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<u>Via E-Mail and U.S. Mail</u>

Ken Lewis
Mary Jo Borak
California Public Utilities Commission
c/o Environmental Science Associates
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Re: <u>Comments on Draft Environmental Impact Report – Monterey Peninsula Water Supply Project</u>

Dear Mr. Lewis and Ms. Borak:

This firm represents Surfrider Foundation regarding the California Public Utilities Commission's consideration of a certificate of public convenience and necessity for California-American Water's proposed Monterey Peninsula Water Supply Project (the "Project"). Surfrider is a non-profit organization dedicated to the protection and enjoyment of the world's ocean, waves and beaches. In particular, Surfrider's work focuses on four key areas: beach access, clean water, coastal preservation, and ocean protection. While Surfrider is generally supportive of the Project, it has serious reservations regarding the Project's size and specific design features.

The Project will provide replacement water that California American Water ("Cal-Am") must acquire to reduce its present over-pumping of the Carmel River and comply with a State Water Resources Control Board Cease and Desist Order. *See* SWRCB Order WR 2009-0060. The importance of the Project for protecting the Carmel River means that its environmental review must be of the highest quality and must fully support the PUC's decision. The current draft environmental impact report ("EIR") does not, and without revision will not, meet these standards.

As identified below, the EIR falls short of requirements of the California Environmental Quality Act ("CEQA"), Public Resources Code § 21000 *et seq.*, and the

CEQA Guidelines, California Code of Regulations, title 14, § 15000 *et seq.* ("CEQA Guidelines"). The Commission must resolve the EIR's multiple deficiencies before the Commission may legally grant the requested approval. Surfrider therefore urges the Commission to remedy the identified defects in the EIR's analysis and mitigation, and to adopt all feasible mitigation to reduce the Project's environmental impacts.

I. The EIR Should Ensure that Mitigation Measures Related to Coastal Erosion Impacts Are Adequate.

The EIR notes that Cal-Am has revised its Project proposal to relocate wellheads for the two southernmost slant well clusters 400 feet inland, behind the existing sand dunes at the proposed intake site. EIR at 4.2-60. Surfrider had previously raised concerns regarding the original slant well locations proposed in Cal-Am's application because the wellheads could be compromised by coastal erosion (especially when exacerbated by sea level rise).[1] Surfrider believes that relocating the slant wells inland helps avoid these foreseeable impacts and is consistent with Surfrider's previous recommendations in this proceeding. Consequently, Surfrider supports the decision to revise the project to move the wellheads to more protected locations. Because the EIR considers only these new locations, the Commission must incorporate the updated slant well locations in any decision to approve the Project. The original slant well locations proposed for Project lack record support and environmental analysis that CEQA requires.

Even with this revised wellhead location, however, the EIR's analysis reveals that the northernmost wellhead cluster (located at the CEMEX site) will become exposed by erosion and potentially compromised under extreme storm conditions by 2060. *See* Figure 4.2-6. The EIR thus proposes Mitigation Measure 4.2-6a, which requires annual monitoring of coastal retreat at the CEMEX site and removal of the northernmost well cluster if and when data indicates that slant wells are expected to become exposed within five years.

CEQA requires that an EIR contain sufficient evidence to indicate that a mitigation measure is adequate to reduce a potentially significant impact to a less-than-significant level. *See National Parks & Conservation Assn. v. County of Riverside* (1999) 71 Cal.App.4th 1341, 1366. Yet the EIR does not demonstrate that Mitigation Measure 4.2-6a can adequately reduce the identified erosion impact. First, Measure 4.2-6a does

[1] *See* Testimony of Bradley Damitz on Behalf of Surfrider Foundation at 6-7 (Attachment A).

not specify which erosion profile[2] Cal-Am should use for calculating when threatened exposure will trigger slant well relocation planning and permitting. As the EIR shows elsewhere, a 100-year storm event could erode the dune profile at the site by up to 130 feet inland. EIR at Figure 4.2-6 (compare 2060 erosion profile with the profile showing the combined impact of 2060 erosion and a 100-year storm event). This single-event erosion is roughly equivalent to the average erosion that would be expected to occur over *twenty years*. *See id*. (compare 2040 erosion profile with 2060 erosion profile).

Every year brings a possibility of such an extreme storm event. And as was noted at the recent Commission workshop on climate adaptation, "the frequency and magnitude of [storm] extremes" is expected to "increase markedly" with climate change.[3] But if the mitigation measure's monitoring and projections overlook the possibility of an extreme storm event, they could allow the beach to erode within the range a single storm's erosion, without triggering relocation. This possibility would entirely undermine the EIR's conclusion that the measure is sufficient to avoid significant erosion impacts.

Thus, to address this issue with the EIR's erosion analysis and to fully protect against large storm events, Mitigation Measure 4.2-6(a)(1) should be revised to read:

> CalAm shall conduct annual monitoring of the rate of coastal retreat relative to the northern slant well cluster (the test slant well and one additional slant well) at the CEMEX site. The data shall be used to estimate the year at which the test well and associated pipelines have 5 years before exposure <u>under 100-year storm conditions</u>.

However, even if the EIR is properly revised to focus on 100-year storm events, the EIR lacks any information indicating whether the 5-year period will allow sufficient time to plan and permit the necessary decommissioning and relocation of the threatened slant wells. The EIR must substantiate the time threshold for removal and replacement of

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[2] The EIR's "erosion profiles" are predicted cross-sections of the beach perpendicular to the waterline. These profiles attempt to depict how the beach will retreat in response to sea-level rise, erosion, and storm events over different time horizons.

[3] *See* Dan Canyan, "Planning for climate change on top of already high climate variability" at pdf p. 16, available at www.cpuc.ca.gov/NR/rdonlyres/52D8EFC3-B79C-4854-8714-DB8151C8664F/0/Dan_Cayan_CEC_PUC_27JULY2015_Web.pdf.

the northernmost slant well cluster, especially in light of the extended permitting process that has been needed for the test well for this very project.

II. The EIR's Analysis of Impacts from Greenhouse Gas Emissions and the Proposed Mitigation Are Inadequate.

The EIR anticipates that multiple sources will contribute to the Project's total greenhouse gas emissions. These sources include emissions from construction, operation of diesel emergency generators, vehicle trips necessary for Project operation, and the electricity generation required to operate the Project. The vast majority of annual greenhouse gas emissions will stem from the Project's energy consumption. The EIR therefore uses the Project's anticipated energy consumption to calculate a very large proportion of the greenhouse gas emissions attributable to the Project.

The EIR estimates the Project's net increased energy consumption will be 40,500 MWh per year. It reaches this number by subtracting the baseline energy demand for Cal-Am's existing Seaside Basin and Carmel River production sources (7,700 MWh/year) from the Project's expected energy demand (48,200 MWh/year).[4] EIR at 4.11-10.

The EIR's calculation thus assumes that Seaside Basin and Carmel River pumping will cease once the Project comes online. That assumption is unsupported and incorrect. The calculation's purpose is to determine how much future energy use is attributable to the Project; the Project is not held responsible for the amount of its consumption that is balanced out by current energy demand that it will replace. But the EIR's approach inappropriately gives the Project "credit" for energy consumption that will continue and thus should not be netted out. As the EIR notes elsewhere, Cal-Am's water production from the Seaside Basin and the Carmel River will continue at a reduced level after the Project comes online. EIR at 1-1, 2-3 through 2-6. Consequently, the EIR must determine the Project's net energy consumption (and attendant emissions increases) by subtracting the existing baseline energy consumption from the sum of (1) the Project's energy consumption *and* (2) energy consumption from reduced pumping of Seaside Basin and Carmel River water. That calculation will correctly show the amount of Project energy

[4] The EIR describes the Project as consisting of the proposed (1) seawater intake system (i.e. slant wells), (2) a new desalination plant and appurtenant facilities, (3) desalinated water conveyance facilities, and (4) an expanded ASR system. *See* EIR at ES-5 through ES-6. That is, the Project does not include water pumping from the Seaside Basin and Carmel River.

consumption that is “new.” Without correcting this error, the EIR violates CEQA by understating both the Project’s increase in energy consumption above baseline conditions and the associated greenhouse gas emission impacts.

Even with the inaccurate calculation of the Project’s potential greenhouse gas emissions, the EIR still determines that the Project will have a significant impact related to those emissions. EIR at 4.11-14. When an agency’s analysis indicates that a proposed project will have a significant project-specific or cumulative impact related to climate change, the agency must identify and adopt feasible mitigation measures to address that impact. CEQA Guidelines § 15126.4(c).

Here, the EIR proposes two mitigation measures to reduce greenhouse gas emissions from Project operations and construction. The first measure requires Cal-Am to submit a plan for PUC approval before Project construction that (1) describes potential greenhouse gas emissions in detail, and (2) requires Cal-Am to identify and incorporate “feasible” energy recovery and conservation technologies. That measure likewise obligates Cal-Am to make “good faith efforts” to obtain renewable power for the Project.[5] EIR at 4.11-15. The second measure requires a Cal-Am consultant to prepare a “Construction Equipment Efficiency Plan” that “identifies specific measures that Cal-Am (and its construction contractors) will implement” to reduce construction-related energy use. Cal-Am must also submit that plan for Commission approval before beginning Project construction. EIR at 4.11-15, 4.18-12. Thus, in both instances, the EIR defers formulation of the specific mitigation requirements to an uncertain future date.

An EIR generally may not defer evaluation of mitigation until a later date as the EIR does here. CEQA Guidelines §§ 15126.4(a)(1)(B). CEQA allows a lead agency to defer mitigation only when three narrow, specific prerequisites are met: (1) an EIR contains criteria or performance standards to govern future actions implementing the mitigation; (2) practical considerations preclude development of the measures at the time of initial project approval; and (3) the agency has assurances that the future mitigation will be *both* “feasible and efficacious.” *Communities for a Better Environment v. City of Richmond* (2010) 184 Cal.App.4th 70, 94-95; *San Joaquin Raptor Rescue Center v. County of Merced* (2007) 149 Cal.App.4th 645, 669-71; CEQA Guidelines § 15126.4(a)(1)(B).

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[5] The identified sources of renewable power are installation of onsite solar photovoltaic panels and methane gas from the Monterey Regional Waste Management District’s adjacent landfill-gas-to-energy facility.

The EIR fails this standard in multiple ways. First, it lacks any evidence demonstrating that more precise greenhouse gas mitigation requirements cannot be formulated at this time. Cal-Am and the Commission appear to have all of the information required to formulate a conservation plan and to determine whether and how much renewable energy will be available, or at least to produce a clear menu of options and a calculation of potential emissions reductions from each. There is no justification for deferring these measures.

Moreover, an agency may not satisfy its mitigation requirements by merely ordering a project proponent to "obtain a . . . report and then comply with any recommendations that may be made in the report." *Defend the Bay v. City of Irvine* (2004) 119 Cal.App.4th 1261, 1275. This is effectively what the EIR does—it says a future plan will be prepared and then lists broad categories of mitigation that may be adopted, if "feasible." *See* EIR at 4.11-15. The EIR does not define what it considers "feasible" or otherwise establish performance criteria to determine what mitigation the Commission will ultimately adopt. The public and the Commission are thus left in the dark about the mitigation that Cal-Am will actually employ to reduce greenhouse gas impacts, let alone the mitigation's actual effect.

