

**CALIFORNIA COASTAL COMMISSION**

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original staff report

# Tu14a

October 5, 2015

To: Coastal Commissioners and Interested Parties

From: Alison Dettmer, Deputy Director  
Joseph Street, Environmental Scientist

Subject: **Addendum to 9-15-0228 – Southern California Edison SONGS  
ISFSI Project**

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This addendum provides correspondence on the above-referenced staff report, *ex parte* communications, proposed revisions to the staff report, and staff's response to comments. The proposed modifications to the staff report do not change staff's recommendation that the Commission **approve** CDP # 9-15-0228, as conditioned.

## **Correspondence Received**

- Four e-mails from Donna Gilmore, San Onofre Safety, to Joseph Street, Coastal Commission, dated September 1, 2015
- Letter from Donna Gilmore, San Onofre Safety, to Joseph Street, Coastal Commission, September 17, 2015
- E-mail from Donna Gilmore, San Onofre Safety, to Joseph Street, Coastal Commission, September 21, 2015
- Letter from Ted Quinn, Technology Resources, to California Coastal Commission, September 27, 2015
- Letter from Jerome Kern, Oceanside City Council, to Joseph Street, Coastal Commission, September 29, 2015
- Letter from David Lochbaum, Union of Concerned Scientists, to Joseph Street, Coastal Commission, September 30, 2015
- E-mail from Lyn Harris Hicks, Coalition for Responsible and Ethical Environmental Decisions (CREED), to Joseph Street, Coastal Commission, October 1, 2015
- E-mail from Jane Swanson, San Luis Obispo Mothers for Peace, to Joseph Street and Tom Luster, Coastal Commission, October 1, 2015
- Letter (via e-mail) from Patricia Borchmann to California Coastal Commission, October 1, 2015

- E-mail from Donna Gilmore, San Onofre Safety.org, to Joseph Street, Coastal Commission, October 1, 2015
- E-mail from Dorah Shuey to Joseph Street, Coastal Commission, October 1, 2015
- E-mail from Ray Lutz, Citizens Oversight, to California Coastal Commission, October 1, 2015
- E-mail from Laura Lynch to California Coastal Commission, October 2, 2015
- Letter from David Victor, Tim Brown and Daniel Stetson, SONGS Community Engagement Panel, to Joseph Street, Coastal Commission, October 2, 2015
- E-mail from Linda Anabtawi, Southern California Edison, to Joseph Street, Coastal Commission, October 2, 2015
- Letter from Captain W. L. Whitmire, U. S. Marine Corps – Camp Pendleton, to Joseph Street, Coastal Commission, October 2, 2015
- E-mail from Charles Langley to Joseph Street, Coastal Commission, October 2, 2015
- E-mail from Donna Gilmore, San Onofre Safety, to Joseph Street, Coastal Commission, October 2, 2015
- E-mail from Dr. Donald Mosier, Del Mar City Council, to Joseph Street, Coastal Commission, October 2, 2015
- Letter from Garry Brown, Orange County CoastKeeper, to Joseph Street, Coastal Commission, October 2, 2015
- E-mail from Gary Headrick, San Clemente Green, to California Coastal Commission, October 2, 2015
- Letter from Glenn Pascall, Sierra Club Task Force on San Onofre, to California Coastal Commission, October 2, 2015
- Letter from Rita Conn, Let Laguna Vote, to Dr. Charles Lester, Coastal Commission, October 2, 2015
- Letter from Jack Monger, Industrial Environmental Association, to Joseph Street and Coastal Commission, October 3, 2015
- Letter from Donna Gilmore, San Onofre Safety, to California Coastal Commission, October 4, 2015
- E-mail from Laura Lynch to Joseph Street, Coastal Commission, October 4, 2015
- Six e-mails, with attachments, from Michael Aguirre, Aguirre & Severson, to Joseph Street, Coastal Commission, October 5, 2015
- E-mail from Marv Lewis to Joseph Street, Coastal Commission, October 5, 2015

### **Revisions to the Staff Report**

Recommended revisions to the staff report include changes to **Special Conditions 1 and 3**, the inclusion of a revised and clarified sea level rise analysis examining flooding in 2051 (35-year timeframe) rather than 2047 (30-year timeframe), as well as a number of minor clarifications and corrections. Additions to the staff report are shown below in underline and deletions in ~~striketrough~~.

The proposed revisions below as well as the below responses to public comments are recommended findings and will be incorporated into the relevant portions of the staff report as adopted findings.



Page 6, Special Condition 1:

- “1. **Evidence of Landowner Approval.** PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT, the applicant shall submit to the Executive Director for review and approval evidence of their legal ability to undertake the development as conditioned by the Commission. ~~Such evidence shall include documentation demonstrating that the U.S. Department of the Navy has renewed or extended its existing easement for use of the Part 50 licensed area for a term encompassing the authorized development (i.e., through October 6, 2035).~~”

Reason for Proposed Revision: There are a variety of ways an Applicant who does not own a fee interest in the property being developed can satisfy their obligation, prior to permit issuance, to demonstrate their ability to comply with the conditions of approval. Since the Applicant, prior to permit issuance, can demonstrate their authority to comply with the conditions of approval in a manner other than that specified, the sentence limiting the manner of compliance to one method is proposed for deletion.

Page 7, Special Condition 3:

- ~~“C. All development and redevelopment of the property by the Permittee shall be sited and designed to ensure geologic stability without reliance on any of the existing shoreline protective devices adjoining the North Industrial Area. As used in this condition, redevelopment is defined to include: (1) additions, or; (2) expansions, or; (3) demolition, renovation or replacement that would result in 50% or more of a structure, structural wall or structural foundation, or; (4) demolition, renovation or replacement of less than 50% of a structure where the renovation or addition would result in a combined alteration of 50% or more of the structure from its condition on October 6, 2015.”~~

Reason for Proposed Revision: Staff is recommending that clause C of **Special Condition 3** be deleted because it is duplicative of the restrictions on future shoreline protection development contained in clauses A and B, and therefore unnecessary.

Page 9, paragraph 4, lines 1-3:

“The plant is collectively owned by SCE (75.0576.8%), San Diego Gas and Electric Company (20%), and the City of Anaheim (3.16%) and the City of Riverside (1.79%). As a previous owner, the City of Riverside is also a co-participant on the ISFSI project. The plant operates subject to a long-term easement ...”

Page 10, paragraph 3, lines 2-3:

“The ISFSI, including its concrete approach aprons, would occupy approximately ~~32,000~~ 40,000 square feet ...”

Page 11, paragraph 2, lines 1-2:

“...the SONGS facility would consist of 75 VVMs set in a surrounding berm measuring approximately ~~111~~160 ft wide by ~~211~~260 ft long...”

*Page 11, paragraph 3, lines 4-5:*

“...Cavity Enclosure Container (CEC), comprised of a ~~low carbon~~ stainless steel Container Shell welded to a stainless steel Base Plate.”

*Page 11, footnote 1:*

<sup>41</sup> “A small HI-STORM UMAX system with six storage modules was previously installed at the Humboldt Bay Power Plant (see CDP #E-05-001).”

*Page 12, paragraph 4, lines 3-7:*

“The MPCs would be placed in a licensed transfer cask, lowered into the pools, loaded with spent fuel assemblies, and then removed from the pools. Water would be drained from the MPCs; ~~the air inside of them would be~~ and replaced with helium, and they would be welded shut. Subsequently, ~~the MPCs would be placed in a licensed~~ transfer casks containing the MPCs would be ~~and~~ loaded onto a transfer vehicle that would use existing roads ...”

*Page 15, paragraph 3, lines 3-6:*

“SCE has requested Navy authorization to renew the grant of easement ~~until 2051, at which time SCE expects to have completed~~ to allow for plant decommissioning, ~~and~~ required site restoration, and the transferred of all SONGS spent fuel to DOE custody.”

*Page 17, paragraph 4, lines 9-11:*

“...the SONGS ISFSI has been designed to withstand significantly greater ground shaking intensities (1.5 g in two orthogonal directions, net 2.12 g) than the existing spent fuel pools (0.67 g in each direction).”

*Page 19, paragraph 3, lines 2-3:*

“...at some of the lowest grade elevations (approx. ~~14~~13 to 20 feet MLLW)...”

*Page 19, paragraph 3, lines 5-7:*

“During its review of SCE’s alternatives analysis and in view of the fact that the ~~proposed~~ project applicant seeks authorization for temporary, interim storage ...”

Page 26, paragraph 1, lines 10-11:

“The spectra labeled “SONGS” ~~is~~are derived from the NRC-approved “free field” spectra and takes into account ...”

Page 26, paragraph 1, lines 15-16:

“The ISFSI design spectra exceed ~~that~~ those of the design basis earthquake ...”

