recent agreement with the Nature Conservancy removed a substantial portion of the facility as a conservation easement.

At Diablo Canyon and San Onofre—retrofitting is problematic (although not necessarily infeasible). At Diablo Canyon, the constraints of the existing site and the disruption a wet cooling tower retrofit will require both units to be offline for 8 months or more. At San Onofre, the installation and operation of wet cooling towers would require an additional regulatory approval because of a potential effect on sensitive plant species and environmentally sensitive habitats.

IMPINGEMENT/ENTRAINMENT CONTROL TECHNOLOGIES ASSOCIATED WITH OTC SYSTEMS

Variable Speed Pumps/ Variable Frequency Drives - Allow a facility to moderate its cooling water intake flow depending on seasonal and operational conditions. The maximum benefit is dependent on reductions in intake flow but actual reductions will be based on the time of year and generating load of the facility. Variable speed pumps are technically feasible at all facilities; a benefit, however, is dependent on the frequency and degree which flow can be reduced without impacting operations.[ss]

Traveling Water Screens – Traveling Water Screens have been employed on seawater intakes since the 1890's. The screens are equipped with revolving wire mesh panels having 6mm to 9.5mm openings. As the wire mesh panels revolve out of the flow, a high-pressure water spray removes accumulated debris, washing it into a trough for further disposal. The screens are located onshore, either as a shore installation on an embayment or at the end of a channel, forebay or pipe that extends out beyond the surf zone into the sea.[tt] Traveling screens located onshore within an embayment, with intake velocities of less than 0.5 feet per second, are considered acceptable controls to eliminate impingement.

Velocity Cap – The cover placed over the vertical terminal of an offshore intake pipe is called a "velocity cap". The cover converts vertical flow into horizontal flow at the intake entrance to reduce fish entrainment. It has been noted that fish will avoid rapid changes in horizontal flow and velocity cap intakes have been shown to provide 80-90% reduction in fish impingement at two California power stations, and a 50-62% impingement reduction versus a conventional intake at two New England power stations

[ss] California's Coastal Power Plants: Alternative Cooling System Analysis, prepared by Tetra Tech, Inc, February 2008

[tt] Pankratz, Tom: An Overview of Seawater Intake Facilities for Seawater Desalination www. texaswater.tamu.edu/readings/desal/Seawaterdesal.pdf

(EPA Efficacy of Cooling Water Intake Structures, EPA-821-R-01-036, November 2001, http://www.epa.gov/waterscience/316b/phase1/technical/ch5.pdf).

It has been shown that the relationship of the vertical opening (x) to the length of horizontal entrance (1.5x) can be optimized to create a uniform flow and improve a fish's ability to react. As with all intake configurations, there are many design issues that must be considered, and the performance of a velocity cap may vary in still water versus areas subject to tidal cross-flows.[uu] Even with velocity caps, offshore intakes have been known to allow impingement of marine wildlife.

Fish Return Systems – A **Ristroph *Screen*** is a modification of a conventional traveling water screen in which screen panels are fitted with fish buckets that collect fish and lift them out of the water where they are gently sluiced away prior to debris removal with a high pressure spray. At one New York seawater intake, the 24-hour survival of conventional screens averaged 15% compared with 79-92% survival rates for Ristroph Screens. A review of 10 similar sites reported that Ristroph modifications improved impingement survival 70-80% among various species. Ristroph Screens may be effective for improving the survival of impinged marine life, but they do not affect entrained organisms. **Fish Elevators** remove fish from within a forebay prior to impingement on traveling screens. The fish are then returned to the sea. In California, SONGS operates a fish return system with a fish elevator.

Fine Mesh Screens have successfully reduced entrainment of eggs, larvae, and juvenile fish at some intake locations where traveling water screens have been outfitted with mesh having openings ranging from 0.5 mm to 5 mm, reducing entrainment by up to 80%. Fine mesh screens may result in operational problems due to the increased amount of debris removed along with the marine life, and in some locations, the fine mesh is only utilized seasonally, during periods of egg and larval abundance.[vv]

Passive "Wedgewire" Screens – Another intake arrangement utilizes slotted screens constructed of trapezoidal- shaped "wedgewire". The cylindrical screens have openings ranging from 0.5 millimeters (mm) to 10 mm are usually oriented on a horizontal axis with screens sized to maintain a velocity of less than 15 centimeter per second (cm/s) (0.5 feet per second, fps) to minimize debris and marine life impingement. Passive screens are best-suited for areas where an ambient cross-flow current is present, and air backwash system is usually recommended to clear screens if debris accumulations do occur. As with all submerged equipment, material selections should reflect the corrosion and biofouling potential of seawater.

Passive screens have a proven ability to reduce impingement and entrainment in river systems. Their effectiveness is related to their slot width, and low through-flow velocity. It has been demonstrated that 1 mm openings are highly effective for larval exclusion

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uu Ibid

vv Ibid

and reduce entrainment by 80% or more.[ww] Wedgewire screen systems have not been employed or tested in open coastal waters, or in any California waters to date.

Filter Net Barriers are a relatively new method of reducing intake impingement and entrainment. A full-depth, porous filter fabric with openings ranging from 0.4mm to 5mm is placed at the entrance to an intake structure and suspended by a floating boom and anchored to the seabed. The system is sized to provide enough surface area to have a through-flow velocity low enough to avoid impingement of marine life or debris. [xx] If placed in an embayment such net barriers would pose safety risks to the navigation beneficial use or possibly eliminate the use. Filter net barriers have not been employed or tested in open coastal waters, or in any California waters to date.

Behavioral systems using lights, bubbles, or sound to enhance fish avoidance or attract them to a fish diversion system have generally been ineffective and are used infrequently.[yy]

See Appendix B for a table of existing intake and control information at California's OTC power plants.

DESALINATION AND POWER PLANTS

Seawater desalination increasingly supplements water supply needs in coastal California communities. New desalination technologies have made desalination more feasible. However, desalination requires a great amount of electricity and creates waste brine. Disposal of waste brine is problematic because the salinity can be twice the salinity of the ocean. Waste brine is denser than seawater and has the potential to sink to the ocean bottom, adversely impacting sensitive benthic organisms.

Because of the energy and waste disposal needs, desalination facilities are increasingly being proposed at or near existing coastal power plants. Co-location allows the desalination facility to combine (i.e., *co-mingle*) their brine wastes with the large volumes of once-through cooling water used at coastal power plants. In addition, co-location allows the desalination plant to have a reliable and direct use of electrical power produced at the power plant.

Environmental advocates have argued that the co-location of a desalination facility near a power plant will ensure the continued existence of OTC at the power plant, and possibly prolonging the lifetime of an out-dated power plant and its associated environmental impacts. Power plant officials recognize that their main business is to generate electric power, not to provide water, and the co-location of a desalination facility near a power plant must have community support and not hinder the power

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ww Ibid
xx Ibid
yy Ibid

plant's current or future operations. A stand-alone desalination facility will be required to apply for an NPDES permit to discharge waste brine.

Typically, desalination plants co-located with power plants draw water off of the system after thermal exchange and, therefore, should not increase the intake volumes. This subject is outside of the scope of the Clean Water Act § 316(b) issues and would be more appropriately addressed under existing water quality control plans and policies (e.g., California Ocean Plan, State Water Board Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California).

ISSUES AND ALTERNATIVES FOR STATEWIDE CWA 316(B) POLICY

Should the State Water Board Adopt a Statewide Policy?

Although most of the Phase II rule was remanded to USEPA and suspended, 40 CFR 125.90 (b) was not suspended. This retains the requirement that permitting authorities implement CWA Section 316(b) on a case-by-case basis using BPJ for existing facility cooling water intake structures.

Alternatives:

1. Wait for USEPA to promulgate a new Phase II rule, or
2. Move forward and develop a statewide policy.

Discussion:

USEPA is moving forward with promulgation of a new Phase II rule. It is State Water Board staff's understanding that USEPA will attempt to issue a draft Phase II rule by the end of 2008. Even if the draft is issued by the end of 2008, the formal public comment process and development of a final rule will likely be lengthy.

The development of a statewide policy in California is much further ahead than the USEPA process. California has many plants that need NPDES permits renewed, and that NPDES renewal is contingent upon waiting for a new nationwide rule or a California specific statewide policy. The most expedient way to provide guidance to permit writers for renewal of power plant NPDES permits is through a California statewide policy.

Staff recommendation:

Staff recommends Alternative 2, moving forward with a statewide policy to provide statewide consistency in implementing CWA Section 316(b) and California Water Code Section 13142.5(b).

How should New and Existing Power Plants be defined?

Section 316(b) requires that the location, design, construction, and capacity of cooling water intake structures reflect BTA for minimizing adverse environmental impacts. USEPA implemented §316(b) by developing separate rules for new power plants, existing power plants, and offshore oil and gas extraction facilities. As stated previously, however, the regulations for existing power plants have largely been suspended.

Alternatives:

1. Use the existing definitions as defined by USEPA in the Phase I federal regulations.
2. Create new definitions of new and existing power plants.

Discussion:

Generally there are no truly new coastal power plants being developed in California's coastal waters (marine and estuarine) that rely on once-through cooling. Re-powering projects are essentially new projects at existing power plants.

California Water Code §13142.5 applies to new and expanded coastal power plants. Section 13142.5 does not define the terms "new" or "expanded". However, the USEPA Phase I 316(b) regulations at 40 C.F.R. 125.83 define new facilities as follows:

> *"New facility* means any building, structure, facility, or installation that meets the definition of a "new source" or "new discharger" in 40 C.F.R. 122.2 and 122.29(b)(1), (2), and (4) and is a greenfield or stand-alone facility; commences construction after January 17, 2002; and uses either a newly constructed cooling water intake structure, or an existing cooling water intake structure whose design capacity is increased to accommodate the intake of additional cooling water. New facilities include only "greenfield" and "stand-alone" facilities. A greenfield facility is a facility that is constructed at a site at which no other source is located, or that totally replaces the process or production equipment at an existing facility. A stand-alone facility is a new, separate facility that is constructed on property where an existing facility is located and whose processes are substantially independent of the existing facility at the same site. New facility does not include new units that are added to a facility for purposes of the same general industrial operation (for example, a new peaking unit at an electrical generating station)."

Thus, under the Phase I definition, a new power plant must, at a minimum, be a greenfield or a stand-alone facility, and it must use a new intake structure or an existing structure that has been modified to increase its design capacity to accommodate the intake of additional cooling water. An "existing facility", under the Phase I regulations, is any facility that is not a new facility (40 C.F.R. §125.83.).

Staff recommendation:

State Water Board staff recommends Alternative 1. Under this approach, a new power plant is defined as any plant that is a new facility, as defined in 40 C.F.R. §125.83, that is subject to Subpart I, Part 25 of the Code of Federal Regulations. In like manner, an existing power plant is defined as any power plant that is not a new power plant.

What Constitutes BTA for Existing Power Plants?

In the absence of applicable federal regulations implementing section 316(b), the states and USEPA must use BPJ to determine BTA on a case-by-case basis. The *Riverkeeper* decisions provide some bounds for the exercise of BPJ. First, BTA cannot be determined on the basis of a cost-benefit analysis, although some limited cost consideration is permitted, *i.e.,* can the costs of a given technology be reasonably borne by the industry? Second, the BTA standard is technology-driven; therefore, restoration is not a permissible compliance alternative. Third, the technology must be the "best" technology available, i.e. it must be based on "the optimally best performing" facility and not the average facility. Fourth, other factors, such as the negative environmental impacts of alternative cooling technologies and concerns about energy production and efficiency, may also be considered.

Finally, section 316(b) requires that the technology be the best available for "minimizing adverse environmental impact." Water Code section 13142.5, in contrast, requires that new and expanded industrial facilities using seawater for cooling employ the best available technology feasible "to minimize the intake and mortality of all forms of marine life," irrespective of whether these impacts are adverse.

Alternatives for existing power plants:

1.a. Based on a statewide determination of BTA using BPJ, establish BTA as reductions in flow and intake velocity, at a minimum, to a level commensurate with that which can be attained by a closed cycle cooling system (Track I). The closed cycle cooling system could be either a wet or dry cooling system. If Track I is not feasible, the power plant must reduce the level of adverse environmental impacts from the cooling water intake structure to a comparable level to that which would be achieved under Track I, using operational or structural controls, or both (Track II); or

1.b. Establish BTA consistent with Alternative 1.a., except that, under this alternative, BTA for power plants that re-power would consist of reductions in flow and intake velocity to levels that are, at a minimum, commensurate with that which can be attained by a closed cycle dry cooling system (Track I). BTA for power plants that retrofit, but do not re-power, would consist of reductions in flow and intake velocity to levels that are, at a minimum, commensurate with that which can be attained by a closed cycle wet cooling system (Track I). Track II would be same as in Alternative 1.a.

2. Establish BTA, based on a statewide determination of BTA, using BPJ for existing power plants, that consists only of Track I, as defined in Alternative 1.a.; or

3. Allow each Regional Water Board to separately employ BPJ to determine BTA on a plant-specific and permit-specific basis.

Discussion:

Alternative 1.a.

Based on a statewide determination of BTA using BPJ for existing power plants, BTA would be established as reductions in flow and intake velocity, at a minimum, to a level commensurate with that which can be attained by a closed cycle cooling system (Track I). In this alternative BTA for minimizing the intake and mortality of all forms of marine life would be either a closed cycle wet (evaporative) cooling system or a closed cycle dry (air cooled) cooling system. The power plant owner or operator would have the flexibility to select either wet or dry closed cycle cooling under Track I. In addition, technological controls that achieve reductions in impacts to those comparable to closed cycle wet cooling would be allowed (Track II).

A recent analysis by Tetra Tech for the Ocean Protection Council (February 2008) states that retrofitting to closed cycle wet cooling is feasible at 12 out of 15 coastal power plants assessed. Twelve plants where wet cooling towers (retrofits) were considered technically and logistically feasible by Tetra Tech were: Alamitos, Contra Costa, Diablo Canyon, Harbor, Haynes, Huntington Beach, Mandalay, Morro Bay, Moss landing, Pittsburg, San Onofre (SONGS), and Scattergood. The three plants where wet cooling towers (retrofits) were considered technically and logistically infeasible by Tetra Tech were Redondo, Ormond Beach, and El Segundo.

At the two nuclear facilities, Diablo Canyon and San Onofre—retrofitting is problematic (although not infeasible). At Diablo Canyon, the constraints of the existing site and the disruption a wet cooling tower retrofit would cause will be problematic. At San Onofre, the installation and operation of wet cooling towers would require additional regulatory approval because of a potential effect on sensitive plant species and environmentally sensitive habitats. It is likely that retrofitting with closed cycle cooling may take more time to address at these plants as compared to fossil fuel plants.

Tetra Tech did not assess the Potrero plant; it may shut down at some point in the near future, pending the outcome of the San Francisco grid reliability study. Tetra Tech did not assess the South Bay Plant since it had been pursuing an air-cooled re-powering project (since that time the application for re-powering has been withdrawn). Hunter's Point has ceased operations and was also not assessed.

Retrofitting to wet cooling towers is not feasible at Redondo Beach because of its immediate proximity to office buildings and residential areas. Compliance with local use requirements would be unlikely. For two other load following facilities – El Segundo and

Ormond Beach – the preferred option could not be configured to meet the minimum site constraints. At both locations, interference from a wet cooling tower's visible plume with nearby flight operations made it probable that plume-abated towers would be required. An acceptable configuration could not be designed for either location due to limited space availability and potential interference with other major structures. In addition, at El Segundo, the cooling towers would be located immediately adjacent to the beach, which may conflict with the requirements the California Coastal Act to protect visual resources. At Ormond Beach, the proximity to the Mugu Naval Air Station suggests the need for plume-abated towers, but sufficient land is not available for this type of tower.

In addition, four existing facilities, El Segundo (partial plant), Encina (Carlsbad Energy Center), Long Beach, and Humboldt Bay, have adopted closed cycle dry cooling as part of their re-powering applications. Therefore, it is clear that some plant operators consider closed cycle dry cooling feasible and economical when re-powering.

Under this alternative, Track I controls would be required if feasible for a particular plant. Feasible would be defined as capable of being accomplished in a successful manner by the final compliance dates in the Policy, taking into account the following site-specific factors: availability of adequate space, potential impacts from increased noise on neighboring commercial or recreational land uses, air traffic safety, public safety, and the ability to obtain necessary permits, such as permits from the California Coastal Commission or local air district.

For Redondo and Ormond Beach, if re-powering using closed cycle cooling is not employed, Track II controls would be necessary. For El Segundo, a combination of re-powering (see below) and Track II controls would be necessary. Track II controls could include replacement of OTC water with recycled treated wastewater, and/or one or more of the technologies discussed above in the Section titled I/E Control Technologies Associated with OTC.

Under this alternative, a reduction in environmental impacts under Track II would be considered to achieve a "comparable level" if both impingement mortality and entrainment of all life stages of marine life are reduced to 90 percent or greater of the reduction that would be achieved under Track 1, using closed cycle wet cooling.

Alternative 1.b.

Under Alternative 1.a. above BTA would be established for existing power plants based on either wet or dry closed cycle cooling and the power plant owner or operator would have the flexibility to select one of those two types of closed cycle cooling under Track I. Alternative 1.b. would establish different requirements for Track I, depending on whether the power plant is re-powering or retrofitting. For retrofits, BTA would be closed cycle wet cooling. For re-powers BTA would be closed cycle dry cooling. Track II would remain the same as under Alternative 1.a.

When retrofitting an existing plant the same power generating system is used and only the cooling system is replaced. In such cases air cooled systems have a high energy penalty resulting in much greater combustion air pollution (including greenhouse gases) per MW of energy produced. Evaporative cooling towers produce particulate emissions (salt drift), but technology does exist to partially mitigate the particulates from cooling towers. The combustion air emissions associated with using evaporative cooling towers are much lower per MW of energy produced than for dry cooling. Based on these relative air pollution characteristics, closed cycle wet cooling would be BTA for retrofits.

When re-powering, the electrical generating systems are replaced with newer, more efficient systems, such as combined cycle technology. In general, power plants that have chosen to re-power have selected closed cycle dry cooling systems. When re-powering with efficient combined cycle generating technology and dry cooling, there are fewer air emissions per MW of electricity produced. Such air-cooled systems are preferable for re-powered plants because particulate air emissions are not associated with the cooling system. In addition, water usage in dry cooling systems is much lower than for evaporative cooling towers; there would be no need for the intake of cooling tower makeup and there would be no cooling tower blowdown discharges. Based on this information, closed cycle dry cooling would be BTA for re-powers.

Alternative 2

This alternative would establish closed cycle cooling as BTA (Track I), but not allow alternative technological controls (Track II) to be used at existing power plants. Under this alternative, the few plants that may not be able to install either wet or dry closed cycle cooling systems may be forced to shut down. Therefore, a policy that does not allow a second track for compliance may be considered unreasonable. This approach is not recommended.

Alternative 3

Allowing the use of BPJ by the Regional Water Boards on a facility- and permit-specific basis will likely result in inconsistency from region to region. This option may also result in a multitude of petitions to the State Water Board for review. This approach will not provide certainty to the operators (or the State energy agencies) and will seriously lengthen the period during which controls are not implemented to protect marine and estuarine life. The permit-specific BPJ approach is not recommended.

Staff recommendation:

Staff recommends Alternative 1.a. Establish requirements for BTA, based on a statewide determination using BPJ, that consist of reductions in flow and intake velocity, at a minimum, to a level commensurate with that which can be attained by closed cycle, wet or dry cooling (Track I). If Track I is not feasible, the power plant must reduce the level of adverse environmental impacts from the cooling water intake structure to a

comparable level to that which would be achieved under Track I with closed cycle wet cooling, using operational or structural controls, or both (Track II).

Makeup Water for Closed Cycle Wet Cooling

Closed cycle evaporative cooling systems, more often referred to as wet cooling towers, function by transferring waste heat to the surrounding air through the evaporation of water, thus enabling the reuse of a smaller volume of water several times to achieve the desired cooling effect. Compared to a once-through cooling system, wet cooling towers may reduce the volume of water withdrawn from a particular source by as much as 93-96 percent depending on various site-specific characteristics and design specifications.

In their study titled, *California Coastal Power Plants: Cost and Engineering Analysis of Cooling System Retrofits*, Tetra Tech estimates the design make up water required for retrofitted cooling towers at thirteen of the State's OTC power plants. Table 11 summarizes the Tetra Tech estimated makeup water requirements for wet cooling tower retrofitted power plants compared with design OTC water requirements.

Table 11. Makeup Water Requirements for Wet Cooling Tower Retrofitted Power Plants Compared with OTC Water Requirements

Plant	Combined OTC Design Intake Volume (mgd)	Combined Cooling Tower Makeup Volume (mgd)	%Reduction
Alamitos	1152	57	95
Huntington	484	26	95
Haynes	858	36	95-96
Harbor	81	4.6	94
El Segundo	379	20	95
Diablo Canyon	2484	108	96
Contra Costa	431	20	95
Moss Landing	1166	56	95
Mandalay	241	13	95
Pittsburg	462	20	96
Ormond Beach	654	47	93
SONGS	2287	110	95
Scattergood	495	23	95

The re-use of treated wastewater may have a potential application as makeup water for alternative cooling by evaporative cooling towers. The reduced volume requirements of a cooling tower system may make wastewater effluent more feasible. This would be especially true in the situations where the sewage plant is in close proximity and costs of a pipeline are not exorbitant. In such cases, the wastewater would need to be of sufficient quality (in accordance with requirements in Title 22 of the California Code of Regulations) to ensure plant safety and prevent aerial contamination. Any concentrated

chemical constituents or solids would likely need to be disposed at permitted land disposal sites.

Alternatives:

1. Do not specify source water preferences in the Policy.

2. Require that power plant owners consider the feasibility of using recycled wastewater for power plant cooling.

Discussion:

Alternative 1: This alternative is inconsistent with the State Water Board's policy direction regarding the use of recycled wastewater. The State Water Board's 1975 "Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Powerplant Cooling" establishes recycled wastewater being discharged to the ocean as the highest priority for power plant cooling source water. Further, the State Water Board is committed to encouraging the safe use of recycled wastewater in order to conserve the state's scarce potable water resources. To that end, the State Water Board is currently working on development of a recycled water policy.

Alternative 2: For the reasons explained above, this alternative is consistent with the State Water Board's policy direction to favor the safe use of recycled wastewater.

Staff recommendation:

Staff recommends Alternative 2: Require that power plant owners consider the feasibility of using recycled wastewater for power plant cooling.

Nuclear and Conventional Facilities

In the Phase II rule, USEPA included a provision that authorized a site-specific compliance alternative for nuclear facilities to address safety concerns unique to these facilities. This provision stated that if a nuclear facility "demonstrate[s] to the Director based on consultation with the Nuclear Regulatory Commission that compliance with [subpart J] would result in a conflict with a safety requirement established by the Commission, the Director must make a site-specific determination of BTA for minimizing adverse environmental impact that would not result in a conflict with the Nuclear Energy Commission's safety requirement."[zz]

In *Riverkeeper II,* the court rejected industry's challenge to the Phase II rule on the ground that USEPA had failed to consider the unique safety concerns relating to nuclear facilities. Industry representatives had argued that nuclear facilities face unique safety concerns associated with the stable flow of cooling water to ensure safe reactor operation and shutdown. They contended that any change in water intake or obstruction

[zz] 40 C.F.R. §125.94(f).

of water intake systems due to, for example, the clogging of screens, could affect nuclear power facilities in specific and serious ways. The court concluded, however, that the site-specific compliance alternative cited above adequately addressed industry's concerns.

Alternatives:

1. Grant nuclear facilities an exemption from the Policy.

2. Do not exempt nuclear facilities from the Policy, but allow them a longer time to comply than conventional facilities and include a safety provision to assure that the Policy's requirements do not compromise safety.

3. Regulate nuclear and conventional facilities in the same manner.

Discussion:

Alternative 1: Under design flow conditions, the State's nuclear facilities can withdraw up to 4.8 billion gallons of cooling water per day. In comparison, the combined average cooling water intake flow for all the State's OTC plants in 2005 was 9.4 billion gallons per day (this does not include flows for Humboldt Bay, Hunters Point, and Long Beach power plants). Nuclear power plants can impinge and entrain substantial numbers of aquatic organisms because of the large volume of cooling water flows that pass through these facilities each day. Granting nuclear facilities an exemption from the Policy would allow considerable impingement and entrainment impacts to continue uncontrolled. This is not recommended.

Alternative 2: This alternative would give nuclear facilities more time to comply with the Policy's requirements because of safety concerns. It would also alleviate concerns that the Policy would impose requirements that would compromise the safety at a nuclear power plant. Since this alternative requires eventual compliance with the Policy, impingement and entrainment would also be controlled.

Alternative 3: This alternative would require that nuclear facilities meet the same time schedule and controls as conventional facilities. While this alternative requires all facilities to control impingement and entrainment, it does not address possible safety concerns and the large scale facility changes that nuclear facilities may face. This is not recommended.

Staff recommendation:

Staff recommends Alternative 2: Allow nuclear facilities more time to comply with the Policy's requirements.

Compliance Schedule

Planning, permitting and retrofit installation of BTA will take considerable time and resources to accomplish. There may be significant down time during which power will not be generated from the affected units.

Alternatives:

1. Regional Water Board staff may schedule BTA retrofits on a case-by-case basis.
2. State Water Board staff may establish a power plant specific schedule in a statewide policy.
3. The statewide policy may provide deadlines for BTA retrofits for different classes of power plants, and scheduling retrofits within those deadline periods would be accomplished in collaboration with State energy agencies.

Discussion:

The general consensus of the energy industry is that about 5 years are needed to plan, site, permit, and construct a new major power plant. Permitting alone for retrofits may take one year or more, with the larger capacity factor and nuclear plants requiring more time to plan and permit. If plant operators opt to re-power, the permitting may be considerably more extensive.

For retrofits, following construction of the closed cycle cooling system, the installation phase (connecting the new cooling system to the generation system) may require the plants to be down for a significant period of time. For installation, fossil fueled plants will likely be off the grid for four weeks or more, and nuclear-fueled power plants may take up to six months or more. According to the Grid Reliability Study (Jones and Stokes, 2008), the State's electrical supply can be maintained throughout the retrofit period, but each plant will require time to plan and permit the alternative cooling systems.

Grid reliability is an issue of statewide concern. To promote grid reliability it is not advisable to assume that all plants can convert to BTA at the same time in a very short time frame. Conversion to BTA must be accomplished in an orderly and coordinated fashion.

The mission of the Water Boards is to protect water resources and marine/estuarine life. The Water Boards are experts in protecting water resources but are not energy experts. If Regional Water Boards individually attempt to schedule retrofit or re-power projects associated with NPDES permits, there may be disruptions in grid reliability. Likewise, if the State Water Board attempts on its own to set a schedule, disruptions to the grid may occur. From a grid reliability standpoint, the safest approach would be for the Water Boards to collaborate with the experts in the State's energy and coastal permitting agencies.

Staff recommendation:

Staff recommends Alternative 3. The State Water Board will convene a Statewide Task Force, which will include agencies with oversight in energy resource planning and permitting. This Task Force will assist in reviewing and implementing scheduled conversions to BTA by existing power plants.

Monitoring Provisions to Assess Track II Reductions in I/E

Existing power plant dischargers opting to use Track II for compliance with the Policy would need to reduce I/E impacts through operational or technological controls. How should these reductions be quantified?

Alternatives:

1. Do not require further monitoring; only estimate I/E reductions based on reductions in flows.
2. Do not include specific monitoring language in the Policy; Regional Water Board staff would have to independently develop monitoring language for permits.
3. Include consistent Track II monitoring language to be used statewide.

Discussion:

According to the Tetra Tech report wet-cooling towers would result in a control of 93-96% water consumption (flow) depending on the plant, if ambient marine or brackish water is used. Track II controls must be comparable to Track I.

In some cases, simply comparing flows before and after controls may be the simplest (but somewhat inaccurate) way to estimate I/E reductions. Some Track II measures may actually involve a reduction in flow, such as replacement of OTC water with treated wastewater or the use of variable frequency drive pumps. In such cases, intake flow reductions may be related to entrainment reductions. If Track II results in flow reductions to levels comparable to Track I, I/E reductions may be similar (but possibly not identical) to flow reductions. There may not be an exact relationship between water reduction and entrainment reduction.

If Track II plants employ screen technologies (e.g., wedgewire screens) to reduce entrainment, there will not be a reduction in flow, just a reduction in entrainment. In other cases, especially when a mix of Track II controls are employed, I/E monitoring would be necessary. In order to fully understand the reductions in I/E, pre- and post-control monitoring data would be required. Possibly the studies performed under the PIC and CDS requirements of the suspended USEPA Phase II rules may suffice for the pre-control I/E. In such cases only post-control monitoring would be needed. However, in cases when a particular PIC/CDS study may be deficient in some way, then both pre- and post- control monitoring may be necessary for a Track II plant.

If Regional Water Boards independently determine the monitoring requirements, there may be inconsistencies statewide. One consistent statewide approach would be preferable, and would also provide guidance for permit writers in requiring a monitoring plan.

Staff recommendation:

Staff recommends Alternative 3: Include consistent Track II monitoring language to be used statewide.

Interim Requirements

Considering that there will likely be a significant time lag between the adoption of the policy and ultimate retrofit to BTA, impacts to marine life will continue for that interim period.

Alternatives:

1. Provide no interim measures in a statewide policy.
2. Provide interim measures for impingement of large organisms only.
3. Provide interim measures for entrainment when power is not generated only.
4. Provide restoration as an interim measure for I/E.
5. Provide all of the above interim measures, including large organisms exclusion devices, reduction in entrainment when power is not generated, and restoration for the remaining interim I/E impacts.

Discussion:

The National Marine Fisheries Service reported to staff that large organisms such as marine mammals and sea turtles are regularly impinged in offshore intakes. Such impacts to protected marine life should be addressed more rapidly than by waiting for a full BTA retrofit at power plants. Existing power plants with offshore intakes can reduce impingement of large organisms by installing large organism exclusion devices having a mesh size no greater than 4" square.

Another impact that may be addressed on a short-term basis prior to full BTA retrofit is impingement and entrainment of marine life during periods when no energy is being produced. Typically, OTC water flows continue when electrical generation is not needed in order to prevent biofouling. In addition, in-plant waste streams, including in some cases treated sewage, are commingled and disposed of in OTC discharges.

Flow should be reduced to ten percent of the average daily flow during periods when electrical energy is not being produced for a period of two or more consecutive days. Flow reduction will reliably reduce both Impingement and entrainment impacts of OTC.

There are a variety of options to reduce intake flows including re-powering to combined cycle combustion technology, seasonal outages, and variable speed pumps. An example of flow reduction is at the Contra Costa Power Plant, which currently employs variable speed pumps and seasonal reductions to avoid entrainment of striped bass larvae. The CEC discussed these intake flow reduction options in Chapter 6 of its June 28, 2005 report.

Not requiring interim measures would allow the I/E impacts to continue unabated until the dates of ultimate compliance. Ultimate compliance, i.e. BTA installed, may not be accomplished for several years due to the lengthy planning, permitting and construction timelines. The interim measures proposed would at least offset the impacts during the interim prior to installation of BTA.

Restoration as an Interim Measure

In the past, USEPA and the states have allowed existing power plants to comply with §316(b), in part, by using restoration measures to address impingement and entrainment losses. California law on intakes using seawater for cooling at new and expanded power plants specifically references the use of best available mitigation measures feasible, as well as the best available site, location, and technology feasible, to minimize intake and mortality of marine life.

The original USEPA Phase I rule for new power plants allowed owners or operators to comply with the rule by using restoration measures to compensate for ecosystem losses due to impingement and entrainment. In *RiverKeeper I*, the Second Circuit Court of Appeals ruled that USEPA exceeded its authority because "restoration measures are inconsistent with Congress' intent that the 'design' of intake structures be regulated directly, based on the best technology available . . ." (358 F.3d at 190). In *RiverKeeper II*, the Second Circuit Court of Appeals reached the same conclusion for existing power plants. The court once again decided that under CWA Section 316(b) restoration measures, such as restoring habitat or restocking fish, could not be considered BTA.

It is clear that restoration to comply with CWA 316(b) is not BTA. Restoration of habitat, however, is valuable and should be encouraged as an offset during the interim until BTA is fully complied with. Determination of restoration funding may be determined in one of two ways: a) by simply basing restoration on plant flow rates; or b) by a more rigorous biological model such as habitat production foregone.

Habitat production foregone is one of the most promising methodologies for use in assessing entrainment losses and then applying that information to a restoration project. This methodology estimates the amount of habitat (production foregone) it would take to produce the organisms lost to entrainment. Estimates of lost production can be for affected individuals only or the affected individuals plus the production of progeny that were not produced. This method can address all losses across all habitat types.

Habitat production foregone requires an estimate of the Proportional Mortality (i.e., the proportion of larvae killed from entrainment to the larvae in the source population). An estimate is also required of the source water body area for the target species' source population. The product of the average Proportional Mortality and the source water body area is an estimate of habitat production foregone area that is lost to all entrained species. This habitat area can then be restored in a nearby area. For example, if the average Proportional Mortality of estuarine species is 17 percent and the area of the source water estuary is 2000 acres, then the habitat production foregone is equal to (17% x 2000 acres) = 340 acres.

Restoration costs will necessarily be site-specific. Placing a dollar amount on ecological effects or societal values can be controversial. Use of the Habitat Production Foregone methodology is advantageous because the cost of restoring, enhancing, or protecting a specific amount of habitat (340 acres in the above example) can be readily estimated. Power plants that utilize restoration measures must demonstrate the efficacy of the restoration measures to the Regional Water Board.

Staff recommendation:

Staff recommends Alternative 5: Provide interim measures, including large organism exclusion devices, reduction in entrainment when power is not generated, and restoration for the remaining interim I/E impacts.

Summary of Staff Recommendations and Proposed Policy

The staff recommendation is to moving forward with a statewide policy to provide statewide consistency in implementing CWA Section 316(b) and California Water Code Section 13142.5(b). The draft policy would apply to existing power plants, defined as any power plant that is not a new power plant. New power plants would be any plant that is a new facility, as defined in 40 C.F.R. §125.83, that is subject to Subpart I, Part 25 of the Code of Federal Regulations.

The draft policy would set BTA (Track 1) as closed cycle cooling for existing power plants. For those plants where it is not feasible for closed cycle cooling to entirely replace once-through cooling, the draft policy would allow other types of technological retrofits or operational measures that would constitute Track II controls. Track II must be comparable to Track I. For the few plants that might employ Track II, the policy would specify monitoring provisions to quantify I/E reductions.

With regard to makeup water for Track I, the policy would encourage the use of recycled water for cooling water in lieu of ambient marine and estuarine waters whenever feasible, but would not reiterate the specific source water preferences from the 1975 Board Policy.

The statewide policy may provide deadlines for BTA retrofits for different classes of power plants, and scheduling retrofits within those deadline periods would be accomplished in collaboration with State energy agencies. As part of that compliance schedule, nuclear facilities would be allowed more time to comply with the Policy's requirements.

The draft policy would require interim measures to eliminate impingement of large organisms at offshore intakes, and reducing flows when power is not generated. Restoration would be required only as an interim measure.

The proposed draft Policy is provided in Appendix A.

PUBLIC PROCESS AND SCHEDULE

This scoping document and the attached draft policy are the first step in a public process. The State Water Board will hold a scoping meeting. Following the scoping meeting, the State Water Board will consider comments in modifying the draft policy and preparing a substitute environmental document. Under its certified regulatory program, the State Water Board prepares a substitute environmental document that addresses potential environmental impacts, alternatives, and mitigation measures. A public hearing will be held. Staff will then formally respond to comments received at that public hearing step. The following is a tentative schedule.

Table 12. Tentative Schedule for Adoption of Proposed Policy

Activity	Tentative Dates (2008)
Release scoping document with preliminary draft policy	March
Expert Review Panel Findings	April/May
Public scoping workshop/public comments	May
Release Draft Policy and Substitute. Env. Document	July
Public Hearing	September
Response to Comments/Final Draft Document & Policy	October/November
State Water Board Meeting to adopt Policy	December

SCIENTIFIC REVIEW

Expert Review Panel

At its April 20, 2006 meeting, the OPC adopted a "Resolution of the California Ocean Protection Council Regarding the Use of Once-Through Cooling Technologies in Coastal Waters." In that resolution, the OPC resolved "to encourage the State Water Resources Control Board's formation of a technical review group to ensure the required technical expertise is available to review each power plant's data collection proposals, analyses and impact reductions, and fairly implement statewide data collection standards needed to comply with § 316(b)."

Thermal, impingement, and especially entrainment impacts from OTC are often difficult to accurately define. For example an analysis of entrainment impacts, controls, and mitigation measures requires very specialized technical expertise in certain areas of physical oceanographic processes, coastal marine biology, ecological modeling, restoration ecology, and engineering.

The State Water Board has contracted with Moss Landing Marine Laboratory to convene an Expert Review Panel (ERP) to review this document and the proposed policy. The ERP includes membership from academic and consulting scientists and technical experts representing industry and the environmental community. Staff, in conjunction with the ERP, developed a set of questions relative to the draft policy. These initial questions that will be addressed by the ERP are as follows:

1. How will baseline be defined?

   Note: Under the California Environmental Quality Act, the baseline for this project is the current condition of the coastal and estuarine OTC plants. However, in the application of certain aspects of the draft policy, i.e. Track II and interim restoration, how should existing controls be considered?

   In determining Track II controls (when applicable) should environmental impacts be assessed retrospectively, i.e., before existing site-specific controls were in place? Or should impacts be assessed under current operating conditions, i.e., taking into account existing controls? Likewise, for determining interim restoration levels, should credit be given for existing site-specific controls or restoration projects?

2. Has the State Water Board staff correctly estimated statewide marine life due to uncontrolled once-through cooling?

3. How will trophic and ecosystem effects be quantified? Using models?

4. Are the interim controls effective and feasible to prevent mortality and to reduce takes of wildlife?

5. For Track I, did staff adequately consider adverse impacts associated with conversion to closed-cycle cooling?

6. For Track II, are the proposed monitoring requirements appropriate to determine actual percent reductions in mortality?

7. What data and models should be required to determine restoration offsets?

8. How should restoration projects be monitored to determine compliance?

9. Will the policy requirements be implemented using a transparent process?

Additional questions may also be posed to the ERP. Staff will consider the input from the ERP before it releases the next draft policy and substitute environmental document.

External Scientific Peer Review

In 1997, section 57004 was added to the California Health and Safety Code (Senate Bill 1320-Sher) which requires an external scientific peer review of the scientific basis for any rule proposed by any board, office, or department within California Environmental Protection Agency (Cal/EPA). Scientific peer review helps strengthen regulatory activities, establishes credibility with stakeholders, and ensures that public resources are managed effectively. After the draft policy and substitute environmental policy are released, State Water Board staff will obtain an external scientific review.

CALIFORNIA ENVIRONMENTAL QUALITY ACT

Introduction

The State Water Board is the lead agency for this project under the California Environmental Quality Act, or CEQA (Public Resources Code, §21000 *et seq.*) and is responsible for preparing environmental documentation for the proposed Policy. The California Secretary of Resources has certified the Water Boards' water quality planning process as exempt from certain CEQA requirements. These include the requirements to prepare Environmental Impact Reports (EIRs), Negative Declarations, and Initial Studies (Cal. Code Regs, tit. 14, §15251(g); see Public Resources Code, §21080.5.). Instead, the State Water Board must fulfill the requirements of its "certified regulatory program" regulations when adopting plans, policies, and guidelines. Under these regulations, the State Water Board must prepare a written report that describes the proposed project, analyzes reasonable alternatives, and identifies mitigation measures to minimize any significant adverse environmental impacts of the proposed activity. (Cal. Code Regs., tit. 23, §3777.)