Courts have recognized that this approach violates CEQA, finding EIRs are inadequate if:

> "[t]he success or failure of mitigation efforts . . . may largely depend upon management plans that have not yet been formulated, and have not been subject to analysis and review within the EIR." *San Joaquin Raptor Rescue Center*, 149 Cal.App.4th at 670. "A study conducted after approval of a project will inevitably have a diminished influence on decisionmaking. Even if the study is subject to administrative approval, it is analogous to the sort of *post hoc* rationalization of agency actions that has been repeatedly condemned in decisions construing CEQA." *Sundstrom v. County of Mendocino* (1988) 202 Cal.App.3d 296, 307.

Communities for a Better Environment, 184 Cal.App.4th at 92.

The EIR itself reveals the deficiency of its vague, deferred mitigation measures. It states that the Commission "cannot substantiate numerically that the mitigated GHG emissions would be reduced to a less-than-significant level." EIR at 4.11-15. The EIR cannot substantiate the level of mitigation because the proposed mitigation is so uncertain that it is impossible to know whether it will reduce greenhouse gas emissions at all, much less below the identified levels of significance.

The EIR thus necessarily concludes that the Project's GHG emissions will cause a significant impact even after adopting the proposed mitigation measure. The EIR cannot, however, simply determine that an impact is significant and unavoidable and ignore its mitigation obligations. *Lotus v. Department of Transportation* (2014) 223 Cal.App.4th 645, 653. The Commission must adopt any and all feasible mitigation to reduce those impacts. CEQA Guidelines § 15126.4(a)(1); *Lotus*, 223 Cal.App.4th at 653 ("For each significant effect, the EIR must identify specific mitigation measures; where several potential mitigation measures are available, each should be discussed separately").

Thus, the EIR must consider whether adopting additional mitigation measures could further reduce the Project's greenhouse gas emissions and the extent of such reductions. For instance, the Commission could follow the lead of other agencies approving energy-intensive projects and require Cal-Am to purchase carbon offsets for 100% of the Projects non-renewable electricity consumption.[6] The Commission could adopt additional mitigation measures such as (1) installation of solar photovoltaic panels throughout the site including solar canopies over parking areas, (2) use of the most energy efficient technologies and engineering processes for the Project's operation, (3) mandating low or zero-emission construction vehicles, and (4) facilitating ride sharing programs and employee shuttle programs to and from the Project site.

Numerous agencies and organizations have documented other feasible and effective greenhouse gas mitigation options. The Commission must consider all of the applicable measures listed in the following documents, and adopt *all* feasible measures to reduce the Project's impacts. CEQA § 21002 ("[A]gencies should not approve projects as proposed if there are . . . feasible mitigation measures available which would substantially lessen the significant environmental effects of such projects").

- Governor's Office of Planning and Research. 2008. Technical Advisory. CEQA and Climate Change: Addressing Climate Change through California

[6] *See* Mitigation Monitoring and Reporting Program for Southern California International Gateway Project at 2-21 (available at http://www.portoflosangeles.org/EIR/SCIG/FEIR/Final_MMRP.pdf).

Environmental Quality Act (CEQA) Review. See "Examples of GHG Reduction Measures." Available at: http://www.opr.ca.gov/docs/june08-ceqa.pdf

- California Air Pollution Control Officers Association (CAPCOA). 2008 (January). CEQA & Climate Change. Evaluating and Addressing Greenhouse Gas Emissions from Projects Subject to the California Environmental Quality Act. See page 79, "Mitigation Strategies for GHG." Available: http://www.capcoa.org/wp-content/uploads/downloads/2010/05/CAPCOA-White-Paper.pdf

- California Air Pollution Control Officers Association (CAPCOA). 2010 (August). Quantifying Greenhouse Gas Mitigation Measures. A Resource for Local Government to Assess Emission Reduction from Greenhouse Gas Mitigation Measures. Available: http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf

- Attorney General of the State of California. 2008 (December). The California Environmental Quality Act. Addressing Global Warming Impacts at the Local Agency Level. Available: http://ag.ca.gov/globalwarming/pdf/GW_mitigation_measures.pdf

III. The EIR's Analysis and Mitigation of Impacts to Marine Life and Water Quality from the Project's Wastewater Discharge Is Inadequate.

The Project will produce up to 14 million gallons per day of high-salinity brine during the desalination process. EIR at 4.3-64. The Project plans to discharge that brine through the Monterey Regional Water Pollution Control Agency's existing outfall and into Monterey Bay. *Id*. at 4.3-64. The discharge will occur within the federally protected Monterey Bay National Marine Sanctuary, which contains "habitats that support extensive marine life," including "numerous special-status" marine species. *Id.* at 4.5-2, 4.5-8.

To understand the potential impacts that the Project's brine discharge might have on this special ecosystem, CEQA requires an accurate description of the existing environmental baseline. CEQA Guidelines § 15125(a); *San Joaquin Raptor/Wildlife Rescue Center v. County of Stanislaus* (1994) 27 Cal.App.4th 713,722. The EIR must describe "the physical environmental conditions in the vicinity of the project, *as they exist at the time the notice of preparation is published*." CEQA Guidelines § 15125(a) (emphasis added). The EIR fails this basic requirement.

The EIR acknowledges that, without mitigation, both concentrated brine and mixed brine/wastewater discharges could pose potentially significant impacts to the marine ecosystem and water quality objectives contained in the State Water Board's recent amendment to the California Ocean Plan to address impacts from desalination facilities ("Ocean Plan Amendment"). *See, e.g.,* EIR at 4.3-74, 4.5-41. Yet the EIR does not even describe the character of the existing marine ecosystem surrounding the outfall that the Project proposes for the brine discharge. As the EIR admits, there have been no studies of the ecosystem immediately surrounding the outfall since 1999. EIR at 4.5-17. The observations used in that 1999 study were likely conducted even earlier. Without information regarding the current conditions at the discharge site, it is impossible to accurately evaluate the potential impact that the brine discharge could pose to marine organisms there. *Berkeley Keep Jets Over the Bay Committee v. Board of Port Com'rs* (2001) 91 Cal.App.4th 1344, 1382-83 (an EIR is defective where it excludes information necessary to understand a Project's potential impacts). This inadequate description of baseline conditions contravenes not only CEQA, but also the Ocean Plan Amendment. *See* State Water Resources Control Board, California Ocean Plan (2015) at M.4.a(2) (requiring establishment of "baseline biological conditions . . . prior to commencement of construction" of a new desalination plant).

The EIR also improperly limits its analysis of potential discharge impacts to those which are anticipated to occur *beyond* the boundary of the "zone of initial dilution," or ZID. The ZID extends radially 100 meters from the point of discharge. EIR at 4.3-20. Yet the EIR disregards all impacts within this sizable area, making it essentially a "sacrifice zone." The Commission and the public are left in the dark about what might happen to marine life within the ZID.

This is a serious flaw. The EIR states that the Project's brine discharge "could have an effect on special-status species" including the California gray whale, the Southern sea otter, and bottom dwelling and foraging fish, any of which may live in or pass through the ZID. EIR at 4.5-34. The EIR also admits that by the time of the last observation study, a reef-like marine community had developed on the discharge outfall itself—organisms that spend their entire lives within the future ZID. EIR at 4.5-16 through 4.5-17. Yet the EIR never discusses the potential impacts that the Project's concentrated brine discharge could have on that reef community, the special status species living within or passing through the ZID, or the benthic community surrounding the outfall. Significantly, an expert report recently commissioned by the State Water Resources Control Board to evaluate the impacts and management of brine discharges, observed that such "benthic infaunal communities and sea grasses are the most sensitive to the acute effects of concentrate discharge." *See* Management of Brine Discharges to Coastal Waters: Recommendations of a Science Advisory Panel, Southern California Coastal Water Research Project ("SCCWRP Report") at 9 (available at http://www.waterboards.ca.gov/water_issues/programs/ocean/desalination/docs/dpr051812.pdf).

The EIR cannot focus so myopically on brine dilution *at* the ZID boundary that it effectively ignores impacts to biological resources that fall *within* that boundary. If the Project would cause major disruption and mortality to these species, we would never know based on this EIR. It has therefore plainly failed to describe all of the Project's impacts. *Citizens To Preserve the Ojai v. County of Ventura* (1985) 176 Cal.App.3d 421, 430 (and EIR cannot "completely ignore[]" a potential impact, even if agency does not have sufficient information to fully quantify the impact).

As the EIR acknowledges, elevated salinity and its impact on marine ecology, both within and outside of the ZID, is one of the "major concerns associated with coastal desalination projects." EIR at 4.5-34. Yet "very few studies" have examined the sublethal impacts of long-term brine exposure on marine life and data on impacts to California biota "are extremely limited." SCCWRP Report at 9, 11. Given this uncertainty, the SCCWRP Report recommends that salinity levels at the ZID boundary be limited to an increase of either 2 parts-per-thousand ("ppt") or 5% above pre-project ambient salinity levels, ***whichever is less***.

The EIR relies heavily on the SCCWRP Report, and acknowledges that a 5% increase would be the equivalent of a 1.7 ppt salinity increase above ambient conditions. Yet the EIR instead relies on the 2 ppt threshold of significance, which represents more than a 17% increase over the 1.7 ppt threshold recommended by the SCCWRP Report. *See* Memorandum of Dr. Craig Jones, September, 29 2015 (Attachment B). While the 2 ppt threshold aligns with the regulatory standard adopted in the recent Ocean Plan Amendment, the EIR lacks any rationale for why the 2 ppt threshold is more appropriate for the Project than a 5% increase above ambient salinity (1.7 ppt) threshold recommended by the SCCWRP Report. CEQA requires such an explanation. *Protect the Historic Amador Waterways v. Amador Water Agency* (2004) 116 Cal.App.4th 1099, 1109 (agencies cannot use regulatory standards as significance thresholds in a manner that ignores other relevant thresholds). Moreover, given CEQA's command that "all agencies" give "major consideration . . . to preventing environmental damage," rounding up to make the threshold less protective requires close scrutiny and support by substantial evidence in the record. CEQA § 21000(g). The EIR does not provide evidence to support the 2 ppt, as opposed to the 1.7 ppt, threshold.

The EIR's use of the higher threshold is particularly troubling considering that the EIR's near-field modeling anticipates that increased salinity levels from the Project's discharge will almost reach the 5% increase above ambient salinity threshold. *See* EIR Table 4.3-12 (showing increased salinity between 1.5 and 1.6 ppt at the edge of the ZID; a 5% increase equals a 1.7 ppt increase). As Dr. Craig Jones notes, "any small model sensitivity or error suggests that there is a reasonable possibility of elevation [of the Project's salinity impacts] above the recommended 1.7 ppt value." *See* Attachment B at 2.