Page 30, paragraph 1, lines 6-8:

“Superimposing this tsunami on a 7-foot high tide (the 10% exceedance Spring high tide for the site) and a one-foot storm surge, resulted in a maximum “still” water level of 15.6 feet MLLW (SONGS 2&3 FSAR).”

Page 31, paragraph 4, lines 3-5:

“As a part of its CDP application, SCE prepared an analysis of future flood conditions over the life of the development (SCE 2015a, d, h), using the sea level rise projections ...”

Page 31, fourth paragraph, lines 11-16:

“The analysis indicates that sea level can be expected to rise ~~0.30.4~~ to 1.82.0 feet by ~~2047~~2051 ~~(30-year time horizon)~~, depending on which scenario is used. Under the high sea level rise scenario, and assuming an additional foot of sea level height associate with wind and storm surge and/or oceanographic forcing (such as due to an El Niño event), SCE estimated that in 2051 the still-water level at mean high tide could reach 7.68 feet MLLW. A more extreme high tide of +6.9 feet MLLW, combined with 1 foot of storm surge, 2 feet of sea level rise and maximum wave run-up, could result in temporary flooding up to 25.0 feet MLLW (SCE 2015h).<sup>10</sup> Commission staff notes that a maximum high tide at SONGS (>7.2 feet MLLW) (SONGS 2&3 FSAR), 1 foot of storm surge and temporary high sea level associated with a large El Nino event (+0.4 to 1 ft) (Flick 1998; CCC 2015) could add an additional 0.5 to 1.5 feet to this projected flooding elevation.

Page 31, paragraph 4, continuing to page 32:

~~“For several reasons, Commission staff believes that SCE’s analysis underestimates the potential for future flooding at the project site. First, short-term fluctuations in water level (assumed by SCE to amount to +1 foot) may include both surge and the underlying effects of oceanographic forcing. Temporary increases in sea level associated with storm surge in Southern California may reach +1 foot, while short-term sea level increases in sea level associated with the large 1982-83 El Nino event ranged from 0.4 to 1 foot (Flick 1998; CCC 2015). Thus, a more conservative estimate of the contribution to sea level from short-term phenomena would be approximately +2 feet. Second, SCE examined flooding only under mean tidal conditions of 5.8 feet MLLW. High tides equal or exceed 7.0 feet MLLW about 10% of the time and high tide levels equal or exceed 7.2 feet about 1.5% of the time, based~~

~~on the distribution of five years of tide data<sup>10</sup>. Using these higher tide levels, present day extreme high still water level could reach 9.2 to 9.3 feet MLLW (SONGS 2&3 FSAR), and current wave runup could exceed 24 feet MLLW. Using the same additive method that SCE used to modify runup for future sea level rise, wave runup in 2051, with 2.0 feet of sea level rise, could exceed 27 feet MLLW. However, run up does not change linearly with changes in water level, so these estimates of how run-up will change with changes in water levels likely underestimate potential run-up.”~~

Page 31, *new* footnote 10:

<sup>10</sup> However, run up does not change linearly with changes in water level, so these estimates of how run-up will change with changes in water levels likely underestimate potential run-up.”

Page 32, footnote 10:

<sup>10</sup> Based on distribution of Table 2.4-11: Distribution of Spring High Tides at San Diego During Five Years, from the San Onofre 2&3 Final Safety Analysis Report (FSAR) Section 2.4, (Revision 24), adjusted by the amplitude ratio of 0.92.”

Page 33, *second* paragraph, lines 5-8:

“a maximum average bluff retreat rate of 20 inches per year over the proposed 35-year life of the project would equate to a total bluff retreat of ~~29~~ 58 feet, or about ~~one-third~~ half of the distance between the existing seawall and the proposed ISFSI facility.”

Page 35, *second* paragraph, lines 3-6:

“A crude calculation using a maximum estimated bluff retreat rate of ~~0.8 feet/20 inches~~ per year (Hapke et al. 2007, for unprotected slopes in San Mateo Formation bedrock) indicates that erosion could begin to undermine the ISFSI structure by approximately ~~2130~~ 2077.”

Page 37, *fourth* paragraph, lines 4-10:

“The initiation and growth of stress corrosion cracking in stainless steel fuel storage casks are not fully understood and remain a topic of active research, but these processes are likely to be accelerated in a coastal environment such as at SONGS (e.g., Kain 1990; Bryan and Enos 2014; EPRI 2014). Commission staff is not aware of any documented instances of stress corrosion cracking in fuel storage casks at other nuclear power plants. However, the NRC has collected evidence of stress corrosion cracking in other welded stainless steel components at several coastal nuclear power plants (~~NRC~~ Dunn 2014).”

Page 37, *fourth* paragraph, lines 12-14:

“Elsewhere, the NRC has estimated that at least 30 years would be required for the initiation of stress corrosion cracking in steel fuel storage casks (NRC 2014).”

Page 38, *second* paragraph, lines 3-4:

“In the Preliminary Safety Evaluation Report (SER) supporting the September 8, 2015, final approval of an amendment ...”

*Page 39, paragraph 2, lines 6-7:*

“Accordingly, the Commission is adopting **Special Condition 4**, which requires the ~~landowners~~Permittee to assume the risks...”

*Page 43, paragraph 3, lines 4-5:*

“Construction would not occur during weekends and holidays, with the possible exception of operations such as excavation, pouring concrete or other activities that require continuous work.”

*Appendix A, Substantive File Documents*

“Bryan, C.R., and D.G. Enos (2014). “Understanding the Environment on the Surface of Spent Nuclear Fuel Interim Storage Containers”, Probabilistic Safety Assessment and Management PSAM 12 (conference), Honolulu, Hawaii, June 2014.”

“Dunn, D.S. (2014). “Chloride-Induced Stress Corrosion Cracking Tests and Example Aging Management Program”, Presentation for U.S. Nuclear Regulatory Commission, at Public Meeting with Nuclear Energy Institute on Chloride Induced Stress Corrosion Cracking Regulatory Issue Resolution Protocol, August 5, 2014. <http://pbadupws.nrc.gov/docs/ML1425/ML14258A082.pdf>”

“Electric Power Research Institute (EPRI) (2014). Flaw Growth and Flaw Tolerance Assessment for Dry Cask Storage Canisters, EPRI Technical Report #3002002785, October 2014.”

“Kain, R.M. (1990). Marine atmospheric stress corrosion cracking of austenitic stainless steels. *Materials Performance* 29(12): 60.”

“Southern California Edison (2015h). “Projected Sea Level Rise Given the Project’s Design Service Life”, transmitted by e-mail from L. Anabtawi (SCE) to J. Street (CCC), September 17, 2015.”

“U.S. Nuclear Regulatory Commission (2014). “Summary of August 5, 2014, Public Meeting with Nuclear Energy Institute on Chloride Induced Stress Corrosion Cracking Regulatory Issue Resolution Protocol”, September 9, 2014. <http://pbadupws.nrc.gov/docs/ML1425/ML14258A081.pdf>”

*Exhibit 4, page 2, caption to Figure 1:*

“The space between the cylindrical storage modules is filled with ~~a flowable grout material~~concrete.”

*Exhibit 5, page 1, addition to legend, with indicative coloring:*

“If necessary, pumps within the NIA sump area would be relocated, not removed”

*Exhibit 6, Figure 3 (Horizontal Acceleration), curve label:*

“UMAX ISFSI Design Spectrum (PGA = ~~2.42~~ g 1.5 g in each direction”

*Exhibit 6, Figure 4 (Vertical Acceleration), curve labels:*

“UMAX ISFSI Design Spectrum (PGA = ~~2.42~~ g 1.0 g)”

“SONGS Design Basis Earthquake (PGA = ~~0.67~~ g 0.45 g)”

### **Staff Response to Comments**

The below responses to public comments are recommended findings and would be incorporated into the relevant portions of the staff report as adopted findings.