In addition, CEQA imposes specific obligations on the Water Boards when they adopt rules or regulations establishing performance standards or treatment requirements. Public Resources Code §21159 requires that the Water Boards concurrently perform an environmental analysis of the reasonably foreseeable methods of compliance. The environmental analysis must address the reasonably foreseeable environmental impacts of the methods of compliance and reasonably foreseeable alternatives and mitigation measures.

Public Resources Code §21159 does not require the State Water Board to prepare a "project level analysis". Rather, the State Water Board must prepare a program-level analysis, i.e. a Tier 1 analysis, that takes into account a reasonable range of environmental, economic, and technical factors, population and geographic areas, and specific sites. Site-specific or project-level impacts will be considered by the

appropriate public agency that is ultimately responsible for approving or implementing individual projects.

Environmental Resources

Under its certified regulatory program, the State Water Board will prepare a substitute environmental document that addresses potential environmental impacts, alternatives and mitigation measures. Resource areas that could be affected are briefly discussed below.

Aesthetics

Cessation of once-through cooling for power production and retrofitting of existing plants with wet cooling towers could adversely affect aesthetics depending on local conditions and applicable laws, ordinances, regulations, and standards. Impacts could result from the wet cooling towers themselves, and/or the plume created by conventional wet cooling towers. Plume-abated towers are generally 15 to 30 feet taller than conventional wet cooling towers and could have a greater impact on visual resources than conventional towers.

Agricultural Resources

Agricultural land is not expected to be impacted by the construction of cooling towers at any of the existing once-through-cooling power plants (Tetra Tech 2008).

Air Quality

The California Air Resources Control Board (CARB) has estimated potential Policy induced increased air emissions from two types of hypothetical power plants, a 300 MW steam turbine power plant unit and a 540 MW combined-cycle power plant unit, both fueled by natural gas[aaa]. CARB's findings are incorporated into this document as the Air Quality impacts section:

Retrofitting power plants from OTC to wet or dry cooling will cause decreases in net plant efficiency and increases in auxiliary power consumption; thereby, resulting in decreases of energy production and distribution. To make up for the energy loss, fuel consumption would need to be increased to produce an equivalent amount of electricity. This would result in increased emissions from the combustion of additional fuel. This analysis will quantify criteria pollutants [e.g. total organic gases (TOG), reactive organic gases (ROG), oxides of nitrogen (NOX), oxides of sulfur (SOX), carbon monoxide (CO), particulate matter of 2.5 microns or less (PM2.5)] and carbon dioxide (CO2) emissions produced by the combustion of additional fuel.

A second source of increased air emissions is from evaporation and drift produced by wet cooling towers. Wet cooling towers transfer heat from recirculated water to air

[aaa] California Air Resources Control Board, 6/1/07 memo to State Water Board.

traveling out of the tower. This heat transfer from water to air increases the temperature of the air and increases the air's humidity to 100 percent. As water vapor leaves the cooling tower, droplets of make-up water called drift are entrained along with the water vapor. Drift carries the same pollutants found in the tower's make-up water. These pollutants may include, but are not limited to PM, bacteria and pathogens, salts and minerals, volatile organic compounds (VOCs), and chemical compounds. This analysis will quantify the PM and PM10 emissions from wet cooling towers and discuss the impacts caused by wet cooling tower pollutants.

Energy Penalties

A retrofitted power plant with wet or dry towers will produce less energy than it did with OTC while burning the same amount of fuel. This difference in energy production is called an energy penalty and is often represented as a percentage. Currently, there are no energy penalty studies specific to retrofitting California coastal power plants from OTC to wet or dry cooling towers. Therefore, the energy penalties used in this analysis will be national averages reported by the USEPA and are summarized in Table 13.

Table 13. National Average, Mean-Annual Energy Penalty, Summary Table

Cooling Type	Percent Maximum Load	Mean-Annual Nuclear Percent of Plant Output	Mean-Annual Combined-Cycle Percent of Plant Output	Mean-Annual Fossil-Fuel Percent of Plant Output
Wet Tower vs. Once-Through	67	1.7	0.4	1.7
Dry Tower vs. Once-Through	67	8.5	2.1	8.6

Emissions from Increased Fuel Combustion

Retrofitting power plants from OTC to wet or dry cooling towers will cause decreases in turbine efficiency, increases in fan energy requirements, and increases in pumping energy requirements. As a result, power plants will see reductions in the amount of net energy for export to the grid. Retrofitted power plants have three options to address their energy reduction concerns: 1) purchase power from the grid to make up for lost power; 2) burn additional fuel on-site to replace lost power; or 3) do nothing to replace lost power.

According to the USEPA, it is more likely that power plants that do not operate at full capacity on an annual basis will burn additional fuel to make-up for their energy loss. Nuclear power plants currently operate at or near capacity limits and those plants may have to purchase power from the grid. An indirect increase in emissions would result from purchasing power from the grid due to an increase in fuel combustion where additional electricity is produced.

The combustion of additional fuel to make up for lost power will result in criteria pollutant and CO2 emission increases. CARB staff does not have information to determine the type of cooling systems California OTC power plants would utilize. Therefore, CARB staff estimated emissions from two types of hypothetical power plants, a 300 MW steam turbine power plant unit and a 540 MW combined-cycle power plant unit, both fueled by natural gas. Table 7 (above) shows the baseline emissions inventory for the hypothetical 300 MW steam turbine power plant unit and the hypothetical 540 MW combined-cycle power plant unit cooled by OTC. Tables 14 and 15 show potential air emission increases caused by wet or dry cooling tower retrofits for those same plants.

Table 14. Increase of Emissions from Additional Fuel Consumption – Wet Cooling

Unit	Greenhouse Gas	Criteria Pollutants					
	CO_2	TOG	ROG	NOX	SOX	CO	$PM_{2.5}$
Steam Turbine (tons/yr)	4,067	0.32	0.14	0.91	0.03	2.60	0.29
Steam Turbine %Increase	1.7	1.8	1.8	1.7	1.6	1.7	1.7
Combined Cycle (tons/yr)	3,173	0.25	0.11	0.71	0.02	2.03	0.22
Combined Cycle %Increase	0.40	0.41	0.42	0.40	0.32	0.40	0.39

Table 15. Increase of Emissions from Additional Fuel Consumption – Dry Cooling

Unit	Greenhouse Gas	Criteria Pollutants					
	CO_2	TOG	ROG	NOX	SOX	CO	$PM_{2.5}$
Steam Turbine (tons/yr)	22,130	1.71	0.74	4.94	0.17	14.14	1.56
Steam Turbine %Increase	9.4	9.4	9.4	9.4	9.2	9.4	9.4
Combined Cycle (tons/yr)	16,949	1.31	0.57	3.79	0.13	10.83	1.20

	Greenhouse Gas	Criteria Pollutants					
Combined Cycle %Increase	2.1	2.1	2.2	2.1	2.1	2.1	2.1

Emissions from Wet Cooling Towers

Wet cooling towers are designed to cool by evaporation. Through this process droplets of water called drift may be entrained out of the cooling tower along with water vapor. Drift contains the same suspended material, chemical constituents, and bacteria found in the make-up water used for cooling. Therefore, a variety of pollutants may be emitted from wet cooling towers, and their effects and/or concentrations are influenced by many factors including, but not limited to: make-up water used, chemicals used for make-up water treatment, the location of the cooling tower, and site-specific weather (e.g., wind speed, wind direction, temperature, humidity, etc.). The most common emission of concern associated with wet towers is particulate matter less than or equal to 10 microns (PM10) in diameter. Other environmental impacts such as vapor plumes, bacterial and/or pathogenic species, salts, volatile organic compounds (VOCs), and chemical compounds used for treatment may be emitted from wet cooling systems.

Particulate Matter

Wet cooling towers emit solid or liquid (excluding water) material into the atmosphere as PM emissions.

Reisman and Frisbie (2003) have indicated that depending on the droplet size distribution of the drift, only a certain percentage of drift PM is PM10. From their report, cooling towers using make-up water with a total dissolved solids (TDS) concentration near 2,000 parts per million (ppm) will have a PM10 emission rate which is approximately 60% of the calculated PM emission rate, and cooling towers using make-up water with a TDS concentration over 12,000 ppm will have a PM10 emission rate which is 5% of the calculated PM emission rate (at higher TDS values the drift droplets contain more solids and upon evaporation result in more solid particles larger than PM10 for any given initial droplet size).

Using the emission rates suggested by Reisman and Frisbie (2003), PM10 emission estimates are summarized in the far right column of Table 16. These estimates are not intended to represent site-specific retrofit conditions, but illustrate possible values for each factor used in calculating PM10 emissions. A conservatively high PM10 emission rate was also calculated assuming 100% of the calculated PM emission is PM10.

Table 16. Wet Cooling Tower PM10 Emission Estimates*

Water Type	Water Circulation Rate (gpm)	Operating Time (hrs/yr)	TDS of Circulating Water[a] (ppm)	Drift Loss[b] (%)	Density of Water (lbs/gal)	PM Emissions = 100% PM10 (tons/yr)	PM Emissions = 5% and 60% PM10 (tons/yr)
Fresh Water	180,000	2190	1,947	0.002	8.34	3.84	2.30[c]
Reclaimed Water	180,000	2190	2,402	0.002	8.34	4.74	2.84[c]
Produced Water	180,000	2190	34,800	0.002	8.34	68.65	3.43[d]
Agricultural Return Water	180,000	2190	49,891	0.002	8.34	98.41	4.92[d]
Seawater	180,000	2190	55,000	0.002	8.34	108.49	5.42[d]

* PM10 emission = (water circulation rate) x (operating hours) x (total dissolved solids of circulated water) x (drift loss) x (density of water)

a. TDS values for each water type (excluding seawater) were obtained from the 2003 EPRI/CEC report. The seawater TDS value was obtained from the 1995 Marley Cooling Tower Report.
b. Drift loss percentages of .002% were obtained from the 2003 EPRI/CEC report.
c. 60% of the calculated PM emissions are PM10.
d. 5% of the calculated PM emissions are PM10.

Other Air Related Impacts

As hot water vapor exits the wet cooling tower and mixes with cooler ambient air, the water vapor condenses and becomes tiny droplets. These vapor plumes may cause icing and fogging conditions during the cold and damp parts of the year.

Wet cooling towers may provide suitable environments for bacteria and pathogenic species to live and multiply in. Releases of bacteria and/or pathogenic species and their impacts on communities may be a concern. Power plant operators can eliminate or reduce bacteria and pathogen impacts by limiting the amount of dust and airborne debris entering into the tower, using biocides, increasing the velocity of water to decrease settling particles, and enhancing drift eliminators.

Salt deposition from wet cooling towers is caused by salinity of the make-up water and may cause environmental impacts and damage to sensitive equipment located nearby. To reduce this impact, operators can use make-up water that has no or low salinity content and/or maintain the efficiency and effectiveness of the cooling tower's drift eliminators.

Many different types of source waters can be used for power plant cooling. These sources include fresh water, reclaimed water, and degraded water (e.g., sea water, brackish water, contaminated groundwater, and agricultural water). Organic compounds, chemical compounds, minerals, and metals can be found in those sources of water. Power plants operators can minimize possible air emissions of those constituents by using make-up water from sources that do not contain those compounds

and/or by maintaining the efficiency and effectiveness of the cooling tower's drift eliminators.

Emissions from Dry Cooling Towers

Dry cooling towers do not cool by evaporation. Instead, fans are used to cool the recirculated make-up water. Therefore, the only source of air emissions from dry cooling towers is the combustion of additional fuel to make up for the parasitic load required to operate the fans and water pumps.

Air District Survey

The 19 coastal OTC power plants are located in the Bay Area Air Quality Management District (BAAQMD), Monterey Bay Unified Air Pollution Control District (MBUAPCD), North Coast Unified Air Quality Management District (NCUAQMD), South Coast Air Quality Management District (SCAQMD), San Diego Air Pollution Control District (SDAPCD), San Luis Obispo Air Pollution Control District (SLOAPCD), and the Ventura Air Pollution Control District (VAPCD).

At the request of the State Water Board, CARB contacted the seven local air districts stated above and asked about required permits and the permitting process. Most local air districts require permits for wet cooling; however the SCAQMD regulations do not currently require permits for evaporative cooling towers unless they emit toxic pollutants. Dry cooling permits are considered on a case-by-case basis. In general, the permitting process timeframe is 30 days to review for an application's completeness, 180 days to grant authorization of construction and from one to seven years to complete construction (depending on the local air district).

Biological Resources

Adoption of a statewide policy for power plant cooling is not expected to cause any adverse biological effects. In contrast, the reduction in aquatic life impingement and entrainment is expected to have a beneficial effect on the biological resources of the near coastal and estuarine environments.

Cultural Resources

The construction of facilities to replace once-through-cooling may affect cultural resources, if present. The environmental review associated with each facility retrofit will need to evaluate the potential impacts the projects may have on cultural resources and develop appropriate mitigation.

Water Quality

Compliance alternatives for OTC power plants that would substantially change the characteristics of wastewater effluent include the installation of cooling towers (wet

cooling systems) and dry cooling systems. It is not anticipated that the installation of aquatic barrier nets or fine mesh screening systems would change the characteristics of the effluent discharge.

Dry Cooling Systems

Dry cooling systems are so named because the removal of heat from the steam cycle is accomplished through sensible heat transfer (convection and radiation) rather than through latent heat transfer (evaporation) that is characteristic of wet cooling systems. By relying solely on sensible heat transfer, dry cooling systems eliminate the need for a continuous supply of cooling water to the condenser, thus reducing many of the environmental concerns associated with once through or closed cycle wet cooling systems—such as adverse impact on aquatic ecosystems, consumptive use of water resources, and plume or drift emissions.

Installation of dry cooling systems at power plants would eliminate the need for cooling water, substantially decreasing the wastewater discharge. Dry cooling systems still use water to recirculate between generators and the cooling system, and therefore require a water source and possibly wastewater disposal for that use.

Since dry cooling systems reject heat to the surrounding air instead of the ocean, environmental impacts to surface waters due to heat disposal would be eliminated.

Wet Cooling Systems

Evaporative cooling systems, often referred to as wet cooling towers, function by transferring waste heat to the surrounding air through the evaporation of water, thus enabling the reuse of a smaller volume of water several times to achieve the desired cooling effect. Compared to a once-through cooling system, wet cooling towers may reduce the volume of water withdrawn from a particular source by as much as 96 percent depending on various site-specific characteristics and design specifications.

The volume of makeup water required is the sum of evaporative loss and the blowdown volume required to maintain the circulating water in each towers at the design TDS (total dissolved solids) concentration. Drift expelled from the towers represents an insignificant volume by comparison and is accounted for by rounding up estimates of evaporative losses. Makeup water volumes are based on design conditions, and may fluctuate seasonally depending on climate conditions and facility operations.

Since cooling towers reduce the volume of cooling water needed, the impingement and entrainment losses will be reduced. Also, thermal impacts to the receiving water will be greatly reduced because much of the condenser's heat would be rejected to the atmosphere (evaporated cooling water) instead of the receiving water body. However, concentration of chemical additives and existing pollutants in the makeup water is a concern. Where OTC water is typically similar in chemical pollutant characteristics to the receiving water with the addition of low volume plant wastes and chemical additives,

cooling towers will concentrate pollutants from low volume plant waste streams, make-up water, and additives.

Table 17 provides a summary of effluent data for two cooling towers operating between six and eight cycles of concentration. Makeup water for these cooling towers is partially treated Contra Costa canal water for Cooling Tower 1 and potable water for Cooling Tower 2.

Table 17. Effluent Data for Cooling Towers Operating at 6-8 Cycles of Concentration with Potable Water Makeup

Parameter	Units	Data Set Size (n)	Percent Non-detect	Max Detected Value	Mean
Cooling Tower 1					
pH	unit	1884	0	8.6	7.44
Temp	F	1884	0	86	71.56
As	µg/l	26	4	30	7.69
Cr(VI)	µg/l	10	90	1	1.85
Cu	µg/l	80	0	30	20.19
Pb	µg/l	62	32	4.6	0.59
Hg	µg/l	79	3	0.05	0.01
Ni	µg/l	88	0	73.2	14.57
Se	µg/l	48	10	48.6	5.79
Ag	µg/l	35	94	0.1	0.21
Zn	µg/l	78	1	100	32.04
CN	µg/l	48	77	7.5	2.30
TCDD01	pg/L	3	33	0.38	0.29
Cr	µg/l	37	3	119	9.07
Phenanthrene	µg/l	4	75	0.07	0.03
Bromoform	µg/l	4	0	3.3	2.03
Cooling Tower 2					
Parameter	**Units**	**Data Set Size (n)**	**Percent Non-detect**	**Max Detected Value**	**Mean**
pH	unit	1903	0	8.6	7.73
Temp	F	1903	0	86	73.42
Cr(VI)	µg/l	10	60	5.6	2.42
Cu	µg/l	87	0	33	20.14
Pb	µg/l	63	3	34	3.53
Hg	µg/l	76	1	0.05	0.02
Ni	µg/l	73	1	92.9	10.15
Se	µg/l	26	15	5	2.08
Zn	µg/l	80	0	390	75.67
CN	µg/l	46	78	5	2.12
TCDD01	pg/L	4	50	0.07	0.26
Cr	µg/l	29	3	127	9.34

Tetra Tech's 2007 draft of their Alternative Cooling System Analysis summarizes possible NPDES permitting issues that each specific facility would likely face when converting from OTC to wet cooling. Since NPDES permit limits are established to protect receiving waters from toxic conditions, a facility's ability to comply with limits

associated with retrofit wet towers is a direct measure of possible impacts to water quality. The Tetra Tech draft permitting/water quality findings for each facility are summarized below.

Individual Power Plant Reviews, Cooling Towers and Water Discharges

Alamitos Generating Station

At maximum operation, wet cooling towers at Alamitos Generating Station (AGS) will result in an effluent discharge of approximately 38 mgd of blowdown in addition to other in-plant waste streams—such as boiler blowdown, treated sanitary waste, and cleaning wastes. These low volume wastes may add an additional 3.5 mgd to the total discharge flow from the facility. Unless an alternative discharge is considered, AGS will be required to modify its existing individual wastewater discharge (NPDES) permit. Current effluent limitations for conventional and priority pollutants, as well as thermal discharge limitations, are contained in NPDES Permit CA0001139, as implemented by Los Angeles Regional Water Board Order 00-082. All wastewaters are discharged to the San Gabriel River through one of three separate outfalls.

AGS will be required to meet technology-based effluent limitations for cooling tower blowdown established under the Effluent Limitation Guidelines (ELGs) for Steam Electric Facilities at 40 CFR 423.13(d)(1). These ELGs set numeric limitations for chromium (total) and zinc (0.2 mg/L and 1.0 mg/L, respectively), while establishing narrative criteria for priority pollutants (no detectable quantity).

Although South Coast Air Quality Management District (SCAQMD) prohibited the use of chromium-based compounds in open circulating water cooling towers under Rule 1404, effective January 1, 1990, chromium continues to be detected in Los Cerritos Channel. Intake sampling conducted by AGS as part of its compliance monitoring program has repeatedly detected zinc. The presence of these pollutants in the makeup water source may trigger ELG exceedances when concentrated in the cooling tower. Effluent limitations for cooling tower blowdown must be met at the point of discharge from the cooling tower prior to combination with any other waste stream. The potential for an exceedance could necessitate treatment of the cooling tower blowdown for metals prior to discharge.

Likewise, WQBELs for other parameters may be established at the final discharge point based on the SIP. These WQBELs may present compliance challenges for AGS when converting to a wet cooling tower system, principally due to elevated background concentrations for metals in Los Cerritos Channel. The SIP does make an allowance for intake credits under some circumstances, but none would be applicable to AGS due to the fact that a cooling tower effectively changes the intake water characteristics by concentrating pollutants (through evaporation) by as much as 50 percent above their initial levels. In addition, the current receiving water (San Gabriel River) may not meet the criteria establishing it as "hydrologically connected" to Los Cerritos Channel (State Water Board 2000).

Data submitted by AGS in support of its NPDES renewal application demonstrates a reasonable potential to exceed effluent limitations for copper, zinc, and cyanide (AES 2004). These assessments reflect the existing once-through cooling system and, for zinc and copper, are primarily driven by the elevated concentrations detected in the intake water at AGS. Assuming the same source water, any reasonable potential associated with wet cooling tower operations would likely increase and may require an effluent treatment system, such as filtration or precipitation technologies, to meet NPDES permit conditions.

Thermal limits for an estuary impose a maximum discharge temperature of 20º F above the receiving water's natural temperature (State Water Board 1972). It is unclear if AGS will be able to meet this thermal limitation based on the current once-through configuration, with discharge temperatures reaching as high as 100 ºF and ambient water temperatures in the mid to upper 60s. Wet cooling towers will enable AGS to meet this limitation because blowdown discharge will be taken from the cold water side of the system, ensuring an effluent discharge temperature not in excess of 83º F for normal operations (not including heat treatments). This temperature is within the required 20º F range of ambient temperatures in the San Gabriel River.

Contra Costa Power Plant

At maximum operation, wet cooling towers at Contra Costa Power Plant (CCPP) will result in an effluent discharge of approximately 13 mgd of blowdown in addition to other in-plant waste streams—such as boiler blowdown, floor drain wastes, and cleaning wastes. These low-volume wastes may add an additional 0.5 mgd to the total discharge flow from the facility. Unless an alternative discharge is considered, CCPP will be required to modify its existing individual wastewater discharge (NPDES) permit.

Current effluent limitations for conventional and priority pollutants, as well as thermal discharge limitations, are contained in NPDES Permit CA0004863, as implemented by Central Valley Regional Water Board Order R-01-107. All once-through cooling water and process wastewaters are discharged through a shoreline outfall to the San Joaquin River. The existing order contains effluent limitations based on the California Toxics Rule (CTR) and the1972 Thermal Plan and the Basin Plan.

CCPP will be required to meet technology-based effluent limitations for cooling tower blowdown established under the Effluent Limitation Guidelines (ELGs) for Steam Electric Facilities at 40 CFR 423.13(d)(1). These ELGs set numeric limitations for chromium (total) and zinc (0.2 mg/L and 1.0 mg/L, respectively) while establishing narrative criteria for priority pollutants (no detectable quantity). Although Bay Area Air Quality Management District (BAAQMD) prohibited chromium-based compounds in open circulating water cooling towers under Rule 10, effective March 1, 1990, chromium and zinc have been detected the San Joaquin River, although specific information describing the intake water at CCPP was not available for review.

The presence of chromium or zinc in the makeup water source may trigger ELG exceedances when concentrated in the cooling tower and discharged with the final effluent. Effluent limitations for cooling tower blowdown must be met at the point of discharge from the cooling tower prior to combination with any other waste stream. The potential for an exceedance could necessitate treatment of the blowdown for metals prior to discharge.

The Thermal Plan limits the discharge of elevated-temperature wastes in estuaries to no more than 86º F. CCPP applied for, and received, an exception to this Thermal Plan requirement. The current order permits the discharge of elevated-temperature wastes that do not exceed the natural receiving water temperature by more than 37º F at flood tide (Central Valley Regional Water Board 2001). Because cooling tower blowdown will be taken from the "cold" side of the tower, conversion to a wet cooling system will significantly reduce the discharge temperature (to less than 78º F) and the size of any related thermal plume in the receiving water, thus enabling CCPP to meet the initial requirements of the Thermal Plan.

Diablo Canyon Power Plant

At maximum operation, wet cooling towers at Diablo Canyon Power Plant (DCPP) will result in an effluent discharge of approximately 72 mgd of blowdown in addition to other in-plant waste streams, such as regeneration wastes, boiler blowdown, and treated sanitary wastes. These low-volume wastes may add an additional 20 mgd to the total discharge flow from the facility. Unless an alternative discharge is considered, DCPP will be required to modify its existing individual wastewater discharge (NPDES) permit.

Current effluent limitations for conventional and priority pollutants, as well as thermal discharge limitations, are contained in NPDES permit CA0003751 as implemented by Central Coast Regional Water Board Order RB3-2003-0009. The existing order contains effluent limitations based on the 2001 California Ocean Plan and the 1972 Thermal Plan.

DCPP will be required to meet technology-based effluent limitations for cooling tower blowdown established under the Effluent Limitation Guidelines (ELGs) for Steam Electric Facilities at 40 CFR 423.13(d)(1). These ELGs set numeric limitations for chromium (total) and zinc (0.2 mg/L and 1.0 mg/L, respectively) while establishing narrative criteria for priority pollutants (no detectable quantity).

Thermal discharge standards are based on narrative criteria established for discharges to coastal waters under the Thermal Plan, which requires that existing discharges of elevated-temperature wastes comply with effluent limitations necessary to assure the protection of designated beneficial uses. The Central Coast Regional Water Board has implemented this provision by establishing a maximum discharge temperature of no more than 22º F in excess of the temperature of the receiving water during normal operations (Central Coast Regional Water Board 2003).

Because cooling tower blowdown will be taken from the "cold" side of the tower, conversion to a wet cooling system will significantly reduce the discharge temperature (to less than 78º F) and the size of any related thermal plume in the receiving water.

El Segundo Generating Station

At maximum operation, wet cooling towers at El Segundo Generating Station (ESGS) will result in an effluent discharge of approximately 14 mgd of blowdown in addition to other in-plant waste streams—such as boiler blowdown, sanitary wastes, and cleaning wastes. These low-volume wastes may add an additional 1.1 mgd to the total discharge flow from the facility. Unless an alternative discharge is considered, ESGS will be required to modify its existing individual wastewater discharge (NPDES) permit.

Current effluent limitations for conventional and priority pollutants, as well as thermal discharge limitations, are contained in NPDES Permit CA0001147, as implemented by Los Angeles Regional Water Board Order 00-084. All wastewaters are discharged to the Pacific Ocean through a submerged conduit extending approximately 2,100 feet offshore. The existing order contains effluent limitations based on the 1997 Ocean Plan and 1972 Thermal Plan.

ESGS will be required to meet technology-based effluent limitations for cooling tower blowdown established under the Effluent Limitation Guidelines (ELGs) for Steam Electric Facilities at 40 CFR 423.13(d)(1). These ELGs set numeric limitations for chromium (total) and zinc (0.2 mg/L and 1.0 mg/L, respectively), while establishing narrative criteria for priority pollutants (no detectable quantity). Although the South Coast Air Quality Management District (SCAQMD) prohibited the use of chromium-based compounds in open circulating water cooling towers under Rule 1404, effective January 1, 1990, chromium continues to be detected in the intake water samples collected by ESGS as part of its compliance monitoring program. The presence of chromium or zinc in the makeup water source may trigger exceedances of the ELGs when concentrated in the cooling tower and discharged with the final effluent. Effluent limitations for cooling tower blowdown must be met at the point of discharge from the cooling tower prior to combination with any other waste stream. The potential for an exceedance could necessitate treatment of the blowdown for metals prior to discharge.

Likewise, water quality–based effluent limits (WQBELs) for other parameters may be established at the final discharge point based on the Ocean Plan. Data submitted by ESGS in support of its NPDES renewal application do not demonstrate a reasonable potential to exceed effluent limitations for common metals, although zinc, copper, chromium, lead, and mercury have been detected in the intake water (El Segundo Power 2004). An initial assessment of the data does not suggest that levels of these pollutants are high enough to warrant consideration of an effluent treatment system, although the changes to the facility's dilution model that will occur after adopting wet cooling towers may change the basis for comparison.

Thermal discharge standards are based on narrative criteria established for coastal discharges under the Thermal Plan, which requires existing discharges of elevated-temperature wastes to comply with effluent limitations necessary to assure the protection of designated beneficial uses. The Los Angeles Regional Water Board has implemented this provision by establishing a maximum discharge temperature of 105º F during normal operations in Order 00-084 (Los Angeles Regional Water Board 2000). Information available for review indicates ESGS has consistently been able to comply with this requirement. Because cooling tower blowdown will be taken from the "cold" side of the tower, conversion to a wet cooling system will significantly reduce the discharge temperature (to less than 81º F) and the size of any related thermal plume in the receiving water.

Harbor Generating Station

At maximum operation, the Harbor Generating Station (HGS) wet cooling towers will result in an effluent discharge of 3.0 mgd of blowdown in addition to other in-plant waste streams—such as boiler blowdown, regeneration wastes, and cleaning wastes. These low-volume wastes may add an additional 0.0125 mgd to the total discharge flow from the facility. Unless an alternative discharge is considered, HGS will be required to modify its existing individual wastewater discharge (NPDES) permit.

Current effluent limitations for conventional and priority pollutants, as well as thermal discharge limitations, are contained in NPDES Permit CA0000361as implemented by Los Angeles Regional Water Board Order R4-2003-0101. All wastewaters are discharged to the West Basin of ILAHC. The existing order contains effluent limitations based on the California Toxics Rule (CTR) and 1972 Thermal Plan.

HGS will be required to meet technology-based effluent limitations for cooling tower blowdown established under the Effluent Limitation Guidelines (ELGs) for Steam Electric Facilities at 40 CFR 423.13(d)(1). These ELGs set numeric limitations for chromium (total) and zinc (0.2 mg/L and 1.0 mg/L, respectively) while establishing narrative criteria for priority pollutants (no detectable quantity). Although the SCAQMD prohibited the use of chromium-based compounds in open circulating water cooling towers under Rule 1404, effective January 1, 1990, chromium and zinc continue to be detected in the Los Angeles Harbor.

The presence of chromium or zinc in the makeup water source may trigger ELG exceedances when concentrated in the cooling tower and discharged with the final effluent. Effluent limitations for cooling tower blowdown must be met at the point of discharge from the cooling tower prior to combination with any other waste stream. The potential for an exceedance could necessitate treatment of the blowdown for metals prior to discharge.

Likewise, water quality–based effluent limits (WQBELs) for other parameters may be established at the final discharge point based on the CTR. Effluent data were not available for review for HGS, but the 2002 303(d) list identifies several segments of the

Los Angles Harbor as impaired for cadmium, chromium, lead, mercury, and zinc (USEPA 2002). Total maximum daily loads (TMDLs) for the Los Angeles Harbor may be established in the future, with specific load allocations (LAs) for these pollutants applied to HGS.

Thermal discharge standards are based on narrative criteria established for discharges within enclosed bays under the Thermal Plan, which requires existing discharges of elevated temperature wastes to comply with effluent limitations necessary to assure the protection of designated beneficial uses. The Los Angeles Regional Water Board has implemented this provision in Order R4-2003-0101 by establishing a maximum discharge temperature of 94º F during normal operations (Los Angeles Regional Water Board 2003). Information available for review indicates HGS has consistently been able to comply with this requirement. Because cooling tower blowdown will be taken from the "cold" side of the tower, conversion to a wet cooling system will significantly reduce the discharge temperature (to less than 80º F) and the size of any related thermal plume in the receiving water.

Haynes Generating Station

At maximum operation, wet cooling towers at Haynes Generating Station (HnGS) will result in an effluent discharge of approximately 24 mgd of blowdown in addition to other in-plant waste streams—such as boiler blowdown, treated sanitary waste, and cleaning wastes. These low-volume wastes may add an additional 0.5 mgd to the total discharge flow from the facility. Unless an alternative discharge is considered, HnGS will be required to modify its existing individual wastewater discharge (NPDES) permit. Effluent limitations for conventional and priority pollutants, as well as thermal discharge limitations, are contained in NPDES Permit CA0000353, as implemented by Los Angeles Regional Water Board Order 00-081. All wastewaters are discharged to the San Gabriel River through one of six separate outfalls.

HnGS will be required to meet technology-based effluent limitations for cooling tower blowdown established under the Effluent Limitation Guidelines (ELGs) for Steam Electric Facilities at 40 CFR 423.13(d)(1). These ELGs set numeric limitations for chromium (total) and zinc (0.2 mg/L and 1.0 mg/L, respectively) while establishing narrative criteria for priority pollutants (no detectable quantity). Although the SCAQMD prohibited the use of chromium-based compounds in open circulating water cooling towers under Rule 1404, effective January 1, 1990, chromium continues to be detected in the Long Beach Marina. Likewise, intake sampling conducted by HnGS as part of its compliance monitoring program has repeatedly detected zinc. The presence of these pollutants in the makeup water source may trigger exceedances of the ELGs when concentrated in the cooling tower. Effluent limitations for cooling tower blowdown must be met at the point of discharge from the cooling tower prior to combination with any other waste stream. The potential for an exceedance could necessitate treatment of the blowdown for metals prior to discharge.

Likewise, WQBELs for other parameters may be established at the final discharge point based on the SIP. These WQBELs may present compliance challenges for HnGS when converting to a wet cooling tower system, principally due to elevated background concentrations for metals in the Long Beach Marina. The SIP does make an allowance for intake credits under some circumstances, but none would be applicable to HnGS due to the fact that a cooling tower effectively changes the characteristics of the intake water by concentrating pollutants (through evaporation) by as much as 50 percent above their initial levels. In addition, the current receiving water (San Gabriel River) may not meet the criteria establishing it as "hydrologically connected" to the Long Beach Marina (State Water Board 2000).

Data submitted by HnGS in support of its NPDES renewal application demonstrates a reasonable potential to exceed effluent limitations for copper, mercury, nickel, and zinc (LADWP 2004). These assessments reflect the existing once-through cooling system and are primarily driven by the elevated concentrations detected in the intake water at HnGS. Assuming the same source water, any reasonable potential associated with wet cooling tower operations would likely increase and may require an effluent treatment system, such as filtration or precipitation technologies, in order to meet NPDES permit conditions.

Thermal limits for an estuary impose a maximum discharge temperature of 20º F above the natural temperature of the receiving water (State Water Board 1972). It is unclear if HnGS will be able to meet this thermal limitation based on the current once-through configuration, with discharge temperatures reaching as high as 100º F and ambient water temperatures in the mid- to upper 60s. Wet cooling towers will enable HnGS to meet this limitation because blowdown discharge will be taken from the cold water side of the system, ensuring an effluent discharge temperature not in excess of 81º F for normal operations (not including heat treatments). This temperature is within the required 20º F range of ambient temperatures in the San Gabriel River.

Huntington Beach Generating Station

At maximum operation, wet cooling towers at Huntington Beach Generating Station (HBGS) will result in an effluent discharge of approximately 17 mgd of blowdown in addition to other in-plant waste streams—such as boiler blowdown, floor drain wastes, and cleaning wastes. These low volume wastes may add an additional 1.5 mgd to the total discharge flow from the facility. Unless an alternative discharge is considered, HBGS will be required to modify its existing individual wastewater discharge (NPDES) permit.

Current effluent limitations for conventional and priority pollutants, as well as thermal discharge limitations, are contained in NPDES Permit CA0001163 as implemented by Santa Ana Regional Water Board Order R8-2006-0011. All once-through cooling water and process wastewaters are discharged through a submerged outfall extending approximately 1,200 feet offshore into the Pacific Ocean. The existing order contains effluent limitations based on the 2005 Ocean Plan and the 1972 Thermal Plan.

HBGS will be required to meet technology-based effluent limitations for cooling tower blowdown established under the Effluent Limitation Guidelines (ELGs) for Steam Electric Facilities at 40 CFR 423.13(d)(1). These ELGs set numeric limitations for chromium (total) and zinc (0.2 mg/L and 1.0 mg/L, respectively) while establishing narrative criteria for priority pollutants (no detectable quantity). SCAQMD prohibited the use of chromium-based compounds in open circulating water cooling towers under Rule 1404, effective January 1, 1990.

The presence of chromium or zinc in the makeup water source may trigger exceedances of the ELGs when concentrated in the cooling tower and discharged with the final effluent. Effluent limitations for cooling tower blowdown must be met at the point of discharge from the cooling tower prior to combination with any other waste stream. The potential for an exceedance could necessitate treatment of the blowdown for metals prior to discharge.

Thermal discharge standards are based on narrative criteria established for coastal discharges under the Thermal Plan, which requires existing discharges of elevated-temperature wastes to comply with effluent limitations necessary to assure the protection of designated beneficial uses. The Santa Ana Regional Water Board has implemented this provision in Order R8-2006-0011 by establishing a maximum discharge temperature of that may not exceed the receiving water's natural temperature by more than 30º F during normal operations (Santa Ana Regional Water Board 2006). Because cooling tower blowdown will be taken from the "cold" side of the tower, conversion to a wet cooling system will significantly reduce the discharge temperature (to less than 81º F) and the size of any related thermal plume in the receiving water.

Mandalay Generating Station

At maximum operation, wet cooling towers at Mandalay Generating Station (MGS) will result in an effluent discharge of 8.6 mgd of blowdown in addition to other in-plant waste streams—such as boiler blowdown, regeneration wastes, and cleaning wastes. These low volume wastes may add an additional 0.25 mgd to the total discharge flow from the facility. Unless an alternative discharge is considered, MGS will be required to modify its existing individual wastewater discharge (NPDES) permit. Current effluent limitations for conventional and priority pollutants, as well as thermal discharge limitations, are contained in NPDES Permit CA0001180 as implemented by Los Angeles Regional Water Board Order 01-057. All wastewaters are discharged to the Pacific Ocean via a rock-lined canal at the shoreline. The existing Order contains effluent limitations based on the 1997 Ocean Plan and the 1972 Thermal Plan.

MGS will be required to meet technology-based effluent limitations for cooling tower blowdown established under the Effluent Limitation Guidelines (ELGs) for Steam Electric Facilities at 40 CFR 423.13(d)(1). These ELGs set numeric limitations for chromium (total) and zinc (0.2 mg/L and 1.0 mg/L, respectively) while establishing narrative criteria for priority pollutants (no detectable quantity). Although the use of chromium-based compounds in open circulating water cooling towers has been banned in since 1994, chromium and zinc continue to be detected in the Edison Canal.

The presence of chromium or zinc in the makeup water source may trigger ELG exceedances when concentrated in the cooling tower and discharged with the final effluent. Effluent limitations for cooling tower blowdown must be met at the point of discharge from the cooling tower prior to combination with any other waste stream. The potential for an exceedance could necessitate treatment of the blowdown for metals prior to discharge.

Likewise, water quality–based effluent limits (WQBELs) for other parameters may be established at the final discharge point based on the Ocean Plan. These WQBELs may present compliance challenges for MGS when converting to a wet cooling tower system, principally due to elevated background concentrations for metals in Channel Islands Harbor. MGS has had ongoing difficulty meeting existing effluent limitations for copper primarily due to elevated levels in the intake water.

Reliant Energy, Inc has argued that high levels of copper within Channel Islands Harbor and the Edison Canal are a result of other activities in the area and that MGS does not contribute copper, at any significant level, to the final discharge. The State Water Board agreed with the latter point, but rejected the appeal for permit relief, citing the Ocean Plan's definition of wastes as the "total discharge, of whatever origin" from the facility (State Water Board 2005). The State Water Board did note that MGS could modify its existing discharge structure to increase the level of dilution and thereby increase the monthly effluent limitations. Such modifications, or other treatment measures, may become necessary with a wet cooling tower system because the tower effectively changes the characteristics of the intake water by concentrating pollutants (through evaporation) by as much as 50 percent above their initial levels.