The EIR's brine analysis might be particularly susceptible to modeling error because the Pollution Control Authority's outfall was not designed for brine discharge. The outfall has horizontally-oriented discharge ports rather than inclined diffusers that are preferred for brine disposal. EIR Appendix D2 at 9, SCCWRP Report at 23-27. Like the SCCWRP Report, the EIR acknowledges that there is limited scientific literature studying mixing scenarios for a horizontal discharge of undiluted brine like the discharge that the Project proposes:

> Most [studies] have been conducted for inclined jets (i.e., jets that discharge upward at an angle), which increases the initial mixing of the plume. Fewer studies are available to characterize the mixing of negatively buoyant plumes from horizontally-oriented discharge ports.

EIR Appendix D2 at 9.

All of the circumstances here—limited understanding of existing conditions, untested technology, and a risk to protected resources in a marine sanctuary—call for a conservative, protective approach and a wary eye on model results. Yet the EIR does not consider the possibility that limited information and modeling error might understate the salinity and other impacts of the Project's brine discharge. Significantly, US EPA has observed that "[i]ncreasingly, modelers and project managers are moving beyond an acknowledgement of project uncertainty *to something more useful – a quantification of the degree of uncertainty . . . and estimation of its importance in model application*." Attachment B at 2 (emphasis added). But the EIR's near-field model does not even provide a confidence interval that explains the level of risk in the model. Without this information, the EIR prevents the public and decisionmakers from understanding the risks associated with relying on these models to project brine impacts, and fails to consider mitigation measures that may be needed to protect the environment.

The EIR also employs a far-field analysis to evaluate the potential long-term accumulation of brine plumes within the marine environment. The decision to perform both near-field and far-field evaluations of potential impacts is an improvement over the EIR previously prepared for the Coastal Water Project, and is consistent with Surfrider's recommendation in this proceeding.[7] The EIR's chosen method of far-field plume analysis, however, has never been peer reviewed or otherwise approved by a regulatory agency for evaluating long-term brine accumulation. *See* Attachment B at 3-4. Moreover, the EIR provides no justification for employing its unproven far-field methodology instead of the methodologies recommended in the recent SCCWRP Report. *Id*. The EIR should therefore reevaluate the Project's potential far-field impacts using scientifically-accepted methodologies. *See Berkeley Keep Jets*, 91 Cal.App.4th at 1380-82 (an EIR's methodologies must be able to capture a project's potential impacts).

Given the inherent uncertainty surrounding modeled impacts, the EIR cannot simply assume that brine discharge impacts will be less-than-significant or reduced to that level with mitigation. The SCCWRP Report recognized as much: "Modeling and background observations conducted prior to commissioning [a project] can and should be used to predict plume behavior but *monitoring after commissioning is essential to validate those predictions*." SCCWRP Report at 32 (emphasis added). The report found that such monitoring is necessary to identify both near-field and far-field impacts to marine resources. *Id*. And monitoring is particularly important where a discharge will occur at an existing wastewater outfall that was not specifically designed for brine discharge. *Id*. at 25.

In fact, the recently-adopted Ocean Plan Amendment requires owners and operators of desalination facilities to submit monitoring and reporting programs to regional water boards for approval. State Water Resources Control Board, California Ocean Plan (2015) at M.4. Monitoring programs "shall, at a minimum, include monitoring for benthic community health, aquatic life toxicity, hypoxia, and receiving water characteristics." *Id*. at M.4.a. CEQA requires the EIR to analyze the Project's consistency with applicable land use and regulatory standards, including the monitoring obligations in the Ocean Plan. *See* CEQA Guidelines, Appendix G, X(b). The EIR acknowledges the existence of these monitoring requirements, but fails to undertake the required analysis. EIR at 4.3-36, 4.5-40. Given these legal mandates, the outdated information regarding biological resources at the discharge site, the uncertainty

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[7] *See* Testimony of Dr. Craig Jones on Behalf of Surfrider Foundation (Attachment C).

surrounding the EIR's brine plume modeling, and the ultimate impact that these plumes could have on Monterey Bay's marine ecosystem, the EIR must include a program to monitor for significant marine ecosystem impacts after the Project becomes operational.

A monitoring program could evaluate salinity and chemical levels surrounding the PCA outfall to determine whether any exceedances would occur. Such a program is easily implemented and cost efficient. *See* Attachment B at 4. At the very least, effective monitoring should focus on water quality within the ZID, at the ZID boundary, and 100 yards downslope from the ZID. *Id.* Given the uncertainty of impacts associated with the Project's brine discharge, Dr. Jones recommends at least a three year monitoring period, which would reasonably capture potential seasonal variability in plume dispersals and brine accumulation. *See id*. Thus, regular monitoring would allow the Commission and other regulatory agencies to determine if the Project's discharge would create long-term water quality impacts that would require further mitigation.

Further, the EIR must include potential measures to mitigate any adverse impacts observed in the monitoring reports. For example, these mitigations could include the modification of the outfall operations or facilities, such as the orientation of the discharge nozzle, jet exit velocity, the number and spacing of nozzles, and/or the orientation to prevailing currents.[8] The uncertainty of the EIR's model and the risk of greater-than-anticipated impacts demand a failsafe measure. Without the assurance of concrete mitigation, the Project's discharge impacts must be considered significant and unavoidable. Thus, the Project cannot be legally approved without further mitigation.

IV. The EIR Should Consider Alternatives that Can Reduce the Size of the Desalination Plant.

A proper analysis of alternatives is essential to comply with CEQA's mandate that significant environmental damage be avoided or substantially lessened where feasible. Pub. Res. Code § 21002; CEQA Guidelines §§ 15002(a)(3), 15021(a)(2), 15126(d); *Citizens for Quality Growth v. City of Mount Shasta* (1988) 198 Cal.App.3d 433, 443-45. "Without meaningful analysis of alternatives in the EIR, neither the courts nor the public can fulfill their proper roles in the CEQA process . . . . [Courts will not] countenance a result that would require blind trust by the public, especially in light of CEQA's fundamental goal that the public be fully informed as to the consequences of action by

[8] *See* SCCWRP Report at 23.

their public officials." *Laurel Heights Improvement Assn. v. Regents of University of California* (1988) 47 Cal.3d 376, 404.

The primary purpose of alternatives analysis under CEQA is to explore alternatives to proposed actions that will not adversely affect the environment. *Watsonville Pilots Ass'n v. City of Watsonville* (2010) 183 Cal.App.4th 1059, 1089. Therefore, the discussion of alternatives must focus on project alternatives that are capable of avoiding or substantially lessening any significant effects of the project, even if such alternatives would impede to some degree the attainment of the project objectives or would be more costly. CEQA Guidelines § 15126.6(b); *see also Watsonville Pilots*, 183 Cal. App. 4th at 1089 ("[T]he key to the selection of the range of alternatives is to identify alternatives that meet most of the project's objectives but have a reduced level of environmental impacts").

Here, the EIR improperly circumscribes its analysis of potential Project alternatives. Specifically, it fails to consider a Project alternative that reduces the desalination plant's size relative to either the large desalination plant project scenario or the smaller desalination plant plus groundwater replenishment variant ("GWR Variant"). By reducing the size of the desalination plant, such an alternative could reduce the Project's net greenhouse gas, brine discharge, and groundwater impacts.

Significantly, the EIR's alternatives analysis already recognizes the environmental benefits of reducing the size of the Project's desalination component. The EIR labels the GWR Variant as an environmentally superior alternative to the larger desalination scenario, even though it will have temporary construction-related noise and air quality impacts. EIR at 7-246. The EIR recognizes that because the GWR Variant includes a smaller desalination plant, it would reduce the Project's long-term and "more severe" operational impacts related to groundwater and greenhouse gas emissions. *Id*. Other potentially significant operational impacts, like potential water quality impacts from brine discharge, would also diminish as the proposed desalination plant becomes smaller. Thus, the EIR correctly shows that reducing the desalination plant's size will reduce the Project's most significant environmental impacts.

Despite the environmental gains realized by further reducing the size of the desalination plant, the EIR does not consider an alternative that can shrink the plant's size independent of the GWR Variant. As part of the No Project alternative, the EIR analyzed foreseeable water conservation and water recycling measures within Cal-Am's service district that could offset the water supply deficiency if the Project is not built. EIR at 7-184 through 7-196. The EIR rejects a No Project alternative because it does not provide sufficient water to fully satisfy the impending water deficit in Cal-Am's service district and achieve other Project objectives. *Id.* at 7-197. But the EIR inexplicably fails to consider whether these conservation measures could be combined *with* the Project to reduce the size of the desalination plant and its long-term environmental impacts. CEQA requires the EIR to consider such a Project alternative, especially considering that it could reduce the Project's "most severe" environmental impacts under either large-desalination or GWR Variant scenarios. *See Watsonville Pilots Ass'n*, 183 Cal.App.4th at 1087.

V. Conclusion

For all of the reasons described above, the EIR does not provide the Commission and the public all of the information required to understand the Project's potentially significant environmental effects and prescribe mitigation measures to address those impacts. We therefore urge the Commission to revise the EIR in order to provide any Project approval with legally-required support and to ensure that all of its impacts are mitigated to the greatest extent possible. The Commission should likewise consider a Project alternative that reduces the desalination plant's size and, as a result, the Project's significant operational impacts.

Very truly yours,

SHUTE, MIHALY & WEINBERGER LLP

Edward T. Schexnayder

690571.9

Attachment A

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

In the Matter of the Application of California American Water Company (U210W) for Approval of the Monterey Peninsula Water Supply Project and Authorization to Recover All Present and Future Costs in Rates	Application A.12-04-019 (Filed April 23, 2012)

TESTIMONY OF BRADLEY DAMITZ

ON BEHALF OF SURFRIDER FOUNDATION

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Attorneys for Surfrider Foundation

Date: February 22, 2013

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

In the Matter of the Application of California American Water Company (U210W) for Approval of the Monterey Peninsula Water Supply Project and Authorization to Recover All Present and Future Costs in Rates	Application A.12-04-019 (Filed April 23, 2012)

TESTIMONY OF BRADLEY DAMITZ

ON BEHALF OF SURFRIDER FOUNDATION

Please state your name and address.

My name is Bradley Damitz. I reside at 869 Estancia Way in San Rafael California.

What is the purpose of this testimony?

This testimony assesses potential coastal erosion impacts to the proposed slant intake wells and associated infrastructure for the Monterey Peninsula Water Supply Project ("MPWSP" or "Project"). It also evaluates California American Water Company's ("Cal-Am") erosion and sea level rise modeling, and discusses regulatory requirements of the Monterey Bay National Marine Sanctuary.

Please describe your qualifications for providing this testimony.

My professional career has involved working on coastal erosion issues in the Monterey Bay area for more than 10 years. As an Environmental Policy Specialist for NOAA's Monterey Bay National Marine Sanctuary ("MBNMS") I developed and implemented collaborative plans, guidelines, and policies that address a variety of marine resource protection issues, including coastal erosion and sea level rise, desalination, and other emerging issues. A large part of my job was providing review and analysis of a variety of coastal development project proposals, including desalination plants, for the sanctuary's permit review process. I led the development of the MBNMS Coastal Armoring and Desalination Action Plans, and co-authored or contributed to several publications and studies regarding coastal erosion in the southern Monterey Bay.