In the attached correspondence, the commenters provide disparate perspectives on the proposed project and staff recommendation. A number of commenters, including Garry Bown (Orange County CoastKeeper), Jerome Kern (Oceanside City Council), David Lochbaum (Union of Concerned Scientists), Jack Monger (Industrial Environmental Association), Glenn Pascall (Sierra Club), Ted Quinn (Techonology Resources) and David Victor, Tim Brown and Daniel Stetson (SONGS Community Engagement Panel) express support for the staff recommendation. Southern California Edison (SCE), the applicant, offers several comments and multiple clarifications and technical corrections, but also supports the staff recommendation. A number of other commenters, including Michael Aguirre (Aguirre & Severson), Patricia Borchmann, Rita Conn (Let Laguna Vote), Donna Gilmore (San Onofre Safety), Gary Headrick (San Clemente Green), Charles Langley (Public Watchdogs), Marv Lewis, Ray Lutz (Citizens Oversight), Laura Lynch, Donald Mosier (Del Mar City Council), Dorah Shuey and Jane Swanson (San Luis Obispo Mothers for Peace) oppose the project and urge the Commission to deny SCE’s coastal development permit (CDP) application. The U. S. Marine Corps does not comment on the project itself, but argues that the Commission lacks jurisdiction to require or issue a CDP for development at the San Onofre Nuclear Generating Station (SONGS) site. Commission staff provides the following summary and response to the arguments made by commenters opposing the staff recommendation and hereby amends its proposed Commission findings to include these responses:

#### Comments Related to Geologic Hazards

Several commenters, including Ray Lutz, Dorah Shuey, Patricia Borchmann, and Jane Swanson, express concern that the proposed ISFSI could be undermined by shoreline erosion, fail during an earthquake, or be flooded during a tsunami or as a result of future sea level rise. Mr. Lutz and Ms. Swanson also noted that the groundwater table at the project site would be near the bottom of the ISFSI structure, and expressed concern that the ISFSI could be adversely affected by contact with groundwater during its period of emplacement.

As discussed at length in the September 25, 2015 staff report, Commission staff evaluated the vulnerability of the proposed project to geologic hazards, including earthquakes, erosion, and coastal flooding, and concluded that the proposed project, with the adoption of **Special Condition 2**, would minimize hazards to life and property and assure stability and structural integrity consistent with Section 30253 of the Coastal Act. No changes to the staff recommendation are proposed in response to comments regarding these hazards.

Commission staff also evaluated the hydrogeology of the project site and reviewed monitoring well data provided by SCE (SCE 2015b). At the two monitoring wells within the proposed ISFSI footprint, the water table elevation varies by approximately 0.7 feet above and below a mean elevation of about +5.4 feet MLLW, indicating that, at present, natural variability in the water table is not likely to bring groundwater into contact with the base of the concrete ISFSI foundation pad (at +7.5 feet MLLW). Increases in the water table elevation related to sea level rise could potentially lead to intermittent lead to groundwater contact with the base of the ISFSI toward the end of the proposed 35-year life of the project. However, the design of the ISFSI is such that there are multiple barriers, including the 3-foot thick foundation pad and the steel cavity enclosure container (CEC), between the groundwater and the fuel storage casks, and limited contact with groundwater would not undermine the structural integrity of the ISFSI during the proposed project life. Furthermore, as a part of **Special Condition 2**, SCE would be required to evaluate current and future coastal hazards, including the effects of groundwater intrusion, as part of its CDP amendment application should it wish to retain the ISFSI in its proposed location beyond 2035.

#### Comments Related to Site Alternatives

Comments submitted by Michael Aguirre and Ray Lutz argue that SCE has not adequately explored alternative project locations off of the SONGS site. Mr. Lutz's comments include an extensive discussion of the benefits of siting the project away from the coast, and present a conceptual analysis of a hypothetical ISFSI site in the Mojave desert. In their comments, Ms. Gilmore and Ms. Lynch stated that the potential future alternative (discussed in the staff report) of relocating the ISFSI within the SONGS site would require a major expense and would greatly increase the current estimate of decommissioning costs.

As discussed in greater detail in the staff report, Commission staff has reviewed SCE's analysis of off-site alternatives and agrees with the conclusion that such alternatives are either unavailable or infeasible. No off-site federal permanent repository or private interim storage facility currently exists, and there is no prospect of such a facility becoming available in the near term. Nor is there another inland nuclear power plant with an existing ISFSI that is willing to or licensed to accept spent fuel from another site. Finally, there is no other site under SCE's control that is licensed for the siting of an ISFSI or at which an ISFSI could be developed in a reasonable period of time.

The staff recommendation is based on findings that the proposed project, as conditioned, would be consistent with Coastal Act policies related to geological hazards, the protection of marine and visual resources, and public access and recreation, excluding matters of radiological safety, and does not evaluate the potential cost of any future relocation of the ISFSI within the SONGS site. **Special Condition 2** requires that SCE evaluate the merits and feasibility (including costs)

of such alternatives as part of a CDP amendment application to retain, remove or relocate the ISFSI prior to the end of a 20-year term of approval.

Comments Related to ISFSI and Cask Safety & Radiological Issues

Comments submitted by Donna Gilmore, Laura Lynch, Gary Headrick, Donald Mosier, Dorah Shuey, Patricia Borchmann, Jane Swanson, Michael Aguirre, Rita Conn and Marv Lewis offer numerous arguments for why the proposed Holtec HI-STORM UMAX ISFSI and storage casks are inadequate or inappropriate for storing spent fuel at the proposed site. The main contentions of these comments are summarized below:

- (a) *The proposed underground system is unproven and experimental.*
- (b) *The 60-year design life and 100-year service life for the UMAX system claimed by SCE and Holtec are unsubstantiated; the Holtec warranty for the system is only ten years.*
- (c) *The proposed fuel storage casks are unsafe; stress corrosion cracking can be expected to occur in the stainless steel casks within 20 years.*
- (d) *Storage casks used in the existing ISFSI have been loaded since 2003, so SCE will need to have an aging management plan much sooner than 20 years from now.*
- (e) *The UMAX system configuration planned for SONGS has not been approved by the NRC; the NRC has only licensed a fully underground system using ½-inch thick fuel storage casks, not the partially-underground system and 5/8-inch casks proposed by SCE.*
- (f) *The proposed aging management program is inadequate, and the proposed casks cannot be repaired if damaged.*
- (g) *The NRC does not consider or require aging management in their initial 20-year license approvals.*
- (h) *High burn-up fuel to be stored in the proposed ISFSI could require up to 45 years of cooling prior to transport to permanent storage.*
- (i) *The Commission should not rely on vendor promises of future solutions for inspecting the casks in order to approve this project; there is already sufficient evidence that the proposed casks may not be transportable and maintainable to reject their use; the Commission should demand SCE use a proven system that can be inspected, maintained, monitored and transported, and that doesn't crack.*
- (j) *Thick-walled casks are available, and currently used in the U.S., that would provide superior performance in terms of safety and future transportability; the need to acquire a site-specific license to use such casks at SONGS is not sufficient grounds for rejection; the Commission should require SCE to use thick-walled casks as a special condition for approval.*
- (k) *Numerous past discharges of radioactive materials have occurred at SONGS; locating the ISFSI at the proposed site would make the area unsafe for public access.*
- (l) *SCE is considering loading Areva storage casks from the existing ISFSI into the new UMAX system.*

Without assessing the validity of these concerns, the Commission staff notes that the consequences of any failure, malfunction, or defects in the proposed ISFSI system are primarily a matter of radiological safety, which is under the exclusive jurisdiction of the federal Nuclear Regulatory Commission (NRC). The state is preempted from imposing upon operators of nuclear



facilities any regulatory requirements concerning radiation hazards and nuclear safety. Thus, the findings contained in the staff recommendation address only those state concerns related to conformity to applicable policies of the Coastal Act, and do not evaluate or condition the proposed project with respect to nuclear safety or radiological issues.

Staff's analysis indicates that the avoidance of long-term coastal erosion and flooding hazards at the project site (without resorting to shoreline armoring) is dependent on the ability to remove the ISFSI before it becomes vulnerable. At present, the integrity of the proposed ISFSI system is certified by the NRC for 20 years, providing assurance that the casks will be transportable, and the ISFSI system removable, within this timeframe. Commission staff believes that the 20-year duration of approval recommended in **Special Condition 2** is necessary to assure that potential future geologic hazards (and the need for shoreline protection) are avoided, is consistent with the 20-year certification of the HI-STORM UMAX system granted by the NRC, and does not impose any additional regulatory requirements concerning radiation hazards and nuclear safety.

SCE has informed Commission staff that SONGS fuel transported within a HI-STAR 190 transportation cask will require less than 15 years of cooling time starting from reactor shutdown in 2012, with even the most recently offloaded spent fuel ready for transport by 2027 (SCE 10/5/2015). Furthermore, fuel transport schedules contained in SCE's Irradiated Fuel Management Plan and Decommissioning Cost Estimate, both formal regulatory documents submitted to the NRC, indicate that all SONGS spent fuel can be transported offsite by 2049, 37 years after the 2012 reactor shutdown.

Commission staff is not aware of any plan to transfer older fuel storage casks from the existing ISFSI to the new system. This activity was not proposed in SCE's CDP application and would not be authorized by the proposed CDP.

#### U. S. Marine Corps Comments:

On October 1, 2015, Commission staff received a letter from the United States Navy and Marine Corps asserting that the Commission lacks jurisdiction to require or issue a CDP for development occurring on the SONGS site. The basis for the Navy and Marine Corps position is that under the Federal Coastal Zone Management Act (CZMA), land, "the use of which is by law subject solely to the discretion of ... the Federal Government, its officers or agents" is excluded from the definition of the coastal zone. (16 U.S.C. § 1453(1)).

