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Chairman Jackalyne Pfannenstiel
Vice Chair James D. Boyd
Commissioner Arthur H. Rosenfeld
Commissioner Jeffrey Byron
Commissioner Karen Douglas
California Energy Commission
1516 Ninth Street
Sacramento, California 95814

Re: 2008 Integrated Energy Policy Report Update (08-IEP-1F)
Southern California Edison Company's (SCE) Comments to the Draft Consultant Report: AB1632 Assessment of California's Operating Nuclear Plants (07-AB-1632)

Dear Commissioners:

Southern California Edison (SCE) appreciates the opportunity to comment on the California Energy Commission's draft consultant assessment of California's potential vulnerability to a major disruption due to a major seismic event or the aging of San Onofre Nuclear Generating Station (SONGS) or Diablo Canyon Nuclear Generating Station. SCE is committed to providing safe, reliable, and environmentally sound electricity to our customers. It is important for everyone to understand what to expect following seismic activity, including the potential for SONGS to be off-line for an extended period. Identifying the impacts of seismic activity and developing contingencies is critical to servicing our customers. Toward that end, the accuracy of the report's conclusions is important so that resources are properly focused to maximize benefit to California's citizens.

The comments in Attachments 1 through 3 seek to highlight the important messages in the report and identify areas where contradictory messages exist. Due to the limited time for review, SCE focused its comments in five high-level key areas:

1. Safe Operation of SONGS

    a. There is more than sufficient seismic design margin associated with the safety related portions of SONGS to ensure the safe shutdown of the plant following a seismic event. Conclusions to the contrary are misleading and may cause the diversion of resources that contribute to enhancing SONGS reliability.

b. The draft report should clearly separate discussions of safety and safety margin from reliability discussions associated with vulnerability of non-safety portions of the plant (e.g., turbine building, switchyard, etc.).

2. Vulnerability of an Extended Outage due to a Seismic Event or Plant Aging

   a. Insufficient information exists to make a conclusion regarding seismic vulnerability of the non-safety related portion of SONGS.

   b. SONGS maintenance and life-cycle management strategy minimizes the risk of an extended outage to plant aging issues. Conclusions to the contrary are not supported.

3. Adequacy of Replacement Power

   a. The report inaccurately concludes sufficient power would be available for an extended shutdown of SONGS by assuming energy could be imported in quantities above import capability. This conclusion is contrary to SCE's and California Independent System Operator's (CAISO) analysis.

4. Issues to be Addressed in the Normal Course of the Regulatory Process

   a. The possible expansion of SONGS Independent Spent Fuel Storage Installation (ISFSI) and cost benefit analysis for license renewal are examples of issues that will be addressed in the normal regulatory process. Conclusions in these areas are not based on sufficient fact and analysis and should be deleted from the report.

5. Environmental Impact of SONGS

   a. The draft report does not adequately recognize that SCE is fully mitigating for marine impacts from once-through cooling at SONGS and contains factual inaccuracies. Discussions of the potential effects that could result from the proposed change to the state's policy on once-through cooling should be deleted until the CAISO report on reliability implications has been issued and the state policy itself has completed the regulatory process.

In closing, San Onofre Nuclear Generating Station (SONGS) is an important part of SCE's generation portfolio and provides safe, reliable baseload electricity that is essentially free of greenhouse gas emissions, in addition to providing critical local transmission system support.

If you require additional information, please contact myself or Manuel Alvarez of our Sacramento Office.

Sincerely,

Caroline M McAndrews

Caroline M. McAndrews
Director, Special Projects

cc: Barbara Byron

Safe Operation of SONGS

SCE takes very seriously our responsibility for the safe operation of SONGS and the need to protect the public, as well as our employees, from hazards. The final report must distinguish between safety and reliability. The draft report inappropriately co-mingles these concepts. That said, safe operation is predicated on several components including design and staff activities. The report raises unfounded or exaggerated concerns in both areas.

SONGS safety related structures, systems and components (SSC) are designed to exceed seismic design margin requirements for a Safe Shutdown Earthquake (SSE). The draft report quotes the California Coastal Commission conclusion that followed the evaluation of new seismic information:

> "This does not mean that the facility is unsafe – although the design basis earthquake may have been undersized, the plant was engineered with very large margins of safety, and would very likely be able to attain a safe shutdown even given the larger ground accelerations that might occur during a much larger earthquake."[1]

Also as stated in the report, an Operating Basis Earthquake (OBE) "…is also an unusual event. For example, the largest earthquake experienced to date by Diablo Canyon was just 25 percent of the OBE design conditions." The largest earthquake experienced at SONGS was equal to 13 percent of the SONGS OBE design conditions. The report goes on to state, "An OBE is not expected to cause any damage within the buildings housing the reactor components, the nuclear steam supply system, safety-related SSCs, and balance of plant support systems. All of a plant's safety systems are designed to accommodate the increased external forces on the respective systems and to continue to operate unimpeded." In several sections of the draft report these conclusions are ignored. SCE recommends the California Energy Commission (CEC) reviews the entire report, striking out hypotheses and draw conclusions based on facts. The unintended consequence of leaving the draft report unchanged is the detraction of resources from other credible issues raised in the draft report.