In addition to copper, data submitted by MGS in support of its NPDES renewal application demonstrates a reasonable potential to exceed effluent limitations for cadmium, chromium, and zinc (Reliant 2004). These assessments reflect the existing once-through cooling system and are primarily driven by the elevated concentrations of these pollutants detected in the intake water at MGS. Assuming the same source water, any reasonable potential associated with wet cooling tower operations would likely increase and may require an effluent treatment system, such as filtration or precipitation technologies, to meet NPDES permit conditions.

Thermal discharge standards are based on narrative criteria established for coastal discharges under the Thermal Plan, which requires that existing discharges of elevated-temperature wastes comply with effluent limitations necessary to assure the protection of designated beneficial uses. The Los Angeles Regional Water Board has implemented this provision by establishing a maximum discharge temperature of 106º F during normal operations in Order 01-057 (Los Angeles Regional Water Board 2001). Information available for review indicates MGS has consistently been able to comply with this requirement. Because cooling tower blowdown will be taken from the "cold" side of the tower, conversion to a wet cooling system will significantly reduce the discharge temperature (to less than 80º F) and the size of any related thermal plume in the receiving water.

Morro Bay Power Plant

At maximum operation, wet cooling towers at Morro Bay Power Plant (MBPP) will result in an effluent discharge of 15 mgd of blowdown in addition to other in-plant waste streams—such as boiler blowdown, regeneration wastes, and cleaning wastes. These low volume wastes may add an additional 0.5 mgd to the total discharge flow from the facility. Unless an alternative discharge is considered, MBPP will be required to modify its existing individual wastewater discharge (NPDES) permit. All wastewaters are discharged to the Estero Bay through a submerged conduit. The existing Order contains effluent limitations based on the 1997 Ocean Plan and the 1972 Thermal Plan.

MBPP will be required to meet technology-based effluent limitations for cooling tower blowdown established under the Effluent Limitation Guidelines (ELGs) for Steam Electric Facilities at 40 CFR 423.13(d)(1). These ELGs set numeric limitations for chromium (total) and zinc (0.2 mg/L and 1.0 mg/L, respectively) while establishing narrative criteria for priority pollutants (no detectable quantity.

The presence of chromium or zinc in the makeup water source may trigger ELG exceedances when concentrated in the cooling tower and discharged with the final effluent. Effluent limitations for cooling tower blowdown must be met at the point of discharge from the cooling tower prior to combination with any other waste stream. The potential for an exceedance could necessitate treatment of the blowdown for metals prior to discharge.

Moss Landing Power Plant

At maximum operation, wet cooling towers at Moss Landing Power Plant (MLPP) will result in an effluent discharge of approximately 37 mgd of blowdown in addition to other in-plant waste streams—such as boiler blowdown, floor drain wastes, and cleaning wastes. These low volume wastes may add an additional 1.0 mgd to the total discharge flow from the facility. Unless an alternative discharge is considered, MLPP will be required to modify its existing individual wastewater discharge (NPDES) permit.

Current effluent limitations for conventional and priority pollutants, as well as thermal discharge limitations, are contained in NPDES Permit CA0006254 as implemented by Central Coast Regional Water Board Order 00-041. All once-through cooling water and process wastewaters are discharged through a submerged outfall extending offshore into the Pacific Ocean. The existing Order contains effluent limitations based on the 1997 Ocean Plan and the 1972 Thermal Plan.

Thermal discharge standards are based on narrative criteria established for discharges to coastal waters under the Thermal Plan, which requires that existing discharges of elevated-temperature wastes comply with effluent limitations necessary to assure the protection of designated beneficial uses. The Central Coast Regional Water Board has implemented this provision by establishing a maximum discharge temperature of no more than 26º F to 34º F in excess of the temperature of the receiving water during

normal operations, depending on which units are operating (Central Coast Regional Water Board 2000).

Ormond Beach Generating Station

At maximum operation, wet cooling towers at Ormond Beach Generating Station (OBGS) will result in an effluent discharge of 31 mgd of blowdown in addition to other in-plant waste streams such as boiler blowdown, regeneration wastes, and cleaning wastes. These low volume wastes may add an additional 0.75 mgd to the total discharge flow from the facility. Unless an alternative discharge is considered, OBGS will be required to modify its existing individual wastewater discharge (NPDES) permit.

Current effluent limitations for conventional and priority pollutants, as well as thermal discharge limitations, are contained in NPDES Permit CA0001198, as implemented by Los Angeles Regional Water Board Order 01-092. All wastewaters are discharged to the Pacific Ocean through a submerged conduit extending approximately 1,790 feet offshore. The existing order contains effluent limitations based on the 1997 Ocean Plan and 1972 Thermal Plan.

OBGS will be required to meet technology-based effluent limitations for cooling tower blowdown established under the Effluent Limitation Guidelines (ELGs) for Steam Electric Facilities at 40 CFR 423.13(d)(1). These ELGs set numeric limitations for chromium (total) and zinc (0.2 mg/L and 1.0 mg/L, respectively) while establishing narrative criteria for priority pollutants (no detectable quantity). The use of chromium-based compounds in open circulating water cooling towers has been banned in since 1994.

Available data describing the intake water do not indicate high levels of chromium or zinc, although elevated concentrations of either constituent in the makeup water source may trigger ELG exceedances when concentrated in the cooling tower and discharged with the final effluent. Effluent limitations for cooling tower blowdown must be met at the point of discharge from the cooling tower prior to combination with any other waste stream. The potential for an exceedance could necessitate treatment of the blowdown waste stream for metals prior to discharge.

Likewise, water quality–based effluent limits (WQBELs) for other parameters may be established at the final discharge point based on the Ocean Plan. Data submitted by OBGS in support of its NPDES renewal application do not demonstrate a reasonable potential to exceed effluent limitations for common metals, although zinc, copper, and chromium have been detected in the intake water (Reliant 2004).

An initial assessment of the available data does not suggest these pollutant levels are high enough to warrant consideration of an effluent treatment system, although changes to the facility's dilution model that will occur after adopting wet cooling towers may change the basis for comparison.

Thermal discharge standards are based on narrative criteria established for coastal discharges under the Thermal Plan, which requires that existing discharges of elevated-temperature wastes comply with effluent limitations necessary to assure the protection of designated beneficial uses. The Los Angeles Regional Water Board has implemented this provision by establishing a maximum discharge temperature of 105º F during normal operations in Order 01-092 (Los Angeles Regional Water Board 2001). Information available for review indicates OBGS has consistently been able to comply with this requirement. Because cooling tower blowdown will be taken from the "cold" side of the tower, conversion to a wet cooling system will significantly reduce the discharge temperature (to less than 80º F) and the size of any related thermal plume in the receiving water.

Pittsburg Power Plant

At maximum operation, wet cooling towers at Pittsburg Power Plant (PPP) will result in an effluent discharge of approximately 13 mgd of blowdown in addition to other in-plant waste streams—such as boiler blowdown, floor drain wastes, and cleaning wastes. These low-volume wastes may add an additional 0.8 mgd to the total discharge flow from the facility. Unless an alternative discharge is considered, PPP will be required to modify its existing individual wastewater discharge (NPDES) permit.

Current effluent limitations for conventional and priority pollutants, as well as thermal discharge limitations, are contained in NPDES Permit CA0004880 as implemented by San Francisco Bay Regional Water Board Order R2-2002-0072. All once-through cooling water and process wastewaters are discharged through a shoreline outfall to Suisun Bay. The existing order contains effluent limitations based on the California Toxics Rule (CTR), the 1972 Thermal Plan and the San Francisco Bay Basin Water Quality Control Plan ("Basin Plan").

PPP will be required to meet technology-based effluent limitations for cooling tower blowdown established under the Effluent Limitation Guidelines (ELGs) for Steam Electric Facilities at 40 CFR 423.13(d)(1). These ELGs set numeric limitations for chromium (total) and zinc (0.2 mg/L and 1.0 mg/L, respectively) while establishing narrative criteria for priority pollutants (no detectable quantity). Although BAAQMD prohibited chromium-based compounds in open circulating water cooling towers under Rule 10, effective March 1, 1990, chromium and zinc have been detected in the intake water samples collected by PPP as part of its compliance monitoring program.

The presence of chromium or zinc in the makeup water source may trigger ELG exceedances when concentrated in the cooling tower and discharged with the final effluent. Effluent limitations for cooling tower blowdown must be met at the point of discharge from the cooling tower prior to combination with any other waste stream. The potential for an exceedance could necessitate treatment of the blowdown for metals prior to discharge.

The Thermal Plan limits the discharge of elevated-temperature wastes in estuaries to no more than 86º F. PPP applied for, and received, an exception to this Thermal Plan requirement. The current order permits the discharge of elevated-temperature wastes that do not exceed the natural receiving water temperature by more than 28º F at flood tide (San Francisco Bay Regional Water Board 2002). Because cooling tower blowdown will be taken from the "cold" side of the tower, conversion to a wet cooling system will significantly reduce the discharge temperature (to less than 78º F) and the size of any related thermal plume in the receiving water, thus enabling PPP to meet the initial requirements of the Thermal Plan.

San Onofre Nuclear Generating Station

At maximum operation, wet cooling towers at San Onofre Nuclear Generating Station (SONGS) will result in an effluent discharge of approximately 73 mgd of blowdown in addition to other in-plant waste streams, such as regeneration wastes, boiler blowdown, and treated sanitary wastes. These low-volume wastes may add an additional 20 mgd to the total discharge flow from the facility. Unless an alternative discharge is considered, SONGS will be required to modify its existing individual wastewater discharge (NPDES) permit.

Current effluent limitations for conventional and priority pollutants, as well as thermal discharge limitations, are contained in NPDES permits CA0108073 (Unit 2) and CA0108181 (Unit 3), as implemented by San Diego Regional Water Board orders R9-2005-0005 (Unit 2) and R9-2005-0006 (Unit 3). All wastewaters are discharged to the Pacific Ocean through discharge conduits extending 8,350 feet and 5,900 feet offshore, terminating at a depth of 49 feet. The existing order contains effluent limitations based on the 2001 California Ocean Plan.

SONGS will be required to meet technology-based effluent limitations for cooling tower blowdown established under the Effluent Limitation Guidelines (ELGs) for Steam Electric Facilities at 40 CFR 423.13(d)(1). These ELGs set numeric limitations for chromium (total) and zinc (0.2 mg/L and 1.0 mg/L, respectively) while establishing narrative criteria for priority pollutants (no detectable quantity).

Although the use of chromium-based compounds in open circulating water cooling towers has been prohibited since 1994, chromium has been detected at elevated levels in the intake samples collected by SONGS. The presence of chromium in the makeup water source may trigger exceedances of the ELGs when concentrated in the cooling tower and discharged with the final effluent. Effluent limitations for cooling tower blowdown must be met at the point of discharge from the cooling tower prior to combination with any other waste stream. The potential for an exceedance could necessitate treatment of the blowdown for metals prior to discharge.

Thermal discharge standards are based on narrative criteria established for discharges to coastal waters under the Thermal Plan, which requires that existing discharges of elevated-temperature wastes comply with effluent limitations necessary to assure the

protection of designated beneficial uses. The San Diego Regional Water Board has implemented this provision by establishing a maximum discharge temperature of no more than 25º F in excess of the temperature of the receiving water during normal operations (San Diego Regional Water Board 2005a and 2005b).

Information available for review indicates SONGS has consistently been able to comply with this requirement. Because cooling tower blowdown will be taken from the "cold" side of the tower, conversion to a wet cooling system will significantly reduce the discharge temperature (to less than 82º F) and the size of any related thermal plume in the receiving water.

Scattergood Generating Station

At maximum operation, wet cooling towers at Scattergood Generating Station (SGS) will result in an effluent discharge of approximately 15 mgd of blowdown in addition to other in-plant waste streams—such as boiler blowdown, floor drain wastes, and cleaning wastes. These low-volume wastes may add an additional 0.25 mgd to the total discharge flow from the facility. Unless an alternative discharge is considered, SGS will be required to modify its existing individual wastewater discharge (NPDES) permit.

Current effluent limitations for conventional and priority pollutants, as well as thermal discharge limitations, are contained in NPDES Permit CA0000370, as implemented by Los Angeles Regional Water Board Order 00-083. All wastewaters are discharged to the Pacific Ocean through a submerged conduit extending approximately 1,200 feet offshore. The existing order contains effluent limitations based on the 1997 Ocean Plan and 1972 Thermal Plan.

SGS will be required to meet technology-based effluent limitations for cooling tower blowdown established under the Effluent Limitation Guidelines (ELGs) for Steam Electric Facilities at 40 CFR 423.13(d)(1). These ELGs set numeric limitations for chromium (total) and zinc (0.2 mg/L and 1.0 mg/L, respectively) while establishing narrative criteria for priority pollutants (no detectable quantity).

Although the SCAQMD prohibited the use of chromium-based compounds in open circulating water cooling towers under Rule 1404, effective January 1, 1990, chromium and zinc continue to be detected in the intake water samples collected by SGS as part of its compliance monitoring program. The presence of chromium or zinc in the makeup water source may trigger exceedances of the ELGs when concentrated in the cooling tower and discharged with the final effluent. Effluent limitations for cooling tower blowdown must be met at the point of discharge from the cooling tower prior to combination with any other waste stream. The potential for an exceedance could necessitate treatment of the blowdown for metals prior to discharge.

Likewise, water quality–based effluent limits (WQBELs) for other parameters may be established at the final discharge point based on the Ocean Plan. Data submitted by SGS in support of its NPDES renewal application do not demonstrate a reasonable

potential to exceed effluent limitations for common metals, although zinc, copper, chromium, and lead have been detected in the intake water (LADWP 2004). An initial assessment of the data does not suggest the levels of these pollutants are high enough to warrant consideration of an effluent treatment system, although changes to the facility's dilution model that will occur after adopting wet cooling towers may change the basis for comparison.

Thermal discharge standards are based on narrative criteria established for coastal discharges under the Thermal Plan, which requires that existing discharges of elevated-temperature wastes comply with effluent limitations necessary to assure the protection of designated beneficial uses. The Los Angeles Regional Water Board has implemented this provision by establishing a maximum discharge temperature of 100º F during normal operations in Order 00-083 (Los Angeles Regional Water Board 2000). Information available for review indicates SGS has consistently been able to comply with this requirement. Because cooling tower blowdown will be taken from the "cold" side of the tower, conversion to a wet cooling system will significantly reduce the discharge temperature (to less than 81º F) and the size of any related thermal plume in the receiving water.

Noise

Some alternate cooling technologies such as wet or dry cooling may result in higher ambient noise levels. In contrast, the noise levels from once-though cooling are rarely audible off site.

There are no specific regulations or criteria regarding noise for once through cooling systems. When determining noise criteria for a power plant, the plant operators will need to comply with any applicable city or county noise ordinances. Furthermore, the plant operators will need to ensure that there will be no adverse impacts, per CEQA, to any "sensitive receptors" (e.g., homes, hospitals, nursing homes, etc.) Possible mitigation measures include installation of low-noise fans or sound barriers.

The potential noise levels are site-specific and cannot be addressed in further detail by this staff report.

Land Use Planning

Construction of conventional wet cooling towers is within compliance of local use requirements, with the exception of Redondo Beach (Tetra Tech 2008). In some areas, if plume-abated towers are determined to be necessary as a result of visual impacts, then local height restrictions may be violated. These potential conflicts with local land use requirements will need to be addressed during the environmental review for each project and appropriate mitigation developed or variances allowed by the local planning agencies.

Utilities and Service Systems (including Grid Reliability)

The California Ocean Protection Council (OPC) and the State Water Board have commissioned an Electric Grid Reliability study (Jones & Stokes 2008) to investigate concerns about the State Water Board's pending policy decision on the use of seawater at coastal power plants. These concerns focused on the possible significant negative impact on the overall reliability of the state's electricity grid. The Electric Grid Reliability study also examined the potential indirect impacts to the environment that could result from the Water Board's policy.

Preliminary results of the study indicate that while the State Water Board's pending OTC policy does have potential to negatively affect electric reliability, proper planning can compensate for any plant retirements and prevent reliability problems, provided the industry has sufficient time to respond.

Seven years are needed to plan, site, permit, and construct a new major transmission line. However, the vast majority of the transmission upgrades identified in the Electric Grid Reliability study required to compensate for OTC plant retirements are relatively modest, requiring only 1-3 years to construct and place in-service. Furthermore, the transmission planning process in the state has improved considerably in recent years. The state seems well poised to compensate for most OTC plant retirements in the 2012 and beyond time period by constructing transmission upgrades to tap into the excess generating capacity that is projected to occur then.

While grid reliability can be maintained throughout the retrofit, each plant will require time to plan and permit the alternative cooling systems. The general consensus of the energy industry is that five years is needed to plan, site, permit, and construct a new major power plant. Permitting alone may take one year or more, with the larger capacity factor and nuclear plants requiring more time to plan and permit. If plant operators opt to re-power, the permitting will be considerably more extensive.

According to the grid modeling effort, overall costs could range from as little as around $100 million to as much as $11 billion, depending on how and when the policy is enacted, and how the energy industry responds to OTC plant retirements. Though transmission system upgrades are identified as the least-cost alternative for replacing OTC retirements, doing so presents its own challenges because many upgrades would be needed out of the state. Careful analysis is needed to develop an optimal combination of new plant construction and transmission system improvements to ensure the greatest benefit to the ratepayer following any OTC plant retirements, and to ensure such infrastructure can be developed in a timely manner.

Growth-Inducing Impacts

The CEQA Guidelines (CCR, Title 14, Chapter 3) provide the following direction for the examination of growth-inducing impacts:

(d) Growth-Inducing Impact of the Proposed Project. Discuss the ways in which the proposed project could foster economic or population growth, or the construction of additional housing, either directly or indirectly, in the surrounding environment. Included in this are projects which would remove obstacles to population growth (a major expansion of a waste water treatment plant might, for example, allow for more construction in service areas). Increases in the population may tax existing community service facilities, requiring construction of new facilities that could cause significant environmental effects. Also discuss the characteristic of some projects which may encourage and facilitate other activities that could significantly affect the environment, either individually or cumulatively. It must not be assumed that growth in any area is necessarily beneficial, detrimental, or of little significance to the environment. (CCR, Title 14, §15126.2(d))

Implementation of this Policy will not result in an increase in power generation and is, therefore, not expected to induce additional growth.

Cumulative Impacts

The CEQA Guidelines provide the following definition of cumulative impacts:

"Cumulative impacts" refers to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts. (a) The individual effects may be changes resulting from a single project or a number of separate projects.
(b) The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time. (CCR, Title 14, §15355)

The fundamental purpose of the cumulative impact analysis is to ensure that the potential environmental impacts of any individual project are not considered in isolation. Impacts that are individually less than significant on a project-by-project basis, could pose a potentially significant impact when considered with the impacts of other projects. The cumulative impact analysis need not be performed at the same level of detail as a "project level" analysis but must be sufficient to disclose potential combined effects that could constitute a significant adverse impact.

USEPA conducted an economics and benefits analysis as part of the Clean Water Act § 316(b) rulemaking process. The economics and benefits analyses for the Phase I and Phase II regulations can be found online at: **http://www.epa.gov/waterscience/316b/**. For California, social costs of compliance (pre-tax basis, and including federal, state and local administrative costs) were estimated by USEPA to be $31.7 million.

In California, USEPA estimated that the total current annual impingement and entrainment losses due to OTC were 28.9 million pounds of fishery yield and 43.6 future biomass production due to once through cooling.

BRIEF ECONOMIC ANALYSIS

In recent years, alternative cooling methods—particularly wet and dry closed-cycle systems— have increasingly become the preferred approach for new steam electric facilities. The majority of all new conventional steam units constructed in the last two decades have used a closed-cycle system, with nearly all new combined-cycle units adopting this approach.

The economics and engineering considerations of a closed-cycle system are more favorable when part of a new facility's initial construction, or as a major overhaul of an existing facility (re-power).

Altering the cooling system at an existing facility increases costs and can adversely impact the performance of the generating units. The decision to retrofit an existing facility from once-through cooling to closed-cycle is usually driven by extenuating circumstances that mandate a conversion, such as regulatory oversight or changes in water availability.

Re-powering, on the other hand, is a more comprehensive upgrade or overhaul to the facility's generating system, including the boiler and turbine. When combined with a re-powering project, closed-cycle dry cooling systems become favorable, and may actually be preferable to continued use of once-through cooling. In some respects, a re-powered facility is similar to a new facility in that it has wider latitude in selecting an alternative cooling system. Re-power projects, as noted above, are more comprehensive in their modifications to the existing facility and often involve the complete demolition and replacement of an existing facility. In doing so, closed cycle cooling options, particularly dry cooling, become more practical alternatives.

In California, four of the original 21 coastal power plants are proceeding with re-powering projects that eliminate the use of once-through cooling water, either in whole or in part—Humboldt Bay, Long Beach, El Segundo, and Encina. A fifth close cycle cooled plant, Gateway, is being developed adjacent to the existing Contra Costa Plant.

Taking into account only physical and logistical factors, the Tetra Tech study evaluates each facility with respect to technologies that can achieve a 90–95 percent reduction of I/E impacts as discussed in the 2006 OPC resolution. These include flow reduction measures, such as closed-cycle cooling or, in a few instances, fine-mesh cylindrical wedgewire screens. However the Tetra Tech study primarily focuses on a cost-feasibility analysis of retrofitting the existing once-through system with a closed cycle wet cooling system (evaporative cooling towers).

Below is the summary of annual facility costs for the plants that were analyzed by Tetra Tech. Long Beach, El Segundo, Encina, Humboldt Bay, and Potrero were not part of the analysis because they have proposed to adopt alternative cooling or are shutting down at some point in the near future (Potrero, pending the outcome of the San Francisco grid reliability study). The table presents the total costs including the startup costs, O&M and energy penalty estimates. All annual costs are amortized over 20 years at seven percent.

Table 18. Annual Cost Summary – Facility [bbb]

Facility	Category[a]	20-year annualized cost ($) [b][c]	Rated Capacity (GWh)	Cost Per MWh ($/MWh)	2006 Net Output (GWh)	Cost $/MWh
Alamitos	ST	25,400,000	17,082	1.49	1,677	15.15
Contra Costa	ST	9,900,000	5,957	1.66	142	69.86
Diablo Canyon	N	233,700,000	19,272	12.13	18,465	12.66
Harbor	CC	2,700,000	2,059	1.36	183	15.28
Haynes [d]	CC	6,000,000	5,037	1.19	2,065	2.91
Haynes [d]	ST	13,900,000	9,145	1.52	2,263	6.14
Huntington Beach	ST	15,400,000	7,709	2.00	1,141	13.50
Mandalay	ST	5,800,000	3,767	1.54	312	18.57
Moss Landing [e]	CC	11,900,000	9,461	1.26	5,364	2.22
Moss Landing [e]	ST	21,700,000	12,299	1.76	1,043	20.81
Pittsburg	ST	12,700,000	12,264	1.04	447	28.40
San Onofre [f]	N	208,900,000	19,745	10.58	17,139	12.19
Scattergood	ST	18,600,000	7,034	2.64	1,497	12.42
All Facilities		**586,600,000**	**130,831**	**4.48**	**51,738**	**11.34**

(a) CC = combined cycle; ST = Simple cycle steam turbine (natural gas); N = Nuclear-fueled steam turbine
(b) 20-year annualized cost of all initial capital and startup costs, operations and maintenance, and energy penalty.
(c). Annual costs do not include any revenue loss associated with shutdown during construction. This loss is incurred in the first year of the project but not amortized over the 20-year project life span. Estimates of shutdown losses were developed for the following facilities:

Diablo Canyon: $727 million
San Onofre: $595 million
Haynes: $ 5 million
Moss Landing: $ 5 million

(d) Haynes operates one combined-cycle unit (unit 8) and four simple cycle units (units 1, 2, 5, & 6). Costs are specific for each unit type; facility-wide cost is the sum of both categories.
(e) Moss Landing operates two combined-cycle units (units 1 & 2) and two simple cycle units (units 6 & 7). Costs are specific for each unit type; facility-wide cost is the sum of both categories.
(f) 3-year average output for SONGS.

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bbb Costs for Morro Bay are not included because the analysis was developed based on the repowering project the previous owner (Duke Energy) had proposed for the facility. Cost estimates, therefore, are not directly comparable to the retrofit analyses conducted for the other coastal facilities. Based on a previous analysis prepared by Tetra Tech, Inc. for the Central Coast Regional Water Quality Control Board in 2002 and the general methodology of this study, the updated annual cost for Morro Bay is $9.6 million.

GWh = gigawatt hour
MWh = megawatt hour

In summary, based on the Tetra Tech restricted approach, the report estimated the annual cost to retrofit the 11 facilities above with wet cooling towers translates to 0.45 cents per kilowatt hour (kWh) based on the facilities' collective generating capacity. Compared with their 2006 generating output, the annual cost translates to 1.13 cents/kWh. Assuming an average electricity price of 12.93 cents/kWh, retrofit costs, if passed on to the ratepayer; represent an increase ranging from 3.5 to 8.7 percent.

While significant, these costs would fall hardest on the oldest facilities with their shorter remaining lives. Out of 54 power generating units at the 18 OTC facilities analyzed, 43 are 30 years or older (Table 18). It may be apparently more economical for these older generating units to follow the leads of the Long Beach, Humboldt Bay, Gateway, El Segundo, and Encina generating stations which look to eliminate once-through cooling through proposed re-powering projects. Re-powering allows the facilities to improve efficiency while reducing emissions, and eliminating entrainment and impingement impacts. It will be up to the individual facilities to determine their most economical response to the proposed I/E reduction requirements.

Table 19. California Coastal Facilities

Facility name (Location)	Design Flow (mgd)	Water Body Type	Unit	In-service Year	2001–2006 Capacity Utilization (%)	Dependable Capacity (MW)
Alamitos Generating Station (Long Beach)	1,077	Estuary	1	1956	6.7	175
			2	1957	8.7	175
			3	1961	27.7	326
			4	1962	20.8	324
			5	1969	27.4	485
			6	1966	22.2	485
Contra Costa Power Plant (Antioch)	440	Estuary	6	1964	16.4	340
			7	1964	23.1	340
Diablo Canyon Power Plant (Avila Beach)	2500	Ocean	1	1985	89.9	1103
			2	1986	89.3	1099
El Segundo Generation Station (El Segundo)	424	Ocean	3	1964	19.4	335
			4	1965	24.8	335
Encina Power Station (Carlsbad)	857	Ocean	1	1954	18.7	107
			2	1956	21	104
			3	1958	25.1	110
			4	1973	36	300
			5	1978	33	330
Harbor Generating Station (Los Angeles)	108	Enclosed Bay/Harbor	CC	1994	20.5	227
Haynes Generating Station (Long Beach)	966	Estuary	1	1962	20.5	1606
			2	1963		
			5	1966		

Facility name (Location)	Design Flow (mgd)	Water Body Type	Unit	In-service Year	2001–2006 Capacity Utilization (%)	Dependable Capacity (MW)
			6	1967		
			8	2005		
Huntington Beach Generating Station (Huntington Beach)	516	Ocean	1	1958	31.5	215
			2	1958	31	215
			3	2002	9.6	225
			4	2003	8.5	225
Mandalay Generating Station (Oxnard)	253	Enclosed Bay/Harbor	1	1959	20.6	218
			2	1959	23.4	218
Morro Bay Power Plant (Morro Bay)	552	Estuary	3	1962	18.8	300
			4	1963	18.8	300
Moss Landing Power Plant (Moss Landing)	1224	Enclosed Bay/Harbor	1	2002	41.1	540
			2	2002	41.1	540
			6	1967	19.7	702
			7	1968	24.2	702
Ormond Beach Generating Station (Oxnard)	688	Ocean	1	1971	16.3	806
			2	1973	17.7	806
Pittsburg Power Plant (Pittsburg)	495	Estuary	5	1960	23.7	325
			6	1961	21	325
			7	1972	23.5	720
(Potrero Power Plant (San Francisco)	226	Estuary	3	1956	38.1	207
Redondo Beach Generating Station (Redondo Beach)	871	Ocean	5	1954	4.9	179
			6	1957	5.6	175
			7	1967	22.2	493
			8	1967	19.6	493
San Onofre Nuclear Generating Station (San Clemente)	2574	Ocean	2	1983	86.8	1127
			3	1984	79.4	1127
Scattergood Generating Station (Los Angeles)	496	Ocean	1	1958	22.1	803
			2	1959		
			3	1974		
South Bay Power Plant (Chula Vista)	532	Estuary	1	1960	39.8	136
			2	1962	38.7	136
			3	1964	27.9	210
			4	1971	6.8	214

Note for Haynes and Scattergood - data for facility wide, unit level data unavailable.

According to the grid modeling effort (Jones and Stokes, 2008), overall costs of a statewide policy to replace OTC could range from as little as around $100 million to as much as $11 billion, depending on how and when the policy is enacted, and how the energy industry responds to OTC plant retirements. Though transmission system upgrades are identified as the least-cost alternative for replacing OTC retirements, doing so presents its own challenges because many upgrades would be needed out of the state. Careful analysis is needed to develop an optimal combination of new plant construction and transmission system improvements to ensure the greatest benefit to the ratepayer following any OTC plant retirements, and to ensure such infrastructure can be developed in a timely manner.

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APPENDIX A – STATEWIDE WATER QUALITY CONTROL POLICY ON THE USE OF COASTAL AND ESTUARINE WATERS FOR POWER PLANT COOLING

PRELIMINARY DRAFT FOR SCOPING DOCUMENT

1. Introduction

   A. Clean Water Act §316(b) requires that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact. Section 316(b) is implemented through National Pollutant Discharge Elimination System (NPDES) permits, issued pursuant to Clean Water Act §402, which authorize the point source discharge of pollutants to navigable waters. The State Water Board is designated as the state water pollution control agency for all purposes stated in the Clean Water Act.

   B. The State Water Resources Control Board (State Water Board) and Regional Water Quality Control Boards (Regional Water Boards) (collectively Water Boards) are authorized to issue NPDES permits to point source dischargers in California.

   C. Currently, there are no applicable nationwide standards implementing §316(b) for existing power plants. Consequently, the Water Boards must implement §316(b) on a case-by-case basis, using best professional judgment.

   D. State law in California Water Code §13142.5 also requires that new and expanded coastal power plants using seawater for cooling utilize the best available site, design, technology, and mitigation measures feasible to minimize the intake and mortality of all forms of marine life.

   E. The State Water Board is responsible for adopting state policy for water quality control, which may consist of water quality principles, guidelines, and objectives deemed essential for water quality control.

   F. This policy establishes uniform requirements governing the exercise by the Water Boards of best professional judgment in the implementation of §316(b) for cooling water intake structures at existing coastal and estuarine power plants that must be implemented in NPDES permits.

   G. The intent of this policy is to ensure that the beneficial uses of the State's coastal and estuarine waters are protected while also ensuring that the electrical power needs essential for the welfare of the citizens of the State are met.

H. To prevent disruption in the State's electrical power supply, the State Water Board will convene a Statewide Task Force, which will include representatives from the California Energy Commission, the Public Utilities Commission, the State Coastal Commission, the California State Lands Commission, the California Air Resources Board, and the California Independent Systems Operator (Cal ISO). The Statewide Task Force will assist the Water Boards in reviewing implementation plans and schedules submitted by dischargers pursuant to this policy.

I. To conserve the state's scarce water resources, the State Water Board encourages the use of recycled water for cooling water in lieu of marine, estuarine or freshwater.

2. Requirements for Existing Power Plants*

A. Compliance Alternatives

(1). Track 1. An existing power plant* must reduce intake flow and intake velocity, at a minimum, to a level commensurate with that which can be attained by a closed-cycle cooling system*.

(2). Track 2. If an existing power plant* owner or operator demonstrates to the Water Board's satisfaction that Track 1 is not feasible*, the power plant must reduce the level of adverse environmental impacts from the cooling water intake structure to a comparable level to that which would be achieved under Track 1, using operational or structural controls, or both. A reduction in environmental impacts under Track 2 will achieve a "comparable level" if both impingement mortality and entrainment of all life stages of marine life are reduced to 90 percent or greater of the reduction that would be achieved under Track 1, using closed cycle wet cooling.

B. Final Compliance Dates

(1). Existing non-nuclear fueled power plants having a capacity utilization rate of 20 percent or less shall comply with Section 2.A above no later than January 1, 2015.

(2). Existing non-nuclear-fueled power plants having a capacity utilization rate greater than 20 percent shall comply with Section 2.A above no later than January 1, 2018.

(3). Except as provided in D. below, existing nuclear-fueled power plants shall comply with Section 2.A above no later than January 1, 2021.

C. Interim Requirements

(1). No later than one year after the effective date of this Policy, existing power plants with offshore intakes shall install large organism exclusion devices having a mesh size no greater than 4" square. If the discharger opts to comply with this Policy using Track 2 controls, this measure will be allowed to count as an operational control to assist in meeting the required impingement reductions.

(2). During the interim period between the effective date of this Policy and the date for final compliance specified in Section 2.B above, existing power plants not generating electrical energy for a period of two or more consecutive days shall reduce discharge flows to less than ten percent of the permitted daily flow rate. If the discharger opts to comply with this Policy using Track 2 controls, this measure will be allowed to count as an operational control to assist in meeting the required impingement and entrainment reductions. This requirement shall be implemented in the NPDES permit for the power plant through an appropriate maximum intake flow limitation that applies during these periods.

(3). During the interim period between the effective date of this Policy and the date for final compliance specified in Section 2.B above, existing power plants must demonstrate that interim impingement and entrainment impacts due to the cooling water intake structure(s) are offset by habitat restoration efforts. A plan for habitat restoration must be included in the implementation plan (described in Section 3.B. below) submitted to the Water Board.

D. Nuclear-Fueled Power Plant Exception

If the owner or operator of an existing nuclear power plant demonstrates that compliance with the requirements for existing power plants* in Section 2.A. above of this Policy would result in a conflict with a safety requirement established by the Nuclear Regulatory Commission (Commission), with appropriate documentation or other substantiation from the Commission, the Water Board will make a site-specific determination of best technology available for minimizing adverse environmental impact that would not result in a conflict with the Commission's safety requirement.

3. Implementation

A. NPDES permits issued to regulate waste discharges from existing power plants to coastal or estuarine waters shall include requirements for cooling

water intake structures that, at a minimum, implement the provisions of this policy.

B. Within one year of the effective date of this Policy, existing power plant dischargers shall submit an implementation plan for approval to the Water Board. The implementation plan shall identify the compliance alternative selected by the discharger, describe the design, construction, or operational measures that will be undertaken to implement the alternative, and propose a schedule for implementing these measures.

(1). If the discharger selects Track 1 as the compliance alternative, the discharger shall address in the implementation plan whether recycled water of suitable quality is available for use as makeup water.

(2). The Water Board shall promptly submit the implementation plan and proposed schedule to the Statewide Task Force for review. The Water Board shall request the Statewide Task Force to advise the Water Board on the discharger's proposed implementation schedule within six months of receipt of the discharger's proposed implementation schedule.

(3). The Water Board shall reissue or modify the permit to incorporate a final compliance schedule into the permit, after considering the advice from the Statewide Task Force. The final compliance schedule shall be incorporated into the permit no later than one year from the submittal of the discharger's implementation plan.

C. If a discharger selects Track 2 as the compliance alternative, the permit shall include a monitoring program that complies with Section 4 of this policy.

4. Track 2 Monitoring Provisions

A. Impingement Impacts

(1). A baseline impingement study shall be performed, unless the discharger demonstrates, to the Water Board's satisfaction, that prior studies accurately reflect current impacts. Baseline impingement shall be measured on-site and shall include sampling for all species impinged. The impingement study shall be designed to accurately characterize the species currently impinged and their seasonal abundance to the satisfaction of the Water Board.

(a). The study period shall be at least one year.
(b). Impingement shall be measured during different seasons when the cooling system is in operation and over 24-hour sampling periods.
(c). When applicable, impingement shall be sampled under differing representative operational conditions (e.g., differing levels of power production, heat treatments, etc.).

(2). After the Track 2 controls are implemented, to confirm the level of impingement controls, periodic impingement sampling, consistent with section (1) (a) to (c) above, shall be performed and reported to the Water Board.

(3). The need for new impingement studies shall be evaluated at the end of each permit period. Impingement studies shall be required when changing operational or environmental conditions indicate that new studies are needed.

B. Entrainment Impacts

(1). A baseline entrainment study shall be performed, unless the discharger demonstrates, to the Water Board's satisfaction, that prior studies accurately reflect current impacts. Baseline sampling shall be performed to determine larval composition and abundance in the source water (source water sampling) and entrained water (entrainment sampling). The source water shall be determined based on oceanographic conditions reasonably expected after Track 2 controls are implemented. Baseline entrainment sampling shall provide an unbiased estimate of larvae entrained at the intake prior to the implementation of Track 2 controls.

(2). Entrainment impacts shall be based on sampling for all ichthyoplankton* and zooplankton* (meroplankton*) species. Individuals collected shall be identified to the lowest taxonomical level practicable. When feasible*, genetic identification through molecular biological techniques may be used to assist in compliance with this requirement. Samples shall be preserved and archived such that genetic identification is possible at a later date.

(3). The study period shall be at least one year, and sampling shall be designed to account for variation in oceanographic conditions and larval abundance and behavior such that abundance estimates are reasonably accurate.

(4). After the Track 2 controls are implemented, to confirm the level of entrainment controls, periodic sampling shall be performed and reported to the Water Board.

(5). The need for new entrainment studies shall be evaluated at the end of each permit period. Entrainment studies shall be required when changing operational or environmental conditions indicate that new studies are needed.

5. Definition of Terms

Blowdown – the discharge of either boiler water or recirculating cooling water for the purpose of limiting the buildup of concentrations of materials in excess of desirable limits established by best engineering practice.

Capacity utilization rate – the ratio between the average annual net generation of power (in Megawatt-hours) and the total net capability of the facility to generate power (in Megawatts) multiplied by the number of hours during a year.

Closed Cycle Cooling System – a cooling water system, using either wet or dry cooling, from which there is no discharge of wastewater other than blowdown*.

Existing power plant – any power plant that is not a new* power plant.

Feasible – capable of being accomplished in a successful manner by the final compliance dates in this Policy, taking into account the following site-specific factors: availability of adequate space, potential impacts from increased noise on neighboring commercial or recreational land uses, air traffic safety, public safety, and the ability to obtain necessary permits, such as permits from the California Coastal Commission or local air district.

Ichthyoplankton – the planktonic early life stages of fish (i.e., the pelagic eggs and larval forms of fishes).

Meroplankton – pelagic larvae and eggs of benthic invertebrates.

New power plant – any plant that is a "new facility", as defined in 40 C.F.R. §125.83 (revised as of July 1, 2007), and that is subject to Subpart I, Part 25 of the Code of Federal Regulations (revised as of July 1, 2007).

Once-through Cooling – a cooling water system in which there is no recirculation of the cooling water after its initial use.

Planktonic Organism – phytoplankton, zooplankton, and ichthyoplankton.

Proportional Mortality (PM) – the proportion of larvae killed from entrainment to the larvae in the source population.

Zooplankton - those planktonic invertebrates larger than 200 microns (including invertebrates that are planktonic for their entire life cycle, and the pelagic larvae and eggs of benthic invertebrates).