The U.S. Supreme Court, however, has addressed this issue and determined that the CZMA does not pre-empt application of the California Coastal Act to private activities on federal land. It held that "[b]ecause Congress specifically disclaimed any intention to pre-empt pre-existing state authority in the CZMA, we conclude that even if all federal lands are excluded from the CZMA definition of 'coastal zone,' the CZMA does not automatically pre-empt all state regulation of activities on federal lands." *California Coastal Commission v. Granite Rock Co.* (1987) 480 U.S. 572, 593. Thus, under *Granite Rock*, the Commission retains the authority under the Coastal Act to require coastal development permits for non-federal activities taking place on federal land, such as Southern California Edison's proposed project pending before the Commission.

The U.S. Navy and Marine Corps support their argument that the Commission does not have coastal development permit jurisdiction on federal land by reference to an unpublished U.S. District Court decision, *Manchester Pacific Gateway v. California Coastal Commission* (2008 WL 5642245 (S.D. Cal.)). First, to the extent that the *Manchester* case is inconsistent with the Supreme Court holding in *Granite Rock*, the Supreme Court's decision in *Granite Rock* controls. Second, the *Manchester* case is factually distinguishable from the situation presented by the pending proposal from SCE. The *Manchester* case involved a Congressionally authorized public-private venture that resulted in the Navy obtaining new office space at no cost to the federal government. *Id.* at 1. The court acknowledged that the purpose of that project, as mandated by Congress, was to "provide for the use of private parties to accomplish the federal objective to construct Navy administrative facilities." *Id.* at 5. The project was authorized through legislation that spelled out the general parameters of the project and specifically authorized the project to be jointly developed by the Navy and the private developer. *Id.* at 6. Thus, the project was both a Navy and a private project.

The pending application from SCE does not involve a joint public-private venture. Thus, the facts are not analogous to those presented in the *Manchester* case. Thus, both under *Granite Rock* and due to factual distinctions between these facts and those raised in the *Manchester* case, the CZMA does not pre-empt the California Coastal Act here, and the Commission does have the jurisdiction to require a coastal development permit for the proposed development.

Finally, the Commission notes that the October 1, 2015 letter includes a statement, without elaboration, that the SONGS site is under exclusive federal jurisdiction where State law generally does not apply and the Commission only has jurisdiction over the SONGS site through the consistency provisions of the Coastal Zone Management Act. While the Commission does not disagree that it has jurisdiction over the SONGS site through the consistency provisions of the Federal Coastal Zone Management Act, the Commission finds that the singular statement in the October 1, 2015 letter neither establishes that the SONGS site is under exclusive federal jurisdiction where state law generally does not apply nor provides sufficient documentation, analysis or other supporting evidence.

**TU 14a 9-15-0228**

Southern California Edison Company

**CORRESPONDENCE**

**Street, Joseph@Coastal**

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**From:** Donna Gilmore <dgilmore@cox.net>  
**Sent:** Tuesday, September 01, 2015 5:25 PM  
**To:** Street, Joseph@Coastal  
**Cc:** David Pepper  
**Subject:** Testimony and Transcripts CPUC A1412007

Joseph, here's a link to the CPUC transcripts for the August 25, 26 & 27th evidentiary hearings on San Onofre Unit 2 & Unit 3 Decommission Proceeding A1412007. Each transcript has an index.

[https://sanonofresafety.files.wordpress.com/2015/09/a1412007\\_082515\\_eh\\_vol1.pdf](https://sanonofresafety.files.wordpress.com/2015/09/a1412007_082515_eh_vol1.pdf)  
[https://sanonofresafety.files.wordpress.com/2015/09/a1412007\\_082615\\_eh\\_2.pdf](https://sanonofresafety.files.wordpress.com/2015/09/a1412007_082615_eh_2.pdf)  
[https://sanonofresafety.files.wordpress.com/2015/09/a1412007\\_082715\\_eh\\_3.pdf](https://sanonofresafety.files.wordpress.com/2015/09/a1412007_082715_eh_3.pdf)

You can also find these links and my CPUC testimony with attachments and exhibits here.

<http://sanonofresafety.org/cpuc-decommissioning/>

## Street, Joseph@Coastal

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**From:** Donna Gilmore <dgilmore@cox.net>  
**Sent:** Tuesday, September 01, 2015 4:18 PM  
**To:** Street, Joseph@Coastal  
**Cc:** David Pepper  
**Subject:** Holtec, Dr. Singh Statement: It is not practical to repair a canister if it were damaged

Dr. Singh statement at the October 14, 2014 CEP meeting. Since he is providing the warranty, this is very relevant.

"It is my personal belief, it is not practical to repair a canister if it were damaged. If it had a through-wall, first you prevent it, but in the most unlikely circumstance if that canister were to develop a leak, let's be realistic; you have to find it, that crack, where it might be, and then find the means to repair it. You will have, in the face of millions of curies of radioactivity coming out of canister; we think it's not a path forward.

However, let me you can easily isolate that canister in a cask that keeps it cool and basically you have provided the next confinement boundary, you're not relying on the canister. So that is the practical way to deal with it and that's the way we advocate for our clients.

My personal position is a canister that develops a microscopic crack (all it takes is a microscopic crack to get the release), to precisely locate it itself it is a tall order and then if you try to repair it (remotely by welding) and of course remotely you can go and weld, the problem with that is you create a rough surface which becomes a new creation site for corrosion down the road. ASME Sec 3. Class 1 has some very significant requirements for making repairs of Class 1 structures like the canisters, so I, as a pragmatic technical solution, I don't advocate repairing the canister."

<https://www.youtube.com/watch?v=euaFzt0YPi4&feature=youtu.be>

Regarding Dr. Singh's statement about putting a damaged canister in a cask, he's referring to a transfer cask, which is not approved for that purpose. A transfer cask is just to move fuel from the pool to the overpack, or in the UMAX case into the hole in the concrete. There is no request at the NRC to use a transfer cask for this purpose. I am aware of a canister at Monticello that is sitting in a transfer cask, but it is not damaged. There were some inadequate welds on that canister and they've left it in that transfer cask temporarily until they figure out what to do with it. They are reluctant to open the canister for fear of problems when they return it to the spent fuel pool. Since the spent fuel pool is not yet empty, they are afraid of a reaction between the existing pool fuel assemblies and the fuel assemblies in the canister. No one has ever removed fuel from a welded spent fuel canister. It's only a theory at this point. They opened one bolted lid ductile cast iron cask in a dry storage facility. However, that facility no longer exists. At this point, Edison has no plan for a failed canister or failed UMAX system.

Edison mentioned inserting a damaged canister in a transportation cask, but that is also not approved for that purpose and it's definitely not approved for transporting damaged canisters. They are also extremely expensive because they are made of thicker steel. They're designed to be reusable. I'm not aware of even one of these on-site at San Onofre, but I don't know if that is still the current status. The Holtec has no transportation cask approved for high burnup fuel.

A good question to ask is, how many years will the fuel need to cool in the MPC-37 thin canister before it can be transported? I have a DOE chart that shows it could be over 35 years.

**From:** Donna Gilmore <dgilmore@cox.net>  
**Sent:** Tuesday, September 01, 2015 2:59 PM  
**To:** Street, Joseph@Coastal  
**Cc:** David Pepper; Scott Atwater; Rick Morgal  
**Subject:** Concrete degradation ISFSI - applicable to San Onofre ISFSI  
**Attachments:** ConcreteProblems.doc

Some recent NRC documents of interest on concrete degradation that can impact the ISFSI. Slide presentation and report by NRC senior structural engineer. I included some items, but both documents are worth reading. Also, attached is information I've collected about concrete degradation in spent fuel storage systems. It also includes the below information.