Additionally, between 2005 and 2009 I served as coordinator and facilitator of the Southern Monterey Bay Coastal Erosion Workgroup, a multi-stakeholder workgroup made up of local decision makers, researchers, and other experts. Due to increasing concern over coastal erosion and sea level rise impacts, the Workgroup was established to study erosion, recommend mitigation alternatives, and facilitate the development of a regional planning approach addressing erosion and sea level rise issues along the shoreline between Moss Landing Harbor and Wharf II in Monterey.

My specific experience with desalination includes being a member of the 2001 California Water Desalination Task Force, facilitator of the MBNMS Desalination Workgroup, and a Temporary Advisor for the World Health Organization, where I worked on the development of WHO guidelines for environmental assessment of desalination projects.

What information have you used to formulate your testimony?

I have reviewed information pertaining to the proposed Project, including the January 9, 2013 Memorandum from RBF Consulting to Richard Svindland re MPWSP Project Description Update; the January 9, 2013 Memorandum from RBF Consulting to Richard Svindland re Contingency Planning for the MPWSP; Cal-Am's November 1, 2012 Response to Surfrider Foundation's Data Request; and the October 30, 2009 Final Environmental Impact Report for Cal-Am's Coastal Water Project. I have also consulted the following sources regarding coastal processes and erosion:

- Philip Williams & Associates ("PWA"), E. Thorton, J. Dugan, Halcrow Group, (2008). "Coastal Regional Sediment Management Plan for Southern Monterey Bay." Prepared for Association of Monterey Bay Area Governments.
- Steven Quan, Rikk G. Kvitek, Douglas P. Smith, and Gary B. Griggs, (2012). "Using Vessel-Based LIDAR to Quantify Coastal Erosion during El Niño and Inter-El Niño

Periods in Monterey Bay, CA." Journal of Coastal Research In-Press. Coconut Creek (Florida), ISSN 0749-0208.

- Mark D. Orzech, Ad J.H.M. Reniers, Edward B. Thornton, Jamie H. MacMahan, (2008). "Megacusps on rip channel bathymetry: Observations and modeling." Coastal Engineering 58, 890–907.
- ESA PWA (2012). "Evaluation of Erosion Mitigation Alternatives for Southern Monterey Bay."
- Thornton, E.B., A.H. Sallenger, J. Conforto Sesto, L. A. Egley, T. McGee, and A.R. Parsons, (2006). "Sand mining impacts on long-term dune erosion in southern Monterey Bay." Marine Geology 229: 45-58.
- Thorton, Edward, Professor Emeritus, Department of Oceanography, Naval Postgraduate School, Personal Communication February 2013.
- MBNMS and National Marine Fisheries Service, (2010). "Guidelines for Desalination Plants in the Monterey Bay National Marine Sanctuary."
- Hapke, C.J., Reid, D., Richmond, B.M., Ruggiero, P., and List, J., (2006) "National assessment of shoreline change, Part 3: Historical shoreline changes and associated coastal land loss along the sandy shorelines of the California coast." U.S. Geological Survey Open-file Report 2006-1219.
- Smith, D.P, Gref, K., and Hofmann, A., (2005). "Are 'Stable Shorelines' and 'Broad Beaches' Mutually Exclusive Management Goals Along Southern Monterey Bay?" The Watershed Institute, California State University Monterey Bay, Publication No. WI-2005-09, 46 pp.

Finally, on January 9, 2013, Antony Tersol, Vice Chair of Surfrider Foundation's Monterey Chapter, and I met with Richard Svindland to discuss Cal-Am's plans to install slant wells at the CEMEX sand mine site.

Please describe the location of the proposed water intake system for the Project.

According to the Project Description Update, the preferred site for constructing the slant wells is on a parcel north of the City of Marina. This location is adjacent to an active sand mine owned by the CEMEX Corporation.

Please summarize the water intake design for the proposed Project.

The proposed MPWSP would include a feedwater intake and conveyance system for a 6.4 or 9.6 MGD desalination plant. The desalination plant would extract seawater from subsurface slant wells beneath the beach and seafloor. The slant wells would be constructed in two clusters along a 2000-foot stretch of shoreline. Four wells would be constructed at each cluster for the 9.6 MGD desalination option and three wells would be constructed at each cluster for the 6.4 MGD option. A preliminary layout and profile view of the well cluster is shown on Figures 6 and 7 of Cal-Am's Project Description Update. Individual slant wells would likely be drilled at a 22-degree angle from horizontal to the bottom of the surface aquifer, and would range in length from 530 to 630 linear feet.

Wellheads for the slant wells would be buried completely beneath the beach surface in the area referred as the "swash zone," which is located between the mean high and low tide lines. The Project Description Update states that these wellheads would be capped at or below mean sea level to avoid coastal erosion impacts.

A 36-inch diameter pipe tunnel would be constructed to connect the two well clusters. Other associated infrastructure would include: a beach access tunnel approximately 2,500 feet in length with a minimum diameter of 48 inches; an intake pump station on the east side of the dunes; and an intake pipeline to convey the feedwater from the pump station to the desalination plant.

Please describe the coastal environment surrounding the preferred intake site.

The proposed intake wells would be located on the southern Monterey Bay (SMB) shoreline approximately one mile north of Reservation Road in the City of Marina. Wide sandy beaches backed by large coastal dunes, high coastal erosion rates, and limited coastal development are characteristic of this area.

Average coastal erosion rates in the SMB are the highest in the State of California (Hapke et al., 2008; PWA 2008) and the rates at the proposed intake well location are among the highest in the SMB. A 2006 USGS study identified an average erosion rate of 4.0 feet per year for the entire SMB shoreline, between Monterey and the Salinas River mouth, with the vast majority of erosion occurring during the El Niño events of 1982-83 and 1997-98. The study showed that at Fort Ord, where erosion rates are similar to the proposed intake well area (PWA, 2008), during the 15-year period between 1983 and 1998 the total dune toe erosion was 70 feet. Bluff erosion near the proposed intake location has averaged approximately 4.5 feet per year over the past 20-30 years (Thornton et al., 2006). With future sea-level rise, the Coastal Regional Sediment Management Plan for Southern Monterey Bay (PWA, 2008) predicts that the erosion rate will increase to approximately 5.5 feet per year over the next 50 years.

Indeed, the erosion rate in this location has increased significantly over the past 20 years compared to rates before 1985. This observed increase in coastal erosion is tied to the increase in volumes of sand removed by the CEMEX sand mine (ESA-PWA 2012). Further increases in sand extraction would likely result in higher erosion rates.

Erosion of the SMB shoreline is highly episodic, typically occurring when large storm waves and high tides coincide (PWA 2008). Interestingly, 25 feet of erosion occurred between February and April 1983 and 30 feet during the 97-98 El Niño winter, with only 15 feet of erosion occurring during the remaining 14 years (Hapke et al.). Another study, conducted by Thornton et al. (2006) further emphasizes the episodic nature of SMB coastal erosion. The authors showed that during the 1982-83 El Niño winter storms 1.0 million cubic yards of eroded sediments were lost offshore and 2.4 million cubic yards during the 1997-98 El Niño event—a seven-fold increase over the long-term annual average.

Site-specific erosion rates are also highly variable due to the presence of coastal features called megacusps, which migrate laterally along the shoreline. Dune erosion occurs at the embayments of these megacusps where the beach is at its narrowest. Beach width and erosion also vary seasonally, with beaches narrower and steeper in the winter than in the summer.

Erosion rates throughout the SMB are also expected to increase due to predicted sea level rise from global climate change.

What impacts might coastal erosion have on the proposed project?

Based upon a review of Cal-Am's preliminary information, I have identified several potential coastal erosion concerns. The Project Description Update states that all structures will be capped at or below mean sea level and the diagrams n this memo show the intake well infrastructure buried at just 4 feet beneath the existing ground, in the swash zone, at its shallowest point (at the 4' x 12' wellhead vaults). These proposed wellhead locations are in an area subject to very strong physical forces, including heavy wave action. Moreover, with sea level rise and shoreline recession, the swash zone (along with dunes and beach) will migrate shoreward over time, while the location of the submerged wellheads and caissons will remain fixed. At some point, the wellheads will be located in the surf zone and subject to powerful wave action. This would result in the wellheads and other equipment becoming exposed, which could cause structural damage and present safety hazards to recreational activities such as swimming, fishing, and surfing.

A key consideration is whether intake well structures will be exposed within their economic life. Cal-Am estimates that the intake wells will have at least a 20-year economic life and that the piping system's economic life will be 80 years. Upon analysis of the preliminary design specifications and diagrams, it is my opinion that it is unlikely that all of the intake structures, such as the wellheads, would remain functional during these timeframes. Based on the plan presented in Figure 7 of Cal-Am's Project Description Update, the wellhead would be approximately 50 feet from the shoreline at Mean Sea Level. Given a reasonable average erosion rate of 5 feet per year, the wellhead at MSL would be exposed in 10 years. However, it is also necessary to plan for a high level of variability in erosion on a site-specific basis, therefore an extra safety factor of at least 50 feet of additional erosion would be appropriate for

Cal-Am's planning and design purposes, given seasonal shoreline variability on the order of 30 feet (Thornton, 2013) in addition shoreline variability of at least 30 feet due to megacusp migration (Orzech et al, 2008; Quan et al, 2012). Given these considerations, the wellhead depicted in Figure 7 has a high probability of being impacted within the first few years of installation.

How could the Project avoid impacts from coastal erosion?

There are clear environmental and operational advantages to using a subsurface intake instead of an open ocean intake, and I am optimistic that such a structure can be responsibly built. However, it is unlikely that Cal-Am's intakes at the proposed location would be sufficiently protected from the effects of coastal erosion and physical forces from the ocean.

In light of the concerns described above, I recommend that Cal-Am take a highly precautionary approach to siting the Project's intake. Specific actions that Cal-Am could take to mitigate impacts from coastal erosion include locating slant well infrastructure more inland (e.g. similar to the previously proposed intake design for the North Marina Alternative analyzed in Cal-Am's 2009 EIR) or burying the wellheads deeper below Mean Sea Level so that erosion will not expose them as quickly. Alternatively, if Cal-Am uses the proposed wellhead locations show in the Project Description Update, it should shorten its projected economic life for these structures.

What further steps are necessary to properly consider potential erosion impacts when designing the Project?

Throughout the design process, Cal-Am should seek input from a local geologist, geomorphologist and/or coastal engineer who is familiar with the conditions at this specific location. The erosive forces at this location are extremely strong and unpredictable, and should not be underestimated.

Cal-Am should also use the most current and accurate coastal erosion data for design purposes. Currently, Monterey Bay Sanctuary Foundation is overseeing a Monterey Bay sea level rise study, being conducted by ESA-PWA, that will provide more accurate data than are currently available. Results should be available in late spring or early summer of 2013.

Finally, relying only on an average coastal bluff erosion rate is insufficient for engineering planning purposes, and Cal-Am should not do so when determining its slant well design. Given the high variability of site-specific erosion rates at the proposed location, I recommend that Cal-Am use an additional factor of safety of at least 50 feet of erosion.

