# Review and Comments to the California State Water Resources Control Board's March 2008 "Scoping Document: Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling"

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The following are my comments to the State Water Resource Control Board's ("State Water Board") March 2008 "Scoping Document: Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling." My comments are submitted as part of my role on the Expert Review Panel.

My comments are organized into the three categories requested in an email from Michael Foster on April 11, 2008 and summarized below:

1. Comments Related to Questions: Answer the revised list of questions provided to the Expert Review Panel. These comments can reference important reports, papers, data, etc. that were not considered in the Scoping Document.

2. Comments On Other Scientific Issues: Provide comments to any other scientific issues that are not covered by the questions in #1.

3. Comments on Policy: Provide comments regarding non-scientific and policy issues (politics, economics, legal, etc. in this section.

## Comments Related to Questions:

**1. How will baseline be defined for (a) Track II, and (b) Interim Restoration?**

**Comments to Track II baseline (a):** The Scoping Document does not discuss any options for defining baseline, which makes it difficult to comment on. Further, this question implies that Track II requirements are appropriate and needed. While I do not agree that Track II requirements are the right way to go, per the instructions I will answer

just the questions supplied. My concerns with a Track II approach are described in detail below in my **Comments to Policy** section.

At many facilities in California, I&E reductions have been achieved through seawater intake flow reductions as compared with the facility's original maximum permitted or design flow ("design flow") as well as through structural controls like offshore intakes, velocity caps, and fish return systems. Additionally, several facilities are implementing restoration measures in response to I&E requirements. These I&E reductions should be recognized and credited toward any required Track II implementation plans. The most effective method for doing that would be to define the baseline as design flow and by providing compliance credit for any structural or restoration measures implemented for I&E reductions.

There are many arguments for using design flow to define the baseline condition by which compliance with any Track II performance measures might be determined. For example, Page 27 of the Scoping Document indicates that New York 316(b) regulations define the baseline for New York 316(b) performance measures as full flow and full generating capacity. US EPA also contemplated using design flow as the baseline for its Phase II 316(b) regulations in its use of calculation baseline in the regulations. Further, it is undisputed that real and actual intake flow reductions result in less entrainment of marine organisms at facilities. Therefore, why should flow reductions below permitted and design levels not be credited toward Track II compliance?

Draft Track II requirements would require similar impingement and entrainment reductions as those achieved by closed cycle cooling, which is an approximate 80-90% reduction. To achieve such a substantial level of reduction, operational measures such as flow reduction below design flow must be an allowed compliance technique. There are simply no feasible and commercially available structural techniques that will allow facilities to achieve this level of reduction without including flow reduction. Therefore, any existing flow reduction already achieved by a facility should be credited toward achievement of the Track II requirements. Further, any other impingement or entrainment reductions achieved by a facility through structural controls or restoration measures should be credited toward the Track II requirements.

For the above reasons, I recommend that the baseline for Track II requirements be defined as: (i) the original maximum permitted or design flow level for each unit at a facility, and (ii) each unit be credited for any impingement or entrainment reduction technique it has employed, including fish returns, velocity caps, offshore intake location, restoration measures, etc.

**Comments to Interim Restoration Baseline (b):** Please also see my additional comments on this topic in my answer to question #3 and in my **Comments to Policy** section. In the event that interim restoration requirements are deemed necessary, then I believe that they should be based on the <u>actual</u> levels of I&E occurring based on <u>actual</u> intake flow levels and only to offset any Adverse Environmental Impact ("AEI") occurring. If no AEI is occurring, then interim restoration measures are unnecessary. AEI

would be determined in a manner similar to the 316(b) assessment process employed in recent I&E study reports for facilities in California.

**2. Have current, statewide and individual power plant impingement and entrainment impacts been correctly estimated?**

**Comments:** Table 8 of the Scoping Document (pages 14-16) attempts to show current I&E levels for each facility. However, based on the notes in the "data source" column, it appears that the data is not based on the most current I&E studies completed at the facilities. For example, the Encina Power Station entrainment count shown in Table 8 is over seven times greater than the estimated annual entrainment levels reported in the most recent Encina Power Station I&E study. Further, it appears that Table 8 depicts I&E levels based on maximum potential intake flows instead of on actual intake flows which will substantially overestimate the actual I&E effects. Therefore, it appears that the Scoping Document has not properly estimated current, statewide and individual power plant I&E impacts.