**Aging Effects on Structural Concrete and Long-term Storage of Spent Nuclear Fuel in DCSS at ISFSIs in the USA slides**, SMIRT-23 Conference, Manchester, UK, August 10 - 14, 2015, Bhasker (Bob) P. Tripathi, P. E., F. ASCE, Senior Structural Engineer, NMSS/DSF1M/CSTB ML15204A058 E-mail: [Bhasker.Tripathi@nrc.gov](mailto:Bhasker.Tripathi@nrc.gov) 301-492-3281  
<http://pbadupws.nrc.gov/docs/ML1520/ML15204A058.pdf>

**Slide 3 Technical Challenge is to maintain intended design safety functions for:**

- Initial license (20 Yrs.)
- Renewal license (First Renewal up to 40 Yrs.)
- Extended Storage - Long-term (**a period of up to 300 years**)

**Slide 7 Concrete Deterioration**

- Concrete structures are generally designed for a service life of 50 years, **but experience shows that in urban and coastal environments many structures begin to deteriorate in 20 to 30 years or even less time**

**Slide 14 Conclusions**

- Within the extended storage of SNF regulatory program, the aging of systems and components may have to be viewed as occurring on a continuum that extends from initial licensing and renewal, through longer periods (**up to 300 years**) of extended storage

**Aging Effects on Structural Concrete and Long-term Storage of Spent Nuclear Fuel in DCSS at ISFSIs in the USA**, Bhasker (Bob) P. Tripathi, P. E., F. ASCE1 [Bhasker.Tripathi@NRC.GOV](mailto:Bhasker.Tripathi@NRC.GOV) Manchester, United Kingdom - **August 10-14, 2015** Division 9, Paper ID # 185  
<http://pbadupws.nrc.gov/docs/ML1520/ML15204A054.pdf>

As the wet spent fuel pools at the operating commercial nuclear reactor facilities in the US reach their storage capacity the licensees transfer the Spent Nuclear Fuel (SNF) to Dry Cask Storage System (DCSS) and move these casks to Independent Spent Fuel Storage Installations (ISFSIs). Existing ISFSIs in the United States of America were licensed for an initial period of 20 years. The U.S. Nuclear Regulatory Commission (NRC) has revised 10 CFR Part 72, so that the initial licenses and renewal may now be issued for periods not to exceed 40 years. **Thus in effect upon first renewal, the approved design bases for the facility must be maintained for periods up to 60 years. Short of any permanent repository and/or interim consolidated storage facilities, these ISFSIs may be storing SNF on the order of 100 years and beyond.** Licensees must include an aging management program (AMP) as defined in the 10 CFR Part 72 regulations for renewals of existing ISFSIs.

Page 8

Aging management programs **are being developed** by the NRC to ensure that potential degradation mechanisms are identified, and the design safety functions are maintained for long-term storage.

Prevention, mitigation, inspection and monitoring, AMP and TLAA, remediation and repair, are just a few of the topics that are further investigated currently by the NRC staff, in order to ensure the long-term functional capabilities of the ISFSI related ITS reinforced concrete structures

## Concrete problems

**Aging Effects on Structural Concrete and Long-term Storage of Spent Nuclear Fuel in DCSS at ISFSIs in the USA** slides, SMIRT-23 Conference, Manchester, UK, August 10 - 14, 2015, Bhasker (Bob) P. Tripathi, P. E., F. ASCE, Senior Structural Engineer, NMSS/DSF1M/CSTB ML15204A058 E-mail: [Bhasker.Tripathi@nrc.gov](mailto:Bhasker.Tripathi@nrc.gov) 301-492-3281  
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**Aging Effects on Structural Concrete and Long-term Storage of Spent Nuclear Fuel in DCSS at ISFSIs in the USA**, Bhasker (Bob) P. Tripathi, P. E., F. ASCE1 [Bhasker.Tripathi@NRC.GOV](mailto:Bhasker.Tripathi@NRC.GOV)  
Manchester, United Kingdom - **August 10-14, 2015** Division 9, Paper ID # 185  
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ACRS Agenda 2014-09-19 Concrete Degradation ACRS Cognizant Staff Engineer/DFO: Kent L. Howard, Sr. Email: Kent.Howard@nrc.gov Phone #: (301) 415-2989  
<http://pbadupws.nrc.gov/docs/ML1424/ML14248A452.pdf>

<http://pbadupws.nrc.gov/docs/ML1206/ML120660154.pdf>

ML14282A172 ACRS Transcript 9/19/2014 [brown@matse.psu.edu](mailto:brown@matse.psu.edu) <http://www.matse.psu.edu/directory/faculty/paul-brown>

Concrete Durability, Repair Strategies and Their Limitations Paul Brown, Ph.D.

Professor of Materials Science & Engineering, Penn State Univ. President Chemhydration, LLC

[chemhydration@aol.com](mailto:chemhydration@aol.com) PWBrown, NRC Concrete Degradation Mtg 9-19-14, slides

### **Degradation reactions (some)**

#### **Delayed ettringite formation (DEF)**

Homogenous paste expansion in mature concrete as a result of an elevated curing temperature.

#### **Alkali-silica reaction (ASR)**

~Homogeneous expansion due to silicate gel formation.

Corrosion of embedded steel

Concrete cracking and debonding

due to the increase in specific

volumes of local solids as steel

corrodes.

#### **ACR (alkali-carbonate reaction)**

A relatively rare form of degradation associated with MgO extraction from dolomitic aggregate.

### **Degradation reactions common aspects**

Freezing-thawing – locally expansive

Sulfate attack - locally expansive

Physical salt attack - locally expansive

Corrosion of embedded metals – locally expansive

DEF – **globally expansive**

ACR – **globally expansive**

ASR – **globally expansive**

### **Repair methodologies – in situ concrete**

Carbonation – R & R of the affected area (1)

Leaching – R & R of the affected area (1)

Acid (chemical) attack – R & R of the affected area (1)

Freezing-thawing – R & R of the affected area (1)

Sulfate attack – R & R of the affected area (1)

Physical salt attack – R & R of the affected area (1)

Corrosion of embedded metals:

concrete R & R including cleaning the rebar (1)

ECE (2)

apply a penetrating corrosion inhibitor (2)

DEF, ACR, ASR - **none**

### **Summary**

- Concrete will always contains flaws.
- Concrete will contain cracks, some of which will appear in mature concrete.
- The mere detection of cracks does not necessarily mean that the world is coming to an end.
- **\*The absence of macroscopic cracks should not be interpreted as the absence of degradation.**
- Strength data can be interpreted in a variety of ways.
- While a variety of factors associated with its service environment can degrade a concrete structure, degradative processes are frequently expansive.

- With respect to ASR, there is no proven method of remediation.
- There are a variety of technologies that may provide a method of remediation an ASR affected structure.

Commentary on the Alkali-Silica Reaction in Concrete Structures at the Seabrook Nuclear Plant  
March 14, 2012

<http://pbadupws.nrc.gov/docs/ML1233/ML12339A268.pdf>

or

[http://www.ucsusa.org/sites/default/files/legacy/assets/documents/nuclear\\_power/brown-seabrook-concrete-report-3-14-12.pdf](http://www.ucsusa.org/sites/default/files/legacy/assets/documents/nuclear_power/brown-seabrook-concrete-report-3-14-12.pdf)

CLEAR REGULATORY COMMISSION BEFORE THE ATOMIC SAFETY AND LICENSING BOARD In the Matter of NextEra Energy Seabrook, L.L.C. Docket No. 50-443-LR Seabrook Station, Unit 1, ) September 21, 2012

SUPPLEMENT TO FRIENDS OF THE COAST AND NEW ENGLAND COALITION'S MOTION FOR LEAVE TO FILE A NEW CONTENTION CONCERNING NEXTERA ENERGY SEABROOK'S AMENDMENT OF ITS AGING MANAGEMENT PROGRAM FOR SAFETY-RELATED CONCRETE STRUCTURES

<http://pbadupws.nrc.gov/docs/ML1226/ML12265A394.pdf>

<http://pbadupws.nrc.gov/docs/ML1122/ML112241029.pdf>

## November 18, 2011 NRC INFORMATION NOTICE 2011-20: CONCRETE DEGRADATION BY ALKALI-SILICA REACTION

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice (IN) to inform addressees of the occurrence of alkali-silica reaction (ASR)-induced concrete degradation of a seismic Category 1 structure at Seabrook Station...

ASR [alkali-silica reaction] is one type of alkali-aggregate reaction that can degrade concrete structures. ASR is a slow chemical process in which alkalis, usually predominantly from the cement, react with certain reactive types of silica (e.g., chert, quartzite, opal, and strained quartz crystals) in the aggregate, **when moisture is present**. This reaction produces an alkali-silica gel that can absorb water and expand to cause micro-cracking of the concrete. Excessive expansion of the gel can lead to significant cracking which can change the mechanical properties of the concrete. In order for ASR to occur, three conditions must be present: a sufficient amount of reactive silica in the aggregate, adequate alkali content in the concrete, and sufficient moisture...

ASR degrades the measured mechanical properties of the concrete at different rates. Therefore, **relationships between compressive strength and tensile or shear strength and assumptions about modulus of elasticity that were used in the original design of affected structures may no longer hold true if ASR-induced degradation is identified...**

After observing concrete cracking patterns typical of ASR, in August 2010, the licensee for Seabrook Station performed petrographic examinations and compressive strength and modulus of elasticity testing of concrete core samples removed from below-grade portions of the control building (a seismic Category I structure) that confirmed that ASR had caused the cracking. **These concrete core samples demonstrated a substantial reduction in compressive strength compared to test cylinders cast during construction and a modulus of elasticity substantially lower than the expected value...**

Regardless of the measures taken during initial construction, visual inspections of concrete can identify the unique “map” or “patterned” cracking and the presence of alkali-silica gel in areas likely to experience ASR (i.e., concrete exposed to moisture)...