To appropriately address SCE's concern, the report needs to separate the seismic vulnerability of SONGS into two separate issues: 1) safety risk to the public due to SONGS and 2) the vulnerability resulting in a loss of generation capability due to a seismic event.

With respect to the safe design of SONGS:

- The plant was engineered with very large margins of safety and is highly likely to be safely shutdown during a much larger earthquake than the original design basis. The draft report supports this statement. Conclusions to the contrary are unsubstantiated and should be deleted.
- The height of the tsunami wall was designed with a great deal of conservatism. The design considered the joint occurrence of a storm surge, high-tides, storm waves, and vertical displacement of the offshore fault. The draft report currently characterizes the tsunami wall as having a small margin of design safety. Contrary to that depiction, the additional three (3) feet of the wall height represents about a 50 percent margin in the estimated tsunami wave

[1] Draft report – page 78

height. Conclusions that call into question the adequacy of the height of the tsunami wall are without basis[2]. That said, SCE has not evaluated submarine landslides and would consider evaluating the credibility of this phenomenon at SONGS once the maps referenced in the draft report become available.

- The description of the condensate storage tank and refueling water storage tank area on page 119 in the draft report is factually inaccurate[3]. There are a set of tanks for each unit, and the tanks are at plant grade level, not in a low lying area. There is no underground piping for these tanks. There are 31' high walls around the tanks. These tanks are required to function to support Safe Shutdown Earthquakes (SSE) and as such, do not introduce a vulnerability that places the public at risk.
- The draft report clearly states "The structures of the pools at Diablo Canyon and SONGS are designed to the highest safety classification, and the pools are supported on or partially embedded in the ground to increase their ability to withstand seismic ground motion beyond their design basis. The pool is not expected to fail, even during a safe shutdown earthquake."[4] Regardless of fuel density in the spent fuel racks, because of the design of the spent fuel pool, storage in the spent fuel pool is safe. These facts readily lead to the logical conclusion that used fuel storage facilities are designed with additional safety margin for seismic events rather than the unsubstantiated concerns raised in the draft report.

With respect to the safe operation of SONGS:

- SCE agrees with the draft report that a strong nuclear safety culture is critical to SONGS success. SONGS has a well established history of operating the plant safely. We continue to do so. The Nuclear Regulatory Commission (NRC) in its most recent Annual Assessment letter (dated March 3, 2008) stated "Overall, San Onofre Nuclear Generating Station, Units 2 and 3, operated in a manner that preserved public health and safety and fully met all cornerstone objectives." SCE has identified instances in which some individual workers did not meet our or the NRC's expectations. In their role of providing independent oversight of nuclear safety, the NRC stated that those instances have low safety significance. Notwithstanding the low significance of these events, actions have and are being taken to improve performance, such as significant leadership and structural changes, establishment of a new accountability measures, and an expanded training program for all managers, employees and contractors. That said, SCE does not agree with the draft report's implication that the presence of an independent safety committee is necessary for a strong nuclear safety culture. The draft report cannot substantiate the need for an independent safety committee based on objective facts. Other than the PG&E facility, SCE is not aware of any U.S. plant with a strong nuclear safety culture rating that makes use of such a committee. To the contrary, the industry has found that safety culture improvement must be led from within to ensure sustainability.

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[2] Draft report page 83
[3] Draft Report page 119
[4] Draft Report page 161

Vulnerability Resulting in Loss of Generating Capability

The draft report inadequately evaluates the vulnerable portions of the plant; those being the non-safety related side. A loss of production capability may follow a significant seismic event, which is likely true for most of the electrical generating facilities in California. There are no studies that assess the seismic vulnerability of the non-safety related portions of SONGS. The seismic design robustness of non-safety related systems and components would need to be compiled and evaluated. Since repair time is strongly linked to the component type, data would have to be compiled on time to obtain new components or repair existing components. Any time to repair study would need all of the aforementioned elements to provide a basis for a conclusion. This information would then have to be compared against the likely spectrum of seismic activity to determine the true vulnerability and the need for selected station design improvements on the non-safety related portions of SONGS. In the absence of this type of analysis, the draft report speculates on SONGS' vulnerability and potential outage times[5]. There is insufficient information to reach any credible conclusion at this time. SCE encourages the CEC to focus future resources on the study of non-safety related vulnerability that could lead to a loss of generating capability following a seismic event. SCE would support this type of study to ensure a free flow of information and conclusions that can help to increase SONGS reliability. Any conclusions or recommendations for augmented seismic design standards for secondary side or switchyard components should apply to all generating plants in California in addition to the balance of plant systems at a nuclear power plant.