APPENDIX B – CALIFORNIA COASTAL FACILITIES WATER INTAKE STRUCTURES AND CONTROL TECHNOLOGIES

Facility name (Location)	Offshore Intakes	Current Technology	Shore Structures	Current Measures
Alamitos Generating Station (Long Beach)	none		All Intake water from shoreline on Los Cerritos Channel (Alamitos Bay)	Traveling screens
Contra Costa Power Plant (Antioch)	Offshore intakes from San Joaquin River Delta service part of the plant		Shore intakes from San Joaquin River Delta service part of the plant	Vertical traveling screen with 3/8 in mesh panels Variable Frequency Drive Pumps
Diablo Canyon Power Plant (Avila Beach)	none		Shoreline Intake within an-made embayment	Vertical traveling screen with 3/8 in mesh panels
El Segundo Generation Station (El Segundo) – Note: *Planned conversion of units 1 & 2 to CC with dry cooling*	Submerged ocean intake conduit 2000 ft from shore at 20 ft depth	Velocity cap	Onshore structure fed by offshore intake has four screen bays	Vertical traveling screen with 5/8 in mesh panels
Encina Power Station (Carlsbad) *Planned conversion of plant to CC with dry cooling.*	none		Shore water intake in Agua Hedionda lagoon	Traveling screen
Harbor Generating Station (Wilmington district, Los Angeles)	none		Shore water intake in LA Harbor	Vertical traveling screen with 5/8 in. by 3/8 in. mesh panels
Haynes Generating Station (Long Beach) *Unites 3&4 replaced with cc in 2005 using OTC, Units 1&2 replacement underway using OTC, no plans for units 5&6*	none		Shore intake on a forebay and canal from Alamitos Bay (Long Beach Marina)	Units 1, 2 & 8 stationary screens, Units 5 & 6 traveling screens.
Huntington Beach Generating Station (Huntington Beach)	Submerged ocean intake conduit 1500 ft from shore at 17 ft depth	Velocity cap	Onshore structure fed by offshore intake has four screen bays (one for each unit)	Stationary screen and traveling screen for each bay
Mandalay Generating Station (Oxnard)	none		Shore intake from Channel Islands Harbor via Edison Canal	Vertical slide screens
Morro Bay Power Plant (Morro Bay) Note: Proposed *re-powering with 2 combined cycle units and OTC*	none		Shoreline Intake within Morro Bay	No technologies Listed –.

Facility name (Location)	Offshore Intakes	Current Technology	Shore Structures	Current Measures
Moss Landing Power Plant (Moss Landing)	none		Intakes along shoreline of Moss Landing Harbor	Vertical traveling screen with 5/16 and 3/8 in mesh panels
			Units 1&2 re-powered in 2002 with Combine Cycle and OTC	
			Restoration Project in Elkhorn Slough	
Ormond Beach Generating Station (Oxnard)	Submerged ocean intake conduit 1950 ft from shore at 35 ft depth	Velocity cap	Onshore structure fed by offshore intake, has four screen bays (one for each unit)	Vertical traveling screen with 5/8 in mesh panels
Pittsburg Power Plant (Pittsburg)			Surface Intake along Suisun Bay	Vertical traveling screen with 3/8 in mesh panels and variable speed drive pumps
			2 steam units with OTC and I unit with combined cycle & evaporative cooling tower	
Potrero Power Plant (San Francisco)	Re-power Processing ended 3/06.		Pending San Francisco Grid Study, plant expected to shut down around 12/08	
Redondo Beach Generating Station (Redondo Beach)	Units 5 & 6 Intake In King Harbor	Velocity Cap	Shore structures fed by within-harbor intakes	Four Traveling screens with 5/8-In. Wire mesh
	Units 7 & 8 Intakes at Mouth of King Harbor	Velocity Cap	Shore structures fed by within-harbor intakes	Four Traveling screens with 5/8-In. Wire mesh
San Onofre Nuclear Generating Station (San Clemente)	Two Submerged ocean intake conduits 3183 ft from shore at 32 ft depth	Velocity Caps	Shore structures fed by ocean intakes. Two sets of six vertical traveling screens fitted with 3/8-in. mesh panels	Additional vertical louvers in the forebay with fish elevators, return fish via pipeline 1900 ft from shore
			Since 1991, mitigation requirements include fish barrier devices (velocity cap and fish elevators above) and restoration of kelp forests and wetlands.	
Scattergood Generating Station (Los Angeles) *LADWP under consent decree to replace project- no plans yet to re-power or convert cooling system*	Submerged ocean intake conduit 1600 ft from shore at 15 ft depth	Velocity Cap	Shore structures fed by ocean intakes.	Vertical traveling screens with 3/8-in by 3/4-in mesh panels

April 2, 2008

Dr. Richard Wright, Chair and Members of the Board
California Regional Water Quality Control Board
San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

SAN DIEGO COASTKEEPER

Surfrider Foundation

RE: Inadequacy of Poseidon's Revised "Flow, Entrainment and Impingement Minimization Plan"

Dear Dr. Wright and Members of the Board:

We write as representatives of the environmental community and on behalf of our members who are dedicated to the restoration and protection of our coast and ocean. As noted in our March 19, 2008 letter, we believe any action taken by the San Diego Regional Water Quality Control Board on the "Revised Flow, Entrainment and Impingement Minimization Plan" (Revised Plan) at its April 9 meeting would be premature and inconsistent with noticing requirements.

Nonetheless, we find ourselves compelled to comment on the Revised Plan to ensure its inadequacies are corrected before the Regional Board takes the unprecedented step of approving the largest ocean desalination facility ever proposed in the western hemisphere. As the decision will potentially set important precedent for interpretation and enforcement of provisions of the Porter-Cologne Act to the intake of seawater for an ocean desalination facility, it deserves even more heightened scrutiny.

Below you will find our detailed preliminary comments regarding:

- Ripeness of Regional Board Review
- Misinterpretation of Porter Cologne Act, Chapter 7, § 13142.5(b)
- Inappropriate analysis of "feasible alternatives"
- Inconsistent and incomplete conclusions and assumptions

We want to assure the Regional Board that we are not raising these issues for the first time in this letter -- quite the opposite. We have participated in numerous industry conferences (some of which we were co-panelists with representatives from Poseidon Resources), we participated and raised these issues at the California Department of Water Resources "Desalination Task Force," we have informed the State Water Resources Control Board of these issues, and have commented on these issues at every stage of approval of this project, including extensive comments on Poseidon's NPDES permit in July 2006.

I. Timing of Implementation Schedule is Arbitrary and Unnecessarily Aggressive

We are particularly opposed to the adoption of the "Mitigation Implementation Approach and Schedule" (Implementation Schedule) laid out in Table 7-2, Chapter 7, p. 7-4 of the Revised Plan. Specifically, the Implementation Schedule requires "Approval of the Plan" by the Regional Board in April. This approval would then set an arbitrary and extremely restrictive set of dates for multiple agency coordination and separate approvals. Further, the Implementation Schedule appears to require that the Revised Plan be thoroughly reviewed by multiple agencies, in some instances, after the Regional Board has approved the Revised Plan. In short, we believe the decision-making timeline suggested by Poseidon effectively "puts

the cart before the horse." The California Coastal Commission has already weighed in on this issue with a letter to the Regional Board detailing its concerns with the timing of a potential approval.[1]

No prejudicial harm will come to Poseidon by postponing this decision until the document is finalized by the applicant. By its own admission, there is still much to be done before the Revised Plan can be considered "final" and ripe for Regional Board consideration and approval.

We are currently seeking a "peer review" of the technical documents recently provided to the Regional Board and the Coastal Commission – the latest of which we received from the Coastal Commission by special request on March 17, 2008. We note that these communications regarding the Revised Plan have yet to be posted by the Regional Board for public consideration.

The Revised Plan incorrectly states that Poseidon's second submission of this Plan (Original Plan) was posted on the Regional Board website "for public review and comment" shortly after it was submitted in February 2007.[2] Though the Original Plan was posted on the Regional Board website, it was never subject to public comment and review. Further, Poseidon admits that the Original Plan took 12 months of review by the Regional Board, yet its proposed schedule provides less than one month for review of the Revised Plan. Such a limited period is insufficient for the Regional Board and inappropriate for public review. The experts we have retained to conduct this peer review on the issues of entrainment and impingement and mitigation cannot complete a thorough review in the limited time for public comments prior to the April 9, 2008 scheduled hearing of the Revised Plan.

In conclusion, it is not clear that there is any compelling reason for the Regional Board to take any action on Poseidon's request to "approve" the Revised Plan. The latest revisions included in the Revised Plan still lack numerous specifics (e.g., a finalized "mitigation plan") and fully documented assumptions and conclusions. If Poseidon is simply asking for a time extension to finalize its review of the Revised Plan with the Department of Fish and Game or other agencies, no approval vote is necessary at this point. For all the reasons above, we strongly encourage the Regional Board to postpone this decision until the Applicant has fully finalized all the details and offered sufficient time for peer review by independent sources and the public at large.

II. Porter-Cologne Act Governs Plan Elements and Has Been Disregarded by Applicant

California Water Code Section 13142.5 (b) establishes the legal standards for the withdrawal and industrial use of seawater.

> For each new or expanded coastal power plant or other industrial installation using seawater for cooling, heating, or industrial processing, the best available site, design,

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[1] Peter M. Douglas, Comments for April 9, 2008 Regional Board Meeting Item, 3/20/08

[2] Revised Plan, p. 1-3. Poseidon's first Plan submission is not, and has not been, available on the Regional Board website.

> technology, and mitigation measures feasible shall be used to minimize the intake and mortality of all forms of marine life.[3]

This fundamental concept was well articulated in the State Water Resources Control Board's recent scoping document for its Water Quality Control Policy on the Use of Coastal and Estuarine Waters For Power Plant Cooling. That document points out that though Section 13142.5 has a more limited focus than section 316(b) of the Clean Water Act (i.e. only covering new and expanded coastal facilities); Porter Cologne is more stringent in one respect:

> Section 13142.5 requires use of the best available technology feasible "to minimize the intake and mortality of all forms of marine life", without regard to whether these impacts are adverse, in contrast to section 316(b) which focuses on "minimizing adverse environmental impact."[4]

Minimizing the "intake and mortality" requires "before the fact" compliance with best available site, design, technology and mitigation measures.

The Revised Plan inaccurately summarizes this explicit language as simply "...requir[ing] industrial facilities using seawater for processing to use the best available site, design, technology *and* mitigation feasible to minimize impacts to marine life." See: *Revised Plan, Executive Summary, p. ES-1* (emphasis in original). This summarization of the actual language omits the most critical objective of the law to "minimize the intake and mortality of all forms of marine life."

It is critical to recognize the interaction between the terms "site," "design," "technology," and "mitigation measures." These terms should be considered in their totality, not as distinct and disconnected parts. The operative term "and" ensures that, for example, the "site" of the industrial installation is taken into consideration when it affects best available "design" and "technology" to minimize the intake and mortality of marine life. Likewise, the "design" of the facility should be reviewed in the context of what "technology" is available to minimize the intake and mortality of all marine life.

It is equally critical to recognize that beside the mandate to employ the best available site, design and technology, "mitigation measures" must also "minimize the intake and mortality of all forms of marine life." In stark contrast to this plain mandate, the Revised Plan relies primarily on an, as yet undefined, "after the fact" restoration project to mitigate the so-called "unavoidable impacts[5]." "Restorative

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[3] Cal. Water Code § 13142.5(b)

[4] Scoping Document: Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling

[5] According to the Revised Plan, Chapter 6, Introduction, p. 6-1: "Pursuant to Water Code section 13142.5(b), this Chapter establishes a state-agency coordinated process for identification of the best available mitigation feasible to minimize Project related impacts to marine life... Section 6.3 provides an assessment of the wetlands restoration needed to compensate for entrainment impacts of the desalination facility stand-alone operations." (emphasis added)

measures" have been found inconsistent with the "technology-forcing" policies and plain reading of Clean Water Act § 316(b) in Riverkeeper II.[6] Instead, the court found that: "Restoration measures *correct* for the adverse environmental impacts of impingement and entrainment...but, they do not *minimize* those impacts in the first place."[7] Porter-Cologne § 13142.5(b) must be read the same way. To do otherwise would be an illogical read of the mandate found in Porter-Cologne to minimize impacts from the use of seawater for cooling – and by extension, any other industrial process listed in Section 13142.5(b).

Further, the so-called "unavoidable impacts" are an unacceptable assumption that the "design" of the installation must provide 50 million gallons a day (MGD) of product water and that there are no alternative discharge designs – which in combination requires a total intake of 304 MGD. These self-imposed design parameters (i.e., the size of the facility and the discharge of brine through the existing cooling water discharge channel) do not adequately assess other available alternatives. In fact, as explained in more detail below, these self-imposed design parameters set up a "strawman proposal" that eliminates the use of what is identified in the Revised Plan as available alternatives for "minimizing the intake and mortality of all marine life."

This approach is clearly offensive to the mandate to avoid the "intake" and subsequent "mortality" of marine life through "before the fact" mitigation measures.

Although Poseidon argues that redesigning the project is infeasible because it has already invested years of effort to get regulatory approval of the site-specific project[8], it must be clear that the profitability of a private entity has no place in the Regional Board's decisionmaking process. In fact, Poseidon has repeatedly claimed that the major benefit of a "public/private" partnership is, among other things, the assumption of risk associated with regulatory approval. Indeed, much of the "risk" and now the potential for late redesign of the project falls on the project proponent for not submitting timely responses to agency requests for information or the public comments about the need to employ technologies available to avoid marine life intake and mortality.

III. Applicant Misconstrues "Feasible Alternatives" Definition

Poseidon has chosen a definition for "feasible" by interpreting that term from the California Environmental Quality Act (CEQA) – a law with a very different purpose than Porter-Cologne. CEQA is a vehicle for informing the public about the environmental impacts of potential projects in order for the pubic and decision-makers to make a fully informed decision. In that respect, the Environmental Impact Report is the heart of CEQA and its purpose is "information-forcing". In contrast, Porter-Cologne is a "technology-forcing" law for industrial uses of seawater for cooling, heating and other industrial processes. Importantly, Section 13142.5(b) expands on the protections found in the federal Clean Water Act § 316(b) by including other industrial processes beyond "cooling water intakes" to the list of regulated activities.

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[6] *Riverkeeper v. U.S. EPA, 475 F.3d 83 (2d Cir. 2007) (Riverkeeper II")*

[7] Id at 39-40.

[8] See Revised Plan, Chapter 2, p. 2-7

Therefore, a more relevant interpretation may be found in the recent Federal Second Circuit Court decision on "cooling water intakes." The federal court found that:

> The Agency accordingly could not make the policy decision, in the face of Congress's determination that facilities use the best technology available, that an economically feasible level of reduction of impingement mortality and entrainment is not desirable in light of its cost.
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> [W]e nevertheless acknowledge that the comparable technologies considered by the Agency need not be identically effective for the Agency to engage in cost-effectiveness analysis. Were that the case, all that would be required would be the simple determination of which among competing technologies that achieved the same degree of reduction of adverse environmental impacts is the cheapest. Instead, the specified level of benefit is more properly understood as a narrowly bounded range, within which the EPA may permissibly choose between two (or more) technologies that produce essentially the same benefits but have markedly different costs. *Riverkeeper v. U.S. EPA, 475 F.3d 83 (2d Cir. 2007) (Riverkeeper II").* (emphasis added)

In short, the Riverkeeper II decision specifically prohibited a "cost-benefit" analysis to justify an exemption from the technology-forcing policy of CWA § 316(b). The same would hold true for the policies embodied in California's Water Code § 13142.5(b). This type of cost-benefit analysis is what is used as a justification for the continued and exacerbated intake and mortality of marine life recommended in the Revised Plan.

IV. Revised Plan Takes Flawed Approach Toward Site, Design, and Technology Issues

As noted above, the Revised Plan appears to segment the list of mandated considerations for minimizing the intake and mortality. We believe the language in Section 13142.5(b) is intended to be read in its entirety. Further, it is an impermissible interpretation of the language to permit "after the fact" restoration projects to substitute for the mandate to "mitigate" both the intake and mortality of marine life.

a) Site Analysis

The review of potential sites is too narrowly analyzed and excludes a combination of potential sites that could feasibly result in dramatically reducing the intake of marine life. Further, the analysis in this, and other sections of the Revised Plan, rests on the design of the facility producing 50 MGD of product water. If this production output precludes using the best available technology or other "before the fact" mitigation measures to minimize the intake of marine life, then it is arguably a fundamentally flawed "design."

For example, the Revised Plan asserts that the location of the desalination facility at the Encina Water Pollution Control Facility (EWPCF) would require construction of a 72-inch diameter intake pipeline to deliver source water to the facility. This limited review does not examine the use of the EPS site for the production facility and the use of the EWPCF for the discharge. This example of a superior "design"

could potentially eliminate the need to withdraw 200 MGD for dilution of the brine – and the associated intake and mortality of marine life. The Revised Plan also asserts, without documentation, that there is a constraint on the capacity of the outfall from EWPCF. A thorough Revised Plan would necessitate documenting and analyzing means for alleviating the constraint. It is our understanding that the EWPCF has plans to expand their recycled water production and it is not clear whether this would simultaneously eliminate the constraints on the discharge capacity and/or reduce the need for a 50 MGD ocean desalination facility.

In conclusion, like many of the segmented sections of the Revised Plan, this section on alternative "Site" locations is not comprehensively analyzed along with different designs, technologies, and other mitigation measures that would reduce the intake of seawater.

As a final note on this section, the text on page 2-8 (and other parts of the Revised Plan) cite a Coastal Commission "Revised Findings" document. It should be noted that the "Revised Findings" are still a draft document and have not been approved by the Coastal Commission. Nor do the "Revised Findings" have any bearing on Poseidon meeting the conditions of its Coastal Development Permit.

b) Design Analysis

As noted above, the "design" of the facility should be an integral part of meeting the mandate to minimize the intake and mortality of marine life. It is an unacceptable interpretation and implementation of § 13142.5(b) to start with the presumption of a 50 MGD production facility. Especially as the size of the facility appears to preclude the use of technologies that dramatically reduce, if not eliminate, the intake and mortality of marine life.

Nonetheless, this section includes some unsatisfactory conclusions that require further scrutiny. As noted above, we are engaging a respected consulting firm to review the entrainment and impingement studies, as well as a review of the technologies and mitigation measures available to minimize intakes.

i) Use of the EPS discharge for "desalination source water" does not meet the purpose of the Revised Plan to document the minimization of intake and mortality from a "stand alone" facility.[9] The annual estimate of marine life mortality doesn't account for seasonal variations in the survival strategy and spawning periods of the numerous species entrained at the site. In fact, Figure 3-2 on page 3-5 illustrates dramatic seasonal variations in 2007 cooling water intake volumes.

ii) Poseidon's discharge analysis is misleading. Figure 3-2 provides a graphical representation of EPS historical flow for 2007. However, the raw data and calculation method are not provided. Poseidon merely presents a conclusory statement that EPS operations in 2007 would have provided 61 percent of the dilution water needed, thus limiting Poseidon's impingement and entrainment impacts to 39 percent of stand-alone operations.[10] As was the case in Poseidon's

[9] Revised Plan, p. 3-2, bullet 1
[10] Revised Plan, p. 3-4

original flow estimates for EPS, the numbers estimated in the Revised Plan are unjustifiable.[11] EPS' intake flow has historically diminished and will continue to do so. Therefore, the 2007 figures do not provide an accurate assessment of future flow. Further, it is illogical to conclude that EPS providing 61 percent of the needed dilution water reduces Poseidon's impacts by 61 percent. Poseidon, at the lowest estimate, *increases* impingement and entrainment impacts by 39 percent by perpetuating the use of the intakes.[12]

iii) We agree that reducing intake velocity reduces impingement. However, the more intractable problem is entrainment – which is a function of volume, not velocity. Moreover, the Revised Plan states that the inlet screen velocity will be .5 fps or less without providing any documentation to support this assertion.[13] Analysis of Poseidon's Original Plan reveals that the maximum velocity of all of the generating units is at least double .5 fps.[14] In light of the future retirement of units 1, 2, and 3, Poseidon's intake water must come from units 4 and 5.[15] Both units' maximum velocity at high and low tide is significantly higher than .5 fps. In the Original Plan, Poseidon claimed that the "relative contribution to the total impingement potential of the intake pump system" would be "proportional to the pump flow."[16] However, in the Revised Plan, Poseidon has failed to show how it will obtain 304 MGD and reduce intake velocity when only two of the five units are available for use.

iv) Discrepancies between the Original Plan and the Revised Plan also require attention. For example, the Original Plan states that according to 2004-2005 analysis, the maximum pumping capacity of unit 4 is 288 MGD.[17] However, the Revised Plan states that unit 4 maximum pumping capacity is 307 MGD.[18] The data in the Revised Plan is from a 1997 report, which is presumably less reliable than the 2004-2005 data. Without clarification as to the origin of these figures, which of these figures is correct, and how these figures correspond to calculated velocity, an accurate assessment of CDP impingement impacts cannot be made.

v) The Revised Plan states that routing intake through the condensers and reducing velocity and turbulence will reduce entrainment mortality.[19] However, the Revised Plan fails to document any studies conducted to verify these conclusions or quantify the reduction in mortality. Further, Poseidon cannot assert that utilizing only one of two pumps for each generating unit is a design feature that mitigates impingement of marine life. As noted above, perpetuating the use of open-ocean intakes results in increased impingement and entrainment as compared to a scenario in which the intakes are no longer used or a sub-seafloor intake design is used. Moreover, Poseidon claims that it causes only 39 percent impingement and entrainment impacts in the site analysis of the Revised Plan. Conversely, in the design analysis portion of the Revised Plan, Poseidon takes

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[11] EIR, Appendix E, Carlsbad Desalination Facility Intake Effects Assessment, March 3, 2005, p. 2-2
[12] Revised Plan, p.ES-2, Table ES-1; p. 3-4
[13] Revised Plan, p. 3-5
[14] Revised Flow, Entrainment and Impingement Minimization Plan, June 1, 2007, p. 18
[15] Carlsbad Energy Center Project Application for Certification, p. 1-15
[16] Revised Flow, Entrainment and Impingement Minimization Plan, June 1, 2007, p. 18
[17] Revised Flow, Entrainment and Impingement Minimization Plan, June 1, 2007, p. 17-18
[18] Revised Plan, p. 2-4, Table 2-1
[19] Revised Plan, p. 3-2, bullet 3

credit for overseeing 100 percent of intake operations. Poseidon contends that by controlling all intake operations, it can choose which pumps to operate and thereby reduce velocity and impingement. However, elsewhere Poseidon fails to attribute 100 percent of negative operational impacts to CDP. Poseidon cannot hide behind EPS operations in one section of the Revised Plan and take credit for stand-alone operations in another section.

vi) Poseidon has also provided no documentation to support the contention that reduction of pumping bears a 1:1 ratio with reduction of velocity and impingement.

vii) Much like the claims that reducing velocity and turbulence will reduce entrainment and impingement mortality, reducing entrainment mortality by eliminating exposure to heat in the condensers is not backed up with any referenced studies that verify and quantify the reduced mortality rate.[20]

viii) The Revised Plan asserts that replacing "heat treatment" with "scrubbing balls" will eliminate marine life mortality.[21] Again, the Revised Plan does not document any studies to verify and quantify this assertion. In fact, common sense suggests that the "scrubbing balls" would simply kill the marine organisms residing in the intake canals by crushing them or otherwise adversely affecting them. Further, the introduction of this cleaning method comes at a significantly late stage in the review process. This method was not analyzed in the EIR, during NDPES review, CDP review, or in the SLC permit review process. Thus, the proposed "scrubbing ball" method has not been studied for possible negative impacts, nor has it been proven a viable alternative to heat treatments. Additionally, the recapture of the balls after they are introduced into the system is not detailed. Introducing ½ inch plastic balls into the marine environment presents a variety of serious concerns. Without a more detailed and studied explanation of the "scrubbing balls" it is impossible to assess the supposed benefits and inevitable adverse impacts associated with this cleaning method.

c) Technology Analysis

The technology section of the Revised Plan begins with the assertion that the draft State Lands Commission lease precludes technologies that would interfere with the operation of the EPS. First, the future of the EPS is before the California Energy Commission for review of a "re-power" permit that would eliminate the use of the existing "once through cooling" system for much of the EPS capacity.[22] The EPS intake is also the subject of ongoing litigation that may be settled if the Energy Commission approves the EPS re-power plan.

Second, the State Lands Commission has not finalized the lease terms. Consequently, the meaning of this draft language should be coordinated through a cooperative effort by the Regional Board, State Lands Commission, Coastal Commission and the interested public before the Regional Board approves the Revised Plan. This coordinated effort will result in consistent interpretation of the duties of the several

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[20] Revised Plan, p. 3-2, bullet 4. Also see: p. 3-7, Section 3.6

[21] Revised Plan, p.3-2, bullet 5. Also see: p. 3-7, section 3.7.

[22] Notice of Receipt Application for Certification Carlsbad Energy Center Project, available at http://www.energy.ca.gov/sitingcases/carlsbad/documents/index.html

agencies and avoid unnecessary delays in approval from conflicting determinations on the best available site, design, technology and mitigation measures to avoid the intake and mortality of marine life.

The Revised Plan also asserts that the foundation for analyzing best available technology relies on the definition of "feasibility" found in CEQA.[23] We disagree. (See Section II above.) Further, the introduction to this chapter constrains the analysis of "best available technology" to the "site specific and size of this project."[24] As explained below, these pre-determined constraints set up and utilize an illegal cost-benefit analysis of available technologies to reduce the intake and mortality of marine life. Ironically, if the design (e.g., size of the facility and its product output) was considered in combination with the truly best available technology, the alternative sub-seafloor intake technologies outlined in the Revised Plan in Chapter 4 would have been correctly identified as far superior to those chosen for the project in the Revised Plan. Additionally, such technologies would eliminate the need for an illegal "after the fact" mitigation plan. As noted above, Porter-Cologne § 13142.5(b) mandates an inclusive utilization of site, design, technology and mitigation measures to minimize the intake and mortality of marine life. The analysis here segments these factors and results in an inadequate conclusion.

While we agree that a new offshore open ocean intake is probably not the best available technology, the Revised Plan's analysis of the sub-seafloor intake alternatives is flawed in several ways. First, it is assumed that it is necessary for the preferred intakes to allow 304 MGD. Such an assumption is not necessary if alternatives for the desalination plant source water intakes are considered separately from the discharge alternatives, such as mixing the CDP discharge with the freshwater discharge from the EWPCF. Likewise, the alternative sub-seafloor intakes are disposed of because they do not meet the source water intake volume demanded for the size of the facility. As we have noted repeatedly, the analysis of design (size) and technologies for reducing intake and mortality of marine life should not be segmented in this way. At a minimum, the best technology for minimizing intake and mortality should dictate the size of the facility – not the other way around. Failure to do so incentivizes proposals for ever larger projects, thus requiring ever less effective intake options.

The intake alternatives that are reviewed are not realistic, and misrepresent the associated technology. The Revised Plan offers illustrations and discussion of pump stations on the surface of the adjacent beach that would disrupt recreational uses and inter-tidal ecological processes. However, the successful pilot study of sub-seafloor intakes at Doheny Beach demonstrates that the drilling of wells can be done to cause only temporary disruption to both recreational opportunities and beach ecology. The Doheny Beach pilot demonstration uses buried vaults to house the collector wells and pumping stations – allowing recreational beach activities to continue undisturbed. Therefore, the illustrations offered at Figures 4-2, 4-3, 4-4, 4-5, and 4-6 represent the worst possible case scenario.

Finally, the testing location that yielded groundwater of a higher salt concentration than ocean water is undisclosed.[25] The Revised Plan merely states vaguely that an "actual intake well test completed *in the*

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[23] Revised Plan, p 4-1
[24] Revised Plan, p 4-2
[25] Revised Plan, p. 4-10

vicinity of the EPS" was conducted.[26] (emphasis added) However, the tests completed by Poseidon are not consistent with the Doheny Beach pilot study. In fact, in the Doheny study, the water quality for the intake was far superior to ocean water and eliminated the need for much of the otherwise necessary pre-treatment (and associated energy consumption and costs).[27]

The Revised Plan proposes micro-screening ahead of the pre-treatment equipment combined with the discharge of the entrained organisms to the ocean. However, it is not clear from the document that these micro-filters will actually improve the survival of the entrained organisms. Further, as mentioned above, the apparent design includes the micro-filtration of not only the "source water" for the desalination facility, but the additional water necessary for diluting the discharge. Arguably, a more creative design would separate these intakes and avoid the proposed plan to expose the marine organisms in the dilution water to any contact with screening technology that may impact their survival.

In conclusion, the sub-seafloor intakes offer the standard for reducing the intake and mortality of marine life. As the court in Riverkeeper II explained, a cost-effectiveness test can compare different technologies that meet the standards of the identified "best technology available." However, it is clearly impermissible to conduct the type of cost-benefit analysis used in the Revised Plan. Second best technology does not meet the standard – regardless of cost.

d) Mitigation Analysis

"Mitigation measures" as it is used in Section 13142.5(b) must be interpreted to mean "before the fact" mitigation to avoid the intake and mortality of marine life. The Revised Plan offers an "after the fact" mitigation which has clearly been struck down by the federal court for cooling water intakes. There is no distinction in the language of Porter-Cologne § 13142.5(b) that would distinguish other industrial uses of seawater from this holding in Riverkeeper II.

As stated above, the mitigation plan is not fully detailed in any of the documentation. Therefore, even if "after the fact" restorative measures were a legal exemption to the "best available technology" standards as articulated in Riverkeeper II, the Revised Plan only offers steps for identifying a detailed and final mitigation plan. Consequently, the Revised Plan is not sufficiently final for any formal approval by the Regional Board.

V. Revised Plan Quantification of Unavoidable Impacts to Marine Resources is Unresponsive to Regional Board Concerns

Of general concern is the method of assessment used to quantify marine impacts in the Revised Plan. The results listed in Table 3.2 of the Original Plan, Table 5-1 of the Revised Plan, Attachment 2 to the Revised Plan, Attachment 4 to the Original Plan, and Attachment 5 to the Original Plan have not been validated as a true indication of impingement and entrainment impacts from CDP operation.

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[26] Revised Plan, p, 4-10

[27] Dana Point Desalination Project – Engineering Feasibility Report, p. 3-3, available at http://www.mwdoc.com/documents/FinalDraftReport4-6-07.pdf

The 2004-2005 impingement sampling data was conducted by EPS in accordance with 316(b) Phase II regulations. These weekly sampling events were not considered to be the focus of the assessment because the majority of impingement impacts were associated with heat treatments.[28] Further, the method of determining the daily biomass entrained associated with a flow of 304 MGD is not given in any version of the Revised Plan or accompanying attachments.

In response to concerns raised by Regional Board staff,[29] Poseidon provided a cursory explanation consisting of a narrative account of its calculations.[30] Not only does this narrative description fail to provide the underlying numbers used, but it fails to give the reasoning for its calculations. It is unclear that weekly sampling events conducted at EPS (thought to be of minimal importance in relation to the much larger mortality rate from EPS heat treatments) can be manipulated in order to give an accurate account of impacts from CDP daily operations. Before Poseidon's calculations and methods can be validated, the raw numeric data must be provided to Regional Board staff and to the public for review.

In addition, Regional Board staff expressed concern about the lack of impingement data for invertebrates and the overall lack of individual sampling event data for all organisms, including lack of "dates, times, and flow rates of sampling events."[31] Poseidon responded, "Attachment 2 of the Plan includes the requested information."[32] Poseidon is correct in asserting that Attachment 2 contains sampling weights of invertebrates and other impinged organisms. However, conspicuously missing from sampling data are times and flow rates. The information provided in Attachment 2 is yet another summary of data.[33]

Regional Board staff also expressed concern that the entrainment assessment was not completed according to a protocol approved by the Regional Board.[34] Poseidon notes that the protocol used was reviewed and approved by the Regional Board.[35] However, Poseidon fails to mention that the protocol was reviewed and approved by the Regional Board as a sampling method for EPS in response to EPA's Phase II 316(b) Rule. The protocol was not reviewed by the Regional Board as an assessment tool for predicting impingement and entrainment caused by CDP as a stand-alone facility.

The Revised Plan entrainment impacts assessment suffers the same flaws as the impingement assessment—lack of specificity. Regional Board staff noted that the Original Plan "does not clearly

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[28] Original Plan, Attachment 5, p. 104 (Cabrillo Power I LLC, Encina Power Station 316(b) Cooling Water Intake Effects Entrainment and Impingement Sampling Plan, p. 22)
[29] Regional Board Comments on Revised Flow, Entrainment and Impingement Minimization Plan & Coastal Habitat Restoration and Enhancement Plans (February 19, 2008), p. 3
[30] Poseidon Response to Regional Board Comments, March 7, 2008, p. 6
[31] Regional Board Comments on Revised Flow, Entrainment and Impingement Minimization Plan & Coastal Habitat Restoration and Enhancement Plans (February 19, 2008), p. 2-3
[32] Poseidon Response to Regional Board Comments, March 7, 2008, p. 5
[33] Attachment 2, p. G1-1 to G1-36
[34] Regional Board Comments on Revised Flow, Entrainment and Impingement Minimization Plan & Coastal Habitat Restoration and Enhancement Plans (February 19, 2008), p. 3
[35] Poseidon Response to Regional Board Comments, March 7, 2008, p. 6-7

identify the supporting data or an explanation of underlying assumptions and calculations that were used to estimate proportional mortality values."[36] Once again, in response Poseidon provides a narrative description of calculations conducted and references the underlying data in attachments.[37] Poseidon lists four attachments, none of which provide calculations or raw data. The document that gets closest to a meaningful level of detail is Attachment 5, which provides averages, means, and totals of entrained organisms.[38]

In response to Regional Board staff concerns about excluding salt marsh and brackish freshwater acreage from area of habitat production foregone (APF), Poseidon states that "[i]t is not appropriate to include the other lagoon habitats in the APF calculation...that are not occupied by the impacted species."[39] However, Poseidon provides no studies or data to support the contention that the impacted species do not occupy such areas. Further, Poseidon concedes that the lagoon habitat acreage of the impacted species is based upon a 2000 Coastal Conservancy Inventory of Agua Hedionda Lagoon (Inventory) and that such data requires confirmation by a survey that "will be conducted during the final design of Poseidon's restoration plan."[40] In an attempt to streamline the approval of the Revised Plan, Poseidon promises an accurate survey at some future date. This not only prevents an assessment as to the accuracy of Poseidon's Revised Plan, but also prevents the Regional Board from determining if Poseidon's proposed mitigation measures are adequate.

Of particular concern is Poseidon's contention that the future survey will adjust the restoration plan to the extent that the lagoon habitat acreage is "higher or lower."[41] This implies that Poseidon could possibly reduce the APF calculation and therefore decrease any mitigation efforts in response to a future survey and restoration plan that is not subject to Regional Board approval. Such a scheme serves only to bolster Regional Board staff's concern that Poseidon's reliance on the Inventory is unsubstantiated and the additional concern that the underlying data may not be "accurate or appropriate for the purpose of determining such an important component of the area of habitat production foregone (APF)."[42]

Similarly, Poseidon does not address Regional Board staff's concern that the Revised Plan does not outline "how much more severe impacts may be when populations are small."[43] Poseidon's reply is both obtuse and unresponsive. Poseidon merely states that "fish species occurring in low numbers in the

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[36] Regional Board Comments on Revised Flow, Entrainment and Impingement Minimization Plan & Coastal Habitat Restoration and Enhancement Plans (February 19, 2008), p. 3
[37] Revised Plan, p. 5-12
[38] Attachment 5, Summary of Fish and Target Shellfish Larvae Collected for Entrainment and Source Water Studies in the Vicinity of Agua Hedionda Lagoon from June 2005 through May 2006
[39] Poseidon Response to Regional Board Comments, March 7, 2008, p. 8
[40] Poseidon Response to Regional Board Comments, March 7, 2008, p. 8
[41] Poseidon Response to Regional Board Comments, March 7, 2008, p. 8
[42] Regional Board Comments on Revised Flow, Entrainment and Impingement Minimization Plan & Coastal Habitat Restoration and Enhancement Plans (February 19, 2008), p. 3
[43] Regional Board Comments on Revised Flow, Entrainment and Impingement Minimization Plan & Coastal Habitat Restoration and Enhancement Plans (February 19, 2008), p. 3

Poseidon study entrainment samples are ocean species, and conversely larval fish entrained in the highest number were lagoon species."[44] The support for such a contention is lacking. Fish species occurring in lower numbers in entrainment samples are not necessarily ocean species. These fish, or some subpopulation of these fish, may very well be lagoon species. In either case, fish with smaller populations are likely to be highly affected by any amount of entrainment. Consideration of such concentrated impacts is lacking in the Revised Plan. Regional Board staff correctly note that impacts are likely to be more severe on populations that are already impacted by other factors. Poseidon completely ignores this point and responds by stating that such species simply do not inhabit the lagoon.

VI. An Independent Baseline Study of the Agua Hedionda Lagoon Marine Environment is Required

As a new industrial coastal facility, CDP is subject to the requirements of Porter Cologne.[45] In addition to the requirement of using the best available site, design, technology, and mitigation measures feasible to minimize the intake and mortality of marine life, section 13142 also requires adequate analysis of the marine environment,

> Independent baseline studies of the existing marine system should be conducted in the area that could be affected by a new or expanded industrial facility using seawater in advance of the carrying out of the development.[46]

Although Poseidon has submitted three different versions of the same study, it has yet to submit an independent baseline study of the marine system in Agua Hedionda Lagoon and the surrounding area. As mentioned above, Poseidon's Revised Plan is simply an adaptation of the EPS Phase II PIC Study conducted in 2004-2005. The application of this study to CDP operations does not constitute a baseline study as it was conducted for a different purpose without consideration of CDP. Poseidon plans on conducting a survey of lagoon habitats in the final design of its restoration plan. Such a scheme turns the meaning of Porter Cologne on its head. The lagoon survey, or an independent baseline study, should be conducted before a mitigation or minimization plan is approved. An independent study is necessary in order to accurately assess the existing environment and the effects of CDP operations on this marine environment. Only after such analysis is completed can a plan to minimize those impacts be evaluated.

VII. Conclusion

In closing, we renew our objections to the Regional Board hearing this issue without appropriate public comment and noticing requirements. We remain concerned with the lack of specificity, misleading and incomplete factual basis used to justify this critical element of Poseidon's NPDES permit. Finally, we do not believe that this Plan meets the legal requirements of Porter Cologne or the criteria for the Plan in Poseidon's NPDES permit.

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[44] Poseidon Response to Regional Board Comments, March 7, 2008, p. 7

[45] Cal. Water Code § 13142.5(b)

[46] Cal. Water Code § 13142.5(d)

Sincerely,

Joe Geever
California Policy Coordinator
Surfrider Foundation

Gabriel Solmer
Legal Director
San Diego Coastkeeper

Enclosures:

- SDCK Comment Letter on Tentative Order No. R9-2006-0065 NPDES No. CA0109223
- Surfrider Foundation, San Diego Coastkeeper Reply Re: Poseidon's November 9, 2007 Letter and Attachments
- Environmental Presentation at California Coastal Commission Hearing, November 15, 2007
- Environmental Presentation at California State Lands Commission Hearing, October 30, 2007
- Surfrider Foundation, San Diego Coastkeeper Comments on State Lands Commission Hearing, October 29, 2007
- Assessment of Impact of Desalination Plant and Feasibility of Closed-Cycle Wet Cooling Retrofit at Huntington Beach Generating Station
- State Water Resources Control Board Scoping Document: Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling

Cc: Mr. Eric Becker, *Water Resources Control Engineer*
Mr. Brian Kelley, *Senior Water Resources Control Engineer*

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October 29, 2007

Mr. Paul Thayer
Executive Officer
California State Lands Commission
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Via Electronic and U.S. Mail
(thayerp@slc.ca.gov)

Re: Carlsbad/Poseidon Ocean Desalination Project
Water Intake Infrastructure Lease - Necessity of Subsequent EIR
Supplemental Comments from Surfrider and San Diego Coastkeeper

Dear Mr. Thayer:

On behalf of the Surfrider Foundation and San Diego Coastkeeper, please accept the following supplemental comments regarding the Carlsbad/Poseidon Desalination Plant (CPDP).