These discrepancies can be corrected by integrating the most recent studies at individual plants. Below is a list of some reports that should help correct these problems:

a. "Clean Water Act Section 316(b) Impingement Mortality and Entrainment Characterization Study – El Segundo Generating Station" (Tenera, January 2008).
b. "Clean Water Act Section 316(b) Impingement Mortality and Entrainment Characterization Study – Encina Power Station" (Tenera, January 2008).
c. "Assessment of Once-Through Cooling System Impacts to California Coastal Fish and Fisheries" (EPRI, August 2007).

The Scoping Document also seems to immediately accept that since entrainment numbers may be high at some facilities, that ecosystem impacts must also be high. However, closely reviewing recent impingement and entrainment ("I&E") study reports indicates this is not necessarily true. For example, the January 2008 Encina Power Station I&E study found that relatively large numbers of goby larvae are entrained at the plant each year. However, detailed adult population studies of gobies in the lagoon that is the source for the cooling water shows that goby populations are robust in the lagoon and are actually in higher densities than other nearby lagoons without power plants. Further, the number of goby larvae present in the lagoon is the same now as it was during the 1980 316(b) study at Encina. These examples demonstrate that the power plant entrainment effect on the goby larvae does not cause population level impacts and therefore could not be considered an Adverse Environmental Impact.

Therefore using straight I&E levels at the facilities as an indicator of impacts may not be appropriate. Then, using I&E levels to justify the new stringent requirements to retrofit to closed cycle cooling at all facilities, regardless of whether any Adverse Environmental Impacts are occurring, is not justified in the Scoping Document. Recently completed I&E studies just released in January 2008 show that many facilities have very low potential

effects on fish and shellfish populations and that the plants with higher entrainment mortality are not causing AEI. This would imply that lesser levels of I&E reductions are more appropriate.

**3. Are the proposed interim controls effective and feasible to prevent mortality and reduce takes of wildlife (a) Tetrapod exclusion screens, (b) Flow reduction (c) Restoration?**

**Comments to Tetrapod exclusion screens (a):** Tetrapod exclusion screens should not be required in this policy for three primary reasons. First, the proposed four-inch mesh screens would create significant operational problems including fouling from trash and marine debris that would require frequent manual removal, including by divers at facilities with offshore intakes. This problem may cause a facility to have to shutdown or reduce power, may cause an unsafe operational condition due to loss of cooling water, or may create an unsafe condition during manual removal of accumulated debris. Second, the proposed tetrapod exclusion screens would most likely create a new impingement location at these facilities. Lastly, the protection of marine mammals is more appropriately under the jurisdiction of the National Marine Fisheries Service ("NMFS"). NMFS is presently evaluating Marine Mammal Protection Act applications from California power plants with once-through cooling. NMFS intends to publish an environmental assessment and issue take permits to these power plants based on the applications that show no significant impacts to marine mammals from the power plant intakes or outfalls. It is more appropriate to have NMFS require conditions like tetrapod exclusion devices only if determined to be necessary in their upcoming environmental assessment.

**Comments to flow reduction (b)**: Flow reduction during periods where there is no power production is already an objective of power plant operators. The reason is that this reduces operating costs through reduction in auxiliary power consumption. However, individual facilities may have other reasons for operating circulating water pumps during periods of no power production, including operations associated with sanitary waste treatment systems, operations to avoid water quality problems in the circulating water tunnels, other power plant cooling requirements like bearing cooling, and condenser cooling requirements after plant shutdown that may take several days to properly cool the units. For these reasons and others, any flow reduction requirements during periods of no power production should only be a general requirement to reduce flow to levels feasible and consistent with plant specific safety and operating procedures. An arbitrary 10% flow requirement is likely to conflict with many of these safety and operational procedures.

**Comments to restoration (c)**: See also my policy related comments to the need for interim restoration. Restoration measures would be effective in offsetting I&E at power plants, but not effective in reducing I&E at power plants. Restoration measures are certainly feasible, the question is how much would be required and how restoration funding should be calculated and dispersed.