The draft report also attempts to assess plant aging and reliability issues. It appropriately recognizes SONGS as having achieved the highest level of NRC's maintenance related performance indicators since 2nd Qtr. 2006 and the commensurate increase in SONGS reliability. Improvement in SONGS performance is based in part on SONGS' equipment reliability program, which extends beyond those system/components of the Maintenance Rule program. A graded maintenance and life-cycle management strategy, based on safety and reliability importance, was developed for SONGS' equipment. The approach is holistic and considers both active and passive components. The industry is developing its knowledge base on passive equipment life-cycle and SONGS' reliability is only expected to improve as we incorporate these industry-wide lessons learned. The draft report states, "Unchecked age-related degradation could have significant long-term implications for safety and plant reliability[6]." In the absence of any information the statement would be true for any type of plant. No data associated with SONGS supports the inclusion of this arbitrary statement. As such, it and similar statements should be removed.

Availability of Replacement Power

The draft report's conclusions on energy simulations[7] of replacement power options used for an extended shutdown of SONGS are incorrect. The report assumed quantities of import energy that were greater than import capability. This is because with SONGS shut down, import capabilities into Southern California may be reduced by approximately 1000 to 1500 MW from current levels, therefore Southern California cannot import more energy from outside the state.

[5] Draft report page 132
[6] Draft report page 23
[7] Draft report page 212

Additionally, import capability reduction during a SONGS shut down means sources within Southern California would have to produce more energy, generally with higher heat rates, increasing the amount of green-house gas (GHG) emissions beyond what were characterized in the report. As noted in the draft report, a prolonged shutdown of SONGS could cause serious grid reliability shortfalls unless transmission system infrastructure improvements were made. The draft report also did not address the feasibility of building necessary transmission to import renewable power, nor the additional generation needed to integrate the intermittent nature of the power produced from many renewable technologies. The time required to site, license, permit, and build transmission lines and support generation was not addressed in the report. Furthermore, there was no recognition of the significant costs required.

The draft report also misrepresents the California Independent System Operator (CAISO) findings regarding availability of sufficient reserve margins. CAISO reiterated their conclusion at the recent CEC workshop on September 25, 2008, where it was stated:

> "If either Diablo Canyon or SONGS were to unexpectedly shut down for an extended period during the summer the probability for shedding firm load would greatly increase, both in the near term and in any realistic generation expansion scenario for future."[8]

The draft report should be revised to accurately reflect the current critical need for SONGS, both from a regional and local reliability perspective. Until conditions change due to the actual development of other electrical generating facilities, conclusions that understate the importance of SONGS are inappropriate and misleading.

SCE agrees with the draft report that states, "The cost of power from new power plants of all kinds is highly uncertain"[9] and "Preliminary analysis suggests that replacing the state's two nuclear plants with renewable generation and using existing fossil-fuel units for reliability support could incur significant costs"[10].

Issues that Were Prematurely Addressed

The draft report attempts to draw conclusions regarding used fuel storage capability[11] and the cost-benefit of license renewal[12]. These conclusions are premature given the absence of an existing analysis. Specifically,

- The discussion of SCE's strategy on used fuel storage that projects out to beyond 2020 is of little value since there are too many future variables. SCE will not fill the currently planned dry storage capacity for over a decade. As such, SCE has sufficient time to evaluate existing and emerging technologies, one of which may be identical to the option selected for Unit 1 - storage of all used fuel in the Independent Spent Fuel Storage Installation (ISFSI).
- Analysis of license renewal cost benefit will be presented to the CPUC. Therefore, the sections in the draft report that speculate on the future capacity factor, reliability impacts,

[8] CAISO Comments on: AB 1632 Assessment of California's Operating Nuclear Plants – Draft Report
[9] Draft report page 266
[10] Draft report page 285
[11] Draft report page 223
[12] Draft report page 295 - 296

property values[13], local economic impact[14], and potential increased cost of nuclear power, should be deleted. For example, the draft report speculates the impacts of plant aging[15]. As noted in the draft report, existing maintenance and reliability programs manage the effects of aging and have successfully resulted in consistently high performance from nuclear power plants. There is no basis for postulating that plant performance would not continue at the same level given that the existing programs will continue to ensure reliable plant performance.

Environmental Impact of SONGS

We are encouraged by the draft report's recognition, on page 285, that "No power generation technology is free of environmental impacts." Nuclear power, like every generating facility, has some impacts in that it generates solid waste that must be responsibly disposed of in a licensed facility, uses the ocean for once-through cooling, and performs planned, controlled, and monitored discharges of liquid wastes but has, on occasion, small leaks or spills. However, the draft report mischaracterizes these issues:

- As discussed above and in the draft report, SCE has appropriate plans and programs to responsibly manage solid radioactive waste – both low level and used fuel.
- The draft report's discussions of the effects of once-through cooling need to be revised to include the body of scientific studies rather than relying on the State Water Resources Control Board (SWRCB) Scoping document (March 2008). In its current form, the draft report contains factual inaccuracies. As a minimum, the draft report should reflect that the marine mitigation measures that SCE is performing under the oversight of the California Coastal Commission fully mitigate for the impacts of operating San Onofre. Finally, there should not be any discussion of the potential effects that could result from the proposed change to the state's policy on once-through cooling until CAISO issues its report on reliability implications and the state policy itself has completed the regulatory process. Refer to Attachment 3 for additional details.
- The draft report does not accurately reflect the NRC Task Force's findings on inadvertent releases of liquids and exaggerates the extent and health effects. The NRC's Liquid Release Lessons Learned Task Force Final Report issued on September 1, 2006 states: "Although there have been a number of industry events where radioactive liquid was released to the environment in an unplanned and unmonitored fashion, based on the data available, the task force did not identify any instances where the health of the public was impacted." In addition, tritium was identified in **one** (not "some") off-site well (See NRC's Tritium Contamination Questions and Answers for Braidwood) where the detected concentration was approximately 10 percent of the EPA limit.

[13] Draft report page 298
[14] Draft report page 301
[15] Draft report page 295

Attachment 2
Additional SCE Comments to the AB-1632 Draft Consultant Report by Chapter

Chapter	Issue	Comments
2, 3 & 4	**Seismic Vulnerability Issues** • The SONGS Site o *Safe-shutdown earthquake (SSE) frequency* reduced from 1 in 7194 years to 1 in 5747 years. (Page 65)	o The draft report identifies a change in the frequency of the Safe Shutdown Earthquake (SSE). This change does not decrease our design margin since our margin is based on the SSE actually occurring, not the probability of it occurring.
	o New information on ground motion and blind thrust faulting has eroded SONGS safety margins. (page 15)	o Contrary to the implication in the report, SONGS design is assessed when new credible seismic information becomes available. Specifically in 2001, as cited in the draft report, SCE evaluated the SONGS seismic risk. The results of this analysis found that the incremental change had a small impact on SONGS seismic risk. Next Generation Attenuation Equations, equations that estimate the ground motions at a site based upon an earthquake's characteristics which includes location and magnitude, are currently being evaluated for applicability to SONGS.
	o SONGS does not have an ongoing program to study seismology and geology of SONGS site similar to PG&E's Long-Term Seismic Program, therefore SONGS seismic setting is less known than PG&E. (Page 11)	o SCE is not opposed to performing additional studies when such efforts are warranted and appropriate. The SONGS seismic design criteria has not changed since the construction permits were issued for Units 2 & 3. On the other hand, our understanding is that Diablo Canyon's seismic design criteria were changed due to the discovery of a new nearby fault that, in turn, prompted the license condition for an on-going Long Term Seismic Program (LTSP). There would be no benefit in a formally delineated frequency (an LTSP) to assess potential changes to its seismic design criteria.
	o During a black out, reactors must achieve shutdown by relying on systems and instrumentation that rely on batteries to remain powered (page 121)	o Batteries are not the sole source of power to ensure safe shutdown of the plant. Nuclear power plants have multiple, redundant sources of emergency power such as emergency diesel generators, off-site power, batteries, and the ability to use electricity generated by the other unit, to ensure that the reactor can be safely shutdown.
	o During an earthquake, the likelihood of human error increases due to the unusualness of the event, possible confusion, and even panic	o Nuclear plant operators are extensively trained to respond to a variety of events, including natural phenomenon, and procedures have been developed for these occurrences. The emergency response drills that include earthquakes as one possible scenario, test personnel response and

Chapter	Issue	Comments
		procedures. SONGS personnel have responded consistent with their training and the established procedures to every earthquake that has been detected at the site. It is highly improbable that there would be panic at SONGS if an earthquake were to occur.
	o An earthquake or other impact to a spent fuel pool could result in the spread of radioactivity. (Pages 17, 131)	o The quantity of radioactivity released in the water that spilled from the used fuel pool and was subsequently pumped out to the Sea of Japan was roughly 2 microcuries. It did not exceed any regulatory limits. The quantity of material released in air was about 110 millicuries of iodine. Total dose due to inadvertent releases resulting from the earthquake was approximately 0.00002 millirem. By comparison, an individual in the USA typically receives around 300 millirem each year due to background radiation.
	• Emergency Planning o Plans to mitigate agricultural effects are reviewed and approved by the NRC (Page 157)	o The NRC does not regulate offsite planning and as such does not review or approve offsite plans.
	o On a regular basis, the utilities distribute educational materials to inform the public within 35 miles from the nuclear plants	o SONGS public education zone is 20 miles.
	o Coordination with offsite agencies (Page 157)	o Please include the following language describing SONGS' coordination with offsite agencies for emergency planning purposes: "The Interjurisdictional Planning Committee for SONGS is codified by CA Health & Safety Code (§ 114650a7). Primary members include the San Clemente, Dana Point, San Juan Capistrano, Orange County, San Diego County, U.S. Marine Corps Base Camp Pendleton, California Department of Parks and Recreation and SCE. The group maintains a close working relationship with the Governor's Office of Emergency Services to ensure integration at the state level. The mission of the IPC is to promote nuclear power preparedness through agencies coordination and the integration of emergency plan. The IPC has met monthly since 1981 and is seen as a model planning agency in the nuclear industry."