As discussed in our October 16, 2007 correspondence, CEQA requires government at all levels to consider environmental effects prior to project approvals. (Pub. Res. Code section 21001.) Because it has discretionary authority with respect to the CPDP lease application for seawater intake and discharge infrastructure, the California State Lands Commission ("SLC") is a Responsible Agency under CEQA, and must consider the adequacy of the Final Environmental Impact Report (FEIR) prepared by the City of Carlsbad. (Pub. Res. Code section 21069.) As discussed in the CEQA Guidelines, if a Responsible Agency finds that a FEIR is inadequate, it must prepare a Subsequent EIR. (14 Cal. Code Regs. Section 15096(e)(3)(CEQA Guidelines)) When such circumstance occurs, the Responsible Agency assumes all legal responsibilities of a Lead Agency for the purposes of subsequent CEQA compliance. (CEQA Guidelines sections 15052 & 15094(e)(4))

In this case, the factual, legal, and regulatory landscape have changed dramatically since Carlsbad originally approved the CPDP FEIR. As noted in the SLC Staff Report for the October 30, 2007 hearing (Staff Report), owners of the Encina Power Station (EPS) recently submitted an application to the California Energy Commission for construction of a "closed cycle" power plant that will virtually eliminate the need for seawater intake. Hence, with the impending elimination of destructive "once-through-cooling" infrastructure currently in place, the west basin of the Agua Hedionda Lagoon may finally support traditional coastal lagoon and estuarine beneficial uses critical to the health of our coastline. **And most importantly for purposes of this letter, the environmental impacts of a stand-alone CPDP must be considered and mitigated prior to approval of the lease application by SLC.**

The Staff Report recommends approval of the CPDP lease application without need for a Subsequent EIR. The following comments identify why such a conclusion is not supportable as a matter of law.

A. Changed Conditions and New Information Require SLC to Certify a Subsequent EIR Prior to Approving the CPDP Lease Application.

Subsequent EIRs are required when any of the following three conditions exist:

(a) Substantial changes occur *with respect to the project* that will result in new or increased significant environmental impacts. (CEQA Guidelines 15162(a)(1);

(b) Substantial changes occur *with respect to the circumstances* under which the project is undertaken that involve new or increased significant environmental impacts. (CEQA Guidelines 15162(a)(2); or,

(c) Important *new information* is obtained that shows the project will have one or more significant effect not previously discussed, mitigation measures previously found infeasible would in fact be feasible, or new feasible mitigation measures not previously considered are declined by the applicant. (CEQA Guidelines 15162(a)(3)).

With the recent information disclosing the relatively near-term conversion of the EPS away from OTC, each of these three criteria can be met. The CPDP project description has changed, which the City of Carlsbad has already opined will require additional CEQA review. The circumstances surrounding the CPDP have changed, which will result in new or increased impacts attributable to the stand-alone facility. And finally, because of the new information, mitigation measures previously discarded or ignored are now feasible and must be considered.

1. The Project Has Changed Substantially, and Will Result In New or Increased Significant Impacts Not Previously Attributed to a Stand-Alone CPDP.

The CPDP is unequivocally defined in the FEIR as using the Encina Power Station's intake water for desalination. (FEIR section 3.4.2) As discussed in the City's response to comments, which are incorporated as part of the FEIR:

> There are no plans for the power plant owner, Cabrillo Power, LLC, to significantly reduce or eliminate the cooling water needs of the

> existing power plant or to retool the power plant to use alternative cooling methods. As indicated in Section 3, Project Description, of the Draft EIR, the current project is defined as using the cooling water discharge of the power plant as source water for the desalination plant. Under CEQA, the Lead Agency is required to address existing or reasonably foreseeable future conditions and impacts and cannot speculate about uncertain outcomes or potential effects that cannot be reasonably quantified or predicted at this time or are outside the project definition. In addition, the baseline for measuring potential environmental impacts of a project under CEQA is the current physical environment, including current operating conditions. **Since no plans currently exist or are under consideration to reduce or discontinue the power plant use of seawater for cooling purposes, the assessment of plant operations under this completely different project baseline is speculative at best and is outside of the scope of the CEQA review of this project, as defined in the Draft EIR.**

(Emphasis added; FEIR, Response to Comment 4G, available at http://www.carlsbad-desal.com/media/Response_1_7.pdf)[1] Hence, there can be no

[1] Evidence suggests the City of Carlsbad knew, but neither disclosed nor analyzed, that the EPS would be discontinuing use of its OTC technology. While the City was processing the FEIR, the San Diego County Water Authority (CWA) was similarly processing an EIR for the same use, at the same site. At a conference conducted shortly after the CPDP FEIR was certified, County Water Authority staff commented about the Water Authority's decision not to move forward with its EIR or project:

> The power plant owners hinted at their plans for the immediate future, and this included moving away from OTC and towards air-cooled facilities. The basis of the desalination EIR was utilization and continuation of availability of OTC water. Thus, the operating strategy of the desalination plant would need to change and, as a result, the EIR must change. There was no analysis of permitting issues and environmental impacts of a stand-alone desalination plant option in the original EIR. ... This will change regulations, permitting, and conclusions about environmetnal impacts, so the board chose to pursue other options.

(Comments attributed to Bob Yamada, San Diego County Water Authority, in Alpert,H., Borrowman, C., and B. Haddad, "Evaluating Environmental Impacts of Desalination in California" *Center for Integrated Water Research* 27 July 2007, (October 26, 2007). <http://ciwr.ucsc.edu/desalplanning/workshops.html>; attached as Exhibit H)

Given the high levels of publicity afforded the competing EIR's, it is unreasonable to believe that the CWA knew that the EPS would be converting from OTC, but the City of Carlsbad did not. There is no justification for the City's failure to immediately alter its CEQA process upon acquisition of such knowledge. In fact, in light of comments by the public and Poseidon's convenient last-minute production of the Additional Responses document, it is reasonable to infer that the City intentionally maintained its concocted obliviousness so as not to disrupt the project approval schedule. The State Lands Commission should not now reward Poseidon for subverting the CEQA process. (*See Concerned Citizens of Costa*

question the project considered by the City of Carlsbad was inextricably linked to the continued operation of the EPS.

Nonetheless, concerns regarding the sufficiency of the EIR's consideration of project impacts that would likely occur upon discontinued operation of the EPS were squarely considered during public hearings at the City of Carlsbad. According to the minutes of a Planning Commission meeting held on May 6, 2006, shut down of the EPS would result in an entirely new project, with new CEQA requirements. The minutes reflect:

> Commissioner Segall asked if a new EIR would be required if Section 316(b) causes the Desalination Plant to change any aspect of operation. Mr. Monaco explained how Section 316(b) allows for compliance measures that could be achieved with 304 million gallons per day flow rate. **If, for any reason, compliance with Section 316(b) or other reasons causes the power plant to shut down, the desalination plant would be required to have its own permit for intake of ocean water, additional approvals from the City, and an additional EIR would be required.**

(Emphasis added; Planning Commission Meeting Minutes, dated May 6, 2006; attached as Exhibit B) Comments of the Planning Commission Chairperson appropriately characterize the dilemma arising from failure to consider a stand-alone desalination facility. The minutes reflect:

> Chairperson Montgomery stated that the proposed desalination plant, which would draw water off the warm water outlet of the power plant, **is a different project** than a plant proposed without the power plant and with different intakes and requirements. Mr. Donnell concurred and noted that this scenario was addressed in a condition that is placed on the Redevelopment Permit that deals specifically with the Desalination Plant. **It recognizes that the Desalination Plant operates based on the power plant operating and that any change to this condition would require new project permits and a new EIR.**

(Emphasis added; *Id.*) Thus, when the project was considered and approved locally, the Carlsbad Planning Commissioners, much like the public, were of the opinion that a

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Mesa, Inc. V. 32nd District Agricultural Assoc. (1986) 42 Cal.3d 929 (Court required Subsequent EIR where Lead Agency withheld information or mislead the public))

stand-alone CPDP would constitute a different project requiring an entirely new CEQA process. And as referenced above, **a Subsequent EIR is required as an express condition of Carlsbad's approval**:

> The Desalination Plant is planned to operate in conjunction with the EPS by using the EPS cooling water discharge as its source water and by discharging the brine that is the by-product of the desalination process back into the EPS discharge, which in turn is released from the EPS outfall. **In the event that the EPS were to permanently cease operations, and the Developer were to independently operate the existing EPS seawater intake and outfall for the benefit of the project, such independent operation will require CEQA compliance and permits to operate as required by then-applicable rules and regulations of the City and other relevant agencies. The Developer will not independently operate the EPS intake and/or outfall unless and until CEQA compliance is completed and any required permits have been issued.**

(City of Carlsbad Planning Commission Resolution No. 6091, Condition 6, p. 10:15-22; emphasis added; attached as Exhibit C) Thus, the City itself conditioned project approval on the continued operation of the Encina Power Station, and recognized that additional efforts would be necessary to achieve CEQA compliance.

a. A Stand-Alone CPDP Will Have Significant Impacts Not Addressed in the Carlsbad FEIR.

The project before the City of Carlsbad is not the same project as that currently before the State Lands Commission. While the evidence presented suggests that virtually everyone believed additional CEQA review would be required should elimination of the EPS be considered foreseeable with regulatory certainty, CEQA Guidelines Section 15162(a)(1) also requires that new significant impacts be identified for the new project in order for a Subsequent EIR to be required.

In prior correspondence with SLC, we identified potentially significant impacts that would result from a stand-alone project, yet these were not addressed in the FEIR or Staff Report. These impacts include:

- Energy Consumption from Cooler Feedwater: Energy consumption by the CPDP will increase due to the elimination of a heated stream of desalination feedwater. While the Staff report notes that the CPDP will increase the carbon footprint in the region by 101,270.93 metric tons of CO_2 per year, the fact is stated with no implication or mitigation. Further,

no assessment of the difference between the co-located and stand-alone projects has been conducted; and,

- Construction Impacts: Demolition of the EPS facilities at the same time as construction of the CPDP would result in short term cumulative construction impacts (noise, traffic, air quality, land use, water quality).

Neither of these issues were considered in the FEIR, and thus serve to establish the need for additional CEQA review.

Additional potentially significant impacts have also been identified. For example, the FEIR project description notes, "the project does not include any modifications to existing Encina power plant facilities, other than connection to the seawater discharge channel, and electrical connections and removal of a fuel oil storage tank." (FEIR, p. 3-5) Because the FEIR adamantly denied the likelihood of a stand-alone facility, there was no mention whatsoever of the infrastructure development and/or redevelopment that will be necessary for the CPDP to exist on its own. Upon demolition of the EPS, there will surely need to be changes made to the intake and discharge infrastructure to accommodate the stand-alone desalination facility. Nowhere has the project applicant disclosed nor analyzed: how the existing infrastructure would be impacted by the demolition of all or portions of the EPS; where new intake pipelines may need to be constructed or tied in to the existing infrastructure; nor, how discharge pipelines and alignments could be affected. There is further no assessment regarding how a stand-alone CPDP will function beside the reasonably foreseeable land uses likely at the EPS site once that facility is removed.[2]

Sedimentation

Also of concern are the unique sedimentation impacts that will result from a stand-alone CPDP. Currently, use of the Agua Hedionda west basin by the EPS exacerbates sediment entrainment within the Lagoon. (Northern Inlet Jetty Restoration Project EIR/EA (Cabrillo Jetty EIR), January 2005, p. ES-2; attached as Exhibit E)[3]

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[2] The applicant and City purport to address Land Use impacts of the CPDP without the EPS in the "Additional Responses" document, pp. 8-9. This discussion merely finds consistency with underlying land use plans, but says nothing of the compatibility of industrial infrastructure serving the CPDP with whatever ultimately could be built on the EPS site. Indeed, without detail regarding the likely location of pipelines and pump stations once the EPS is removed (in whole or in part), such analysis is impossible. Because neither the FEIR nor the Response to Comments document ever truly expected the EPS to be removed, such level of analysis simply did not occur. It must now.

[3] The Cabrillo Jetty EIR states:

> However at Agua Hedionda Lagoon the effectiveness of the Lagoon's natural

In part as a result of continued sediment deposition, Agua Hedionda is listed on the Clean Water Act section 303(d) "Impaired Waters" list for sedimentation impacts, and the EPS has had to dredge the lagoon more than 25 times since 1954. Sedimentation of the Lagoon to the point where established beneficial uses are compromised, as is the standard that is met in order to place the water body on the 303(d) list, is surely a "significant environmental impact" pursuant to CEQA.

Importantly, the daily and annual average cooling water flows at the EPS have fluctuated widely since establishment of the west basin of the Lagoon. A stand alone CPDP, on the other hand, will have at least 300mgd of seawater flowing into the intake structure, and approximately 250mgd flowing out the discharge channel, 24 hours a day, seven days a week, all year long. **Because the FEIR did not contemplate a stand-alone project, sedimentation impacts were never studied, and thus it is impossible to discern how often the west basin will need to be dredged in the future, or whether the condition is expected to be better or worse than that experienced under operation of the EPS intake infrastructure.**[4]

The Additional Responses is the document relied upon by the applicant and the Staff Report to satisfy CEQA's requirement that the stand-alone CPDP be analyzed. Unfortunately, the Additional Responses only discuss Aesthetics, Air Quality, Marine

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> sedimentation process is increased by the presence of the Station that relies on seawater for cooling purposes. Peak operations of the Station can require more than 800 million gallons per day (gpd) of seawater for cooling purposes. Seawater enters the Lagoon through the inlet channel created by the inlet jetties. Seawater used by the Station for cooling is discharged through a set of jetties known as the outlet jetties. Thus, because most of the seawater that enters the lagoon is discharged through the outlet jetties, the prevailing direction of seawater flow is through the inlet channel. The net result of this is that the Lagoon is flood dominated, which is to say that more water and sand flow into the lagoon than is flushed out each day. Over time, the diminished sediment carrying efficiency of ebbing tides results in the accumulation of sand in the outer basin of the Lagoon.

(Cabrillo Jetty EIR, p.1-2, 1-3; attached as Exhibit G)

[4] The FEIR barely addressed the issue of sedimentation or sediment transport:

> The combined discharge will have less than significant impacts on sediment transport compared to the currently permitted, power-plant-only discharge. Since the combined discharge volume will be lessened, the discharge-stream offshore velocity will also be lessened, thereby lessening the overall impact on natural longshore sand transport.

(CPDP FEIR, 4.7-22) As expected, the FEIR only addressed the incremental impacts of the CPDP operating in conjunction with the EPS. No information was provided regarding the likely schedule of maintenance dredging expected with a stand-alone desalination facility.

Biology Brine, Marine Biology Entrainment, and Land Use. Nowhere in any of these sections does the document assess the impacts of a stand-alone facility on sedimentation. As such, there has never been a discussion of the fact that a stand-alone desalination facility, even if it uses the existing EPS intake infrastructure, will be required to continue the maintenance dredging conducted by the EPS owners. How much dredging will be required? Without a Subsequent EIR, we simply do not know. Yet, the Cabrillo Jetty EIR notes that, "Extensive dredging in the past has had negative effects upon eelgrass populations within the Lagoon," and, "There is also a potential for turbidity from the dredging operations to impact the recruitment of *Macrosystis* and other kelp species in the vicinity of the entrance channel..." (Cabrillo Jetty EIR, p.4.1-39; attached as Exhibit F). Hence, while approval of a stand-alone desalination facility utilizing existing intake infrastructure will likely result in the need for continued dredging operations and attendant negative biological impacts, the extent of such impacts must be determined, disclosed, and mitigated in a Subsequent EIR.[5]

Once the threshold issue of requiring a Subsequent EIR is overcome, the Cabrillo Jetty EIR contains important information regarding the scope of alternatives that would have to be considered regarding the CPDP intake technology. While the Cabrillo Jetty EIR was produced to assess the impacts of extending the Lagoon intake north jetty, it also looked at the viability of alternative intake mechanisms for the EPS. The alternatives, of course, are directly applicable to a stand alone CPDP as well. Importantly, the Cabrillo Jetty EIR selected as the Environmentally Superior Alternative (CEQA Guidelines section 15123.6(d)) one which would entail the construction and operation of an offshore intake for cooling water. (Cabrillo Jetty EIR, pp. ES-4,5, ES-14,15) Consideration of this alternative will be required in a Subsequent EIR for the stand-alone CPDP.

2. The Circumstances Under Which the Project Will Be Undertaken have Changed Significantly, and Will Result In New or Increased Significant Impacts Not Previously Attributed to a Stand-Alone CPDP.

All of the aforementioned significant impacts are attributable to the stand-alone CPDP if such project is considered different from the co-located project considered and approved in the Carlsbad FEIR. In the alternative, should a stand-alone CPDP be

[5] Note, given that this information was not addressed in the FEIR process before the City of Carlsbad, Poseidon cannot simply provide additional information to SLC without conducting a Subsequent EIR. The administrative record for the FEIR is closed, just as the statute of limitations for challenging that document has long since passed. While it is debatable whether a Subsequent EIR, a Supplemental EIR, or an Addendum to the FEIR must now be produced, in any instance additional CEQA compliance is required.

characterized as simply an alteration of the previously studied project, as opposed to an entirely new one, then CEQA Guidelines section 15162(a)(2) would apply. The decision by the EPS to eliminate or substantially reduce its cooling water intake would constitute a substantial change in circumstances under which the project would be undertaken. As such, the significant impacts identified above would trigger the requirement for SLC to conduct a Subsequent EIR under this provision as well.

3. New Feasible Alternatives and Mitigation Measures Require the Production of a Subsequent EIR.

CEQA requires a Subsequent EIR be produced where new information shows that mitigation measures or alternatives considerably different from those analyzed in the previous EIR would substantially reduce one or more significant effects on the environment. (CEQA Guidelines section 15162(a)(3)(D))

As noted above, the Cabrillo Jetty EIR detailed an environmentally superior alternative – open ocean intake – that has been rendered feasible by the prospect of discontinued use of intake infrastructure by the EPS. This alternative would reduce sedimentation impacts, and if coupled with a sub-surface intake technology, could significantly reduce entrainment impacts as well.

In our October 16, 2007, we also discussed the viability of sub-surface intakes, noting that such technology was recognized by the SLC as a preferred alternative in its April 17, 2006 Resolution regarding "Once-Through Cooling in California Power Plants."

In addition, the Municipal Water District of Orange County earlier this year concluded a five year extensive investigation into the feasibility of an ocean desalination facility in Dana Point, California (Dana Pont Report) without an open ocean intake. The study focused on the viability of using subsurface intake wells, and found them feasible from a technological, economic, and regulatory standpoint. The study notes:

> Accordingly, a subsurface slant well intake system would provide several advantages, including natural pretreatment, shock load protection, water temperature uniformity, and minimal operation and maintenance requirements. In addition, reconnaissance level cost estimates also suggested that this approach would be cost competitive or less costly than a screened open intake system equipped with pretreatment processes.

(Final Draft Engineering Feasibility Report, Dana Point Ocean Desalination Project, March 2007, p.1-1; attached as Exhibit I) The Dana Point Report, while not specific to the CPDP locale, provides a framework for consideration of sub-surface intake alternatives. Whether to reduce significant impacts from entrainment or sedimentation,

sub-surface intake alternatives are available, and must now be considered feasible in light of the new information regarding the fate of the EPS intake infrastructure.[6] To date, Poseidon has refused to consider sub-surface intakes as either a mitigation measure or an alternative. Hence, pursuant to CEQA Guidelines section 15162(a)(3)(D), a Subsequent EIR must be produced prior to SLC lease approval.

B. Because the SLC Must Protect Public Trust Resources Regardless of Technical CEQA Compliance, the Project Should be Denied on Policy and Scientific Grounds.

Independent of the requirements of CEQA compliance, the State Lands Commission has an *obligation* to protect Public Trust Resources, including the marine life and ecological health of the Agua Hedionda Lagoon. SLC further has *the discretion* to require additional investigation if it does not believe the findings of the FEIR appropriately considered the true extent of impacts from the proposed project. Therefore, the following comments point out flaws with the FEIR and Additional Responses conclusions regarding the significance of entrainment impacts from a stand-alone CPDP. Based upon these points, the SLC could order the applicant to undertake additional studies to ensure conclusions in the FEIR and Additional Responses are supportable.

The FEIR section dealing with biological impacts from entrainment was based upon a technical report prepared by consultant Tenera Environmental for Poseidon Resources Corporation. (Carlsbad Desalination Facility Intake Effects Assessment, FEIR Appendix E; attached as Exhibit J). This document purports to assess the baseline conditions in the Lagoon, from which the incremental impacts of the CPDP are assessed relative to the EPS impacts. (*Id.*) While this study does not even claim to consider the CPDP as a stand-alone facility, it is referenced in the Additional Responses as the document upon which the finding that a stand-alone facility will not cause significant entrainment impacts can be made. (*See* Additional Responses, Exhibit A, pp.3,6)

The general methodology employed for the CPDP study closely tracks other studies described in a recently released California Energy Commission consultant report on how to assess power plant entrainment impacts. (Assessing Power Plant Cooling Water Intake System Entrainment Impacts, California Energy Commission, October 2007; attached as Exhibit K) Not surprisingly, the same firm, Tenera Environmental, produced both documents.

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[6] *See also*, An Overview of Seawater Intake Facilities for Seawater Desalination, Tom Pankratz, CH2M Hill, Inc., December, 2004; attached as Exhibit L. Mr. Pankratz describes various subsurface intake options, including horizontal beach wells, vertical beach wells, infiltration galleries, and seabed infiltration galleries. The viability of each of these alternatives should be considered in a Subsequent EIR.

Also not surprising is that the study methodology used for the CPDP has significant, overarching flaws that could skew the findings in favor of continued open ocean intake of source water. The following concerns should be considered by SLC before accepting the FEIR and Additional Responses conclusions.

1. Insufficient Samples Were Taken to Draw Conclusions Regarding Entrainment Impacts at Agua Hedionda.

The Tenera FEIR "Intake Effects Assessment," when discussing the Environmental Setting of the Agua Hedionda Lagoon and Pacific Ocean, admits that numerous important conditions affecting marine life – such as temperature, dissolved oxygen, salinity, predator and prey availability – change depending on the season, the year, or other occasional/cyclical occurrences (such as El Niño events and upwellings). (Exhibit J, pp. 3-1 - 3-4.) Yet, the study performed for the CPDP **only included sampling during the summer season of 2004.** The study did not consider variations likely to occur in different seasons nor under varying climatic conditions. As such, the study found, "...the results cannot be generalized over an entire year, but are indicative of the magnitude of potential effects of water withdrawals." (Exhibit J, p.5-1)

The CEC Entrainment Report, on the other hand, details a standard of more robust sampling frequency performed for assessment of entrainment impacts on the South Bay and Morro Bay, and Diablo Canyon Power Plants. (Exhibit K, p.20-23) For South Bay and Morro Bay, Tenera sampled entrainment and source water for an entire year, either monthly or weekly. (*Id.*) For Diablo Canyon, Tenera sampled from October, 1996, through June, 1999. (*Id.*)

Because the CPDP assessment was designed to assess only the incremental entrainment impacts of a co-located desalination facility, it may be understandable that the study would be conducted with a lower degree of sampling frequency. However, given the changed circumstances now presented, it is both scientifically and legally unacceptable to draw impact conclusions for a stand-alone facility, as was done in the Additional Responses, without a more complete study. The SLC should require an entirely new entrainment impacts assessment before approving the CPDP lease application.

2. The CPDP Entrainment Impact Assessment Was Inappropriately Based Upon Presumptions of "Compensation" and "Surplus Production".

While the application of fisheries management terminology to policy considerations can be complicated, the concepts underlying the fatal flaws in the CPDP entrainment impacts analysis should be easily understandable.

The Additional Responses admit that as much as 34% of the larvae of the three goby populations sampled could be lost to entrainment and dilution with a stand-alone CPDP. (Exhibit A, pp. 6-7) The following represent arguments put forth as to why entrainment losses are not significant ecologically:

- The species most often killed are abundant in adult form near the EPS intake, the Lagoon, and throughout Southern California. (*Id.*)

- Commercially and recreationally valuable species are not often found in the entrainment samples. (*Id.*)

- The species that are killed by entrainment are surplus individuals because 99 percent of larvae die in nature before reaching reproduction age. (*Id.*)

All of these concepts rely on the notion that the death of large numbers of larvae is inconsequential because they are, in essence, "surplus production." The concept of surplus production, and reliance upon the theory to support power plant entrainment losses, was addressed in a widely cited journal article by John Boreman of the National Marine Fisheries Services:

> For over 60 years, fishery scientists have been using the argument that nature creates surplus, and that the surplus can be used as justification to impose anthropogenic sources of mortality (power plants, fishing, pollution, etc.) on fish populations; otherwise, it is wasted. Surplus production is closely tied to the concept of compensation, a form of density-dependent mortality in which the mortality rate of a cohort is directly related to abundance of that cohort. Scientific arguments have been put forth in assessments of power plant impacts that compensation can at least partially offset impacts imposed by power plants. **Although we cannot dismiss the existence of surplus production outright, since in some years environmental conditions are such that a surplus in reproductive effort may occur, we should be assessing the reproductive efforts of fish populations in the context of the ecosystem in which they reside. .... assessments of power plant impacts should include analyses of predation foregone and production foregone.**

(Boreman, J. 2000. Surplus production, compensation, and impact assessment of power plants. Environmental Science & Policy, 3, S445-S449; attached as Exhibit M, (quote from Abstract, emphasis added)) The gist of Boreman's hypothesis appeals to the common senses, namely that there is an extremely complex relationship between predator and prey, parental stock size and recruitment, and other environmental factors. (*Id.*) It does not make sense in a healthy functioning ecosystem to presume that

nature creates waste, or that management decisions based upon averages can be credibly presumed valid or desirable without an astronomical margin of safety.[7] Boreman concludes simply, "Surplus production is an abstract concept that is an incomplete description of reality." (*Id.*, p.S447)

While the notion of "surplus production" may be deeply ingrained in the science of fisheries management, especially as regards 316(b) entrainment impacts assessments, this does not mean the SLC cannot require more. Given that we are, for the first time in decades, on the verge of eliminating significant impacts to marine life from a generation of OTC power plants, it does not make sense practically or legally to allow a new industrial use that will perpetuate the destructiveness of the past practices. On policy grounds alone, the CPDP should be denied. In the alternative, on scientific grounds, a more robust and meaningful marine life mortality assessment should be demanded.

C. Conclusion

For the reasons herein noted, the CPDP lease application should be denied outright until a Subsequent EIR is produced for the stand-alone facility.

Sincerely,

COAST LAW GROUP LLP

Marco A. Gonzalez

CC: Clients
SLC Commissioners

[7] Because it is extremely difficult to estimate the response of fish stocks to power plant entrainment, and because numerous stocks are at risk (including those that rely on the "abundant" populations typically entrained), U.S. EPA "has adopted a 'precautionary approach' in evaluating [cooling water intake system] impacts because of the many uncertainties associated with modeling compensation and stock recruitment relationships." (U.S. Environmental Protection Agency, §316(b) Existing Facilities Benefits Case Studies, Part A, Evaluation Methods, Chapter A6: Fish Population Modeling, p.A6-6; Attached as Exhibit N)

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November 13, 2007

Mr. Tom Luster
California Coastal Commission
25 Fremont Street, Suite 2000
San Francisco, California 94105-2219

Via Electronic Mail
tluster@coastal.ca.gov

Re: Carlsbad Desalination Project Coastal Development Permit Application
No. E-06-013, Agenda Item Th 7a
Surfrider Foundation, San Diego Coastkeeper Reply
Re: Poseidon's November 9, 2007 Letter and Attachments

Dear Mr. Luster:

Please accept these comments on behalf of the Surfrider Foundation and San Diego Coastkeeper in response to Poseidon Resource's November 9, 2007 correspondence (including attachments) responding to the Coastal Commission Staff Report for the above-referenced project.

For the record, it should be noted that these documents included significant new information and arguments, yet they were not available to the public until late afternoon on Friday, November 9th. Because the following Monday was a holiday (Veteran's Day), numerous interested parties did not receive the documents until Tuesday morning, November 13th. Given the gravity of the project at hand, and the significant precedential nature of the decision to be rendered by the Commission, every effort should be made to ensure adequate time for public response to new project information. As such, we believe it would be appropriate to continue the public hearing for a minimum of one month to afford such review.

The following points specifically address Poseidon's last minute offer of "Applicant's Proposed Coastal Development Permit Conditions" submitted less than one week prior to the Commission's scheduled hearing.

First, Surfrider and Coastkeeper would like to recognize Poseidon's apparent efforts to address issues raised in the Staff Report, including numerous violations of Coastal Act Chapter 3 policies. Nonetheless, most of these issues were not new to Poseidon, and in fact should have been readily apparent long ago. In other words, there is no justification for Coastal Development Permit special conditions being dropped on Staff and the public at the last minute. Beyond the extensive efforts of the Coastal Commission staff to resolve unanswered factual and legal questions, the environmental community has raised many of the issues cited in the Staff Report numerous times in desalination conferences, in comment letters to several regulatory agencies, and in direct communications with Poseidon.

Of particular concern in Poseidon's rebuttal to the Staff Report is the company's continued reliance on information and conclusions in the Final Environmental Impact Report (FEIR) that was certified by the City of Carlsbad. Poseidon repeatedly implies, and at times outright states, that objections to the analysis in the FEIR were successfully resolved prior to certification and that legal challenges to the FEIR were dismissed. In fact, the legal inadequacies of that document were never resolved on the merits, as the writ petition was dismissed on procedural grounds before the court received any substantive briefings. Further, while Poseidon claimed to have studied the stand-alone desalination plant in the Final EIR, the fact is that such analysis was provided as part of the City's "response to comments" on the EIR, and was done in a very summary format under the argument that such a condition was not reasonably foreseeable. The public never had a real bite at that apple, and Poseidon's continued reliance on that document as the basis for Coastal Act consistency should be considered highly suspect by the Commission.

Notwithstanding our appreciation of Poseidon's efforts to address concerns of Coastal Commission staff and the environmental community, Surfrider and Coastkeeper still have major disagreements regarding the design of the project and its consistency with Coastal Act policies. Please consider the following:

1. Timing

As noted above, Poseidon's recommendations come just one week before the Coastal Commission's final hearing on the CDP. This leaves very little, if any, time for the Coastal Commission staff and public to review the recommended conditions of approval.

And should Poseidon claim these conditions were foreseeable, we would respectfully disagree. The breadth and scope of the conditions simply cannot be considered insignificant amendments to the CDP. In fact, the amendments to the CDP that result from these conditions, insomuch as they purport to resolve substantive Coastal Act compliance issues raised by staff, require significant investigation to determine whether they can meet such a claim. Staff's report was thoroughly researched and impacts well documented, and a similar effort is required in order to deem these impacts resolved by the special conditions.

Further, should these applicant-drafted conditions be considered and adopted at the dais during the hearing, Coastal Commission legal counsel will not have had adequate time to ensure that they comply with Coastal Act policies, that they are sufficiently binding on the applicant, and that they will continue as requirements of any eventual future owner of the desalination facility. At the very least, should the Commission choose to override staff's denial recommendation, appropriate findings of approval,

including conditions, would have to be drafted and brought back for subsequent consideration by the Commission.

In addition, the Commission should take caution not to conditionally approve the CDP until the conditions are fully vetted, the final findings are approved, and all contingencies are resolved. Poseidon has a history of representing finality in agency decision making despite significant reservations. For instance, Poseidon repeatedly claims to have received its NPDES permit, but fails to clearly articulate that the permit is not valid until the Regional Water Quality Control Board concludes review of Poseidon's Revised Flow, Entrainment and Impingement Minimization Plan. Because significant additional project conditions may result from the pending decisions by the Regional Board and State Lands Commission, the Coastal Commission would do well to postpone a decision until those processes are concluded.

Even more appropriately, the Coastal Commission could recommend denial of the project and require Poseidon to resubmit a completed, new application reflecting all the changes that have evolved over the last 18 months. An amended project description is warranted and the public should have a discrete project to review and evaluate.

2. Proposed Conditions May Not Be Sufficient For Coastal Act Compliance

Below is a non-exclusive list of specific concerns regarding Poseidon's proposed conditions of approval. Please note, Surfrider and Coastkeeper intend to comment further at the hearing on substantive and legal adequacy of the proposed conditions

a. Standard Conditions

The so-called "Standard Conditions" provide for entitlement to conduct the project in perpetuity. While the "assignment of the rights" language should be drafted to bind all successors, the way it is written it could be interpreted as authorization to conduct activities at the property beyond the 30 year life of the project. The Standard Conditions should be closely scrutinized by Coastal Commission legal counsel, and the State Lands Commission should be consulted to ensure consistency with the ultimate conditions of the lease of tidelands sought by Poseidon.

b. Special Condition: 2(a). Final Plans

This condition appears accurately reflects that "final plans" have, as yet, not been submitted to the Coastal Commission staff. Yet, the condition expressly limits the discretion of the Executive Director to review approve only those parts of the non-existent final plans in areas "located in the coastal zone." This provision appears to require the Coastal Commission to ignore its "federal consistency" authority, as well as its authority to regulate activities outside the coastal zone that could impact coastal resources. The condition should be clarified to allow review and approval of all project

components with impact to coastal resources.

c. Special Condition: 2(b). Final Plans

This condition of approval seems to suggest that final plans have not been completed for delivery of the product water, and that there is a potential for extending the delivery of the product water to, as yet, unspecified locations. Again, the expressed provisions in this condition limit the discretion of the Executive Director to consideration of only those changes within the coastal zone. This condition further appears to only apply to the expansion of physical distribution lines and does not allow further consideration of "paper transfers" of the water to areas inside or outside the coastal zone. With this ambiguity, it is impossible to discern whether the water would stay in the San Diego region for its stated purposes. Such "paper transfers," sometimes referred to as "wheeling the water", to developing regions such as Las Vegas would be growth inducing in the long-run.

d. Special Conditions: 3,7. Construction/Stormwater Plans

The construction erosion control/water quality/stormwater best management practices are not consistent with the requirements of the state General Construction Stormwater Permit, the San Diego Region Municipal Stormwater Permit, or Coastal Commission precedence on other large projects. Given the project's proximity to such sensitive resources, specific stormwater controls should be called out in a special conditions drafted following Commission approval, should it occur.

e. Special Condition: 4. Habitat Mitigation Plan

Poseidon appears for the first time to finally have committed to a single project as mitigation for impingement and entrainment impacts from continued use of the once-through cooling intake infrastructure. While we support commitment to mitigation, insufficient time has been allotted to assess whether the 37 acres of proposed restoration suffice for the production foregone due to entrainment impacts. Further, because no assessment has been provided regarding viability of performing the mitigation within the $1.8M monetary cap Poseidon set on its mitigation efforts, it is still unclear whether and when the full restoration will occur. And even more importantly, Poseidon has yet to show that any compensatory mitigation mitigation scheme would be consistent with California Water Code section 13142.5(b) and its mandate to "...minimize the intake and mortality..." of marine life. In fact, a plain reading of that section requires best site location and best available technology to reduce the intake in the first place - not an attempt to mitigate for the harm after the fact. Finally, once again this condition of approval removes the authority primarily vested in the Coastal Commission and delegates it to the Executive Director.

f. Special Condition: 5. Climate Action Plan

Surfrider and Coastkeeper agree with Staff's analysis that greenhouse gas emissions and the enumerated consequences of global warming on protected coastal and ocean resources, as well as other Coastal Act policies, gives the Coastal Commission ample discretion to impose conditions to enforce those numerous Coastal Act policies.

Thus, characterization of the Climate Action Plan as "voluntary" and argument that the Commission has no authority under the Global Warming Solutions Act (AB 32) is irrelevant. While admittedly a case of first impression, the Coastal Act gives broad discretionary authority in and of itself to implement this condition. However, while we are encouraged to see the project proponent recommend the Climate Action Plan as a condition of approval, Poseidon has yet to identify more than a list of potential actions to reduce greenhouse gas emissions. In fact, there is significant dispute among the public, the State Lands Commission and Poseidon as to some basic elements necessary to even begin a Climate Action Plan - not the least of which is differences by experts in the field as to what the baseline emissions are today. Therefore, it is premature to accept the offer of this condition of approval because the details of how this would condition the DP to bring it in conformance with the Coastal Act policies are, as yet, speculative and undocumented. Finally, the Commission should require that the Poseidon facility achieve carbon neutrality on a "gross" basis, not as the difference between the energy used at the facility compared to imported water.

g. Special Condition: 8. Flow, Entrainment Minimization Plan

Surfrider and Coastkeeper disagree with Poseidon's assertion that the Coastal Commission has no authority over the NPDES permit and conditions issued by the San Diego Regional Water Quality Control Board. We support staff's analysis that the NPDES permit is incomplete without final approval of the "Flow, Entrainment & Impingement Minimization Plan" (Minimization Plan). Consequently, as staff cites, the Coastal Commission retains shared authority pursuant to the Coastal Act. Also, as noted above, the draft Minimization Plan does not meet the mandates of California Water Code section 13142.5(b) because it illegally relies on "after the fact mitigation" rather than complying with the clear mandate to locate this facility at the best site, using the best design and available technology to avoid the intake of marine life. This condition of approval appears to simply promise to submit evidence that the Minimization Plan has finally been approved by the Regional Water Quality Control Board - but adds an unacceptable condition that the "[Minimization Plan] shall be in substantial conformance with the Plan dated June 1, 2007." This "poison pill" virtually enshrines in the CDP a Minimization Plan that not only has not been reviewed and adopted by the Regional Board, but one that is plainly not in compliance with the clear language of the California Water Code. In effect, the Commission would be deferring their authority to a future decision by the Regional Water Board without any assurances

the Minimization Plan would be approved, or if approved would withstand judicial scrutiny.

h. Special Condition: 12(a) Timing of Dredging & Beach Deposition

Poseidon appears to be committing itself to conditions imposed on dredging the lagoon for the generator's cooling water intake. The implication is that Poseidon is simply stepping in for the Encina Power Station (EPS). Such is not the case. EPS was a facility constructed long before the enactment of the Coastal Act. The discontinuance of the EPS cooling water intake infrastructure renders the proposed desalination facility a new "stand alone" facility with it's own CDP. Different concerns arise from use of the site for this purpose. First, an off-shore "sub-seafloor intake" would dramatically reduce the need or dredging the lagoon (i.e., confine the dredging to the mouth of the lagoon) and could make other mitigation measures more viable in light of applicable Coastal Act policies. For example, the jetties for the intake could be re-configured so as to restore the natural flow of sediment in the local littoral zone and natural beach width, and consequently reduce the need for mechanical "replenishment." In short, time is needed to consider and finalize approval of the lagoon intake and its attendant necessity of dredging in sensitive habitat areas. These important considerations should be incorporated into a revised CDP application, and not left to a speculative future re-opening of the CDP for final approval.

i. Special Conditions: 14. Evidence of Other Agency Approvals

This condition on approval puts the cart squarely before the horse. There is a reason the Coastal Commission does not typically render CDP decisions until all other agency approvals are obtained. Until issues are resolved by agencies with primary consideration authority, the Coastal Commission is obligated to condition the project appropriately with the CDP in the first instance. Without the ability to rely on express conditions of approval arising from the NPDES permit and State Tidelands lease, the Commission must include substantive conditions to ensure all Coastal Act issues are addressed. Further, itis disingenuous for Poseidon to constantly refer to the FEIR, implying there were no significant impacts identified by the list of agencies in this condition of approval, and then turn around and ask for a CDP before the agencies have made their final decisions. Either the decisions have been made and should be provided to the Coastal Commission as part of Poseidon's project consideration, or the decision on the CDP is premature. The FEIR was not adequate for these purposes and was never reviewed as such, much less dismissed on the merits. Consequently, the Coastal Commission has to exercise independent review to ensure consistency with Coastal Act policies.

j. Missing Conditions

Several concerns have not been adequately addressed in the proposed conditions of

approval. For example, there should be a condition mandating that the desalination facility's CDP expire or require amendment should the quantity of water produced from this facility will be shown to be locally unnecessary. The project should not be allowed to continue if the water would be transferred out of the region or be shown to induce growth.