What is the MBNMS?

The MBNMS is a federally protected marine area offshore of California's central coast. The MBNMS encompasses over 276 miles of coastline from Cambria to Marin County and is administered by NOAA. Congress designated MBNMS in 1992 in accordance with the National Marine Sanctuaries Act.

Please describe the MBNMS's regulatory scheme.

The MBNMS regulates certain activities in Monterey Bay. Permits or authorizations of other agencies' permits may be issued to allow certain projects that would be otherwise prohibited, but only if a project is compatible with MBNMS's resource protection objective and would not have long-term or significant environmental impacts.

Three of the sanctuary's regulations apply directly to desalination plants; therefore MBNMS has regulatory authority over the Project. Two of the regulations involve discharging of material (i.e. brine effluent) either 1) within sanctuary boundaries, or 2) beyond sanctuary boundaries, but entering the sanctuary and causing harm to its resources. The third relevant sanctuary regulation prohibits altering submerged lands. Installation of desalination facility structures such as intake or outfall pipelines on or beneath the ocean floor would require MBNMS authorization of California Coastal Commission Coastal Development Permits that allow for seabed disturbance.

The MBNMS permitting process requires a full review of the project's potential impacts consistent with the National Environmental Policy Act. MBNMS can only issue an

Authorization if the proposed project is consistent with MBNMS mandates and permitting requirements.

In 2010, the MBNMS and the National Marine Fisheries Service released *Guidelines for Desalination Plants in the Monterey Bay National Marine Sanctuary*, attached as Exhibit 1. This document includes several guidelines of interest to Cal-Am, pertaining to coastal erosion impacts and intake well design and operation, including the following excerpts:

- "Desalination plants should be designed and operated to minimize impacts to recreational and commercial activities that occur within the Marine Sanctuary. The project proponent should provide a thorough evaluation of the potential impacts of the proposed project and alternatives to recreation, public access and safety that result from the construction, operation, and maintenance of the facility. These should include but not be limited to potential impacts to SCUBA divers, kayakers, recreational boaters, and commercial and recreational fishermen."
- "Desalination plants in the MBNMS should not contribute to coastal retreat and should not be designed to anticipate the possibility of installing coastal armoring at any time in the future to protect the plant or its infrastructure from the effects of coastal erosion, wave action, or sea level rise. The project proponent should provide a detailed evaluation of the potential for coastal erosion to affect the construction and operation of the plant, as well as the potential for the proposed project to require new coastal armoring structures in the future to protect related infrastructure including intake and outfall pipelines. The anticipated need for planned retreat of infrastructure due to coastal erosion should be considered."
- "The project proponent should provide complete plans, which include detailed information on: location, depth, engineering, and configuration of intake and outfall pipes; sizing and configuration of seabed structures; proposed depth and distance from shore of the intake and discharge points; local bathymetry; and dilution zones for each discharge pipeline alternative. The pipeline placement and configuration of intake and

discharge structures should be designed as to avoid sensitive biological areas in the sanctuary."

What experience do you have with the Sanctuary and Guidelines?

While working for MBNMS, I was the staff lead on desalination issues between 2000 and 2008. My responsibilities included reviewing desalination project proposals, developing an action plan to address potential desalination impacts, and coordinating the multiagency effort to develop the MBNMS desalination guidelines.

What effect could the MBNMS permitting process and Desalination Guidelines have on the proposed Project?

Based upon the Desalination Guidelines and my experience with the Office of National Marine Sanctuaries permitting process, it is highly unlikely that MBNMS would permit any project with a high potential to be negatively impacted by coastal erosion impacts. It is also highly unlikely that the MBNMS would issue a permit to allow construction of a coastal armoring structure to protect desalination plant components. Therefore, it is critical that Cal-Am design its intakes so that coastal erosion or other physical forces would not undermine the intakes within their projected economic life.

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EXHIBIT INTENTIONALLY OMITTED

Attachment B

Integral Consulting Inc.
200 Washington Street
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Santa Cruz, CA 95060

telephone: 831.466.9630
facsimile: 831.466.9670
www.integral-corp.com

September 29, 2015

Gabriel M. B. Ross
Shute, Mihaly & Weinberger LLP
396 Hayes Street
San Francisco, CA 94102

Subject: Review of "Brine Discharge Analyses of the California American Water Company's Monterey Peninsula Water Supply Project (ESA 2015)" prepared by Craig Jones, Ph.D., Principal, Integral Consulting Inc.

Overall Approach

The California Public Utilities Commission (CPUC or Commission) as Lead Agency, prepared a Draft Environmental Impact Report (EIR) for the California American Water Company's proposed Monterey Peninsula Water Supply Project (MPWSP or proposed project) as required by the California Environmental Quality Act (CEQA) and the CEQA Guidelines.

The Southern California Coastal Water Research Project (SCCWRP, 2012) recommended a salinity limit at the mixing zone boundary for the proposed project's discharge of no more than 5% above the ambient background ocean salinity level, or 2 parts per thousand (ppt), whichever was smaller. According to ESA (2015) the 5% recommended limit is an increase of 1.7 ppt above that occurring naturally in the California waters at the edge of the Zone of Initial Dilution (ZID). ESA (2015) rounded the 1.7 ppt recommended limit to 2 ppt which is roughly 18% above the recommended value. *Given the low levels of relative salinity change used as guidance (5%), an 18% rounding upwards of the absolute limit is likely unacceptable.*

The ZID is defined as the zone adjacent to a discharge where there is rapid dilution of a discharge (SCCWRP, 2012). The brine mixing zone is the allocated impact zone where there may be toxic effects on marine life due to elevated salinity (SWRCB, 2015). ESA (2015) defined this as the area where the salinity exceeds 2.0 ppt above natural background salinity.

During certain times of the year, the brine would mix with treated wastewater from the Regional Wastewater Treatment Plant, into a combined discharge. In general, the initial dilution characteristics of a combined discharge during high MRWPCA flow appears to pose no risk of salinity increase at the outfall. Due to low wastewater flows released in April through November, operation of the MPWSP Desalination Plant could result in a brine-only discharge or a very low dilution of the brine discharge. The ESA (2015) analysis conservatively assumes a brine-only discharge for all of these analyses. I concur that this conservative approach is appropriate to drive the dilution analyses.

Near Field Dilution Analysis

ESA (2015) uses two analytical methods to characterize the dilution for the discharge from the MRWPCA outfall diffuser. The models are the Semi-Empirical Analysis (SEA) and the Visual Plumes (VP) model. As cited in ESA (2015), both methods are consistent with the regulatory approach recommended by the SCCWRP for analyzing the initial dilution of brine discharges (Flow Science, Inc., 2014; SCCWRP, 2012b).

The VP method is widely used in diffuser discharge analyses. However, because this method has only recently been validated against limited experimental data for sinking plumes (undocumented in this EIR), the SEA model was used here to provide redundancy in the analysis (Flow Science, Inc., 2014). The results presented in Table 4.3-11 (ESA, 2015) show the horizontal distances of the ZID based on the two analyses. The analyses show identical horizontal analyses results for the rising plume, but only the SEA analysis is used for a sinking plume.

Generally, I agree with this approach of cross-validation of these two analysis techniques. It lends confidence to the modeling approach for near-field validation of rising plumes. However, the highest risk of impacts comes under a sinking plume scenario when only the SEA model is used. Since VP was used previously in a draft EIR for sinking plumes and ESA cites some level of validation in sinking plumes, it would be useful to compare VP results for a sinking plume as well. A comparison of SEA and VP for the sinking case would provide a better understanding of overall model uncertainty in the prediction of the ZID.

Table 4.3-12 show the salinity levels at the edge of the ZID. The ESA (2015) report concludes that the 1.5 and 1.6 ppt salinity increases at the edge of the ZID is below the threshold of 2 ppt and poses a less-than-significant impact. The actual ppt recommended limit without rounding is 1.7 ppt and not 2 ppt (SCCWRP, 2012). Given that the model produces values of 0.1 ppt to 0.2 ppt below the limit at the edge of ZID, one would conclude that any small model sensitivity or error suggests that there is a reasonable possibility that salinity at the ZID boundary exceed the recommended 1.7 ppt value. None of the modeling results included a discussion of uncertainty or sensitivity analysis to determine the quantitative confidence in the model results.

USEPA OSWER Directive 9200.1-96FS states "Both developers and users of models generally agree that all models are uncertain. Increasingly, modelers and project managers are moving beyond an acknowledgement of uncertainty to something more useful – a quantification of the degree of uncertainty in models, and estimation of its importance in model application." Given the model prediction of only 0.1 ppt salinity below the recommended threshold at the edge of the ZID, a quantification of uncertainty in the modeling should be included before concluding a "less-than-significant" impact."

Far Field Modeling

ESA (2015) describes its far-field analysis as follows:

- ESA (2015) conducted a far-field analysis of the plume's fate, transport, and resulting salinity levels using data on ocean currents derived from the Regional Ocean Modeling System (ROMS) model, which is one of the models recommended in the SWRCB's technical report on discharges from desalination plants (SCCWRP, 2012).
- ESA used a far-field particle-tracking model to calculate the dilution rates of the plume (before mitigation) as it traveled farther from the point of discharge beyond the edge of the ZID. The far-field particle-tracking model was used to calculate the dilution rates of the plume as it traveled farther from the point of discharge beyond the edge of the ZID.

The two bullets above are inconsistent and misleading. It may be more properly stated that ESA used results from the ROMS model to provide boundary conditions for a far-field particle-tracking model (FFPTM) developed by ESA. The FFPTM was use to calculated transport and dilution of a salinity plume beyond the ZID. ROMS is not used to calculate salinity transport, it is only used to provide depth-averaged velocities used as an input to the FFPTM. The FFPTM was not reviewed or recommended by the SCCWRP (2012) report nor is the particle tracking approach in the general class of surface water models that was evaluated for far-field circulation.

The FFPTM makes a number of assumptions:

- The model assume that the particle tracking techniques accurately describe discharge plume behavior
- The model is 2-D and does not include vertical mixing processes. Generally this could make the model more conservative due to the lack of vertical dilution of the brine, but also introduces model uncertainty
- Waves are neglected which could also make the model more conservative in shallow waters where it could increase dilution. However, in deeper waters such as the discharge depth, the effects are likely negligible

The work concluded that the salinity levels of the brine discharge dissipate rapidly with time as the plume travels away from the point of discharge. Table 4.3-13 presented the chronic and peak salinities in the simulated scenarios. As discussed with the near-field modeling, the USEPA has stated that model uncertainty needs to be quantified before presenting quantities used in decision making. There is no uncertainty analysis of the FFPTM, nor is there discussion of model sensitivity to uncertain model input parameters and the effects on the predicted values of salinity.

USEPA OSWER Directive 9200.1-96FS states "Every model should be carefully checked to ensure that it is based on accepted scientific principles and that there are no errors generated by faulty computer code." Generally this is facilitated by peer-review in the open literature or on an application bases. The model FFPTM used here is not documented as verified according to USEPA Directives, nor is the approach of particle tracking well-documented in discharge plume studies. The class of surface water models recommended by SCWRRP (2012) should be fully implemented for this study. As applied here, the FFPTM only partially relies on the ROMS model results for dilution calculations.