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Additional SCE Comments to the AB-1632 Draft Consultant Report by Chapter

Chapter	Issue	Comments
	• Roadways and Transmission Systems o Access to the plant may be difficult due to traffic jams. (Page 159)	o Another speculation is in regards to access to the site. SONGS personnel and Local and State government agencies have planned for emergency events that could restrict site access. The plans have been exercised most recently during the wild fires in October of 2007. At that time there were traffic restrictions to SONGS. During that event, on October 24, 2007, SONGS, the California Highway Patrol and Orange County Emergency Management personnel coordinated access to the plant for SONGS personnel.
5	• **Plant Aging Issues** o The reactor pressure vessel head cavity at Davis-Besse is an example of age-induced degradation. (Page 171)	o Davis-Besse is not an example of age-induced degradation – see the statement on page 172 "In fact… a high likelihood that Davis-Besse was violating the conditions of its operating license and that they failed to act upon this potential safety violation."
	o Nuclear plant operators routinely dilute tritiated water for safe release (Page 176)	o Replace this sentence with the following to be more accurate: "Virtually all commercial nuclear power plants routinely release radioactive materials to the environment in liquids and gases. These releases are planned, monitored, and documented. NRC regulations in 10 CFR Part 20 and in 10 CFR Part 50 place limits on these releases to ensure the impact on public health are very low." (From the NRC Liquid Release Lessons Learned Task Force Final Report).
	o Institutional knowledge by aging employees will be lost when they retire. (Page 190)	o SCE is also concerned about the loss of institutional knowledge and as a result, we are seeking means to capture that knowledge. We have requested funds as part of SCE's General Rate Case for enhanced recruitment tools to attract and recruit a qualified nuclear workforce. SCE has expanded its efforts to establish partnerships with two-year technical schools, community colleges and university programs to develop courses and curricula to build skills and provide internships to attract highly qualified candidates to work at SONGS. SCE continues to hire and train employees in advance of retirements to meet its future staffing needs for employees with certain skills and to capture institutional knowledge and pass it on to these capable new employees at SONGS.

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Additional SCE Comments to the AB-1632 Draft Consultant Report by Chapter

Chapter	Issue	Comments
	○ Information related to INPO and SONGS performance. (Page 186)	○ SCE strongly objects to discussions in this public draft report related to the disclosure of confidential INPO information and requests these portions be stricken from the final report.
6	• **Impacts of Major Disruption** ○ Outage duration (page 204)	○ The draft report notes that the last 5 years of operating experience at Diablo Canyon and SONGS has shown few forced outages with an average duration of 2.4 days per forced outage. It then goes on to hypothesize, despite marked improvement in capacity factors, a year-long outage for assessing replacement power needs. Conclusions such as those found on page 207 should not be based on hypothetical situations.
	○ Relative risk from different energy systems (pages 211 and 262)	○ SCE agrees that there is very little public risk from reactor operations due to the extensive safety procedures, stringent design criteria, and other programs. The draft report, however, asserts that the public safety risks from nuclear power plants are greater than those from a natural-gas fired facility. Statements in the report on comparative safety from different energy systems should be supported by credible studies. See for example, a comprehensive study on the safety of energy systems performed by the Paul Scherrer Institut in Switzerland in 1998 entitled "Project GaBEComprehensive Assessment of Energy Systems: Severe Accidents in the Energy Sector".

Attachment 2
Additional SCE Comments to the AB-1632 Draft Consultant Report by Chapter

Chapter	Issue	Comments
7	• **Nuclear Waste Issues** o Cost for SONGS ISFSI is twice that of PG&E (Page 226)	o Given that ISFSI systems must essentially meet the NRC design criteria, it seems improbable that the costs are that dissimilar. SCE recommends that the CEC's consultants ensure that the assumptions and inputs into the ISFSI costs provided by PG&E and SCE are substantively consistent prior to including them in the report.
	o Spent fuel transportation costs (page 232)	o The estimates of used fuel transportation costs to an interim off-site storage facility are purely speculative. This paragraph should be deleted given that no such facility exists today and none is proposed at this time
	o Accident prevention and emergency preparedness costs (page 232)	o The draft report does not appear to include costs for state emergency preparedness response such as those appropriated for the Department of Public Health, Radiologic Health Branch, and the Governor's Office of Emergency Services.
	o Old steam generator may be difficult to transport (page 236)	o As stated in SCE's response to E.4 dated March 21, 2008, SCE plans to resize the steam generators to allow for disposal at the licensed low level radioactive waste disposal facility. The Unit 1 reactor vessel package was not segmented, posing a completely different transportation scenario. SCE has already successfully disposed of the Unit 1 pressurizer and steam generators.
8	• **Land Use Issues** o Property values may be impacted by the presence of Spent Fuel and more study is required (Page 27)	o The draft report should clearly reflect the conclusions from the analytical studies; namely, that there are no negative effects on property values, business, or tourism from plant operation or an ISFSI.
	o Future land use (Page 248)	o It is inaccurate to state that future land uses for the SONGS site are less certain [than Diablo Canyon] – the land will be returned to the Dept. of the Navy once the NRC licenses have been terminated. A NRC license will be required as long as there is used fuel on site.