<http://www.newburyportnews.com/local/x1690519673/Concrete-problem-revealed/print>

CHIARAMIDA, A., “Concrete Problem Revealed,” Daily News, Newbury Port News, Newburyport, MA, March 16, 2012

<http://www.newburyportnews.com/local/x1690519673/Concrete-problemrevealed>

<http://www.nrc.gov/reading-rm/doc-collections/nuregs/contract/cr6424/cr6424.pdf>

**Report on Aging of Nuclear Power Plant Reinforced Concrete Structures**, NUREG/CR-6424 ORNL/TM-13148, D. J. Naus, C. B. Oland, ORNL; B. R. Ellingwood, JHU; Oak Ridge National Laboratory; The Johns Hopkins University, **March 1996**

Prepared for U.S. Nuclear Regulatory Commission

P.22

Alkali-Aggregate Reactions Chemical reactions involving alkali ions (Portland cement), hydroxyl ions, and certain siliceous constituents that may be present in aggregate materials can form a gel.

As **the alkali-silica** gel comes in contact with water, swelling (i.e., hydraulic pressure) occurs that can cause cracking that **eventually could lead to complete destruction of the concrete**.<sup>63</sup> Visible concrete damage starts with small surface cracks exhibiting an irregular pattern (or map cracking). The expansion will develop in the direction of least constraint (i.e., parallel surface patterns developing inward from surface for slabs and cracking parallel to compression forces in columns or prestressed members). Pop-outs and glassy appearing seepage of varying composition can appear as a result of alkali-silica reactions. Expansion reactions also can occur as a result of alkali-carbonate reactions (i.e., dedolomitization).

<sup>63</sup> Y. Mori and B. R. Ellingwood, Methodology for Reliability-Based Condition Assessment - Application to Concrete Structures in Nuclear Plants, NUREG/CR-6052 (ORNL/Sub/93-SD684), The Johns Hopkins University, Baltimore, Maryland, August 1993.

<http://www.osti.gov/scitech/servlets/purl/10179658>

<http://www.nrc.gov/info-finder/reactor/seabrook/concrete-degradation.html>

**Special NRC Oversight at Seabrook Nuclear Power Plant: Concrete Degradation**

<http://www.fhwa.dot.gov/publications/research/infrastructure/pavements/pccp/03047/02.cfm>

Federal Highway Administration Report, Chapter 2 Alkali-Silica Reaction Publication Number: FHWA-RD-03-047, Date: July 2003

Map

ASR has been implicated in the deterioration of various types of concrete structures, including dams, pavements, bridges, and other structures.

It is widely accepted that the three essential components necessary for ASR-induced damage in concrete structures (as shown in figure 2) are: (1) reactive silica (from aggregates); (2) sufficient alkalies (mainly from portland cement, but also from other constituent materials); and (3) sufficient moisture. Eliminating any one of the above components effectively will prevent damage due to ASR, as discussed next.

#### Sufficient Alkalies

The presence of sufficient alkalies is another required ingredient for ASR. The source of alkalies can be from any of the following:

- Portland cement.
- Supplementary cementing materials (e.g., fly ash, slag, silica fume).
- Aggregates.
- Chemical admixtures.
- External sources (e.g., seawater and deicing salts).

- Wash water (if used).

Of the above materials, portland cement is the main contributor of alkalies.

<http://www.fhwa.dot.gov/pavement/concrete/asr.cfm>

<http://www.fhwa.dot.gov/pavement/concrete/asr/reference.cfm>

## Alkali-Silica Reactivity website

<http://www.fhwa.dot.gov/publications/focus/07apr/01.cfm>

### New FHWA Program To Combat ASR in Concrete

Preventing and mitigating alkali-silica reactivity (ASR) in portland cement concrete pavements and structures is the focus of a new \$10 million Federal Highway Administration (FHWA) initiative. The 4-year ASR program was established and funded by the 2005 Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). "This new highway concrete technology program is designed to increase concrete pavement and structure durability and performance and to reduce life cycle costs through the prevention and mitigation of ASR," says Gina Ahlstrom of FHWA's Office of Pavement Technology.

ASR occurs when silica in some aggregates and alkalis in concrete combine with water to form a gel-like substance. As the gel absorbs water and expands, it causes the concrete to crack. Over time, the cracks enable other modes of distress to occur, such as freeze thaw damage or corrosion, causing permanent damage and even structural failure.

...field identification of ASR is difficult and that there is a lack of understanding of the extent of the problem, as ASR is not included as part of most regular pavement or bridge inspection programs. Inspectors need a test to identify ASR in the field that would be relatively easy, fast, and reliable. Participants noted the need as well for a fast and reliable test method to identify the potential for ASR to occur in concrete mixtures proposed for transportation structures. Workshop participants also stressed the importance of increasing awareness of ASR among agencies and contractors and improving the decisionmaking process for preventing ASR in new construction.

<http://www.fhwa.dot.gov/pavement/concrete/asr/reference.cfm>

<http://www.fhwa.dot.gov/pavement/concrete/asr/pubs/hif12022.pdf>

### FHWA Alkali-Silica Reactivity Field Identification Handbook, December 2011

Thomas, M.D.A., Fournier, B., Folliard, K.J., Resendez, Y.A., The Transtec Group, Inc.

No restrictions. This document is available to the public through the National Technical Information Service, Springfield, VA 22161.

Two types of alkali-aggregate reaction (AAR) are currently recognized depending on the nature of the reactive mineral; these are alkali-silica reaction (ASR) and alkali-carbonate reaction (ACR). Both types of reaction can result in expansion and cracking of concrete elements, leading to a reduction in the service life of concrete structures. This handbook serves as an illustrated guide to assist users in detecting and distinguishing ASR in the field from other types of damages.

### ASR and steel corrosion

Cracking due to ASR provides pathways for chloride ions from deicing salts or seawater to rapidly penetrate the concrete cover and initiate corrosion of embedded reinforcement. One instance of corroded steel is shown in Figure 18.



### **ASR and freeze-thaw deterioration**

ASR can reduce the resistance of concrete to cyclic freezing and thawing, even if the concrete is adequately air-entrained. If cracks induced by ASR become saturated the freezing water will propagate and widen the cracks. Horizontal surfaces, such as pavements, are particularly vulnerable to this combination of processes. An example is shown in Figure 19.



### **ASR and delayed ettringite formation**

Delayed ettringite formation (DEF) has often been found in association with ASR. Indeed, ASR can accelerate DEF by reducing the pH of the concrete pore solution, thereby expediting the release of sulfates entrapped by the hydrates during elevated-temperature curing. The released sulfates are then free to form ettringite, and this delayed formation of ettringite increases the expansion and cracking already contributed by ASR. Figure 20 shows effects of ASR and DEF.





### **Long-Term Storage of Cesium and Strontium at the Hanford Site**

<http://energy.gov/ig/downloads/audit-report-oas-l-14-04>

DOE, Office of Inspector General, Office of Audits and Inspections Audit Report  
Long-Term Storage of Cesium and Strontium at the Hanford Site, OAS-L-14-04 March 2014  
<http://energy.gov/sites/prod/files/2014/04/f14/OAS-L-14-04.pdf>

**We found that the continued storage of the capsules in "wet-storage" at WESF resulted in a higher operating cost than the "dry storage" alternative under consideration.** According to information prepared by the Richland contractor, CH2M HILL Plateau Remediation Company (CHPRC), it would cost approximately \$83 million to \$136 million to move the capsules from WESF into a dry storage facility. Once in dry storage, operating costs would be about \$1 million annually. Currently, Richland spends approximately \$7.2 million per year for operations at WESF. Therefore, each year Richland delays moving the capsules into dry storage it misses an opportunity to realize cost savings of about \$6.2 million, the difference between the costs to operate "wet" and "dry" storage. It is important to note that the cost to construct an interim dry storage facility must be incurred at some point, so the earlier this occurs, the more operating costs can be saved.

### **Degrading Facility**

We noted that WESF is more than 9 years past its design life, and has experienced degradation of key structures and systems relied on for safety. Specifically, the facility began operations in 1974 with a design life of 30 years, but has now been in service for more than 39 years. Also, **the concrete in the WESF pool cells has begun to deteriorate due to years of radiation exposure**, according to a recent Safety Evaluation Report conducted by Richland. Weakened concrete in the walls of the pool increases the risk that a beyond design earthquake would breach the walls, resulting in loss of fluid, and thus, loss of shielding for the capsules. Richland officials informed us that the pools walls were still safe despite the damage, citing various design elements in the facility.