In the Scoping Document, restoration is viewed as an interim measure with the apparent objective of implementing near-term improvements and enhancements to the marine ecosystem until full compliance is achieved. Under that premise, any interim restoration required would only need to be temporarily effective until full compliance is achieved. The problem is that restoration efforts like wetlands and habitat creation is not temporary. Therefore, any interim restoration requirements need to take into account the long-term effectiveness of the restoration thereby reducing the short-term obligation accordingly.

Knowing that restoration will be longer lived than the interim period it may be required for is an opportunity to simplify the interim requirements to streamline funds into restoration projects more quickly. My suggestion is to have any interim restoration requirements be simplified into a mitigation fee approach based on actual cooling water used. The mitigation fee amount should be determined knowing that (a) facilities will still have the severe economic burden of full compliance via retrofit or repowering and mitigation fees should not create an overlap or increase in the cost of compliance, (b) restoration projects resulting from these interim funds will be longer lived than the interim period and should be priced accordingly, and (c) interim mitigation fees should be priced to not create a significant increase in the cost of energy or capacity at a facility and should only be required if a facility's commercial arrangements allow for cost recovery of such interim mitigation fees.

This mitigation fee approach for interim restoration requirements would then generate a pool of funds that can be managed by a restoration fund committee, either an existing organization or a newly formed organization that can best leverage the funds into real and worthwhile restoration projects. An example of this is the Santa Monica Bay Restoration Commission. This organization would be a great place to pool interim funds from once-through cooled plants in the Santa Monica Bay area.

**4. For Track I, are adverse impacts associated with conversion to closed-cycle cooling adequately considered?**

**Comments:** The Scoping Document recognizes that conversion to closed cycle cooling will result in adverse environmental impacts and describes the substitute environmental document approach that will be used to evaluate these issues as part of development of the new requirements. However, these potential environmental impacts from retrofitting to closed cycle cooling, including new noise, visual, increased criteria air emission, energy penalty, and increased greenhouse gas emissions impacts are not yet fully evaluated in the Scoping Document. The substitute environmental document should be completed and carefully considered prior to moving forward with any new requirements for existing once-through cooling systems.

The potential adverse impacts associated with a closed cycle cooling conversion requirement should also include the costs of conversion, which are very substantial, ranging from $3.6 to $4.2 billion to convert all California once-through cooled plants to closed cycle cooling, assuming it could be done feasibly (EPRI Closed Cycle Cooling

Report). The Scoping Document states that the costs to replace once-through cooling units would range from $100 million to $11 billion (page 80). These costs are simply too substantial to not carefully evaluate in conjunction with the expected environmental benefits and impacts to electrical system reliability.

The Scoping Document also explains that since many once-through cooled power plants produce relatively little energy in comparison to their full potential and that there is a declining level of energy produced in recent years, that this indicates the units must not be necessary for electrical reliability. This is far from true, as many facilities are absolutely critical for peak demand periods for grid reliability even if they are utilized less than their full potential for the entire calendar year. Because of their lower efficiency, these units are only called on when demand exceeds the capacity of all other more efficient generating units or for local reliability reasons. However, during these peak demand and reliability periods, the need for these units is extremely important to maintain a safe and reliable electrical system.

The potential for significant adverse impacts to electrical system reliability must be a high priority topic considered and evaluated in the Scoping Document. Presently, the Scoping Document gives little to no consideration about how important these facilities are to local resource adequacy and electrical grid reliability, to how the facilities support renewable generation by delivering in-load generation, capacity, and ramping capabilities that backstop the less reliable resources like wind generation, or to how the policy would result in increases to greenhouse gases when the state is clearly moving aggressively toward all measures that will reduce those emissions. Clearly, it would be counterintuitive to propose regulations that would undermine these efforts without serious comparison to the real costs and benefits that may result from such new requirements.

For example, the February 29, 2008, CASIO report entitled “Old Thermal Generation Phase 1 Report (2008-2012 Study Results)” had two key findings that describe the critical role these facilities perform in maintaining electrical system reliability. First, the study found “…that a policy requiring these units to go off-line could jeopardize the ISO’s ability to meet local, zonal, and system reliability requirements, even if a considerable number of new power plants come on-line.” Second, because these facilities perform a crucial backup power function to less reliable renewable resources, the study determined that “…a policy that requires these units to go off line or reduce operations could make meeting the State’s 20% renewable portfolio standard more difficult than our earlier study predicts.” This is CAISO’s initial study only and the complete study results are not expected until the end of 2008. With such drastic reliability and renewable portfolio impacts noted, it would be prudent for the State Water Board to move slowly in this area and ensure complete understanding before imposing stringent requirements that will affect electrical reliability.