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Additional SCE Comments to the AB-1632 Draft Consultant Report by Chapter

Chapter	Issue	Comments
9	• **Power Generation Options** o The cost of replacement power (environmental and financial) could be offset by the reduction in risk associated with a nuclear incident and waste handling. (Page 285)	o Ancillary services and regulating capability may increase if SONGS is replaced with renewables. Due to the intermittent nature of some of the renewable resources (i.e. wind and solar), additional conventional resources (i.e. gas and hydro) will be required to provide ancillary services for regulation and ramping. Fossil fuel peaking resources with high ramping and black start capability typically are installed to fulfill the requirement for regulation and ancillary services for operation of the grid. Additionally, SONGS provides grid support to the L.A. basin. It may be difficult to replace in-basin capacity to support grid reliability after a shutdown of SONGS due to an insufficient amount of PM-10 credits.
	o Environmental Impacts from different energy sources (pages 271, 273, 275)	o The draft report does not appear to fully capture potential environmental impacts for renewables. For example, wind also generates noise pollution and all fuel sources have impacts from transport, storage, and disposal during decommissioning. The life cycle GHG emissions for solar PV seem low by a factor of 5 compared to the values found in "Greenhouse gas emissions of electricity generation chains-assessing the difference", Spider J, Langlois L and Hamilton B (2000), *IAEA Bulletin* 42 **2** http://www.iaea.org/Publications/Magazines/Bulletin/Bull422/article4.pdf The draft report needs to provide objective comparison of land use requirements. All of the technologies have additional indirect land use requirements. For example, natural gas requires land for mining and refining facilities, and biomass has additional requirements for production of the feedstock (plant or animal). The statement on pages 274-275 that indirect land use for nuclear power could increase by as much as 200 times should either be expanded to provide a consistent comparison or the language should be deleted.

Attachment 3
SCE Comments on the Draft Reports Conclusions on Once-Through-Cooling Impacts

The draft report overstates the environmental impacts of once-through-cooling[16] at the San Onofre Nuclear Generating Station (SONGS) and Diablo Canyon Nuclear Generating Station. It does not appropriately reflect recent studies or the conclusions from extensive multi-year, SONGS-specific study by the Marine Review Committee (MRC) under the auspices of the California Coastal Commission (CCC). Rather, the draft report relies on the State Water Resources Control Board (SWRCB) Scoping document for the draft regulations that was not peer reviewed and contained multiple inaccuracies. SCE submitted comments on May 20, 2008 on the SWRCB Scoping document[17] questioning the validity of the information and the simplistic conclusions regarding project feasibility. The SWRCB's feasibility analysis ignores significant physical, environmental, cost, generation impacts, grid reliability, and permitting issues associated with converting from once-through-cooling to closed cooling technology.

The discussion on marine impacts in the draft AB1632 report should be modified to accurately reflect the body of scientific studies and should further state that SONGS is fully compensating for its marine environmental impacts through a suite of marine mitigation projects. In addition, the report should refrain from discussing the potential effects that could result from the proposed change to the state's policy on once-through cooling until the CAISO report on reliability implications and the state policy itself has completed the regulatory process.

Scientific Studies

Studies have been conducted over the course of 30 years at many coastal generating facilities. The most notable for San Onofre is the 15 year, $50 million Marine Review Committee (MRC) study. This study was part of the Coastal Development Permit process for SONGS and involved numerous independent scientists, all respected experts in their fields. After studying all aspects of entrainment, impingement, and discharges associated with operation of San Onofre, the California Coastal Commission amended SCE's Coastal Development Permit to include mitigation measures for marine impacts resulting from plant operation. SCE continues to work with the California Coastal Commission staff to implement the measures that fully mitigate potential environmental impacts to the marine environment.