Monitoring is Recommended

Given the numerous uncertainties surrounding the modeling as presented by ESA (2015), it is highly recommended that brine discharge from the existing MRWPCA outfall be monitored for compliance with water quality standards. A monitoring program is a highly cost-effective way to mitigate against risks that accompany modeling uncertainties. This approach is consistent with the recommendations in SCCWRP (2012), which observed that a "monitoring program consisting of both laboratory and field measurements is needed to confirm model-based predictions regarding plume dilution, fate, and effects."

I have extensive experience with monitoring programs, and would recommend a program with the following parameters. To establish ambient salinity and chemical levels in the receiving waters, monitoring should begin before the MPWSP starts discharging brine. Monitoring should continue for at least three years after the desalination plant is running at its full capacity. A multi-year monitoring period would better capture seasonal variability in conditions at the discharge site. Monitoring platforms should be installed in at least the following three locations on the seafloor to evaluate the brine dispersal and any plume accumulation: (1) within the ZID, (2) at the ZID boundary, and (3) 100 meters downslope from the ZID boundary. The locations of the platforms can be modified based on other site specific information that would provide for a more effective monitoring strategy (e.g. local bathymetry, benthic habitat). Data from these platforms could be collected and shared with regulators on a monthly or bimonthly basis.

Such a monitoring program would be highly cost-effective compared to a project of this scale, i.e. it would most likely cost on the order of tens-of-thousands of dollars over the lifetime of the program.

Conclusion

As indicated above, the predicted salinity increase is very close to identified regulatory thresholds and corrections for modeling error or sensitivity could lead to exceedance of a water quality standard. To better understand this risk, the EIR should explain and quantify the uncertainties contained within its near field and far field models. Additionally, there are deficiencies in the far field analysis presented by ESA (2015) that should be remedied. Finally, given the inherent uncertainty surrounding modeling plume discharge, the EIR should follow the recommendations of SCCWRP (2012) and establish a monitoring program to evaluate ocean water conditions after the proposed project begins discharging brine.

A full list of references listed herein can be provided upon request.

Sincerely,

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691472.6

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Craig A. Jones, Ph.D.
Principal

PROFESSIONAL PROFILE

Dr. Craig Jones is a principal ocean and environmental engineer with 18 years of experience in developing engineering and science programs for government agencies and the private sector to characterize and quantify transport of sediments and associated contaminants. His experience includes riverine, lacustrine, estuarine, and coastal processes involving hydrodynamics, waves, and sediment transport. Dr. Jones continues to develop of state-of-the-science techniques to utilize field measurements and modeling analysis to quantify processes in all aquatic systems. He actively participates in the design of field activities and instrumentation to collect specific data in support of clients' needs. Dr. Jones is adept at incorporating these data into the most effective levels of analysis, from empirical to numerical modeling, necessary to efficiently address the project needs.

Dr. Jones has testified in federal court and in front of public utility commissions as an expert on environmental issues and regulatory concerns, including sediments and contaminants in support of allocation activities. Dr. Jones continues to work on preparation of materials for various environmental litigation cases in the United States.

CREDENTIALS AND PROFESSIONAL HONORS

Ph.D., Mechanical and Environmental Engineering, University of California, Santa Barbara, California, 2000
M.S., Fluid Mechanics (minors: Environmental Ocean and Environmental Engineering) University of California, Santa Barbara, California, 1996
B.S., Coastal Engineering, Texas A&M University, Galveston, Texas, 1994

PROFESSIONAL AFFILIATIONS

American Society of Civil Engineers
American Geophysical Union
Marine Technology Society
American Shore and Beach Preservation Association
International Association of Great Lakes Researchers

RELEVANT EXPERIENCE

Marine and Sediment Services

Contaminated Sediment Transport Evaluation, Berry's Creek Study Area, New Jersey—Serving as project manager for field and modeling studies related to the risk assessment and remedial investigation of the Berry's Creek Study Area (BCSA) wetland in New Jersey. The BCSA is a tidal wetland/marsh adjacent to the Hackensack River. Historical releases of contaminants into the BCSA have resulted in the need for an RI/FS for the site. The study goals are to characterize the fate and transport of sediment-bound contaminants. Responsibilities include the design and implementation of the sediment transport investigation for the site. Implemented the field investigation, maintaining five permanent current and water quality monitoring stations while also employing real-time storm monitoring using vessel-mounted systems. The data are being used to develop a quantitative description of hydrodynamics and sediment transport in the system, providing contaminant fate and transport input to the risk analysis and remedial selection and design.

Marine Renewable Energy Support, Sandia National Laboratories—Serving as project manager for the development of tools and techniques to improve performance, lower costs, and accelerate the deployment of marine and hydrokinetic energy technologies. The project has evaluated all aspects of marine and hydrokinetic resource characterization and environmental evaluations, through applied research and developing tools and methods to improve device performance and minimize environmental disturbance. Of particular importance to this project is the development and application of software tools and guidance for the marine renewable energy industry.

United Heckathorn Superfund Site, Richmond, California—Served as project manager for a DDT fate and transport study that was performed for the Lauritzen Channel as part of a focused feasibility study. The objectives were to develop a quantitative contaminant fate and transport conceptual site model and DDT mass balance for the Lauritzen Channel, based on available analyses, and assess trends in DDT mass and concentration in the channel. Overall, the sediment transport analysis showed that the Lauritzen Channel is accumulating relatively clean sediment from San Francisco Bay. There are distinct regions with different sediment transport and accumulation characteristics in the channel that were characterized. For example, the west side of the channel, which experiences the highest vessel activity in relatively shallow regions, was investigated through the use of propeller scour modeling. The results of the analysis showed overall that the average DDT concentrations in the young bay mud sediment are decreasing in the channel.

Development of a Guide for Assessing Sediment Transport at Navy Facilities, U.S. Navy—Authored a U.S. Navy guidance document to ensure that sediment investigations and remedial actions are successful and cost effective. The guidance provides information on evaluating sediment transport at contaminated sediment sites, and describes how to use sediment transport information to support sediment management decisions. The framework developed in this report has been applied at three demonstration sites: Hunters Point Naval Shipyard (HPS) in San Francisco, California; Bremerton Naval Complex in Puget Sound, Washington; and Naval Station Newport in Newport, Rhode Island.

Development of a Real-Time Wave Assessment Tool, ARPA-E, U.S. Department of Energy—Supporting wave energy converter (WEC) development by collaborating with key WEC technologists to develop, test, and validate a wave measurement buoy that will be capable of providing real-time wave-by-wave information. This could increase WEC capture efficiency by up to 330 percent, potentially reducing the cost of wave power below $0.10 per kWh. Was primary inventor of transformational technology that can be networked to measure and relay real-time wave properties at a fraction of the cost of current systems.

Hamilton Wetland Restoration, San Pablo Bay, California—Served as project manager for the assessment of an open-water dredge material storage facility for beneficial reuse and restoration of Hamilton Wetlands in California. Evaluations were conducted for a temporary dredge material transfer facility in San Pablo Bay to support the restoration at the former Hamilton Army Airfield and surrounding land. The aquatic transfer facility (ATF) is designed to handle 24 million cubic yards of material over a 10- to 15-year operational life. Knowledge of the fate of the dredged material in and around the ATF, developed using SEDflume and modeling studies, was critical to the selection of an optimal location for the ATF, and for guiding the design and configuration so that impacts to the surrounding environment will be minimized.

Sediment Transport Investigation, Lower Passaic River, New Jersey—Led the development of a conceptual site model of sediment transport in the Passaic River. Historically, the Lower Passaic River below the Dundee Dam has been contaminated with a range of contaminants of potential concern. Since the most significant transport pathway for these hydrophobic contaminants is by transport of the sediments to which they are sorbed, sediment transport is a key system-wide process to understand when evaluating environmental risk and any remedial selection. Led the preparation of documents detailing the sediment transport processes important to the site while providing technical review of sediment transport analyses being conducted by EPA.

Remedial Investigation and Feasibility Study, Hunters Point Naval Shipyard, California—During the feasibility study phase of the work at HPS, provided the U.S. Navy with advice and analysis regarding the stability of PCB-contaminated sediments onsite. The work included the development of an agency-approved work plan, collection of cores for SEDflume analysis, and analysis of data to provide a "weight of evidence" approach to sediment stability at HPS. Managed field work and analysis associated with the sediment and contaminant transport investigation, and acted in a technical advisory capacity to the U.S. Navy and local and federal regulatory agencies. Managed the evaluation of the mobility of bottom sediment in areas of potential chemical contamination in the vicinity of HPS, in south San Francisco Bay, California. Also performed analysis of PCB releases into the bay, which were utilized in the feasibility study to select remedial options.

Dredge Disposal, Santa Cruz, California—Co-managed the design and implementation of the third inner Santa Cruz Harbor dredge monitoring program. Before these dredge monitoring programs, it was considered too great a risk to release sediment containing more than 20 percent mud into the surf zone because it might have damaging effects on the coastal environment. The project demonstrated negligible sedimentary changes occurred on the beaches and in nearshore benthic habitats of the Santa Cruz Bight during the dredging period. A variety of data collection efforts were utilized to monitor the experimental dredging event, including local stream flow, wave, and current data collection; beach and offshore sediment sampling; pre- and post-dredging multi-beam surveys and benthic habitat mapping; and sediment transport modeling.

DDT Transport Investigation, Lago Maggiore, Italy—Served as project manager for a DDT transport investigation of the Toce River, Lake Mergozzo, and Lago Maggiore. The investigation was conducted to better understand hydrodynamic processes and the stability of sediments and contaminants in the area. Led the field investigation and modeling team and development of state-of-the-art, 3-dimensional, hydrodynamic and sediment transport models to investigate sediment transport in the Toce River and depositional patterns in Lago Maggiore. The model was successfully used to evaluate the patterns of contaminant deposition. The data were used to develop a risk assessment for the site.

Sediment and Contaminant Transport Investigation, Augusta Bay, Sicily, Italy—As a part of the Augusta Bay contaminated sediment investigation, developed and implemented a study to gain a better understanding of the transport of sediments and contaminants in the bay. The study goals were to develop a conceptual site model describing the key site processes and compile and collect site data to provide an adequate understanding of these processes. Led the field investigation and modeling team and developed a quantitative conceptual site model and state-of-the-art, 3-dimensional, hydrodynamic and sediment transport models to investigate sediment transport in Augusta Bay. A key process of interest was propeller scour during ship motion. Developed innovative techniques to determine sediment resuspension during ship movement events. The data and analysis were being used to develop remedial alternatives for evaluation in a feasibility study.