<http://www.nrc.gov/reading-rm/doc-collections/nuregs/contract/cr5279/#pub-info>

<http://pbadupws.nrc.gov/docs/ML1322/ML13222A002.pdf>

DOE Sulfate-Attack Resistance and Gamma-Irradiation Resistance of Some Portland Cement Based Mortars NUREG/CR-5279, BNL-NUREG-52179, RW, Brookhaven National Lab, P.Soo, L.W. Milian, March 1989

## 5. SUMMARY AND CONCLUSIONS

The preliminary studies carried out in this program on Portland cement mortars indicate that there may be degradation mechanisms associated with long-term exposure to sulfate solutions and to gamma irradiation. These problems should be more fully studied if these types of materials are to be considered for use as barrier materials for low-level radioactive wastes.

With respect to sulfate attack, the Portland V based cement mortar showed a higher resistance to attack compared to Portland I mortar, as expected. However, silica fume additions, rather than enhance the resistance of Portland V cement mortar to sulfate, actually led to increased attack. Even deionized water caused Portland V/silica fume cement mortar to degrade. This indicates that sulfate is not the only factor in the degradation mechanism. It is recommended that caution be exercised in specifying the composition and mixing procedure for this cement mortar. The fact that some workers have produced successful products appears to show that cement mortar quality sensitively depends on these processing variables.

Gamma radiation also degrades the strength of these cement mortars at doses much less than the  $10^{10}$  -  $10^{11}$  rad value specified in at least one prior study on concrete. It was found that curing time during irradiation is an important variable in determining the degree of strength loss. The gamma dose rate, on the other hand, is relatively unimportant. This indicates that although irradiation is a necessary part of the strength degradation mechanism, it does not control it. Some radiation-induced cement dehydration process could be responsible, but the details are not known at this time.

<http://link.springer.com/article/10.1023%2FA%3A1010971122496#page-1>

The effect of gamma radiation on the strength of Portland cement mortars, P. Soo, L. M. Milian, Journal of Materials Science Letters, 20010715, Volume 20, Issue 14, pp 1345-1348, 07/01/2001

<http://www.nrc.gov/reading-rm/doc-collections/nuregs/availability/availability-notice.html>

NRC publishes the several types of documents in its NUREG-series, each of which has a unique alphanumeric designator beginning with the alpha designator **NUREG**, followed by either a four-digit number or by two letters further identifying the type of report and a four-digit number. NRC has issued disclaimers for several of these types of documents as follows:

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<http://www.claisse.info/2010%20papers/m17.pdf>

**Effect of Gamma Irradiation on Hardened Cement Paste**, František Vodák, Vítězslav Vydra, Karel Trtík, and Olga Kapičková, June 28-30, 2010

1-4Faculty of Civil Engineering, Czech Technical University in Prague,Thakurova 7, 166 29 Prague,Czech Republic, E-mail: 1 <vodak@fsv.cvut.cz>, 2 <vydra@fsv.cvut.cz>, 3 <trtik@fsv.cvut.cz>, 4 <vodak@fsv.cvut.cz>

## CONCLUSIONS

**Presented research confirms hypotheses about the radiation carbonation. There is an obvious increase of calcite content in HCP with growing dose of irradiation.** The samples in all experiments were exposed to natural carbonation and simultaneously to radiation carbonation. It was proved by experiments that radiation at least augments natural carbonation. In experiments samples were sliced up with aim to research natural and radiation carbonation separately. It has been proved that radiation carbonation takes part both in depth and on surface of the samples which means, that it is independent on natural carbonation. The hypothesis of radiation carbonation is also supported by porosimetric experiments. Average pore diameter decreases with increasing dose of

irradiation. It was shown that this decrease was caused by shift of pores to nanopore region. Contribution of two independent types of carbonation to the decrease of the average pore diameter was reliably distinguished. In some experiments content of calcite in depth of irradiated samples was doubled in comparison with unirradiated samples. On the contrary decrease of the average pore diameter with irradiation is less steep with higher irradiation. One may speculate that with growing dose (above 1 MGy) enhanced radiolytic dehydration of the samples and formation of microcracks may take part. Microcracks may be detected with porosimetric measurements as micropores, so the resulted picture is a superposition of the decrease of AVP due to carbonation and increase of the AVP due to radiolytic microcracking. Also extinction of ettringite may indicate radiolytic dehydration, as it contains substantial amount of water.

Validation of radiation carbonation hypothesis is, however, based on indirect proofs. As a direct proof may be considered monitoring of CO<sub>2</sub> content in the samples during irradiation. Further experiments should be heading for this beside with investigation of the role of dose rate.

<http://przyrbwn.icm.edu.pl/APP/PDF/114/a114z211.pdf>

**Effect of Gamma Irradiation on Cement Composites** Observed with XRD and SEM Methods in the Range of Radiation Dose 0-1409 MGy. A. Lowinska-Kluge and P. Piszora  
Institute of Structural Engineering, Poznan University of Technology, Piotrowo 5, PL-60-965 Poznań, Poland; Department of Materials Chemistry, Faculty of Chemistry. Adam Mickiewicz University, Grunwaldzka 6, PL-60-780 Poznan, Poland, ACTA PHYSICA POLONICA A, Vol. 114 (2008)

The effect of gamma radiation in the range of 0-1409 MGy on the structure of a new mineral additive to cement based composites was investigated in the perspective of employing them as radioactive waste protection material. According to the authors knowledge, it is the first paper dealing with observations of the cement matrix, both pure and modified, treated with so giant radiation dose. The absorption of gamma radiation modifies the morphology of the additive grains, causes decomposition of cement hydrates and clinker relicts in cement paste containing the additive at twice higher radiation dose than that inducing the decomposition of the reference pure cement paste and the cement paste containing pozzolane additives.

<http://pbadupws.nrc.gov/docs/ML1121/ML112140109.pdf>

Containment Liner Corrosion, Darrell Dunn April Pulvirenti and Paul Klein Darrell Dunn, April Pulvirenti, and Paul Klein, NRC, 15th International Conference on Environmental Degradation of Materials in Nuclear Power Systems – Water Reactors, August 7-11, 2011, Slide Presentation  
Degradation rates

<http://pbadupws.nrc.gov/docs/ML1121/ML112140119.pdf>

12/4/2012 CONTAINMENT LINER CORROSION - Report  
Darrell Dunn, April Pulvirenti, and Paul Klein

<http://prod.sandia.gov/techlib/access-control.cgi/2010/108718.pdf>

SANDIA REPORT SAND2010-8718

**July 2011 Nuclear Containment Workshop: Final Recommendation**

Jason P. Petti., Sandia National Laboratories

Albuquerque, New Mexico 87185 and Livermore, CA

Sandia National Laboratories is a wholly owned subsidiary of Lockheed Martin

**Steel Liner Corrosion Workshop: Final Summary and Recommendation Report**

The current state of NDE technology is not capable of effectively detecting OD-corrosion when considering the size of the containment structures and the area of the liner surface. While ultrasonic inspections can detect corrosion at point locations, there is no currently available technology for using this over large areas. Current concrete and liner repair methods are well established and are not considered an issue. Mitigation methods, mainly cathodic protection, are not considered practical for preventing liner corrosion.



<http://www.osti.gov/scitech/servlets/purl/117708>

### **Remote Technologies for Buried Waste Retrieval**

1995 INEL Doc# 95/00196 CONF-9506184—3

In the past, much of the Department of Energy's (DOE'S) **transuranic and hazardous waste** was **disposed of in shallow pits** and trenches that are similar to landfills. At **the Idaho National Engineering Laboratory (INEL)** alone, over 65,000 m<sup>3</sup> of transuranic and hazardous waste was buried in shallow pits and trenches between 1950 and 1972 in the Subsurface Disposal Area at the Radioactive Waste Management Complex.<sup>1</sup> Commingled with this waste is up to 283,000 m<sup>3</sup> of fill soil. **Over the entire DOE complex, 181,400 m<sup>3</sup> of transuranic and hazardous waste was buried before 1970.**<sup>2</sup> Transuranic waste requires particular care because the transuranic contaminants tend to be micron-sized particles that are easily suspended in air and breathed into the lungs. The uptake (amount breathed into lungs) limits for transuranic contaminants (e.g., plutonium) are extremely small because uptake quantities on the order of a microgram of transuranic contaminant result in a lifetime body burden (i.e., a lifetime dose of radiation).