The draft report currently states, "The SWRCB estimates that SONGS annually entrains over 5.6 billion fish and impinges over 3.5 million fish (nearly 48,000 pounds)"[18]. This statement and the rest of that paragraph are not accurate representations of the marine impacts of San Onofre. Conclusions from the MRC study include: "there is no evidence for a local reduction in plankton, and the MRC concludes that these losses do not constitute a substantial adverse effect."[19] The MRC also concluded that the intake of fish larvae did not show a "clear pattern of decreases in the abundance of fish larvae near SONGS," while at the same time estimating a reduction in larvae that could decrease the overall populations of queenfish and white croakers by

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[16] Draft Report at p. 200, p. 275-278, p. 296, and p. 303-308

[17] http://www.waterboards.ca.gov/water_issues/programs/npdes/docs/cwa316_may08/comments/michael_hertel.pdf

[18] Draft Report at p. 276

[19] Final Report of the Marine Review Committee to the California Coastal Commission, Marine Review Committee, 1989.

approximately 600 tons of fish. Impacts on all other fish species were determined to be insignificant. The MRC further estimated that approximately 57 tons of adult fish would be impinged at the plant; however, the average impingement has been approximately 50% lower, less than 30 tons.

Over the last 5 years, nearly all once-through-cooling facilities have conducted Impingement Mortality and Entrainment (IM&E) Studies. These studies quantified the amount of fish, fish eggs and larvae, invertebrates, and invertebrate eggs and larvae that are entrained or impinged into a plant. Many of these studies were standardized to allow for large scale analyses. In the recent Comprehensive Demonstration Study[20] (CDS) for SONGS, data on Impingement Mortality and Entrainment (IM&E) Study showed SONGS entrains approximately 1.1 to 1.4 billion fish larvae per unit and 13 to 14 billion eggs per unit each year. A total of 1,353,000 fishes, weighing 13,037 kg were estimated to be impinged. The CDS and IM&E documents summarize the impacts of the once-through-cooling, compare current impacts to those found during the MRC studies and previous Clean Water Act 316(b) demonstrations and also evaluated existing technologies for the reduction of entrainment. The CDS was completed and submitted to the San Diego Regional Water Quality Control Board in January 2008. Ultimately, the document came to the same conclusion that the MRC study did – that the existing intake structure is the best available technology.

Marine Mammals and Sea Turtles

SCE currently has a federal take permit for sea turtles and its application for take permits for marine mammals is under review. Data from 1978 to 2004 show that the actual average entrapment of mammals at the SONGS facility has been about 21.5. In recent years, the numbers have increased due to increases in the population, but the values have been much less than the 47 quoted. The CEC's draft report does not discuss the fact that SONGS has a comprehensive marine mammal rescue program and many of the mammals are released unharmed. Over $35,000 of research was conducted to design cages to capture harbor seals and California sea lions. The cages are deployed in SONGS fish return system whenever a marine mammal is sighted. Once captured, the mammals are released back to the ocean. Sea turtles are tagged and released. Harbor seals and sea turtles have a high survivability percentage, with sea turtles survival being nearly 100 percent. The National Marine Fisheries Service has not determined the level of take to be significant.

Kelp Impacts

The extent of impact to kelp resulting from SONGS' operation has been long debated. A great many factors, including natural changes in environmental conditions and climate, can significantly influence kelp canopy coverage. This is complicated by different approaches in

[20] Comprehensive Demonstration Study for Southern California Edison's San Onofre Nuclear Generating Station, prepared by D. Bailey, EPRI, for Southern California Edison, January 2008

measurement methodology and can lead to significantly dissimilar projections of kelp canopy coverage. The Kelp Survey Consortium measures canopy coverage in Orange and San Diego Counties, using a methodology similar to the California Department of Fish and Game. The consortium has been conducting aerial surveys since 1983[21] with the survey results showing that the amount of kelp increased offshore after SONGS Units 2 and 3 began operation in 1983 and 1984, and reached a record high in 1990. Testimony by Dr. Wheeler North, a world-renown kelp expert, indicated that the impact was not nearly as significant as initially postulated and the CCC eventually concluded that the impacts attributed to operation of SONGS could be mitigated with 61 Ha (0.61 km2 or 150 acres) of artificial reef.

Measures taken to Minimize or Mitigate Marine Impacts

- The circulating water systems at SONGS were designed to minimize the entrainment and impingement of fish and to minimize thermal effects on the environment. The intake for the circulating water conduit uses an offshore, submerged intake with a velocity cap to slow the flow of water into the intake conduits. The result is slower velocities that most fish can easily detect and avoid. Some fish are still drawn into the intake conduit. Once inside the onshore portion of the circulating water intake conduit, the fish are guided through a series of vanes and angled louvers to a quiet area of the intake. The quiet area is an elevator that allows plant operators to monitor the fish being collected and periodically raise and tilt the elevator to transfer the collected fish through a sluiceway to the Pacific Ocean. Seventy to seventy-five percent of the fish that enter the circulating water conduits are recovered and returned to the ocean.

- In addition to the design of the SONGS' circulating water system, SCE has also developed and implemented procedures to minimize impacts during heat treatments. Heat treatments are conducted at approximately six-week intervals to control biofouling in the intake conduits. The heat treatment process re-configures the system to raise the temperature in the intake conduits to 105°F for up to one hour to kill biofouling organisms. To minimize the impacts on fish, a "fish chase" procedure has been developed that gradually raises the temperature to encourage fish to swim into the Fish Return System's (FRS) collection area (the large tray) prior to heat treatments. The fish can then be returned to the Pacific Ocean. SONGS is unique in using the FRS to remove fish from the intake screen wells and return them back to the ocean.