Remedy Effectiveness Monitoring, Anacostia River, Washington, DC—Managed the analysis of sediment stability in the vicinity of the Washington Navy Yard on the Anacostia River to provide a better understanding of the integrity of capping material and transport of contaminants of potential concern at the site. The studies provided rationale for the field study design, specifically selection of locations for sediment erosion rate measurements using SEDflume and current measurements using Acoustic Doppler Current Profiler deployments. The study focused on the collection and analysis of data to assess the remedial options of capping and monitored natural recovery employed at the site. Also performed a numerical analysis of sediment transport on the native and capped material using typical and extreme hydrodynamic conditions in the Washington Navy Yard region.

Contaminated Sediment Dredging, Ashtabula River, Ohio—An environmental dredging and disposal project was conducted by EPA to remove PCB-contaminated sediments from the Ashtabula River. Served as a technical lead in a program that was implemented to determine the nature and source of contaminated residuals during a typical dredging operation. Led efforts to monitor water quality and bathymetric variability during the Ashtabula River navigational and environmental dredging and disposal project. Conducted both fixed and mobile current and water quality measurements near the dredging operations. In addition, water quality moorings were deployed upstream and downstream of the project to measure background conditions at the project extents. Conducted analysis to determine the nature and source of residuals post-dredging.

Technical Advisor, San Francisco Estuary Institute—Acted as an advisory member of a contaminated sediment advisory group for the Estuary Institute. In addition, continue to provide technical advice on the development of modeling studies to evaluate water quality issues in the San Francisco Bay region.

Evaluation of Sediment Transport, Chalk River Laboratories, Atomic Energy of Canada Limited—The Ottawa River contains a region of sediment offshore of Atomic Energy of Canada Limited's Chalk River Laboratories that has been shown to have above background levels of radioactivity, some of which is in the form of sand-sized radioactive particles. The sediments have been evaluated in past studies and do not currently pose a direct environmental or human health threat; however, assessments of human health risk must consider the possibility of sediment erosion and transport to shallow water areas. Responsible for investigating sediment erosion potential and sediment transport trends in the vicinity of the contaminated footprint. Initial studies were conducted using numerical models to predict river hydrodynamics, wind-wave production, and general sediment transport trends. The hydrodynamic model was refined using high-resolution bathymetry, and sediment erosion studies were conducted on the site's sediments; the sediment was found to be at low risk of transport during extreme events.

Dredge Material Transport, Delong Mountain Terminal, Alaska—Managed a project evaluation of erosion of a dredged material mound near the Delong Mountain Terminal in northwest Alaska, which is subject to various storm events. The evaluation was based on the combined hydrodynamics of Environmental Fluid Dynamics Code and the sediment transport algorithms of SEDZLJ. To help evaluate the physical processes and possible impacts due to dredge material placement from the Delong Mountain Terminal Navigation Improvements Project, a numerical modeling analysis of dredge mound erosion and transport was conducted. The model assisted the U.S. Army Corps of Engineers in developing the optimal methods and locations for dredge material placement to minimize future erosion and subsequent channel infilling.

Platform Usumacinta Investigation, Gulf of Mexico, Mexico—Conducted a geophysical survey and a seafloor geotechnical sampling program to investigate shallow soil conditions near a mat-supported drilling rig and offshore platform that encountered a failure in 2007. The study presented the results of a field and laboratory program to investigate geotechnical engineering properties of the site for a forensic evaluation of the failure. Overall operational conditions and pre-conditioning of the seafloor in the region coupled with a large storm event contributed to the failure. The team was able to make recommendations that could be used in future operations.

Prediction of Optical Variability in Dynamic Nearshore Environments, Santa Cruz, California—The objective of this project was to develop a system for forecasting marine optical conditions in the surf zone for the purpose of improving naval operations. Successful, rapid identification of mine-like objects in nearshore coastal oceans is critical for safe passage of the U.S. Navy fleet. Developed an *in situ* optical forecast model so the fleet will be able to deploy remote drifters, combine drifter data with meteorological and oceanographic data within the model, and predict optical properties along a coastline of interest. The models have been developed and validated with field measurements in Santa Cruz, California, and Waimanalo, Hawaii. Physical and optical characterization can be conducted on multiple temporal and spatial scales spanning a wide, dynamic range of conditions with the system.

Hydrodynamic Analysis of the Lower Fox River, Green Bay, Wisconsin—Managed a study to develop an extensively validated hydrodynamic model of Reach 3 and 4 of the Lower Fox River to support cap design in the river. Detailed velocity profile measurements were used to validate shear stresses so that a cap stability analysis could be conducted under design flow conditions. The U.S. Geological Survey (USGS) conducted all data collection efforts and provided more than 100 total velocity profiles over four sampling events. The data, combined with continuous velocity measurements at the mouth of the Fox River by a USGS acoustic velocity meter, allowed for the development and refinement of a hydrodynamic model of Reaches 3 and 4. The model was shown to reproduce measured velocities and shear stress to allow for confident cap design evaluations.

Mare Island Naval Shipyard Stability Analysis, Mare Island, California—Managed a project to better characterize the stability and potential for future exposure of munitions of environmental concern (MEC) and potential unexploded ordnance in the sediment offshore of Mare Island Naval Shipyard. Sediment cores were collected and analyzed to evaluate sedimentation and sediment stability through the radioisotope and SEDflume analysis. Based on the long-term morphological change of the mudflats, it is possible for MEC to be exposed but there is no probability of MEC mobilizing. The results were carried forward into an engineering feasibility study of shoreline restoration.

Litigation Support

Expert Report, Direct Testimony, Cross Examination, and Rebuttal Testimony on behalf of Appleton Papers Inc. and NCR Corp. (Case No. 10-c-910)

Participated as an expert on behalf of the defendants, in an action brought against Appleton Papers and NCR by the United States. Provided an expert report and testimony to demonstrate that the defendants were not liable for the entire harm to the Lower Fox River due to the discharge of PCBs. Developed a numerical model of hydrodynamics, sediment transport, and PCB transport to show that PCBs discharged from multiple parties on the river could be apportioned by discharger. Provided testimony and rebuttal testimony in the 2013 trial in the U.S. District Court Eastern District of Wisconsin.

Expert Report and Testimony to the San Francisco Public Utilities Commission on behalf of the Surfrider Foundation (Application A.12-04-19)
In review of an application for a water supply project, provided an expert report and testimony on behalf of local stakeholders. The testimony reviewed the proposed brine discharge system for California American Water's Monterey Peninsula Water Supply Project. It also discussed brine mixing and dilution in marine environments. It finally discussed the modeling that will be necessary to accurately analyze the project's brine discharge and the design of appropriate facilities for that discharge.

PATENTS AND AWARDS

United States Utility Patent No. 61/857,057 (provisional). A device and method for measuring wave motion.

Recipient of J.C. Stevens Award, recognizing excellence in a paper published by the American Society of Civil Engineers. The paper is in the field of hydraulics, including fluid mechanics and hydrology. See Jones and Gailani (2009) below.

SELECTED PUBLICATIONS

Jones, C.A., and B.E. Jaffe. 2013. Influence of history and environment on the sediment dynamics of intertidal flats. *Mar. Geol.* 345:294-303.

James, S.C., C.A. Jones, M.D. Grace, and J.D. Roberts. 2010. Advances in sediment transport modeling. *J. Hydraul. Res.* 48(6):754-763.

James, S.C., E. Seetho, C.A. Jones, and J.D. Roberts. 2010. Simulating environmental changes due to marine hydrokinetic energy installations. *Oceans 2010*. September:1-10.

Jones, C., and J. Gailani. 2009. Discussion of "comparison of two techniques to measure sediment erodibility in the Fox River, Wisconsin" by T. Ravens. *J. Hydraul. Eng.* 135(5):432-434.

James, S.C., M.D. Grace, M.A. Ahlmann, C.A. Jones, and J.D. Roberts. 2008. Recent advances in sediment transport modeling. World Environmental and Water Resources Congress 2008. *American Society of Civil Engineers*. May:1–10.

Jones, C., and S. Watt. 2008. Modeling of wave driven circulation and water quality in nearshore environments. World Environmental and Water Resources Congress 2008. *American Society of Civil Engineers*. May:1–10.

Zimmerman, J.R., J.D. Bricker, C. Jones, P.J. Dacunto, R.L. Street, and R.G. Luthy. 2008. The stability of marine sediments at a tidal basin in San Francisco Bay amended with activated carbon for sequestration of organic contaminants. *Water Res.* 42:4133-4145.

Blake, A.C., D.B. Chadwick, P.J. White, and C.A. Jones. 2007. User's guide for assessing sediment transport at Navy facilities. Technical Report 1960. Available at: http://www.epa.gov/superfund/health/conmedia/sediment/pdfs/Sed_transport_guide_2007.pdf. U.S. Navy, SPAWAR Systems Center, San Diego, CA.

James, S.C., C.A. Jones, J.D. Roberts, M.A. Ahlmann, and D.A. Bucaro. 2006. Sediment transport and water quality model of Cedar Lake, *EOS Transactions*, American Geophysical Union, 87(52), H23B-1511.

X. Luo, W. Lick, and C.A. Jones. 2006. Modeling the sediment-water flux of hydrophobic organic chemicals due to bioturbation. Ninth International Conference on Estuarine and Coastal Modeling. *American Society of Civil Engineers*. July:468–485.

Jones, C.A., S.C. James, J.D. Roberts, and P.L. Shrestha. 2005. Continuous treatment of cohesive and non-cohesive sediment dynamics in a three-dimensional hydrodynamics model. Ninth International Conference on Estuarine and Coastal Modeling, 9A.

James, S.C., C.A. Jones, and J.D. Roberts. 2005. Consequence management, recovery and restoration after a contamination event. Sandia National Laboratories, Los Alamos, NM.

Jones, C.A., T.S. Jung, and W. Lick. 2001. Use of accurate erosion rates in sediment transport modeling. International Association of Great Lakes Research.

Jones, C.A., and W. Lick. 2000. An accurate model of sediment erosion and transport. International Association of Great Lakes Research.

Lick, W., Z. Chroneer, C.A. Jones, and R. Jepsen. 1997. A predictive model of sediment transport. Fifth International Conference on Estuarine and Coastal Modeling. *American Society of Civil Engineers.* October:389–399.

Invited Presentations

01/15—Ocean Waves Workshop 2015 paper presentation titled "Evaluating Sediment Stability at Offshore Marine Hydrokinetic Energy Facilities."

01/15—Eighth International Conference on Remediation of Contaminated Sediments: Short course titled "Evaluating Sediment Transport: Tools, Techniques, and Application to Site Management."

Selected Presentations/Posters

Jones, C., G. Chang, K. Nelson, and T. Martin. 2015. Field and modeling characterization of wetland hydrodynamics. Eighth International Conference on Remediation of Contaminated Sediments, New Orleans, LA.

Chang, G., C. Jones, and T. Martin. 2015. Near-bed sediment dynamics in the Berry's Creek tidal estuary. Eighth International Conference on Remediation of Contaminated Sediments, New Orleans, LA.

Thompson, R., K. Gustavson, C. Jones, and P. White. 2015. Investigating DDT fate and transport at the United Heckathorn Superfund site. Eighth International Conference on Remediation of Contaminated Sediments, New Orleans, LA.