3. Responses to Exhibit B: Poseidon's Corrections to Misstatements

Please consider the following in response to Poseidon's "correction" to the Commission Staff Report.

Stand-Alone Analysis (p. 3 #8)

We agree with the Staff Report that the Carlsbad EIR did not contain sufficient analysis of a stand-alone desalination facility. The public was not involved in the analysis of the stand-alone option as Poseidon added the analysis at the last minute without any public comment or review. Poseidon states that no evidence of adverse impacts from the stand-alone scenario was presented, but the public was not afforded the luxury of responding to the stand-alone studies and conclusions which were added to the record the day of the certification of the EIR.

Further, the Coastal Commission also has authority under Pub. Res. Code Section 21080.5 to analyze information under its own environmental review process. Under either review of the EIR prepared by Carlsbad or by the Commission's environmental review process the analysis is insufficient. Poseidon relies on many documents either outside of the public record or prepared after the EIR was certified. Under Pub. Res. Code Section 21005, it is an abuse of discretion by the public agency if the agency fails to comply with the information disclosure provisions of CEQA. CEQA Guidelines Sections 15200, 15201 and 15203 make clear that public input and sufficient time for review and comment are essential to the environmental review and decision-making process. *See Concerned Citizens of Costa Mesa, Inc. v. 32nd District Agricultural Association*, 42 Cal. 3d. 929, 936 (1986); *Laurel Heights Improvement Association v. Regents of the University of California*, 47 Cal. 3d. 376, 392 (1988)

Existing Intake Structure (p. 3 #9)

As a result of the inadequate analysis of alternatives in the EIR, the conclusion that the current EPS intake is environmentally superior and would not result in any adverse impacts is fatally flawed. Poseidon relies on the assertion that the existing EPS intake does not result in adverse impacts and therefore the subsurface intakes could not be environmentally superior. The underlying assertion is incorrect as well as the preclusion of analysis of the subsurface intakes because of reduced intake volumes. Alternatives should be analyzed as to their impacts to the environment, not the volume of intake water Poseidon requires for economic feasibility.

316(b)/Riverkeeper II Application (p. 5-6 #12)

Poseidon asserts that Clean Water Act 316(b) does not apply to desalination facilities, but fails to consider the applicability of Porter-Cologne. The state courts will look to the federal court decision in Riverkeeper II in analyzing Porter-Cologne and applying the same best technology available standard. In using the same intake structure as power plants use for once-through cooling technology, the desalination plant will be subject to the same technology requirements as OTC power plants.

By definition, the best technology available is the best and most protective of the environment. Poseidon argues that ocean water can be extracted in an environmentally destructive manner irrespective of available environmentally superior technologies for performing the same function (drawing water from the ocean) as OTC so long as the water is used for a more worthy purpose. Thus, any application of the best technology available standard can be sidestepped by merely finding a new function for a destructive technology.

Further, if the assumption Poseidon relies upon is that withdrawing ocean water for desalination serves a higher purpose and therefore should be afforded greater leniency in applying environmental regulations, only 50 MGD of the water being withdrawn fits this definition and the other 200 MGD of dilution water and 50 MGD brine discharge are subject to stricter standards.

Lagoon Sedimentation (p. 7 #17)

Poseidon asserts that it is both innocent in contributing to the sediment problem in Agua Hedionda Lagoon (AHL) and that it would actually help that situation by performing dredging. In making this determination Poseidon relies on the 2006 Clean Water Act 303(d) List of Water Quality Limited Segments Requiring TMDLs, by the San Diego Regional Water Quality Control Board, June 28, 2007. This document states in table format that AHL potential sources for the sedimentation/siltation are non-point and point sources. However, Poseidon fails to mention that the technical report used for the lagoon and watershed models used to estimate existing pollutant loading, develop TMDLs, and conduct a source analysis for the waterbodies determined that data gaps prohibited detailed analysis of sediment in the lagoon and that several data elements would be useful to better understand the lagoon. Missing data specifically included in-lagoon sediment data and the report concluded that without collection of further data, TMDL development would not be possible. (Investigation Report No. R9-2006-0076 Technical Report, p. 14)

Impingement Rate (p. 9-10 #20-21)

The impingement and entrainment effects of a stand-alone facility are analyzed in a study submitted to the San Diego Regional Water Quality Control Board (Regional

Board) that has yet to be reviewed and accepted by the Regional Board. Poseidon provided the study in a letter to Coastal Commission staff dated June 1, 2007. In contrast to Poseidon's characterization in footnote 15 (page 22), the Flow, Entrainment and Impingement Minimization Plan has not been subjected to public comment or review and is not part of the EIR. If the study is to be considered as part of the Coastal Commission review process, it must be made available to the public for comment and review as required by Pub. Res. Code Section 21080.5(d)(3)(A) and (B).

In addition, the marine impacts Poseidon presents are not the only impacts of the stand-alone facility. If Encina no longer operates, or reduces flow, Poseidon will be responsible for most, if not all of the maintenance of the intake. Heat treatments are currently conducted by Encina every five weeks. (Proposal for Information Collection Clean Water Act 316(b), p. 2-9) The heat treatments are required because without these treatments, organic matter would grow along the intakes at the rate of 1000yd^3 in six months. Id. These heat treatments kill a vast amount of marine life by heating the discharge water to 105 degrees Fahrenheit in a process that takes six hours from heating to cooling. Id. Poseidon fails to include the amount of marine life killed in such routine maintenance operations in the EIR. In the Minimization Plan, Poseidon provides such data. The reported loss of fishes, sharks, and rays impinged during normal operations at Encina from June 2004 to June 2005 was 19,408 samples weighing 351,672 grams. (Minimization Plan, p. 19-21). In contrast, the amount of loss attributed to heat treatments is 94,991 samples weighing 2,034,900 grams. The marine life lost during these routine heat treatments is almost five times the number and six times the mass of that lost during normal operations. These significant adverse impacts were not analyzed in the EIR because the heat treatments were not associated with Poseidon since the power plant performed the routine maintenance of the intakes. Once the power plant is shutdown, Poseidon will be responsible for these heat treatments and for the resulting fish-kills. The impacts associated with these treatments have not been presented for public comment and review and have not been analyzed whatsoever, resulting in a complete lack of avoidance or mitigation measures. A subsequent or supplemental EIR should be completed to remedy this omission in light of the certainty of the stand-alone scenario. Public Resources Code Section 15162(a).

Entrainment Study (p. 11 #23)

The survival rates of entrained phytoplankton and zooplankton from studies at Huntington Beach Generating Station and Ormond Beach Generating Station that show the vast majority of entrained organisms return to the discharge channel unaffected are based on studies that: were not incorporated into the Carlsbad EIR; have not been made available to the public for comment and review; and are not based on discharge in concentrated brine from desalination plants. Once cannot be sure if entrainment deaths would be due to brine or intake processing - i.e. whether the animals make it through alive to the discharge point.

Commercial and Recreational Fishing Impact (p. 12 #26)

Poseidon states that less than 1 percent of entrained organisms have recreational and commercial value and thus the ecological impact resulting from entrainment is insignificant. This assertion is unsubstantiated because 1 percent of entrained organisms may constitute a large number, and should be viewed in context. Survival of the populations from which entrained organisms are taken does not ensure that the species' position in the food web will be protected. No assessment is made of the role of entrained larvae as prey for other species at various stage of its life. Again, this figure is pulled from the Minimization Plan that was not included in the EIR and has not been the subject of public comment and review.

Entrainment of large species (p. 14 #32)

Poseidon states that it has documented the velocity during stand-alone operation and that the velocity of the water at the entrance to the bar racks is at or below 0.5 feet per second (fps), and therefore the proposed operation would be consistent with what the U.S. EPA considers to be "best available technology" for cooling water intakes. Therefore, according to Poseidon, the impingement impacts and the potential for an incidental take associated with the stand-alone operation are less than significant.

The velocity documented by Poseidon is simply an assertion added to the Carlsbad EIR at the close of the comment period in response to comments on the day of the certification. Further, the velocity quoted by staff is more accurate than the Poseidon velocity. As stated by Encina Power Station (EPS) in its Proposal for Information Collection dated April 1, 2006, the approach velocity at pump 4 is 1.6 fps and the through-screen velocity is 2.9 fps. (Proposal for Information Collection Clean Water Act 316(b), p. 2-8 Table 2-1) Therefore, not only is the velocity cited by Poseidon inaccurate, any impingement analysis using this figure is inaccurate.

The actual impingement impacts to marine life, including the endangered sea turtles, will be much greater than opined by Poseidon, resulting in significant adverse environmental impacts that have thus far been ignored in the environmental review process.

Alternative Intake Structures (p. 19-20 #34)

Despite Poseidon's assertion that staff's belief of the superiority of the subsurface technologies is not substantiated, evidence in the record suggests otherwise. The open-ocean intake structure for a stand-alone desalination facility that has allegedly been the subject of the "comprehensive" study is not in the EIR and has not been subject to public comment and review. Furthermore, the assertion that subsurface intakes are not Best Technology Available (BTA) is wholly inconsistent with the court decision in *Riverkeeper II*. As of yet, no court decisions have invalidated the use of

subsurface intakes as inconsistent with BTA; the same cannot be said of open-ocean intakes. Though it may be true that subsurface intakes are not recognized as BTA under EPA 316(b) regulations, courts have stated that open-ocean intakes definitely *are not* BTA.

Feasibility of Minimization Procedures (p. 21-22 #36)

The Revised Flow, Entrainment and Impingement Minimization Plan submitted to the Regional Board in June 2007 is not subject to public review as the Regional Board is not currently taking comments on the revised plan and is not currently set to hold a public hearing on the Minimization Plan prior to approval. Poseidon's assertion (footnote 15) is completely unsubstantiated. In fact, the Regional Board website gives no indication that the plan is even being considered as the last correspondence posted from the Regional Board to Poseidon indicates that the Regional Board was delaying evaluation until June 2008. While we believe a subsequent letter was transmitted purporting to withdraw the Regional Board's assertion of deferred consideration, there still is no indication what process is being undertaken by the Board to reach a decision on the plan. At this point, any movement by the Regional Board in reviewing or accepting comments on the review of the Minimization Plan is wholly absent from the public arena.
(http://www.waterboards.ca.gov/sandiego/misc/desalination/desalination.html)

Further, any reliance upon this plan for alternatives analysis is inconsistent with CEQA or Coastal Commission environmental review because the Minimization Plan: has not been made available for public comment; was not included in the Carlsbad EIR; and does not contain adequate analysis of alternative intakes.

Salinity Discharges (p. 32-35 #43, #44)

The 19-day salinity study conducted by Poseidon is inconclusive at best. The purple sea urchin test species contained one mortality at each salinity level, thus the study concludes that the adjusted survival rate was also 100 percent. The elapsed time to the first mortality in the purple sea urchin group increased as salinity increased, which "is counterintuitive and indicates that salinity is not a factor causing sea urchin mortality in the tested salinity range." (Salinity Tolerance Investigations: A Supplemental Report for the Carlsbad, CA. Desalination Project, p. 6) The fact that salinity increased and the sea urchins still died does not mean that salinity is not a factor. This "counterintuitive" result signals at best an inconclusive result and should at least be repeated. The fact that one mortality occurred also gives no indication as to the survival rate as a percentage of the total population and also gives no indicia of reliability.

Furthermore, the study states that "species living within the ZID will show no effect at the proposed normal operating condition and will also tolerate salinities at or below 40 ppt." (Salinity Tolerance Investigation, p. 6) It is clear that the study did not anticipate

"normal operating condition" to mean a stand-alone facility as the 40 ppt was the extreme condition and maximum endpoint of the study. Reliance on a study that considered the stand-alone scenario as an extreme condition in a cursory manner does not satisfy the requirement of thorough investigation and runs counter to scientific method.

In addition, Poseidon's supplemental whole effluent toxicity (WET) test of chronic toxicity and a separate acute toxicity test were completed after the EIR was certified and were not available for public comment and review. Poseidon's response makes mere mention of the studies and provides no supplemental or supporting data or documentation.

Poseidon asserts that "results of the [Salinity Tolerance Investigation] and other studies formed the basis for the 40 ppt maximum salinity discharge limit established by the Regional Board [NPDES permit] (Order R9-2006-0065)." However, the NPDES permit was granted subject to review and acceptance of the Minimization Plan and before the Regional Board or the public knew that Encina was moving to dry-cooling. All of the studies performed by Poseidon before the NPDES permit was granted relied on a fully operational EPS scenario and did not consider a stand-alone option as reality or the norm. Therefore, the Regional Board's reliance on the studies is no longer a valid basis for attributing to them the credibility of studies reflecting the current situation. The studies subsequently undertaken by Poseidon have not been accepted by the Regional Board and should not be accepted as part of the EIR or CEQA review process until they have been made available for public comment and review.

Adverse Near-Shore Impacts (p. 38-39 #49)

Poseidon opines that in "issuing [the NPDES permit], the Regional Board adopted a finding that the permit will be fully protective of all beneficial uses applicable to the Pacific Ocean in the vicinity of the discharge including marine habitat," and this determination was "based on the muti-year, multi-disciplinary studies." Contrary to Poseidon's assertions, the NPDES permit was issued before the stand-alone scenario was considered and relied on studies that are no longer valid. The studies that address the current stand-alone situation have not been peer-review, have not been open to public comment, and are not part of the EIR.

Lagoon Stewardship (p. 41-42 #52)

As we have seen from the beginning of this process, Poseidon consistently changes its position to achieve the most favorable outcome. In preparing the EIR, Poseidon stated that the stand-alone facility was mere speculation, and therefore only addressed in a cursory fashion in response to comments. However, it now asserts that the "seawater cooled power plant is expected to be decommissioned in the coming years, leaving the lagoon without an entity responsible for its long-term maintenance." (p. 42) In its

response to the staff report (p.2), Poseidon asserts that the two operating units that are not moving to dry-cooling will remain in service indefinitely. Poseidon eagerly presents the scenario of Encina moving to dry-cooling and completely shutting down when discussing the need for a lagoon steward. However, when it comes to discussing the project setting, Poseidon views Encina as being in service indefinitely. Similarly, for purposes of the original EIR, Poseidon vigorously denied that Encina was shutting down to ensure that the EIR did not fully address the now more than reasonably foreseeable shutdown of Encina and Poseidon as a stand-alone facility.

Agua Hedionda Lagoon Sedimentation (p. 43 #53)

As mentioned above, the 303(d) listing for Agua Hedionda Lagoon for sediment is not only for urban runoff. The technical report prepared by Tetra Tech for the TMDL process identified the data gaps missing from its analysis. One of these missing data sets was in-lagoon sediment information. The urban runoff from cities in the area is a contributing factor, but this does not disprove that the sediment problem in the lagoon could also be caused by the intake for Encina. The mere fact that dredging is required supports the contention that sedimentation from unnatural inflow to the lagoon contributes to the 303(d) listing.

Lagoon Dredging Conditions (p. 46 #58)

The purpose of CEQA is to review the environmental impacts of a project. A piecemeal approach prohibits adequate analysis of all the impacts associated with the proposed project. *See Laurel Heights Improvement Association v. Regents of the University of California*, 47 Cal. 3d. 376 (1988); *Del Mar Terrace Conservancy, Inc. v. City Council of the City of San Diego*, 10 Cal. App. 4th 712 (1992).

Poseidon suggests that any future dredging conducted will be conditioned upon future approval of a separate CDP. This fragmentation obscures the true environmental impacts of the entire project. Further, Poseidon specifically relies on the ability to undertake the dredging of the lagoon for its lagoon stewardship. Poseidon cannot first claim that Encina is not shutting down for purposes of the EIR, then claim that Encina is shutting down in order to prove the need for a new lagoon steward.

Similarly, Poseidon cannot rely upon the ability to dredge the lagoon in order to execute its stewardship and at the same time condition its project approval upon future issuance of the CDP for dredging. Such an argument is all too familiar. In the Carlsbad EIR, Poseidon argued that it is "reasonably foreseeable" that Encina will continue to operate and that if the desalination plant were [sic] to operate independently, Poseidon "would have to obtain new permits and undergo new CEQA compliance." (Additional Response to Comments on the Final EIR, June 13, 2006, p. 2) However, now that the stand-alone desalination plant is reasonably foreseeable and a supplemental or subsequent EIR should be conducted, Poseidon argues that the Encina shutdown is not new

information.

Carbon Emissions (p. 46-48 #59)

Poseidon claims that its emissions should be based on the SDGE emission factor because it plans to receive electricity from SDGE. No contract or source of reliability for this expectation has been provided by Poseidon; therefore it is completely appropriate for the Commission staff to rely on the California average rate of 804.54 lbs Co2 per MWh.

Offshore Intake Alternative (p. 44-45 #56)

Poseidon asserts that an offshore intake is not a viable alternative. Some of the reasons given for the inadequacy of this alternative are:

> Intake flows of 304 mgd for the stand alone desalination plant would produce flow velocities of only 0.66 ft/sec in the pipeline. These flows are insufficient to prevent the pipeline from developing a sand plug. Also, the DEIR gives no consideration to bio-fouling of the pipeline and the impacts associated with the repeated loss of marine life that would be routinely killed during de-fouling maintenance cycles of the pipeline. A stand-alone desalination plant would not have the option to de-foul the pipeline by heat-treatment, leaving chlorination as the only viable option, with all its associated polluting impacts, none of which are considered in the DEIR. (p. 44-45)

Without addressing the truth of Poseidon's assertions, it is clear that Poseidon's analysis proves the inadequacy of its own operation and intake. If a velocity of .66 ft/sec cannot prevent a sand plug, then Poseidon's asserted intake velocity of .5 ft/sec is insufficient as well. Further, Poseidon admits in this analysis that it plans to continue heat treatments that will result in the above-mentioned devastating fish-kills. While Poseidon purports to have studied alternative intake viability, its disclosures to the public have provided virtually no opportunity to test its study methodology and assumptions. This is particularly notable due to the fact that no post-EIR studies have been made available at all.

Carbon Emission Offsets (p. 52 #71)

Greenhouse gas (GHG) emissions from the production of desalinated product water should not be offset against the emissions from current water supplies. First, the goal of AB 32, the Global Warming Solutions Act is to reduce emissions to 1990 levels by 2020. This project would produce water in a more energy intensive manner than the currently most energy intensive method, water transport. This project would use technology that causes more emissions than our current supply. From a policy standpoint, this runs counter to the goals of AB 32 to reduce emissions. San Diego's

water supply should be less energy intensive, not more.

Poseidon claims that its product water replaces water that would otherwise have to be pumped into the region through either the State Water Project or the Colorado River Aqueduct. (p. 52) Thus, its Climate Action Plan only offsets emissions above and beyond current emissions. If California is to meet the goal of AB 32 in reducing overall emissions, simply offsetting an increase in emissions will not suffice. Moreover, the water provided by Poseidon is not replacement water. Contrary to the assertions of Poseidon and water agency partners, it is clear that this water is a supplement to current water supplies. Testimony from elected officials and community leaders at the State Lands Commission meeting on October 30, 2007 reflected the view that the desalinated water would help San Diego grow. The desalinated water is needed to enable future growth and will not be used as an offset.

In anticipation of the fact that the subscribing cities will use the delivered desalinated water as a supplement to their existing water supply, Poseidon states:

> If the replaced water is pumped into the region for other uses, then the associated carbon emissions from such pumping should be and is the responsibility of the proponents of those other uses. Any other result would be an unfair and unwarranted "double counting" of carbon emissions, requiring Poseidon to offset emissions caused by other activities not associated with its own operations. (p. 52)

Poseidon's definition of double counting is, in reality, single counting. Poseidon is making new water. All emissions from making this water should be offset. Once the water is delivered to a region, Poseidon knows that it will be added to the existing water supply and Poseidon, along with the water agencies and cities, will have no further responsibility to offset remaining emissions. If Poseidon wishes to place the burden of offsetting emissions it creates in producing water, it should reflect this burden in its price of water. Otherwise, shifting the burden to the costumer will be completely unregulated and in all likelihood, completely infeasible. Poseidon is taking a "hands-off" approach with respect to the ultimate use of its water. If Poseidon cannot ensure that its water will be used as replacement water, it is unreasonable to allow Poseidon to take emission offsets for that use.

Poseidon's approach to the end-use of its desalinated water is yet another example of the piecemeal approach to environmental impacts Poseidon encourages. All impacts associated with this project should be attributed to this project. Delaying the assessment of reasonably foreseeable environmental impacts and mitigation measures runs counter to the purpose of CEQA. *Laurel Heights Improvement Association v. Regents of the University of California*, 47 Cal. 3d. 376 (1988)(Laurel Heights I)

Significant Adverse Impacts (p. 55 #77)

Poseidon asserts "[n]o evidence was presented to the City that standalone operations would result in any adverse impacts, and the City's consultants did not find any such adverse impacts." (p. 55) No evidence of adverse impacts associated with stand-alone operations was admitted into the record before the City of Carlsbad and no evidence was incorporated into the final EIR. However, the stand-alone scenario was not analyzed in the EIR and was simply addressed on the day of the certification of the EIR in a response to comments document. (Additional Response to Comments on the Final EIR, June 13, 2006) To state that no evidence was provided to Carlsbad does not prove that there are not, in actuality, adverse environmental impacts associated with the project. The hasty inclusion of the Additional Response to Comments documents did not address Commission staff's concerns about the project, and therefore, staff is correct in stating that more information and analysis is needed. (Staff Report, p. 80) As also noted by staff, in preparing the EIR Carlsbad regarded the stand-alone scenario as "speculative" and therefore did no fully analyze the environmental impacts of the desalination plant as a stand-alone facility. (Staff Report, p. 79) Further, the record is replete with California Energy Commission documents identifying the widespread destruction of marine life attributable to once-through cooling, as well as the significance attached to such mortality. Poseidon's site-specific analysis was conducted in the same manner as other 316(b) studies, and is insufficient to overcome the BTA requirements of the California Water Code as interpreted consistent with *Riverkeeper II.*

Poseidon attempts to address the numerous significant environmental impacts of the stand-alone facility through documents introduced to the Coastal Commission staff after the certification of the EIR and not subject to public review and comment. This includes, among other things: salinity and toxicity; sedimentation; marine impacts; GHG emissions and energy impacts; intake alternatives; dredging impacts; and construction impacts.

The public comment and review component of CEQA is of the utmost importance in environmental review. The public holds a "privileged position" in the CEQA process. *Concerned Citizens of Costa Mesa, Inc. v. 32nd District Agricultural Association*, 42 Cal. 3d. 929, 936 (1986). The California Supreme Court has stated that CEQA procedures should be "scrupulously followed" so "the public will know the basis on which its responsible officials either approve or reject environmentally significant action" and will "respond accordingly to action with which it disagrees." *Laurel Heights I*, 47 Cal. 3d. 376, 392. Poseidon's attempt at circumventing both the purpose and the process of CEQA review should be addressed through a supplemental or subsequent EIR. If the environmental impacts of the project are truly not significant, the public should, at the least, be afforded the ability to assess and comment openly on the information.

4. Conclusion

Given the foregoing, Surfrider and Coastkeeper strongly urge the Commission not to approve the CDP and project at its November 15, 2007 hearing. Instead, the Commission should either deny the project as proposed by its staff, or defer approval until such time as the public and staff have sufficient opportunity to review recent documents submitted by Poseidon. These include, but are not limited to:

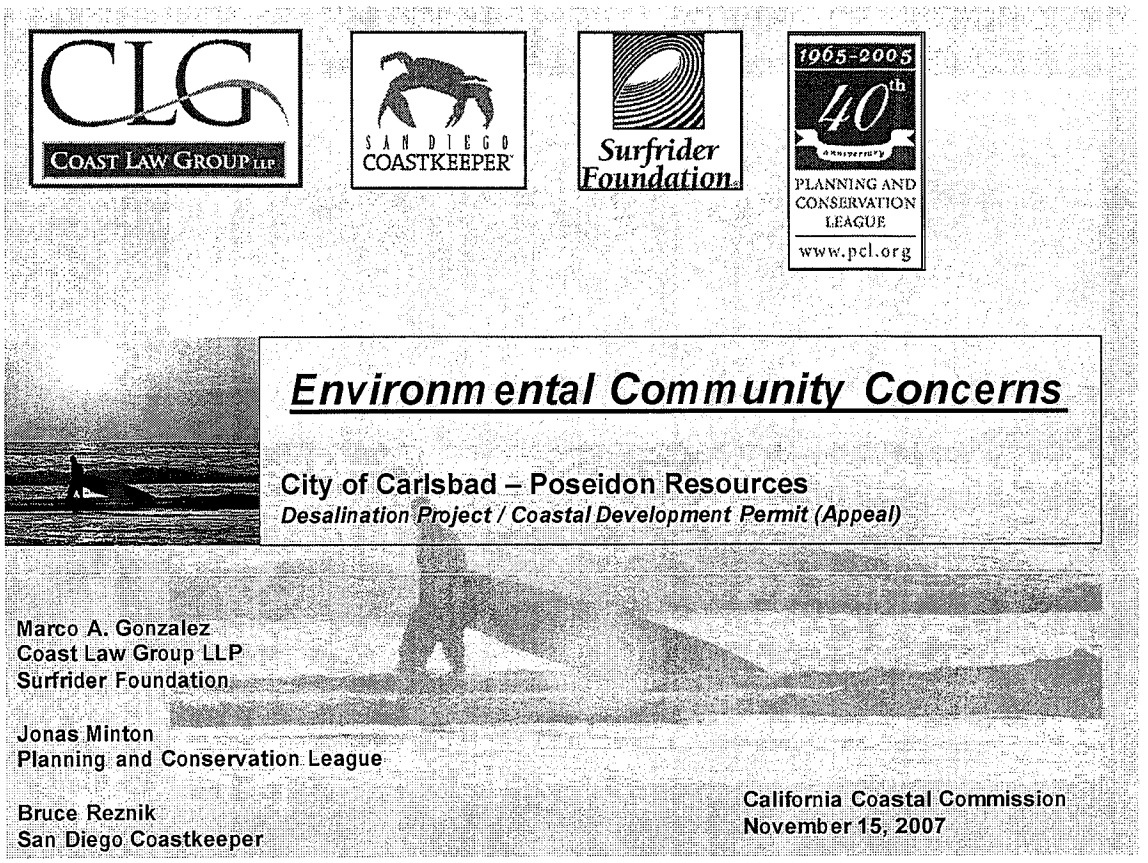
Sep. 28, 2007:	Comparative Analysis of Intake Flow Rate on Sand Influx Rates at Agua Hedionda Lagoon: Low-Flow vs. No-Flow Alternatives
Oct. 8, 2007:	Additional Analysis of Submerged Intake Gallery
Oct. 8. 2007:	Analysis of Offshore Intakes
Oct. 8, 2007:	Issues Related to the Use of the Agua Hedionda Inlet Jetty Extension EIR to Recommend An Alternative Seawater Intake for the Carlsbad Desalination Project
Oct. 9, 2007:	Coastal Habitat Restoration and Enhancement Plan
Oct. 9, 2007:	Updated Response to Coastal commission's September 28, 2007 Request for Additional Information
Oct. 17, 2007:	Intake Cost Estimates
Oct. 18, 2007:	Climate Action Registry CO2 Conversion Calculation
Oct. 21, 2007:	Updated Response to Coastal Commission's September 28, 2006 Request for Additional Information
Oct. 22, 2007:	GHG Emission Baseline Protocol
Nov., 2007:	Carlsbad Desalination Project Briefing Package, CDP Application No. E-06-013
Nov. 7, 2007:	Transmittal of Garibaldi Study and Coastal Development Permit for Southern California Edison and San Dieguito River Valley Joint Powers Authority San Dieguito Wetland Restoration Plan
Nov. 8, 2007:	Letter to State Lands Commission Executive Director re: Desalination Project's Impact on Imported Water Use

Sincerely,

COAST LAW GROUP LLP

Marco Gonzalez

Marco A. Gonzalez


CLG
COAST LAW GROUP LLP
SAN DIEGO COASTKEEPER
Surfrider Foundation
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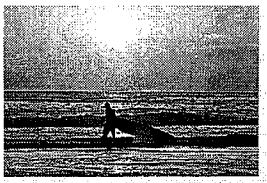
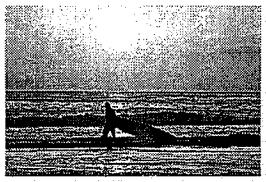
40th
PLANNING AND CONSERVATION LEAGUE
www.pcl.org
Environmental Community Concerns
City of Carlsbad – Poseidon Resources
Desalination Project / Coastal Development Permit (Appeal)
Marco A. Gonzalez
Coast Law Group LLP
Surfrider Foundation
Jonas Minton
Planning and Conservation League
Bruce Reznik
San Diego Coastkeeper
California Coastal Commission
November 15, 2007



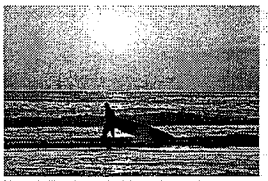
Overview

- Procedural Issues
- Entrainment Impacts
- Sedimentation Impacts
- Alternative Intakes
- Conservation/Rec ycling
- Conclusion



Themes

- Poseidon has been less than up-front with Commissioners, staff, and public.
- Project is a giant step backwards with respect to marine life protection.
- Coastal Act empowers and requires CCC to consider project specific and statewide implications of approval.
  - In other words, Staff got it right.

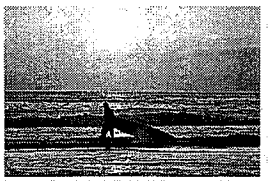


Timing: Documents and Approvals

Procedural Irregularities

- **When is an application complete?**
  - How about when all of the information is submitted?
  - Hundreds of pages of letters, new studies, new mitigation commitments all given to staff in the last 30-60 days, some within last week.
  - Public given access to some on website yesterday afternoon.

- **Why require completion of other agency processes?**
  - Certainty of conditions before consideration by CCC
  - Overlap in agency responsibilities



Water Boards

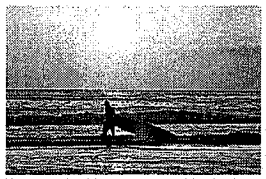
Discharge (NPDES) Permit: **Completed**

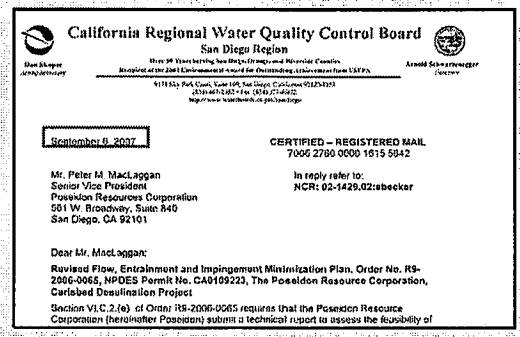
- Responsible Agency: Regional Water Quality Control Board
- NPDES: Approved August 16, 2006
- SWRCB Dismissal of Appeal June 2007

Poseidon Briefing Book, November, 2007

"The Regional Board... is currently reviewing the Project's intake-related impacts pursuant to the federal Clean Water Act and California's Porter-Cologne Act. **The Coastal Commission may not take any action in conflict with the Regional Board's ongoing jurisdiction over the project."**

Poseidon Response to Staff Report, Exhibit A, pp. 8-9,





California Regional Water Quality Control Board
San Diego Region

September 6, 2007

CERTIFIED – REGISTERED MAIL
7006 2760 0000 1615 5842

Mr. Peter M. MacLaggan
Senior Vice President
Poseidon Resources Corporation
501 W. Broadway, Suite 840
San Diego, CA 92101

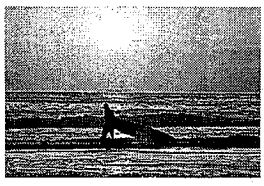
In reply refer to:
NCR: 02-1429.02:sbecker

Dear Mr. MacLaggan:

Revised Flow, Entrainment and Impingement Minimization Plan, Order No. R9-2006-0065, NPDES Permit No. CA0109223, The Poseidon Resource Corporation, Carlsbad Desalination Project

Section VI.C.2.(e) of Order R9-2006-0065 requires that the Poseidon Resource Corporation (hereinafter Poseidon) submit a technical report to assess the feasibility of

c. The State Water Resources Control Board is developing guidance to the Regional Boards on the BTA requirements for ocean intake structures to reduce impingement and entrainment of marine life. It is my understanding that the SWRCB intends to develop a once-through cooling water policy, for compliance with the Clean Water Act Section 316(b), by June 2008. The Regional Board anticipates using the SWRCB guidance to evaluate technology based requirements needed for the intake structure that provides ocean water for both EPS and CDP operational requirements.



Letter rescinds 9/06 deferral, but DOES NOT APPROVE Poseidon's plan.

Timeline for consideration not known.

No "determination" made under §30412.

California Regional Water Quality Control Board
San Diego Region

Over 50 Years Serving San Diego, Orange, and Riverside Counties
Recipient of the 2004 Environmental Award for Outstanding Achievement from USEPA

9174 Sky Park Court, Suite 100, San Diego, California 92123-4353
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http://www.waterboards.ca.gov/sandiego

September 20, 2007

CERTIFIED MAIL
7099 3400 0018 9997 1122
In reply refer to:
NCRU: 02-1429.02:obecker

Mr. Peter M. MacLaggan
Senior Vice President
Poseidon Resources Corporation
501 W. Broadway, Suite 840
San Diego, CA 92101

Dear Mr. MacLaggan:

Revised Flow, Entrainment and Impingement Minimization Plan, Order No. R9-2006-0065, NPDES Permit No. CA0109223, The Poseidon Resource Corporation, Carlsbad Desalination Project

In a letter dated September 6, 2007, I indicated that I am deferring determination of the Revised Flow, Entrainment and Impingement Minimization Plan (Plan) based on reduction of intake flows at Encina Power Station (EPS), removal of key Federal 316(b) regulation, and pending State Water Resources Control Board guidance on the Best Technology Available (BTA) requirements for ocean intake structures to reduce impingement and entrainment of marine life. In a letter dated September 18, 2007, Poseidon Resource Corporation (Poseidon) requested that I rescind the letter. Upon further consideration of your September 18, 2007 letter, I concur with the information provided to support your request and, therefore, hereby rescind my September 6, 2007 letter.

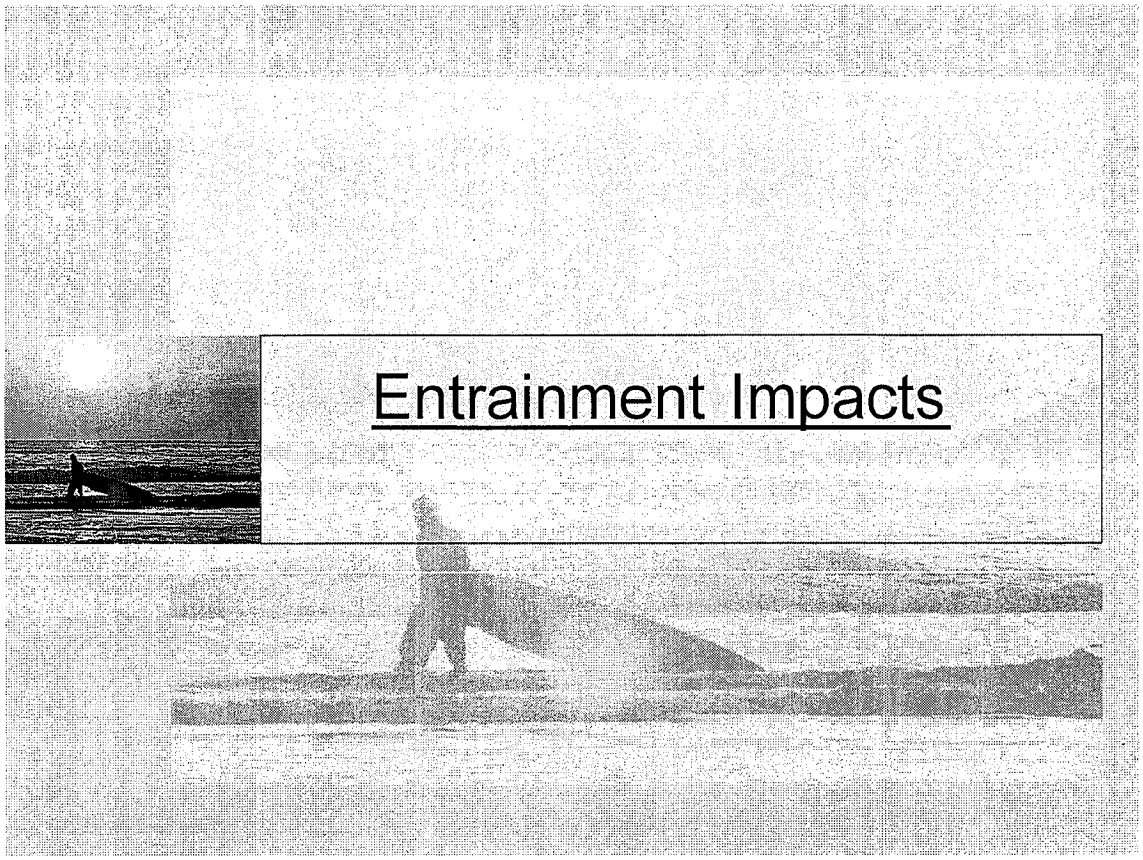
The heading portion of this letter includes a Regional Board code number noted after "In reply refer to:" In order to assist us in the processing of your correspondence please include this code number in the heading or subject line portion of all correspondence and reports to the Regional Board pertaining to this matter.

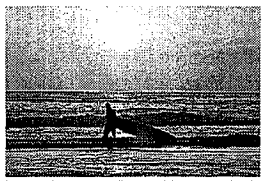
If you have any questions regarding the above, please contact Mr. Eric Becker at (858) 492-1785, or at EBecker@waterboards.ca.gov

Respectfully,

/John H. Robertus
Executive Officer

California Environmental Protection Agency
Recycled Paper


Entrainment Impacts



- The EIR extensively analyzed the project's marine impacts as both a co-located facility with the Encina Power Station and as a stand-alone facility without the operation of the power plant, including potential impingement-, entrainment-, and discharge-related impacts.