- Mitigation measures specified in the SONGS 2 and 3 Coastal Development Permit (Permit No. 183-73) include restoration of the San Dieguito River mouth and coastal lagoon to compensate for fish losses, construction of an artificial kelp reef to address kelp impacts, and support for a white sea bass hatchery, also for fish impacts.

[21] Kelp Survey Consortium 2005, Status of the Kelp Beds 2004, San Diego and Orange Counties, Prepared by MBC Applied Environmental Services.

- The restoration of the San Dieguito river mouth and coastal lagoon provides 160 acres of new or restored highly productive coastal wetland habitat essential for foraging and reproduction of hundreds of native species of fish, birds, and mammals. The project is approximately 75 percent complete and surveys performed in August of this year showed significantly increased populations of gobies pipefish, invertebrates, and other marine life in the restored lagoon, all of which serve as food for larger fish, birds, and invertebrates. Independent scientists appointed by the CCC estimated nearly 9 million fish in the largest open-water pond, surpassing expectations and far out-numbering local reference sites. An additional 280 acres is being returned to its natural condition and will serve as a protected park for the public to view and enjoy the newly created preserve.

- SCE constructed 150 acres of artificial reef to provide valuable kelp forests and habitat for fish and other marine organisms. The artificial reef is located just off San Clemente pier on an 862 acre parcel leased from the State Lands Commission. The initial phase of the reef was constructed in 1999 and covers 22.4 acres of sea floor. It was designed to identify optimal design and materials. A team of University of California Santa Barbara scientists completed their 5-year study of the initial phase of the reef in 2005. Their results show all experimental modules were very successful in supporting the requisite kelp plant density and diverse fish and invertebrate communities regardless of substrate type or density. The rest of the artificial reef (Phase 2) used approximately 125,000 tons of quarry rock from Catalina Island. Full build-out of the artificial reef was completed ahead of schedule in September 2008.

- SCE provided $4.7 million in funding for a white sea bass hatchery in Carlsbad, California. The hatchery is operated under the direction of Hubbs/Sea World Research Institute and began operations in 1996. Since then, over 650,000 juvenile white sea bass have been released.

- SCE was also required by the CCC to test additional fish protection measures to accelerate fish movement out of the circulating water conduits. A variety of light and sonic stimuli were tested. Laboratory studies ultimately demonstrated that neither effectively improved the fish return rate. The tests were concluded with concurrence from the CCC.

The CCC specifically rejected requiring the installation of cooling towers at SONGS, finding that these measures fully mitigate the impacts to the marine environment attributed to the plant's operation.

Proposed Changes to Once-Through-Cooling Policy

We will continue to work with the SWRCB to ensure that future changes to regulations on once-through-cooling appropriately reflect the actual environmental impacts of existing facilities. Even though the recent IM&E studies were submitted to Regional Water Quality Control Board staff, the data were not incorporated into the SWRCB Scoping document. Tables in the SWRCB

Scoping document have data from varying sources, none of which have been standardized for accurate comparisons. In many cases where data were not readily available, SWRCB staff failed to refer to these sources of information and failed to contact plant operators to determine if the data were available.

Clearly, the proposal by the SWRCB to amend regulations on the use of once-through-cooling could complicate reliability planning and could adversely affect generation by coastal facilities, regardless of fuel source. As noted on page 201 of the draft report, the California Independent System Operator (CAISO) is currently performing a comprehensive assessment of the reliability implications that could result from changes to the state's regulations for once-through-cooling. There are significant environmental and financial impacts that vary in magnitude depending on the timing, replacement measures, and response from the electricity generating industry to the state policy[22]. The anticipated timeframe for the report is fourth quarter 2008. Until the California Independent System Operator's (CAISO) report is issued, discussions of the potential effects of changes to the state's once-through-cooling regulations on nuclear power plants are premature and speculative.

Summary

The draft report's discussions of the effects of once-through-cooling need to be revised to include the body of scientific studies rather than relying on the SWRCB Scoping document. In its current form, the draft report contains factual inaccuracies. At a minimum, the draft report should reflect that the marine mitigation measures that SCE is performing under the oversight of the California Coastal Commission fully mitigate for the impacts of operating SONGS.

Finally, there should not be any discussion of the potential effects that could result from the proposed change to the state's policy on once-through-cooling until the CAISO report on reliability implications has been issued and the state policy itself has completed the regulatory process.

[22] "Electric Grid Reliability Impacts from Regulation of Once-Through Cooling in California," prepared by ICF Jones & Stokes, Global Energy Decisions, and Matt Trask for the CA Ocean Protection Council and State Water Resources Control Board, April 2008.
http://www.swrcb.ca.gov/water_issues/programs/tmdl/docs/power_plant_cooling/reliability_study.pdf