Martin, T., P. de Haven, C. Jones, D. Glaser, and N. Kelsall. 2015. Evaluation of natural recovery in the Berry's Creek Study Area. Eighth International Conference on Remediation of Contaminated Sediments, New Orleans, LA.

Attachment C

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

In the Matter of the Application of California American Water Company (U210W) for Approval of the Monterey Peninsula Water Supply Project and Authorization to Recover All Present and Future Costs in Rates	Application A.12-04-019 (Filed April 23, 2012)

TESTIMONY OF CRAIG JONES

ON BEHALF OF SURFRIDER FOUNDATION

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Attorneys for Surfrider Foundation

Date: February 22, 2013

BEFORE THE PUBLIC UTILITIES COMMISSION

OF THE STATE OF CALIFORNIA

In the Matter of the Application of California American Water Company (U210W) for Approval of the Monterey Peninsula Water Supply Project and Authorization to Recover All Present and Future Costs in Rates	Application A.12-04-019 (Filed April 23, 2012)

TESTIMONY OF CRAIG JONES

ON BEHALF OF SURFRIDER FOUNDATION

Please state your name and address.

My name is Craig Jones. I live at 250 33rd Ave., Santa Cruz, CA 95062.

What is the purpose of this testimony?

This testimony reviews the proposed brine discharge system for California American Water's ("Cal-Am") Monterey Peninsula Water Supply Project ("MPWSP" or "Project"). It also discusses brine mixing and dilution in marine environments. It finally discusses the modeling that will be necessary to accurately analyze the Project's brine discharge and the design of appropriate facilities for that discharge.

Please describe your qualifications for providing this testimony.

I received a Ph.D. in Mechanical and Environmental Engineering with an emphasis on fluid mechanics in 2000 from the University of California, Santa Barbara. I am a nationally recognized expert in the field measurement, analysis, and modeling of physical transport processes in coastal and estuarine environments. I have worked closely as project manager and technical lead with federal, state, and local regulatory agencies in the analysis and solution of aquatic problems at numerous sites nationwide, with a particular emphasis on environmental projects. In addition, I continue to lead development efforts for state-of-the-science measurement and modeling techniques in aquatic environments. I have over 15 years of experience conducting these types of studies.

My 15-year experience in coastal sciences, especially in field measurements applied to computational modeling qualifies me to provide comments in this testimony. Furthermore, my extensive hands-on experience with specific coastal environmental projects in the Monterey Bay provide unique insight for this testimony.

What information have you reviewed in formulating your testimony?

I have reviewed information pertaining to Cal-Am's proposed Project, including the January 9, 2013 Memorandum from RBF Consulting to Richard Svindland re MPWSP Project Description Update; the January 9, 2013 Memorandum from RBF Consulting to Richard Svindland re Contingency Planning for the MPWSP; the October 30, 2009 Final Environmental Impact Report for Cal-Am's Coastal Water Project ("Coastal FEIR"); and the "Management of Brine Discharges to Coastal Waters Recommendations of a Science Advisory Panel" prepared for the 2012 State Water Resources Control Board by the Southern California Coastal Water Research Project ("SCCWRP"), attached as Exhibit 1. I have also reviewed various papers published in the scientific literature dealing with brine discharges.

What is Cal-Am's proposed method to discharge brine from the Project.

According to the Coastal FEIR, a desalination plant could generate a brine stream with a salinity of approximately 60 parts per thousand ("ppt") or approximately 70 to 80 percent higher than seawater at a flow rate equal to 120 to 140 percent of the desalination plant's product water flow rate. According to the Project Description Update, the brine stream will flow by gravity from the desalination plant to the Monterey Regional Water Pollution Control Authority's (PCA) outfall, where it will mix with effluent from PCA's Regional Treatment Plant and discharge into the ocean through the existing outfall diffusers. The PCA pipeline discharges into 95 to 109 ft depth water (below Mean Sea Level, MSL). The outfall contains between 120 and 170 2-inch diameter ports, approximately 3.5 feet above the seafloor.

Cal-Am's Contingency Memo further outlines four discharge contingency options including constructing modified outfalls and routing brine to the Moss Landing Power Plant.

Different discharge configurations anticipated in these contingency options could decrease the potential environmental impacts due to the brine discharge.

How much effluent will mix with the discharged brine?

According to the Project Description Update, the amount of Treatment Plant effluent available for blending with the brine is expected to be highly variable throughout the year. Treatment Plant effluent may be entirely unavailable for extended periods during the summer months when effluent is reclaimed for agricultural irrigation. Without effluent for blending, undiluted brine will discharge into Monterey Bay.

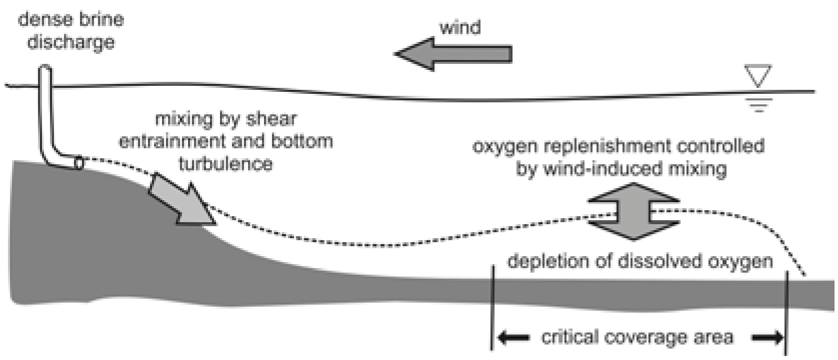
Please describe the marine environment near the PCA outfall.

The oceanographic circulation affecting waters of Monterey Bay is primarily the California Current System, which consists of the California Current, the California Undercurrent, and the Davidson Current. The California Current is a large upper ocean current that transports cold subarctic and North Pacific water south along the North American coast (Bograd et al., 2000; Breaker, 2005). Beneath this near-surface current, and relatively close inshore, the California Undercurrent transports warm subtropical water northward. During winter months the California Undercurrent becomes the inshore countercurrent or Davidson current (Pennington & Chavez, 2000).

The salinity at the outfall has not been measured, but other salinity data have been collected in the vicinity. Bograd and Lynn (2003) compared nearshore salinity and temperatures in Monterey Bay that were also used in the Coastal FEIR to consider discharge impacts at the PCA outfall. During January to July 2003, the salinity at a location a few hundred meters south of the Moss Landing Power Plant outfall in Monterey Bay ranged from 27.51 ppt to 33.62 ppt with an average of 32.22 ppt.

What happens to brine once discharged?

Discharged high salinity brine is denser than the ambient seawater. The denser brine will sink in the Monterey Bay receiving waters causing it to potentially pool and collect on the seafloor. Figure 1 provides a schematic of how the higher-salinity brine can behave as it is discharged into the water. The figure is reproduced from the report "Desalination Brine Discharge Model" submitted by the University of Texas to the Texas Water Development Board (2006) which studies how to improve the modeling of desalination brine discharges.



What marine environmental impacts can brine have?

The tendency of the brine to sink and collect near the seafloor creates potential degradation of local waters. For example, the 2012 SCCWRP report notes that poorly implemented discharges with low initial dilution in poorly flushed areas can cause widespread alterations of community structure in seagrass, coral reef, and soft-sediment systems. The University of Texas study additionally found that brine can limit the oxygen transport of water to the benthic (i.e. seafloor) regions resulting in habitat degradation.

Please describe the brine dilution model used in the Coastal FEIR.

The configuration analyzed for dilution in the Coastal FEIR consists of the brine stream driven through the PCA outfall. The brine will mix with effluent from PCA's Treatment Plant and then discharge into the ocean through the existing outfall diffusers. The PCA pipeline discharges into 95 to 109 ft depth water MSL. Flow Science, Inc. used a semi-empirical method and the Visual Plumes model to evaluate the discharge of the brine from the PCA diffuser. Both of these models are considered "near field" models, meaning that they only consider behavior of brine discharge within the vicinity of the discharge point.

The near field models were only employed for assumed worst-case scenarios. Specifically, the Coastal FEIR assumed worst case conditions would occur when little or no PCA effluent is available to blend with the brine discharge. The near field model simulations also assumed that no currents represented a worst-case scenario for plume dilution and dispersion due to the assumption of no flushing of the brine.

What is your assessment of this modeling?

Based on the Coastal FEIR's evaluation of the brine discharged in coastal waters, it is my opinion that insufficient characterization has been done to evaluate the impacts of the brine discharge into Monterey Bay. Several problems result from the assumptions in the Coastal FEIR's evaluation of the brine discharge. Although stagnant water might represent the worst case for a typical buoyant plume, for a sinking plume, currents can collect brine near the seafloor resulting in pooling in flat areas or depressions in the seafloor near the discharge site, which could result in reduced dilution. The FEIR's near field model simulations assume discharge with no offshore current and flat bathymetry, and lacks a temporal element to account for short or long-term changes in these processes. The simplified model used in the Coastal FEIR would not be able to predict long-term pooling of discharged brine.

Additionally, merging plumes from a multiport diffuser could result in further complications that the Coastal FEIR does not consider. If the plumes are too close together, or brought together by local currents, reduced jet height dilution can result. In general, the near-field models used in the Coastal FEIR cannot predict this effect.

Finally, no local current or wave measurements were considered in the Coastal FEIR. The lack of physical data at the proposed discharge sites represents a significant data gap in the analysis of the brine discharge.

What steps are necessary to adequately model the Project's brine plume?

A complete model would account for the effects of the local coastal conditions on the discharge plume and its subsequent transport must be identified to predict the potential plume impacts. Site-specific spatio-temporal variations in bathymetry, salinity, temperature, currents, and waves must be evaluated in terms of their effects on the discharge plume and the potential reduction of dilution due to processes such as pooling of brine on the seafloor.

Three dimensional circulation hydrodynamic models (far field models) are needed to best represent the plume dilution and transport once it leave the immediate vicinity of the discharge. Far field models account for variable bathymetry, open water circulation, waves effects, thermal and salinity induced stratification, and other important oceanographic processes that will act on any plume to alter the dilution predicted by the relatively simple Coastal FEIR models. A far field modeling study should be coupled with a near field study in order to determine the potential impacts of local circulation on the discharge plumes. The modeling should be conducted with measurements of conditions at the discharge point to enhance the model with site-specific data.

These studies would allow various discharge designs to be more completely considered so that an efficient and effective low impact brine discharge can be developed.

Do any discharge contingency options have possible dilution benefits over the proposed discharge?

The design and construction of a modified outfall is proposed as part of contingency option 1 and a new outfall is proposed as part of contingency option 2. Modifications are not outlined or evaluated in detail in the contingency memo. Contingency option 2 specifies that the new outfall would be designed to meet anticipated requirements of California's amended Ocean Plan.

The designs of these new outfalls could be configured to improve brine dilution compared with discharge at from the current PCA outfall. Generally diffusers designed for typical positively buoyant plumes, such as the PCA outfall, do not enhance dilution of negatively buoyant brine. The design of the new outfalls could include higher discharge port velocities to promote mixing and dilution (SCCWRP).

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EXHIBIT INTENTIONALLY OMITTED