Poseidon Briefing Book, November, 2007

If their EIR analysis was so extensive, why wasn't it good enough for the Regional Board to sign off on Poseidon's entrainment impacts?

CALIFORNIA
ENERGY
COMMISSION

2007 ENVIRONMENTAL PERFORMANCE REPORT OF CALIFORNIA'S ELECTRICAL GENERATION SYSTEM

Prepared in Support of the 2007 *Integrated Energy Policy Report*
Proceeding (06-IEP-1)

DRAFT STAFF REPORT

NOVEMBER 2007
CEC-700-2007-010-SD

Arnold Schwarzenegger, *Governor*

State Water Resources Control Board indicates that actual water flows through the once-through cooling systems declined from 13.5 BGD in 2001 to 9.4 BGD in 2005.[15]

Impacts are classified as "entrainment," where microscopic level organisms are drawn through cooling water intakes and killed as they are cycled through the plant, "impingement," where larger organisms such as fish and marine mammals are pinned against the intake screens and killed, and "thermal impacts," which describes impacts to ecosystems when the warmed water is discharged back to the cooler source water.

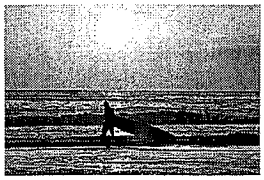
Near-shore marine and estuarine waters are nutrient rich, highly productive ecosystems. These waters provide habitat for innumerable phytoplankton, zooplankton, and invertebrates, as well as the eggs and larval stages for near-shore and off-shore fish, shellfish, crabs and lobsters, and the spores for critical aquatic plant species like kelp. These ecosystems form a critical part of the marine food web for the larger fish and marine mammal species. When near-shore waters are cycled through power plants for cooling, essentially all of the marine organisms are killed. This high mortality impact to the base of the food web is now understood to contribute to the significant declines in near-shore and open ocean fish stocks.

Two influential reports on the state of the oceans produced by the Pew Commission on Oceans[16] in 2003 and the U.S. Commission on Ocean Policy[17] in 2004 documented that the other contributing factors to the alarming declines in ocean ecosystem health included over-fishing, non-point source pollution from urban and agricultural areas, sewage contamination, and exotic species infestations of localized ecosystems.

Three primary types of near-shore and estuarine habitats are affected by once-through cooling systems: bays and estuaries, open coast sand and rock, and open coast sand and harbor. In bays such as Santa Monica, Monterey, and San Diego and estuaries like the San Francisco Bay-Delta and Elkhorn Slough, the impacts from entrainment and impingement can be even more pronounced due to the high biological productivity of these ecosystems and the concentration of multiple power plants using once-through cooling. In Santa Monica Bay for example, the three large power plants using once-through cooling – Scattergood, El Segundo, and Redondo – cycle 13 percent of the bay's near-shore waters every six weeks.[18] Eleven of the 19 coastal power plants using once-through cooling are located on the shores of bays or estuaries.

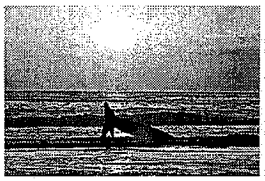
The San Francisco Bay-Delta estuary is the largest estuary on the West Coast of the Americas. Two old power plants on the shore of this estuary that continue to use once-through cooling – Pittsburg and Contra Costa – entrain and impinge endangered species such as the Delta smelt and Chinook

[15] Adam Lapuz, Water Quality Engineer, State Water Resources Control Board, Personal Communication, July 18, 2007. The actual correlations between power production and once-through cooling throughput levels are not well understood because the water use rate (gallons per MWh of production) varies widely within the coastal fleet and because many power plants operate their pumps during periods on non-power production. The forthcoming study by the State Water Board's Ocean Unit should help provide additional data and insight into these correlations.
[16] *America's Living Oceans: Charting a Course for Sea Change, A Report to the Nation*, Pew Oceans Commission, Leon Panetta, Chair, May 2003
[17] *Preliminary Report of the U.S. Commission on Ocean Policy*, A Report to Congress, April 2004.
[18] *Issues and Environmental Impacts Associated with Once-Through Cooling at California's Coastal Power Plants*



marine food web for the larger fish and marine mammal species. When near-shore waters are cycled through power plants for cooling, essentially all of the marine organisms are killed. This high mortality impact to the base of the food web is now understood to contribute to the significant declines in near-shore and open ocean fish stocks.

Official Position of the California Energy Commission, 11/07



How then, can Poseidon stand before the Coastal Commission and claim no significant entrainment impact?

Study Methodology

ELSEVIER

Environmental Science & Policy 3 (2000) S445–S449

Environmental Science & Policy

www.elsevier.com/locate/envsci

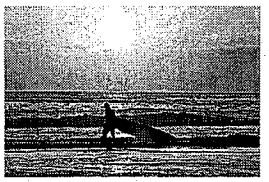
Surplus production, compensation, and impact assessments of power plants

John Boreman*

National Marine Fisheries Service, Northeast Fisheries Science Center, 166 Water Street, Woods Hole, MA 02543, USA

Abstract

For over 60 years, fishery scientists have been using the argument that nature creates surplus, and that the surplus can be used as justification to impose anthropogenic sources of mortality (power plants, fishing, pollution, etc.) on fish populations; otherwise, it is wasted. Surplus production is closely tied to the concept of compensation, a form of density-dependent mortality in which the mortality rate of a cohort is directly related to abundance of that cohort. Scientific arguments have been put forth in assessments of power plant impacts that compensation can, or least partially, offset increases imposed by power plants

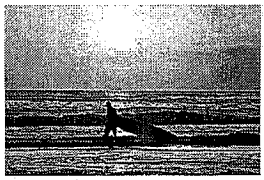


3.3. Nature does not waste

The term surplus production implies that the production will be wasted if it is not used. Production of a species that is vulnerable to anthropogenic sources of mortality risk (power plants, fisheries, pollution, etc.) should not be taken out of the context of the ecosystem in which the species resides. Within an ecosystem context, the species is important as feeder and as a source of nutrition, either while it is still alive or in a decomposing condition (Fig. 4). Removal of a member of the species from the ecosystem will ultimately result in less resource consumption (predation forgone) and less contribution to overall ecosystem production (production forgone). If a 'surplus' is being removed by power plant operations, then something else in the ecosystem is being out-competed. Use of 'surplus' production is essentially an allocation issue among competitors for that resource. Do we use it for supporting fisheries, for allowing the population to hedge against bad times, for providing extra sustenance for natural predators, or for supporting other uses of the resource?

system in which the species resides. Within an ecosystem context, the species is important as feeder and as a source of nutrition, either while it is still alive or in a decomposing condition (Fig. 4). Removal of a member

As you remove individuals from the food web, you must consider the impacts both on the entrained species, as well as those it eats, and that eat it.



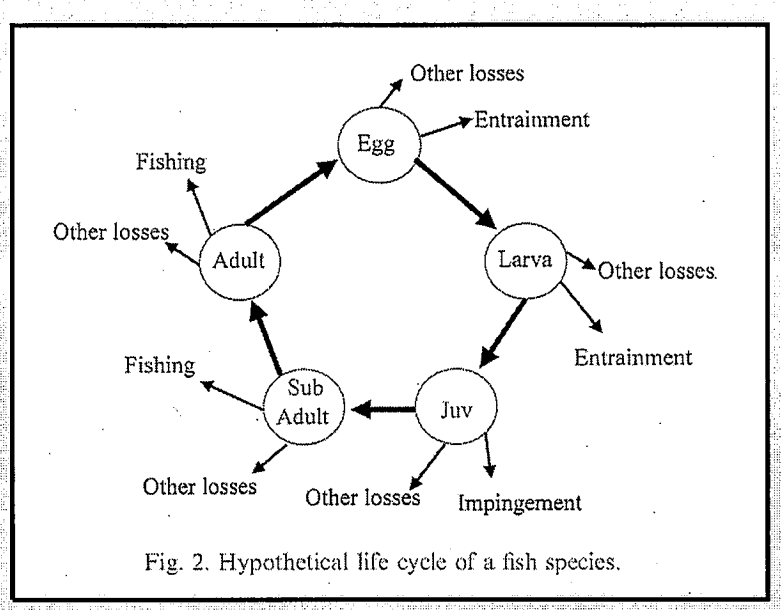
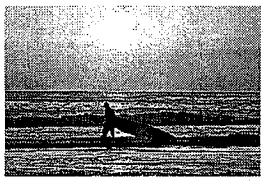


Fig. 2. Hypothetical life cycle of a fish species.



This says it all.

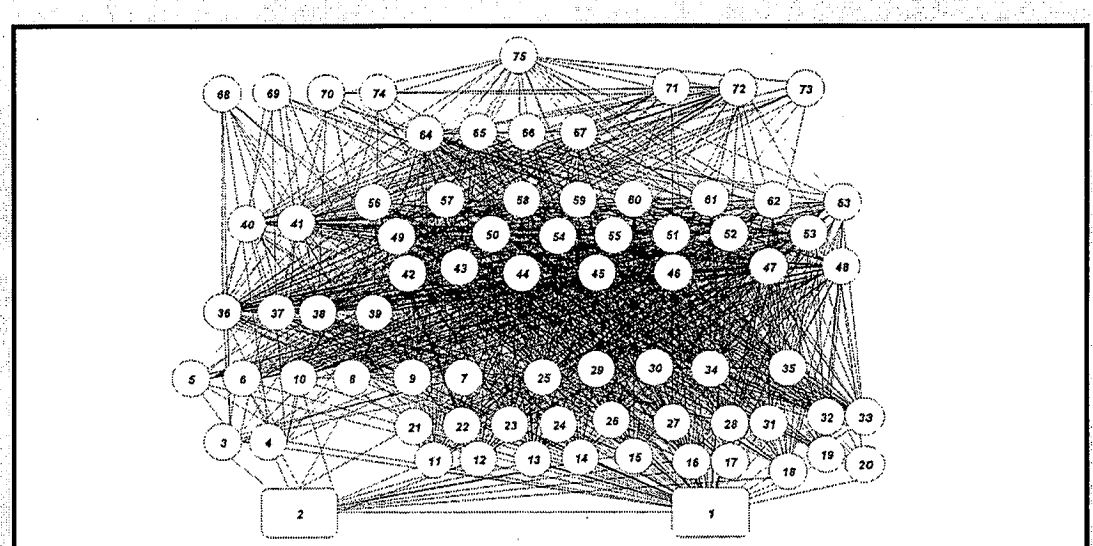
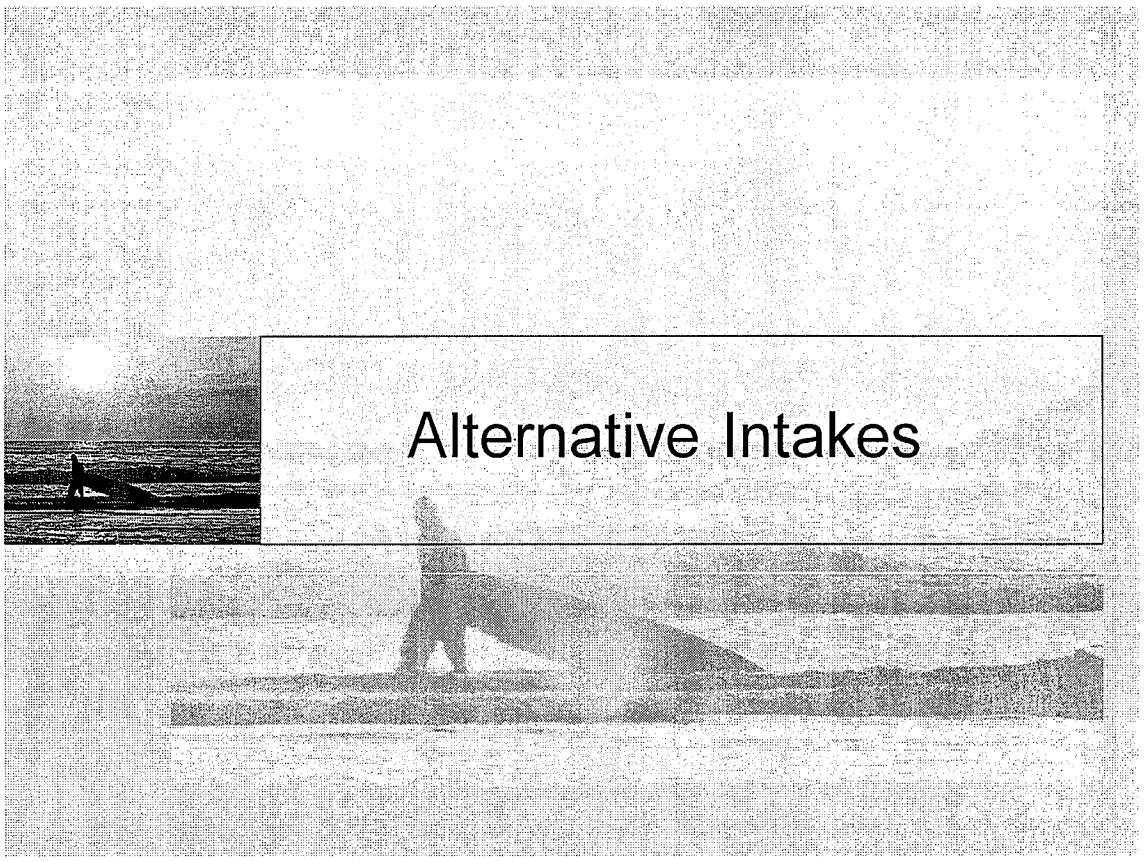
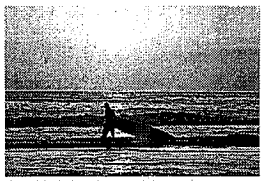


Fig. 4. Links within the northwest Atlantic food web, where #1 is detritus, #2 is phytoplankton, and #75 is humans (Link, 1999).


Alternative Intakes

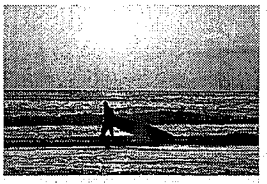
Poseidon's Arguments Re: Alternative Intakes

- EIR sufficiently addressed the issue.
- Regional Board has primary jurisdiction.
- CWA 316(b) regulations don't apply.
- Open ocean intake is "Best Technology Available"



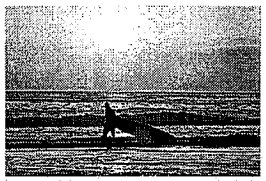
EIR Alternative Intake Failures

- Contemplated stand-alone facility would be studied as an entirely new project
- Cursory review given to alternatives due to speculative nature of power plant shut down of intake
- The "weight of the evidence" test



316(b) Regulations Don't Apply
Desalinatio n ≠ Power Plant

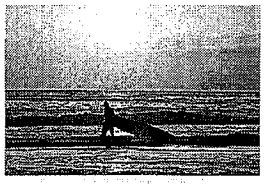
- Federal Clean Water Act
  - Section 316(b) regulates cooling water intake.
  - Section 303 empowers states to set standards and assume role of federal EPA, so long as they are as stringent as CWA.
  - SWRCB/RWQCB administer requirements of CWA via California Porter Cologne Water Quality Control Act (Water Code).



Riverkeeper v. U.S. EPA

475 F.3d 83 (2d Cir. 2007) – Riverkeeper II

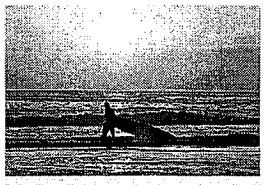
- CWA § 316(b) requires Best Technology Available (BTA) for minimizing adverse environmental impacts.
- Court Found:
  - Closed-cycle cooling is BTA ("Technology Forcing")
  - No cost-benefit analysis allowed, No "range of impacts" considered by CWA (e.g. x% of mortality allowed if $$)
  - "Restorative Measures" (compensatory mitigation)
  - Once-Through Cooling NO LONGER ALLOWED



***Porter-Cologne* & Riverkeeper**

- Cal. Water Code § 13142.5(b)

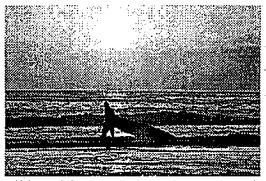
  For each ... industrial installation using seawater for ... industrial processing, **the best available site, design, technology, and mitigation measures feasible** shall be used to minimize the intake and mortality of all forms of marine life.



What Does "Minimize" Mean?

- First, Court said "Restoration Measures" not part of "location, design, construction, and capacity"

- "Restoration measures *correct* for the adverse impacts of impingement and entrainment … but they do not *minimize* those impacts in the first place." *Riverkeeper II* at 109, quoting *Riverkeeper I*, 358 F.3d 174, 189 (2d Cir. 2004)



Riverkeeper-Based Conclusions

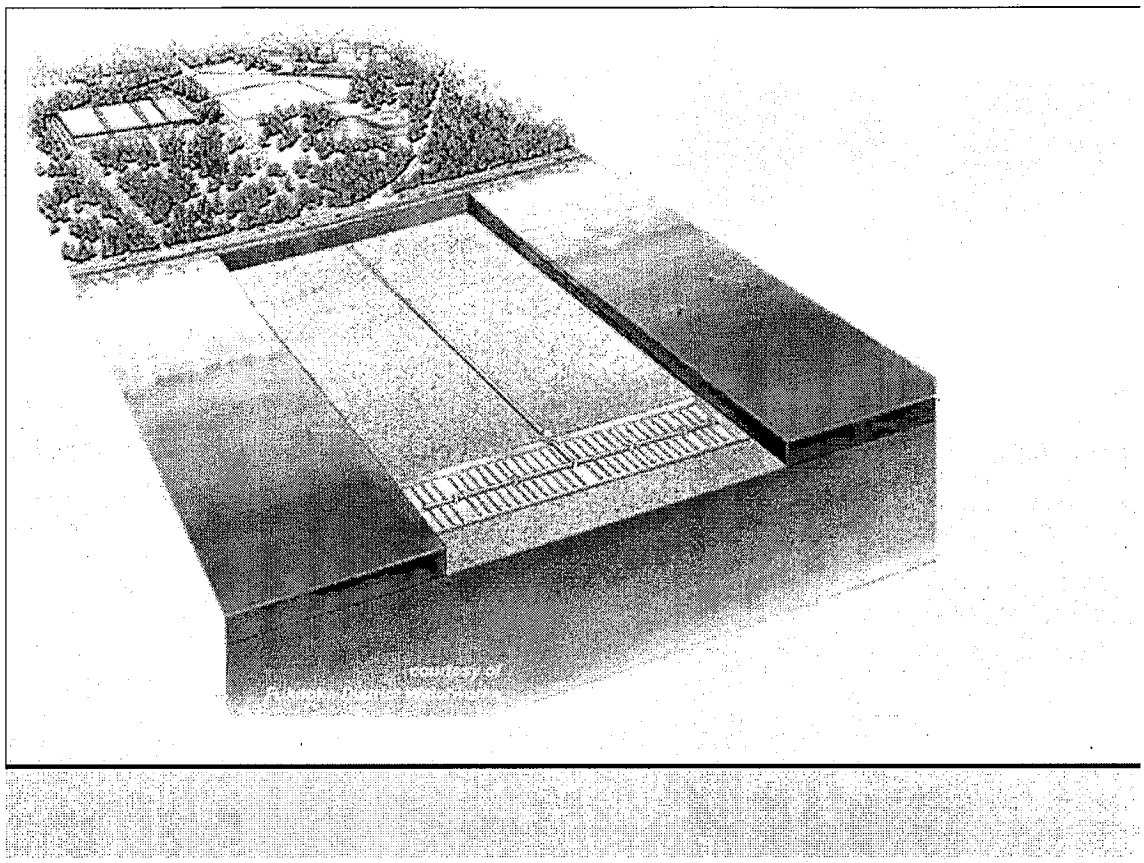
Once-through cooling technology is not BTA for acquiring water from the ocean.

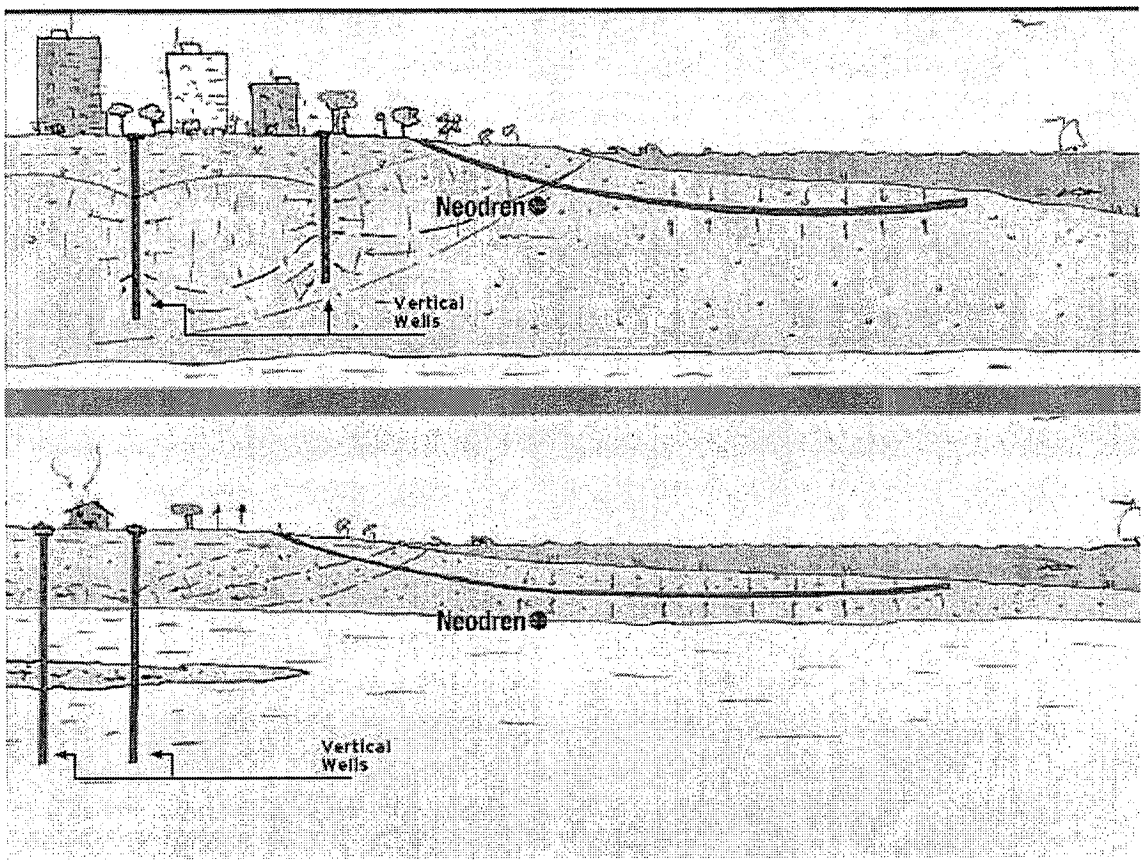
Compensatory Mitigation is not allowed.

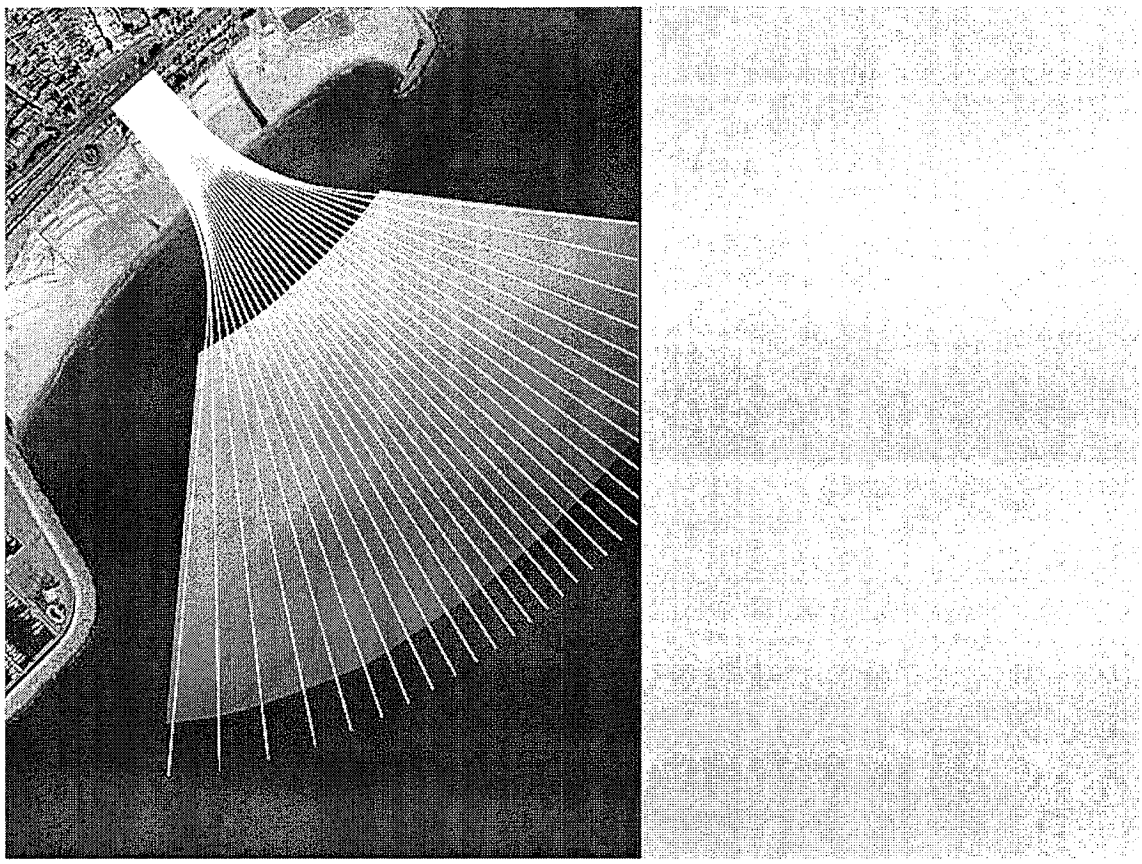
Co-location of desal with Power Plants is illegal.

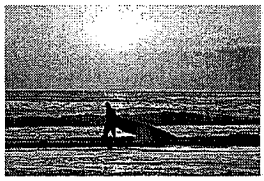
Open Ocean Intake is Not BTA

- **Poseidon's "Alternatives" study**
  - **Does not meet "weight of evidence."**
  - **Cost-benefit analyses not allowed under *Riverkeeper*.**
  - **Compensatory mitigation not allowed under *Riverkeeper* interpretation.**
  - **Alternatives proven viable within desalination industry**



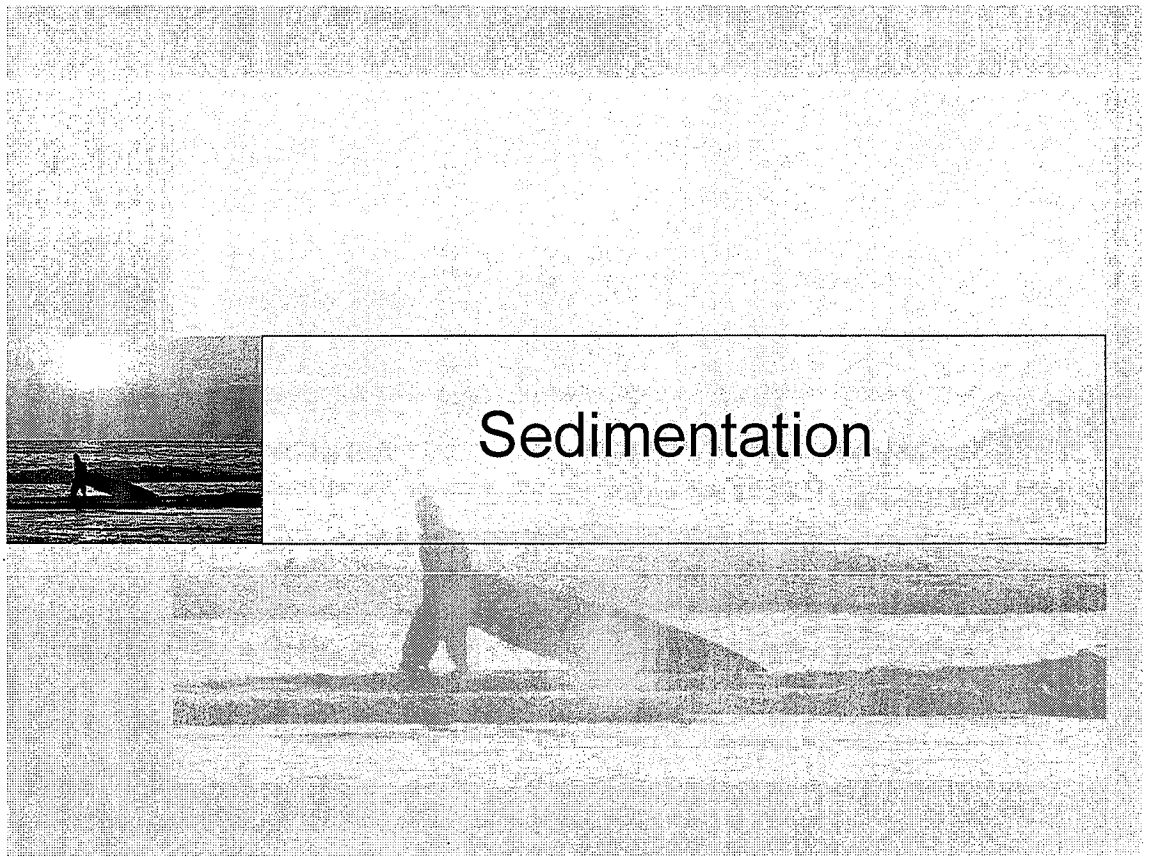

Neodren
Vertical Wells
Neodren
Vertical Wells

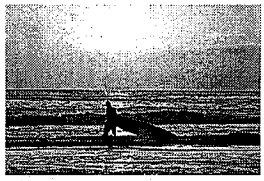




The question is not, "what is BTA for a 50 mgd project", but rather, "what is BTA for a desalination facility in this location?"

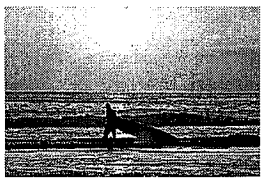
If not, what would preclude Poseidon from sizing the project to 100mgd or greater?


Sedimentation



Poseidon Arguments

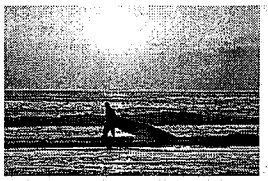
- Impairment of beneficial uses is only caused by urban runoff.
- If Poseidon doesn't assume dredging requirements, the lagoon will revert to "stinky water."



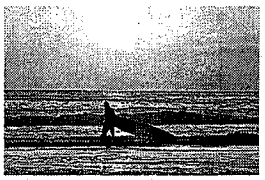
303(d)

9	E	Agua Hedionda Lagoon	90431000	Indicator bacteria		6.8 Acres	2006
					Nonpoint/Point Source		
				Sedimentation/Siltation		6.8 Acres	2019
					Nonpoint/Point Source		

- Poseidon: entire sedimentation problem is in east basin, due to urban runoff.
- RWQCB technical report determined data gaps prohibit detailed analysis of sediment in lagoon (specifically, in-lagoon sediment data missing, and thus more assessment necessary before TMDL development).
- SLC EIR identified sedimentation from power plant intake flows contributing to impairment of beneficial uses
- Common sense: Why dredge otherwise?



Poseidon's "Return to Stinky Water" allegations are bogus.

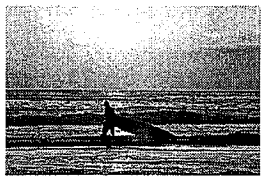


-----Original Message-----
From: Lloyd, David [mailto:David.LLoyd@nrgenergy.com]
Sent: Wednesday, November 14, 2007 12:13 PM
To: Tom Luster
Cc: Peter MacLaggan
Subject: RE: Question about Encina and Agua Hedionda Lagoon

Tom:

As you are aware, this is a complicated question. As the owner of the property on which the Encina Station is located, as well as most of the Agua Hedionda Lagoon seabed, we anticipate maintaining the Lagoons so as to preserve the size of the existing tidal prism necessary for back-up cooling water in case the intake channel is blocked by a winter storm, so long as any of the five steam boilers are required to stay in service as reliability, must-run units. After the eventual retirement of the steam boilers, we expect to substitute steam cooling medium with air cooled condensers, similar to those described in the pending Application for Certification in 07-AFC-6, filed by Carlsbad Energy Center LLC, an affiliate of Cabrillo Power I LLC (which would replace the three oldest boilers or about 1/3 of the generating capacity of the Station). At that point, the State Lands Commission lease for the intake and discharge jetties would require restoration of the jetties to pre-construction conditions. In order to preserve the value of the uplands real estate, we anticipate a requirement for converting the use of the property from heavy industrial to a higher and better use, consistent with the coastal zone, that we continue the maintenance of the lagoons as they currently exist or at least to a state that remains consistent with preserving the value of the uplands property. In that respect, there are many residents along the edges of the three lagoons who would likely expect the City of Carlsbad to impose entitlement restrictions on us relative to the maintenance of the lagoon system. We would also expect that the Coastal Commission would be interested in continued support of sand transfer from the lagoons to the Carlsbad beaches. Sand replacement and nourishment of the beaches for Californians and the tourism industry continues to be an important public objective. Cabrillo Power has developed an environmentally acceptable process for sand dredging, transport to the beaches, and spreading on the beaches through a number of biennial dredge cycles, using an electric dredge and a delivery piping system, which works well. We would anticipate turning that function over to Poseidon, if its project proceeds, once our use of sea water for cooling terminates upon the retirement of the existing steam boilers. If the Poseidon project is not completed, we would look for continued lagoon maintenance either as a burden to our uplands property uses, or in cooperation with a third party who assumes that responsibility, assuming the State Lands Commission extends the jetties lease beyond that point. Approximately the north half of the intake jetty channel and the north beach of the inner lagoon between Carlsbad Boulevard and the Hubbs Sea World Hatchery is owned by San Diego Gas & Electric Company, and our use is pursuant to an easement for lagoon maintenance purposes.

David Lloyd, Secretary
Cabrillo Power I LLC
1817 Aston Avenue, Suite 104
Carlsbad, CA 92008
Cell: 760-535-2058
Office: 760-710-2147
Fax: 760-918-6950



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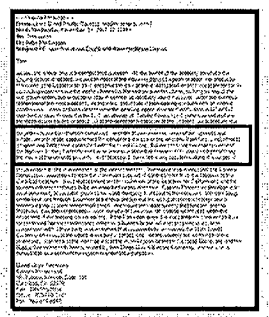

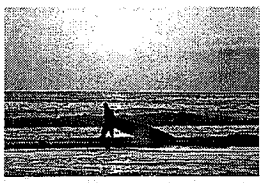

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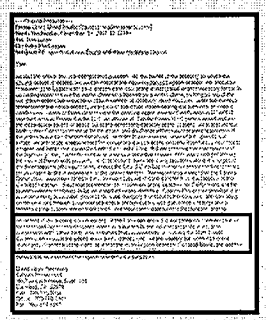
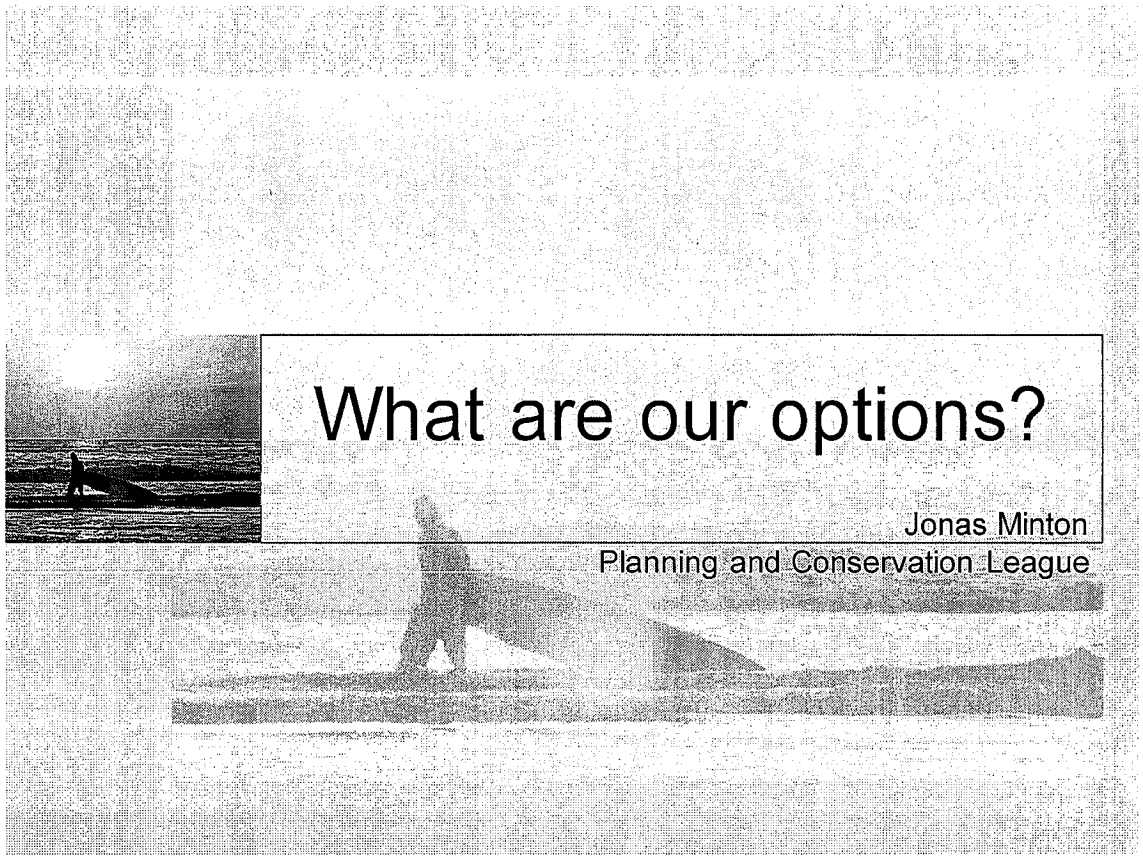
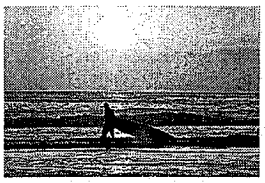


Poseidon's Fatal Flaws

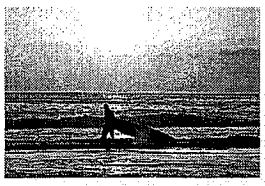
- Entrainment conclusions are not believable and have not been verified by RWQCB
- Alternative intakes exist, and must be implemented pursuant to *Riverkeeper*-based interpretation of Ca. Water Code
- The health of the lagoon does not depend on construction of a desalination facility


What are our options?
Jonas Minton
Planning and Conservation League



Experience

- Water Policy Advisor
  Planning and Conservation League
- Deputy Director
  California Department of Water Resources (2000-2005)
- Chair, State Desalination Task Force
- Co-chair, State of California Water Recycling Task Force
- Water Agency Manager and Executive Director
  (1994-2000)
  - Developed water projects for over 300,000 acre feet of new supply

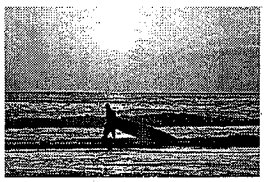


Poseidon says…

- The proposed project is necessary to address immediate and pressing water supply needs in San Diego County.