One of the main concerns is expressed above where it is essentially infeasible to comply with the Track I or II proposed requirements at existing facilities, thereby likely resulting in facility shutdown before projects can be implemented to avoid reliability problems.

This issue is exacerbated by the relatively early implementation dates, especially for the lower use facilities of less than 20% capacity factor by 2015. While these units have lower capacity factors, they are still extremely important during peak demand periods to maintain system reliability and backup less reliable renewable resources like wind generation. At a minimum any compliance deadline by which either repowering or retrofit of these critically important units occurs should include a provision for extension in the event of delay that occurs outside the control of the facility owner. This provision should allow for extension to the compliance date when a facility owner achieves milestones in its implementation plan (e.g. submits permit applications for repowering or retrofit by the dates in its implementation plan), but permitting agencies do not issue final permits by the dates targeted in the implementation plan. This type of extension provision is absolutely critical for the types of repowering or retrofit projects that the Scoping Plan envisions because the permitting of these projects in the coastal zone are certain to be controversial and time intensive. The extension provisions should be automatic in the event of permitting and development delays outside the control of the facility owner.

**5. For Track II, should the proposed policies require monitoring appropriate to determine actual percent reductions in mortality?**

**Comments:** There is no need for periodic monitoring for facilities that use flow reduction as a method of compliance. Periodic monitoring may be necessary for facilities that employ screening devices for compliance, but should consider the variability of the marine life conditions in the monitoring requirements.

**6. Should restoration projects be monitored to determine compliance?**

**Comments**: Since restoration is only considered as an interim measure, then no monitoring should be required. Interim restoration should be a simple approach of quantifying an amount of restoration, determining a mitigation fee, and then applying the mitigation fee to the maximum extent feasible to the betterment of the environment. Please review my earlier comments on interim restoration measures and ideas on how to structure restoration mitigation fees.

**7. Should there be remediation if restoration does not comply?**

**Comments**: As mentioned earlier, restoration is only considered as an interim measure until full compliance is achieved. Because of that, I don't believe that remediation requirements if restoration is less effective than expected are necessary.

## Comments on Other Scientific Issues:

None at this time

## Comments on Policy:

**Using US EPA Phase I regulations and Water Code Section 13142.5 as the basis for determining Best Technology Available (BTA) for existing once-through cooled power plants is not appropriate.**

The draft requirements in the Scoping Document mirror US EPA's Phase I 316(b) requirements for new facilities, which were never intended to be applied to existing power facilities. US EPA, in its preamble to the Phase II 316(b) regulations for existing facilities, explained in detail why it did not choose closed cycle cooling as BTA for existing facilities, including in its reasoning that this is not the most cost effective approach to use, that there are technical impediments to retrofitting these facilities, that there would be substantial energy penalties associated with the retrofit, and that there would be negative air quality effects and other environmental consequences of such conversions (Phase II Final Regulation, Federal Register pages 41605-41607). For these and other reasons, it did not proposed closed cycle cooling as the sole option for Phase II compliance. It is important to note that all of the concerns the EPA expressed also apply to implementing the proposed requirements in California.

Further, the Scoping Document cites Water Code Section 13142.5 as a basis for the proposed new BTA requirements. This section is specific to new or expanded intake structures in California. However, the Scoping Document and proposed new requirements are for existing once-through cooled power plants. Similar to the above discussion, it is inappropriate to use standards for new power plants as a basis for existing facilities.

The result of using new facility requirements for existing plants is that options for compliance are very limited, or in many cases, there are no feasible compliance options. The result of these overly stringent and inflexible requirements is that many facilities will have no other option than to shutdown. Due to the relatively early implementation dates proposed, these facility shutdowns may occur before mitigating measures can be taken to avoid electrical reliability concerns, including replacing the new facilities on or off site or with transmission projects.

**Track I requirements are not feasible at most California facilities**

The Scoping Document uses the Ocean Protection Council (OPC) alternate cooling study as justification that closed cycle cooling is feasible at existing power plants in California. While the OPC report found closed cycle cooling towers to be technically and logistically feasible at some once-through cooled power plants in California, the study did not consider other areas of feasibility besides technical. True feasibility, as used in CEQA, considers all aspects of feasibility including, economic, environmental, legal, social, and technological factors. The Scoping Document needs to fully consider all factors of

feasibility prior to recommending a Track I compliance approach that only has one possible compliance option with questionable feasibility. One example of a feasibility issue considered, but not fully understood in the Scoping Document, is the issue of discharging salt water tower blowdown to the ocean in compliance with technology-based effluent limitations. While the Scoping Document devotes 15 of the 91 pages to discussing the issue, it gives little discussion to the ability to overcome this major issue, which may in fact be a fatal flaw to the feasibility of retrofitting these facilities with saltwater cooling towers.

All relevant information on technical feasibility must also be considered prior to making a determination that Track I compliance is feasible. An EPRI report on closed cycle cooling was published in November 2007 that does not appear to have been referenced in developing this proposed policy. Further, comments from the owners of once-through cooling plants that were made to OPC and other agencies related to closed cycle cooling feasibility must also be considered.

This is a necessary step, because to be wrong about the real feasibility of Track I compliance is to essentially underestimate the real potential of forcing all of these facilities to shutdown in the near-term and create extreme electrical reliability issues for the state of California.

**Track II requirements are not feasible at most California facilities**

The Scoping Document indicates that Track II compliance could be achieved with a similar level of I&E reduction as that achieved with closed cycle cooling using other control measures. Since, closed cycle cooling could achieve an approximate 80-90% reduction in intake flow, this indicates an 80-90% reduction would be required for Track II. Based on recent studies and the understanding of the state of I&E reduction technology, there are no feasible options commercially available that can achieve that kind of I&E reduction at California facilities. Therefore, Track II compliance is essentially infeasible due to technology unavailability. On the other hand, as described above, if the baseline by which Track II compliance is measured is the maximum permitted or design flow, then feasible compliance options are available for some lower use facilities in the form of flow reductions to achieve a similar reduction to closed cycle cooling. If the baseline is determined as actual flows, then an 80-90% reduction from actual flows is not likely to be feasible at most facilities. Defining baseline as the design flow creates a potential compliance path for low use facilities by accepting flow restrictions commensurate with a closed cycle cooling level of reduction from design flow.

**No interim requirements, including restoration are needed**

The Scoping Document describes potential interim restoration requirements, but does not make a case for <u>why</u> such interim measures are needed. The goal is to implement BTA requirements on existing once-through cooled power plants. The Scoping Document states that restoration measures are not BTA (page 46). Therefore, why are interim

restoration measures discussed at all? Further, interim restoration measures for facility implementation plans that later result in retrofit to closed cycle cooling, Track II compliance, repowering, or facility shutdown adds substantial additional cost and compliance efforts to what are already extremely expensive new requirements for aging power plants.

**Implementation dates need to be flexible**

The implementation dates described in the Scoping Document are firm and relatively near-term when considering the time it takes to develop and permit major infrastructure projects in the coastal zone. Further, the lower use (and therefore lower impacting) facilities are inappropriately targeted first for compliance. Implementation dates should allow for extensions for facilities that are seeking repowering or conversion to closed cycle cooling and that meet implementation milestones, but can't complete the projects on time due to issues outside of their control; e.g. permit delays. To accommodate this issue, automatic extensions to the compliance deadlines should be granted if the facility owner, for reasons outside of its control, cannot achieve its implementation milestones. Extension to the interim restoration measures can be required as part of the granting of an extension to the full compliance deadline.

**Conclusion**

For the reasons stated above, it is strongly recommended that the State Water Board move slowly in considering new requirements for once-through cooled power generating facilities, especially related to how electrical system reliability and environment resources may be negatively affected. Additionally, the feasibility and costs of complying with these stringent and inflexible requirements must be carefully thought through before moving forward.

Thank you for the opportunity to review and comment on this draft proposed policy. I can be reached at (760) 710-2144 if you have any questions or need clarification.

Tim Hemig