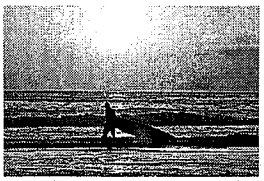
First Question

Are there water supply alternatives for San Diego?



Desal Task Force

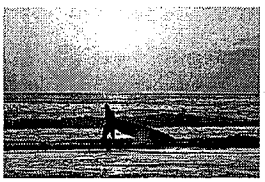
"Include desalination, where economically and environmentally appropriate, as an element of a balanced water supply portfolio, which also includes conservation and water recycling to the maximum extent practicable."



Non compliance with Urban Water Conservation MOU

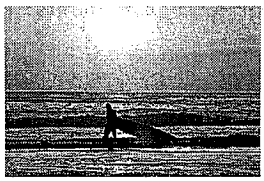
- Carlsbad and Rainbow Municipal Water Districts amount to over half Poseidon's output.

- Neither has filed required reports showing conservation actions or results.



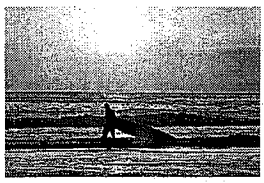
Gallons Per Capita Per Day

- Santa Barbara - 121
- Santa Maria - 123
- Goleta – 123
- Los Angeles – 138
- **Carlsbad - 217**



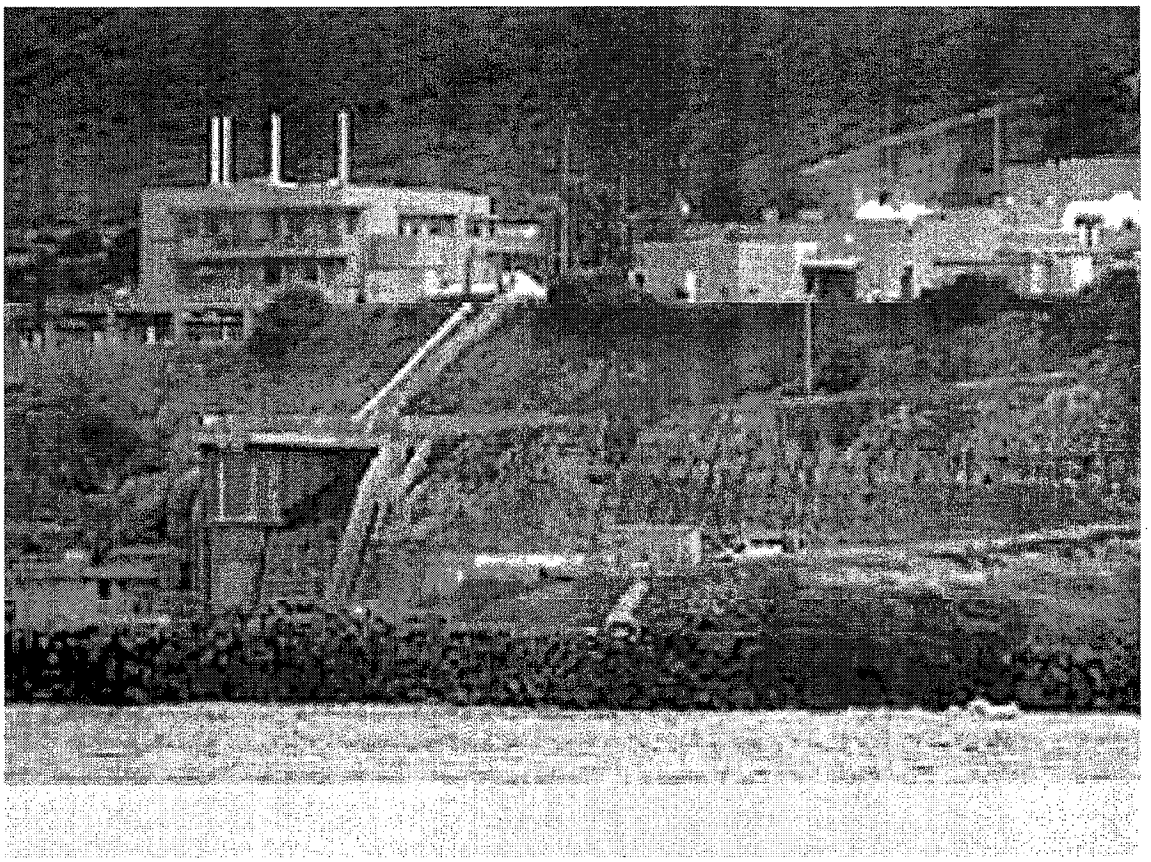
San Diego Region BMP's 1999-2006

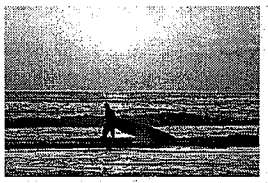
- Interior water audits
  - less than 1/3 of the MOU commitment
- Commercial and industrial water audits
  - less than ¼ of the MOU commitment
- Landscape
  - less than ¼ of the MOU commitment



What about Recycling?

Point Loma Wastewater Treatment Plant: ~196,000 Acre Feet Wasted per Year





Wastewater Discharged to Ocean

- Greater San Diego
  - Over 300,000 acre feet wasted annually
  - Only 12,000 recycled in 2005

Southern California Water Recycling Projects Initiative

White Paper on the Southern California Water Recycling Regional Partnership

COOPERATIVE EFFORT FUNDED AND MANAGED BY:

The United States Bureau of Reclamation

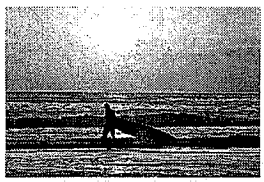
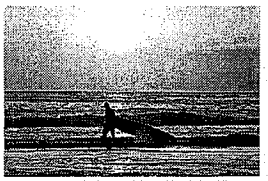
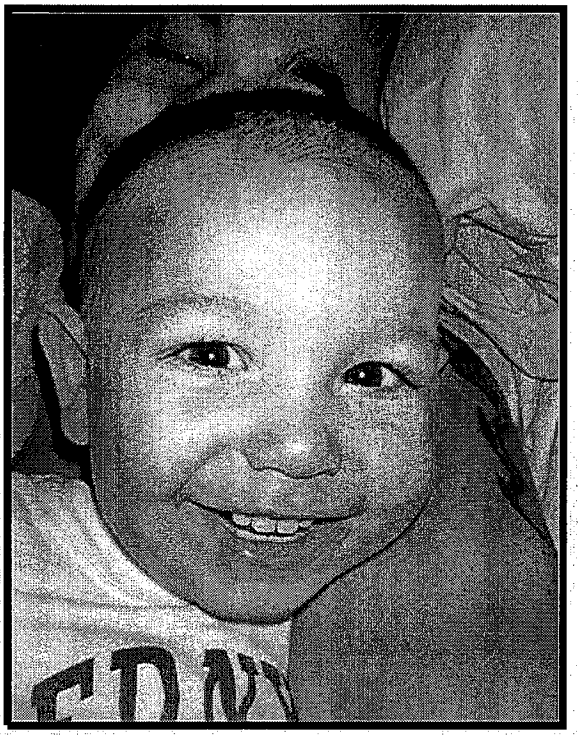


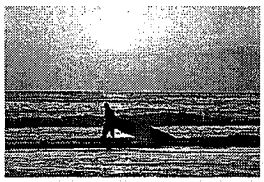
TABLE 5.
IDENTIFIED 16 projects in San Diego County that could yield 54,130 acre feet annually – <u>not</u> including any potable reuse



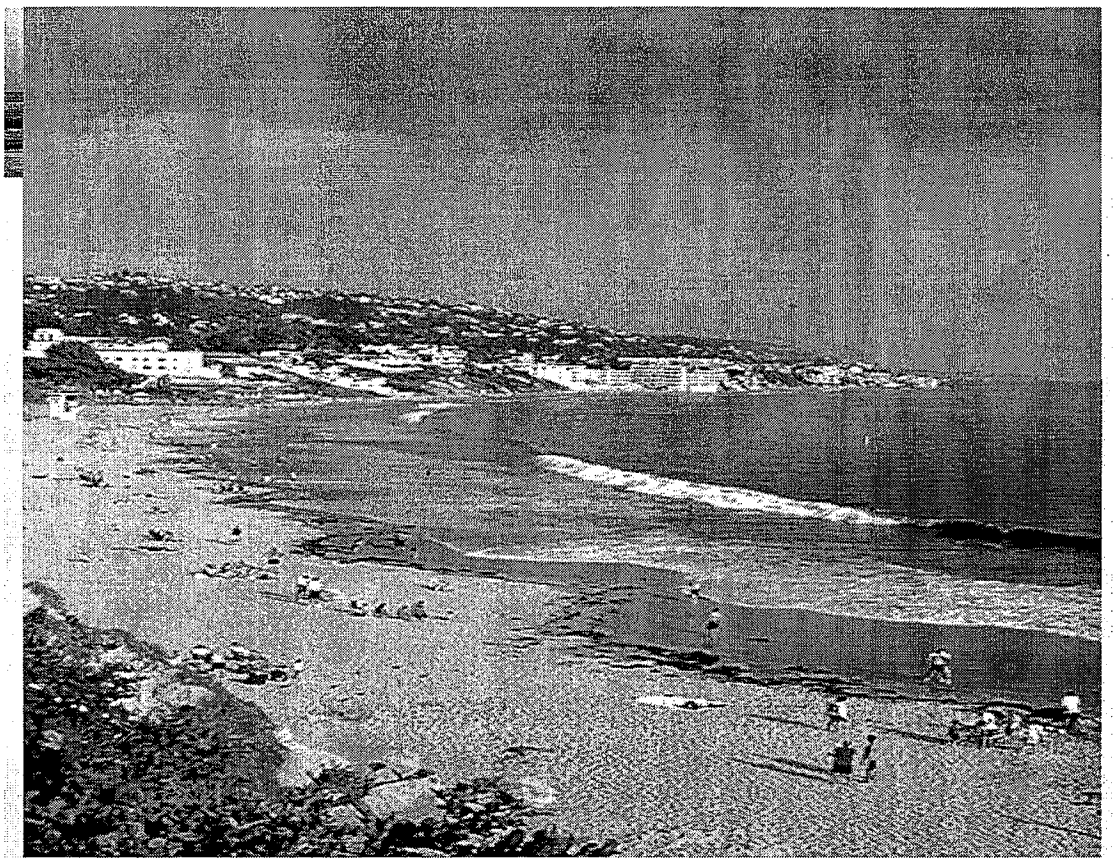
What Difference for CO_2

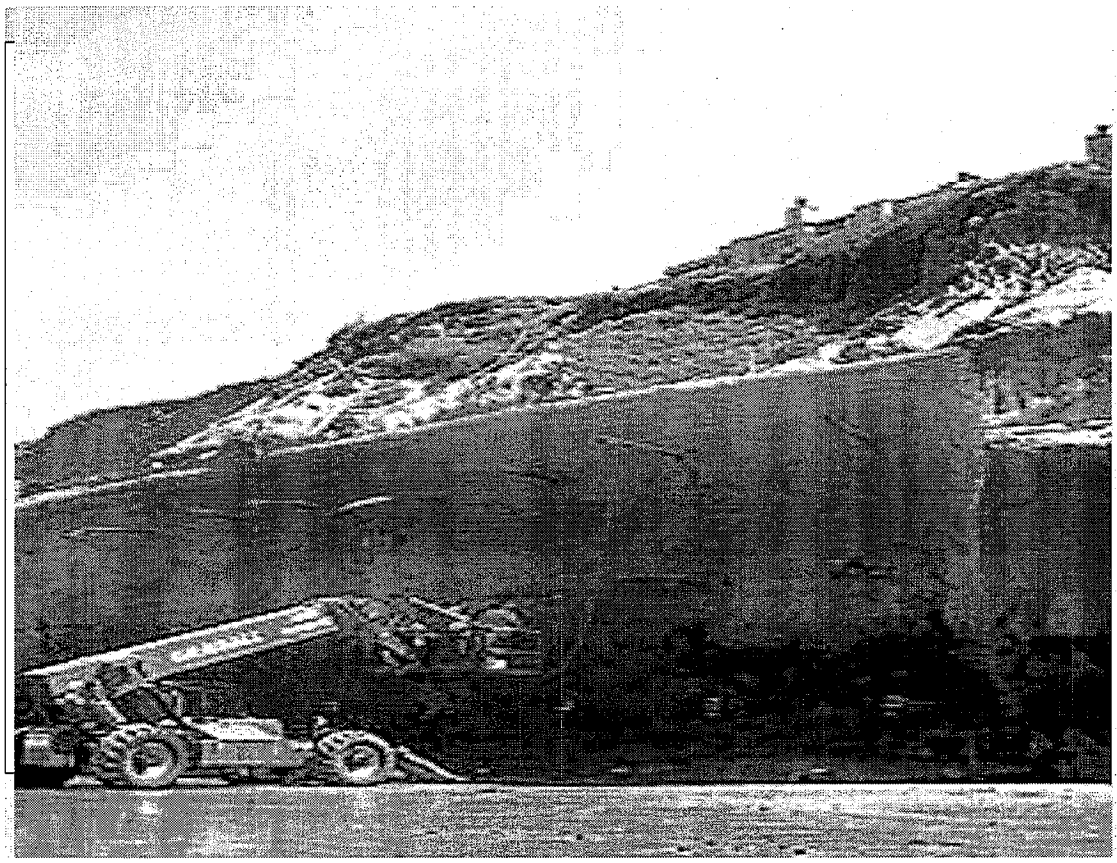
- Desal would **increase** CO_2 150,000 tons annually
- Water conservation would **decrease** CO_2 80,000 tons annually
- Any real carbon offsets should be used for essential energy generation

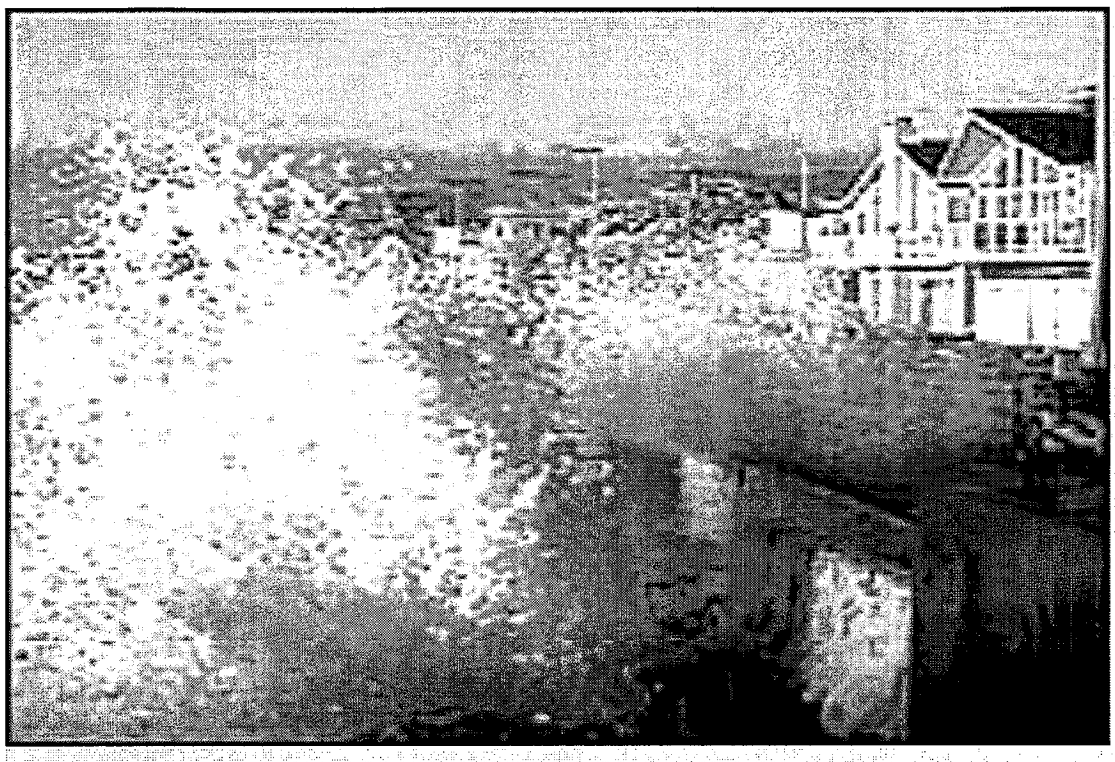


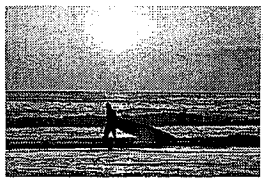


The Bigger Question

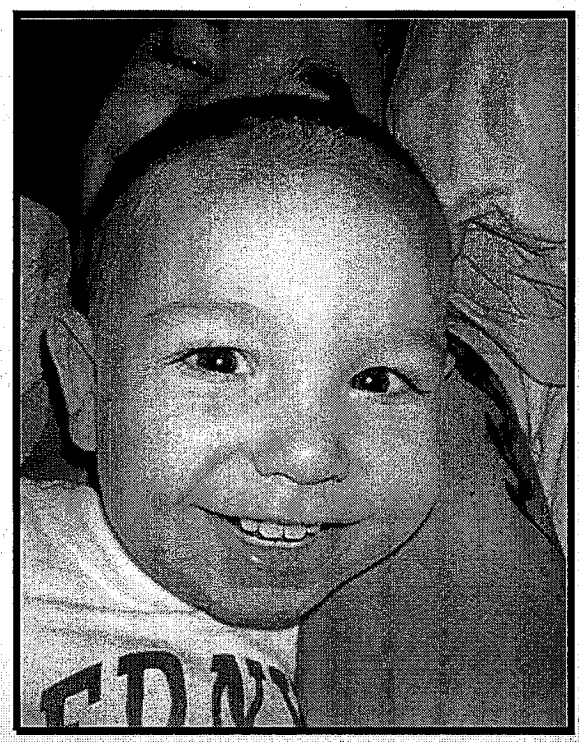


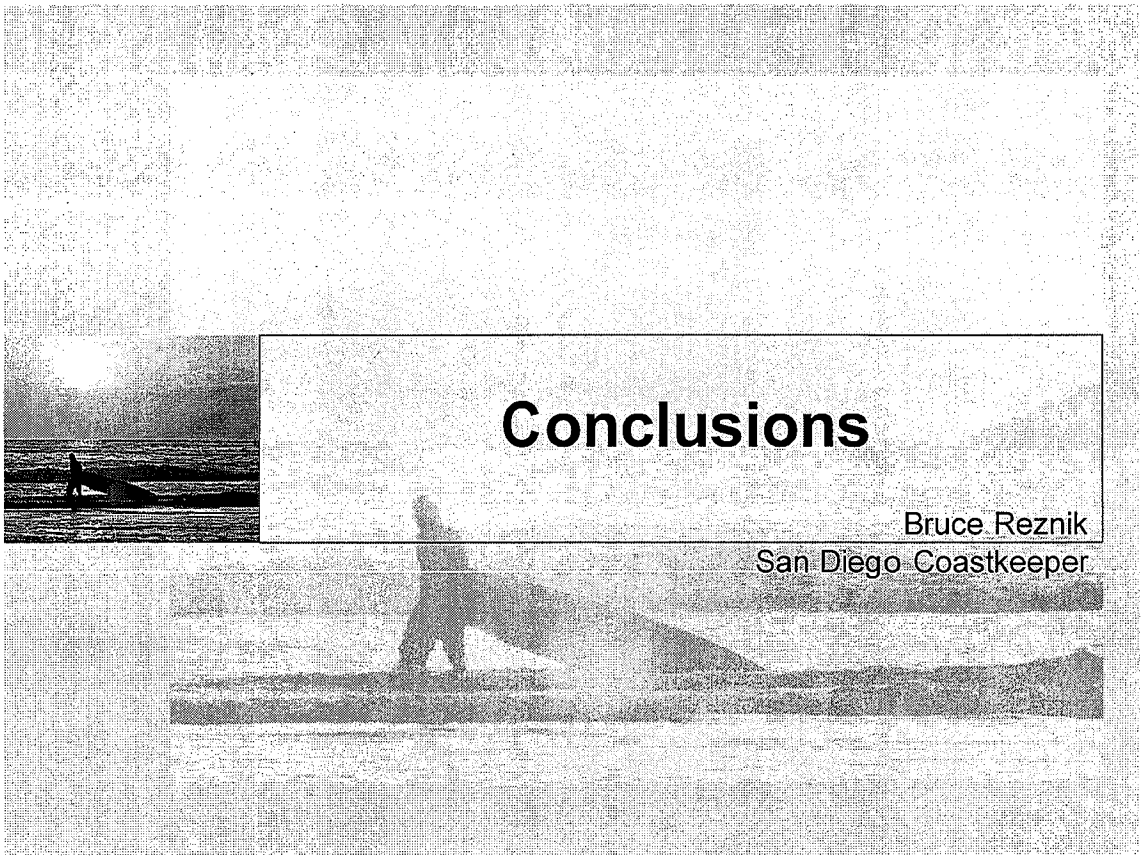


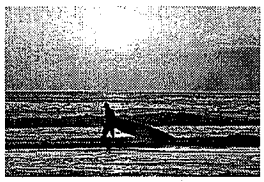




Actually, it is your job.



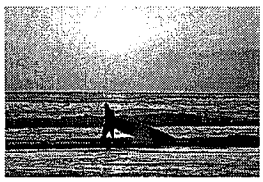

Conclusions
Bruce Reznik
San Diego Coastkeeper



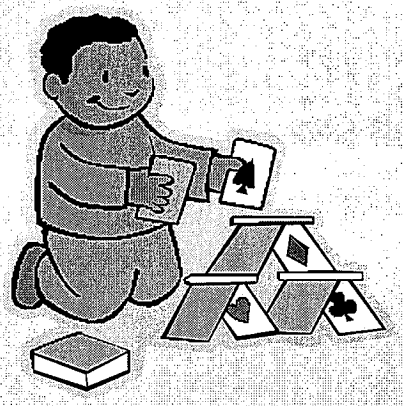
Those most impacted by the decision made today are not yet born.

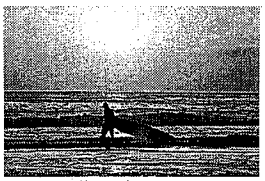
Decisions made TODAY will have long-term impacts on:

Coastal Ecosystems
Global Warming
Water Privatization

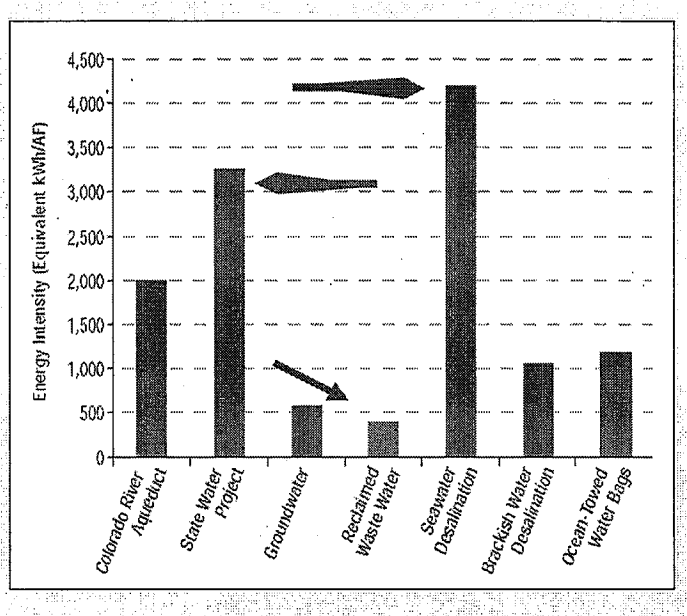


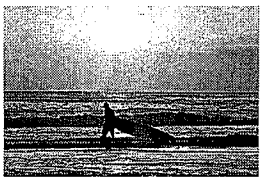
The CDP *seems* like a solid project...





The Truth About Carbon Neutrality





"Today's problems are yesterday's solutions"

– Peter Senge
(*scientist and director of Center for Organizational Learning at MIT*)

Don't let <u>today's solutions</u> be <u>tomorrow's problems!</u>

"Whiskey is for drinking..."

Surfrider Foundation

1965-2005 40th

PLANNING AND CONSERVATION LEAGUE

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COAST LAW GROUP LLP

SAN DIEGO COASTKEEPER

Environmental Community Concerns

Surfrider Foundation ¤ San Diego Coastkeeper

City of Carlsbad – Poseidon Resources

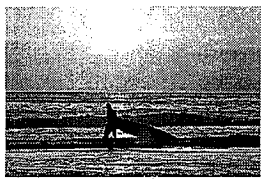
Desalination Project / Proposed Lease Amendment

Marco A. Gonzalez
Coast Law Group LLP

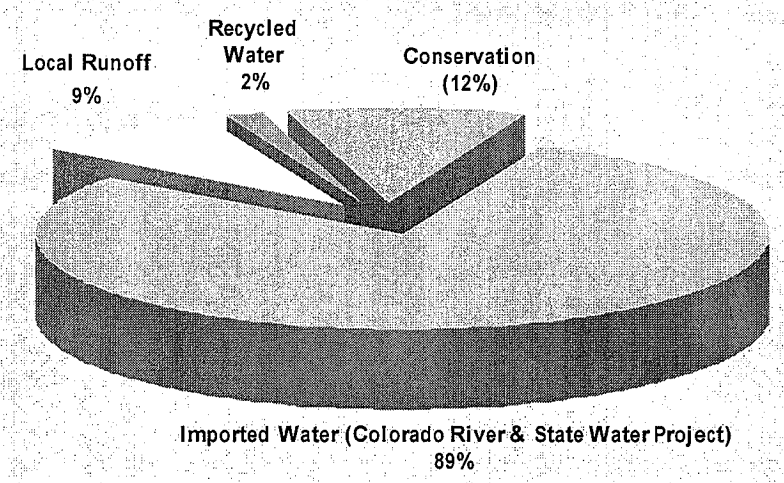
California State Lands Commission
October 30, 2007

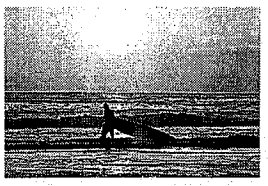
Overview

- San Diego/CA (Lack of) Water Situation
- Statewide Desalination Policy Issues
  - Once-Through Cooling (kills marine life)
  - *Riverkeeper, Inc. v. U.S. EPA*
  - *Porter Cologne*
- Problems with Carlsbad Desalination Plant
  - CEQA and SLC Requirements
  - Energy/GHG and the myth of carbon neutrality
  - Entrainment and the Public Trust



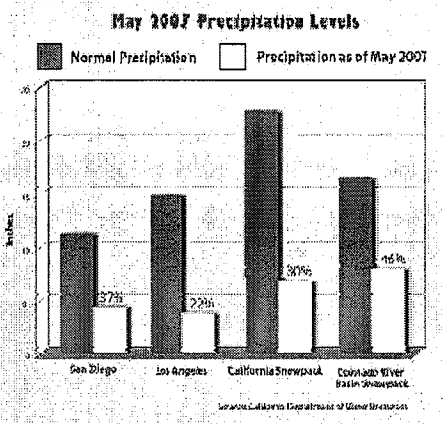
San Diego Water Sources

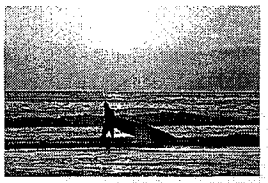




State Water Supply Crisis

- Colorado River – 8th Year of Historic Drought
  - 662,000 af/yr less per year since 2003
- "Delta Smelt" Ruling
  - Possible reductions 14-30% of NorCal water
- 2007 driest year on record in many regions
- Population increases
- Water storage and delivery system 30 yrs. old

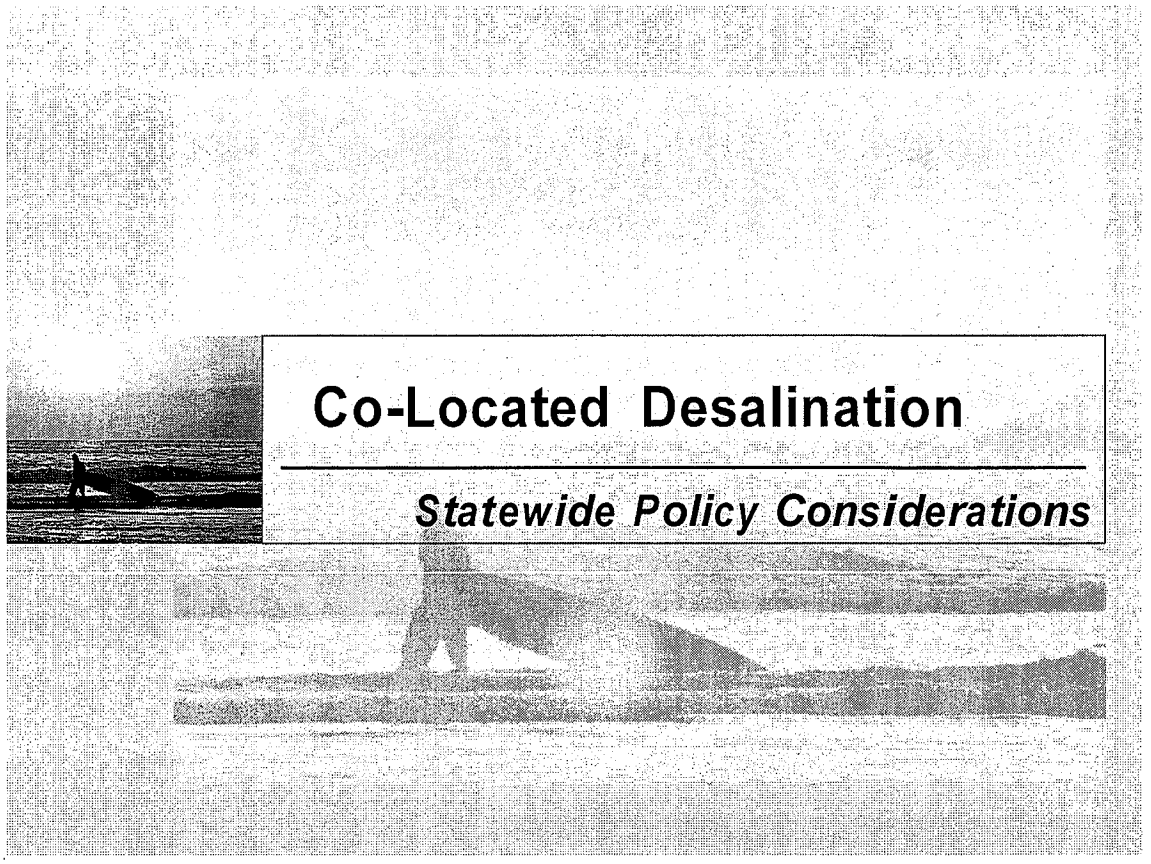


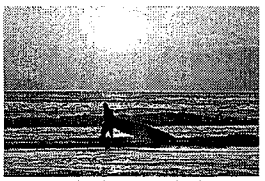


Conclusions

We need new sources of water.

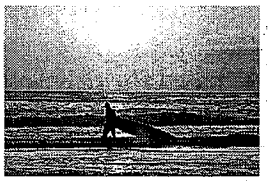
Your decision on this project will shape the future of water policy in the State of California.


Co-Located Desalination
Statewide Policy Considerations



Once-Through Cooling Kills Fish

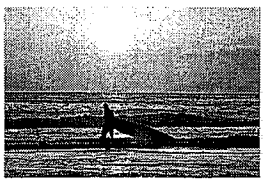
- 21 Coastal plants; 17 Billion Gallons Per Day
  - Impingement and Entrainment
  - Impossible to Quantify Impacts
- 60% of CA Fisheries in Decline
  - US Commission on Ocean Policy
  - Pew Ocean Commission
- Global Climate Change
  - 1995 Study – 80% macrozooplankton decrease since 1951, correlating to climate change data



Riverkeeper v. U.S. EPA

475 F.3d 83 (2d Cir. 2007) – Riverkeeper II

- Compliance with CWA § 316(b) requires use of Best Technology Available (BTA) for minimizing adverse environmental impacts.
- Court Found:
  - Closed-cycle cooling is BTA ("Technology Forcing")
  - No cost-benefit analysis, No "range of impacts"
  - "Restorative Measures" (mitigation) unacceptable
  - OTC NO LONGER ALLOWED

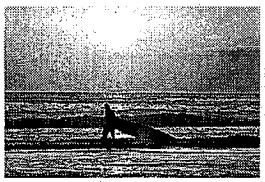


***Porter-Cologne* & Riverkeeper**

- Cal. Water Code § 13142.5(b)

  For each new or expanded coastal power plant or other industrial installation using seawater for cooling, heating, or industrial processing, **the best available site, design, technology, and mitigation measures feasible** shall be used to minimize the intake and mortality of all forms of marine life.

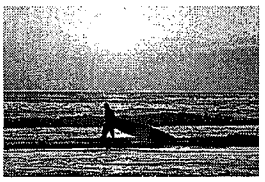
- 316(b) requires "location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impacts."



What Does "Minimize" Mean?

- First, Court said "Restoration Measures" not part of "location, design, construction, and capacity"

- "Restoration measures *correct* for the adverse impacts of impingement and entrainment ... but they do not *minimize* those impacts in the first place." Riverkeeper II at 109, quoting Riverkeeper I, 358 F.3d 174, 189 (2d Cir. 2004)



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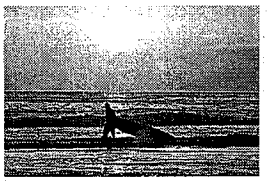
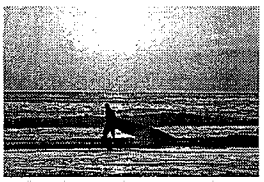


Conclusions

OTC is no more.

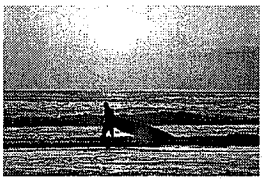
Co-located desalination is illegal.


CEQA, SLC, GHG, SEIR
Why this Project Cannot be Approved



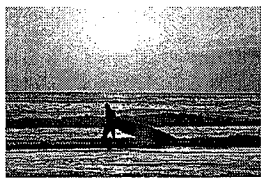
CEQA

- Requires Subsequent or Supplemental EIR
  - Project Changes
  - Circumstances Change
  - Alternatives/Mitigation Opportunities Arise
- EPS movement away from OTC is either a project change or a changed circumstance
  - FEIR Response to Comments
  - Planning Commission
  - Approval Resolution



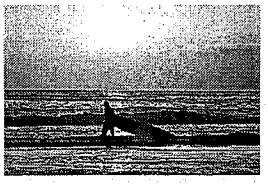
New Info + Significant Impacts

- Energy Consumption: "cooler" feedwater
- Construction Impacts: demolition of EPS
- Infrastructure connectivity without EPS
- Entrainment: 37 acres of mitigation
- Water contracts: growth inducement
- Sedimentation: 300mgd, 24/7/365
  - SLC 2005 EIR for Cabrillo Jetty Extension
  - "flood dominated", 303(d), dredging
  - Environmentally superior intake alternative

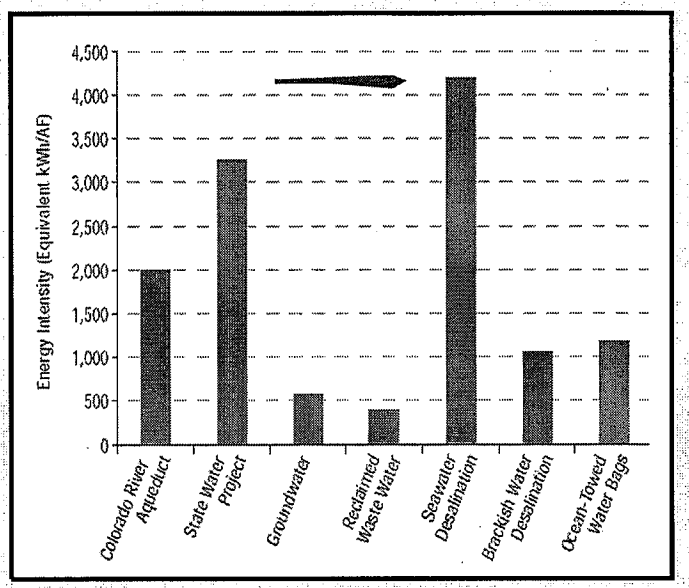


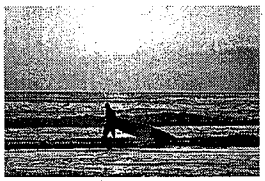
Stand Alone Desalination Facility Alternatives

- Offshore Intake
- Offshore sub-surface intake
- Sub-surface near shore intake (slant well)
- Horizontal beach wells
- Vertical beach wells
- Infiltration galleries
- Seabed infiltration galleries



Energy, GHG, AB32

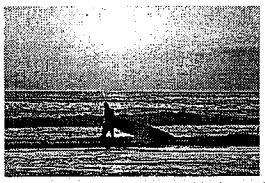




Energy, GHG, AB32

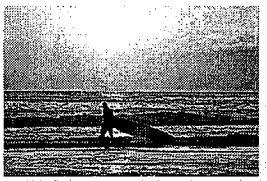
		Energy Usage kWh/AF	Energy Usage Compared to State Water Project Transfers[1]	Tons CO_2 Emitted Annually to Produce 56,000 Acre Feet of Water[2]
✓	Conservation	0	- 100%	0[3]
✓	Reuse (non-potable)	400	- 88%	10,000
✓	Colorado River Transfers	2,000[4]	- 38%	82,000
✓	Reuse (potable)	≤ 2,200[5]	- 31%	≥ 58,000
✗	State Water Project Transfers	3,200	n/a (baseline)	82,000
✗	Desalination (subsurface intake)	3,800	+ 19%[6]	98,000
✗	Desalination (open ocean intake)	4,700	+ 47%[6]	120,000 - 154,000

✓= Good ✗ = Bad



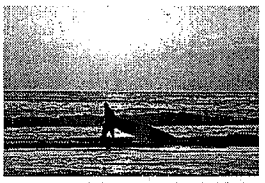
Energy, GHG, AB32

- Staff Report: 101,270.93 metric tons $CO_{2/yr.}$
  - Assumes desalinated water will replace existing supplies
  - If so, net increase is 44,961.53 metric tons $CO_{2/yr.}$
- Coastal Commission: 200,000,000 lbs. $CO_{2/yr.}$
- Surfrider: 120,235 tons $CO_{2/yr.}$
  - Net increase in replacement water is 66,612 tons $CO_{2/yr.}$
  - Assumes CRA and SWP average



Public Trust

- Entrainment Study
  - Sampling Methodology
    - Tenera Poseidon Study: 4 times, one summer
    - Tenera CEC Study: monthly, 1-3 yrs.
  - Entrainment Conclusions re Impacts
    - Surplus Production v. Predation Foregone
    - Pre-Reproduction Food Web Importance Ignored
    - Ecosystem Complexities
- The Future of Marine Life in our Oceans



All Options are Not Equal

	Cost	Environment	Energy	Reliability	Feasibility
Conse rvation	9	9	9	9	9
Potable Reuse	9	9	9	9	8
Non-P otable Reuse	8	9	9	9	8
Desal ination (subsurface intake)	8	9	8	8	8
Storage	8	8	8	9	8
Transfers	9	8	8	8	8
Desalination (open ocean intake)	8	8	8	8	8

"Whiskey is for drinking..."

Questions?

Marco Gonzalez
760.942.8505
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