#### **REFERENCES**

1. D. A. Arrenholz and J. L. Knight, A Brief Analysis and Description of Transuranic Wastes in the Subsurface Disposal Area of the Radioactive Waste Management Complex at the INEL, EGG-WTD-9438, EG&G Idaho, Inc., February 1991.
2. P. S. Kaae, et al., DOE Complex Buried Waste Characterization Assessment, PNL-8390, Pacific Northwest Laboratory, January 1993.
3. L. C. Meyer, et al., La-Oxides CIS Tracers for PuO<sub>2</sub> to Simulate Contaminated Aerosol Behavior, EGG-WTD- 11161, EG&G Idaho, Inc., April 1994.

### **Seabrook – Concrete problems, UCS, December 2013**

#### **STATEMENT ON CONCRETE DEGRADATION AT SEABROOK NUCLEAR STATION**

David Wright, Co-Director and Senior Scientist, Global Security Program, Union of Concerned Scientists  
December 18, 2013

[http://www.ucsusa.org/sites/default/files/legacy/assets/documents/nuclear\\_power/concrete-seabrook-statement.pdf](http://www.ucsusa.org/sites/default/files/legacy/assets/documents/nuclear_power/concrete-seabrook-statement.pdf)

### **ASME June 11 Concrete problems**

<http://www.astm.org/portals/files/CTG-NESCC- ASTM-June11.ppt>

#### **Concrete Radiation Shield**

- Neutrons and gamma photons incident on a concrete radiation shield can cause thermal gradients that can lead to stresses that cause cracking.
- Not addressed in standards:
  - Radiation and the thermal cycling of such shields
  - the dehydration of concrete shields caused by long term exposure to temperatures above about 90 °C
  - degradation in concrete's ability to shield against neutrons.
- The performance-based design of concrete is not yet fully implemented in non-nuclear construction but still should be considered for NPP.
- The obstacle to full implementation is the lack of test methods to measure desirable properties and the lack of models to predict performance after 50 or 100 years of service.

**From:** Donna Gilmore <dgilmore@cox.net>  
**Sent:** Tuesday, September 01, 2015 1:44 PM  
**To:** Street, Joseph@Coastal  
**Cc:** David Pepper; Scott Atwater  
**Subject:** San Onofre ISFSI Issues: Holtec Warranty, UMAX NRC approvals, NUREG-1927 Aging Management

### **Holtec Warranty**

See page marked as 79 where it shows the 25 year thin canister (MPC-37) warranty and the 10 year UMAX base warranty.

Also, the 2 year warranty for the AHSM-HS refers to the Areva storage system. It applies if Holtec loads any canisters into this.

Also note, that after the 10 year warranty expires, if the UMAX base fails and the thin canister is damaged, the 25-year canister warranty is void, since Edison is required to maintain the system.

Edison referenced the 60-year design life in the Final SAR. However, the NRC only approved 20 years. The rest is Holtec's claims for which they provided no specific substantiation and ignored evidence that exists to the contrary.

<https://sanonofresafety.files.wordpress.com/2013/06/sce-dr-response-w-attachment-to-a-14-12-007-gilmore-sce-001-follow-up-2-q-09-q-12.pdf>

### **Here is the NUREG-1927 Rev. 1 draft**

<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1927/r1/>

**Here are my comments to the NUREG-1927 Rev. 1 draft.** The NRC is currently hiding all public comments that were made to this

NUREG <https://sanonofresafety.files.wordpress.com/2011/11/donnagilmorecommentstnureg-1927rev1-2015-08-21.pdf>

**In the UMAX approval for low-seismic areas,** the NRC excluded any aging issues that may occur after the initial 20 years, claiming it's out of scope of their approval requirements.

<http://www.gpo.gov/fdsys/pkg/FR-2015-03-06/html/2015-05238.htm>

**These are comments I submitted to the proposed UMAX for high-seismic areas.** I have not received a response from the NRC as to whether they still plan to approve this. Even if they do, this is just for the UMAX system. It's not an approval for the ISFSI to store the Holtec UMAX system. That's a separate evaluation and approval certificate.

<http://pbadupws.nrc.gov/docs/ML1521/ML15210A177.pdf>

Have you read the NRC UMAX PSER? It clarifies the evaluation assumed support foundation pad level is 25 feet below surface grade.

NRC PRELIMINARY SAFETY EVALUATION REPORT, Docket No. 72-1040

HI-STORM UMAX Canister Storage System, Amendment No. 1

Page 2 - 3

### 3.1 Staff Evaluation

Design Basis Seismic Model (DBSM) and Soil-Structure Interaction Analysis (SSI) In **this amendment request the applicant provided a seismic model that applied the design basis earthquake (DBE) at the support foundation pad (SFP) level 25 feet below surface grade.** By contrast, the applicant's original analysis, approved in CoC No. 1040 Rev. 0 used a design basis earthquake (DBE) specified at the ISFSI pad level with a horizontal zero period acceleration (ZPA) of 1.0g and a vertical ZPA of 0.75g. To arrive at a the seismic demand for the SFP, the applicant applied deconvolution which correctly reduced the demand to a horizontal ZPA of 0.93g and a vertical ZPA of 0.71g at the SFP. In this amendment request, the applicant used a higher seismic demand of 2.12g net horizontal ZPA and 1g vertical ZPA, applied directly to the SFP level located at 25 feet below surface grade for its analyzed model. The applicant also stated that this Amendment No. 1 UMAX system also includes concrete fill between the SFP and the top ISFSI pad which provides a more monolithic structure not requiring independent acceleration inputs at the ISFSI pad level...

P 3

The staff notes that Regulatory Guide (RG) 1.60 indicates that the input DBE demand should typically be applied to the top of the loaded independent spent fuel storage installation (ISFSI) pad. The staff reviewed the applicant's approach and determined that applying the DBE directly at the SFP results in a higher seismic demand for the HI-STORM UMAX storage unit, than if it had been applied at the ISFSI pad level. This approach eliminates a reduction in the seismic demand that would have been seen due to the deconvolution of seismic forces, given that the **support foundation pad is located at 25 feet below the ISFSI pad.** Therefore the staff finds this approach to be conservative, and it meets the general intent of RG 1.60, and is therefore acceptable.

**Street, Joseph@Coastal**

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**From:** Donna Gilmore <dgilmore@cox.net>  
**Sent:** Thursday, September 17, 2015 4:31 PM  
**To:** Street, Joseph@Coastal  
**Cc:** Rita Conn; Toni Iseman; Rick Morgal; Dorah Shuey; Scott Atwater; RL Miller  
**Subject:** Holtec UMAX System for San Onofre - information for October Coastal Commission item  
**Attachments:** LtrToCoastalCommissionDGilmore2015-09-17UMAX-Amend1.pdf

The Nuclear Regulatory Commission (NRC) approved the Holtec UMAX Amendment 1 Canister System effective September 8, 2015 with many limitations. This was not an approval for use at San Onofre and the UMAX system is only certified for 20 years. See details on attachment.

Donna

September 17, 2015

**To:** California Coastal Commission  
Joseph Street  
**Fr:** Donna Gilmore

**Re:** Holtec HI-STORM UMAX Canister Storage System Amendment 1 (CoC No. 1040)

The Nuclear Regulatory Commission (NRC) approved the Holtec UMAX Amendment 1 Canister System effective September 8, 2015 with many limitations. This was not an approval for use at San Onofre and the UMAX system is only certified for 20 years.

### Summary

- **Not an approval for use at San Onofre.** “This rulemaking makes no determination regarding the acceptability of this amended system for use at any specific site.”
- **Certified for only the initial 20 years.** Any evaluation for conditions that may occur after this [such as cracking, inspection, aging management, fuel cladding failure from high burnup fuel] are outside the scope of this approval. “Long-term” [as referenced in the Holtec Safety Evaluation] is a general descriptive term that is not required to support any regulatory or technical evaluation, and thus is not required to be more formally defined.
- **Excludes any plan for storing failed (cracking) canisters.** Both San Onofre V.P. Tom Palmisano, and Holtec President, Dr. Kris Singh, state transfer casks can be used to store failed canisters (July 23, 2015 Community Engagement Panel meeting). However the NRC states “The HI-STORM UMAX transfer cask is authorized to transfer **intact** canisters [e.g., not cracking or otherwise failed canisters].” “Implementing corrective actions in the event of a failed MPC [multi-purpose canister] is the responsibility of the general licensee and those corrective actions are not incorporated into CoC [Certificate of Compliance] No. 1040.”
- **Approved only for 0.5” thick canisters – not the 0.625” thickness San Onofre proposes.** “The nominal MPC thickness for the canisters certified under CoC No. 1040, Amendment No. 1 is 0.5”. The NRC has no knowledge of a Holtec proposal to increase the thickness of an MPC to 0.625”. If presented with an amendment request to do so, the NRC will evaluate it in accordance with 10 CFR part 72 requirements.”
- **The underground system evaluated is different than the system proposed for San Onofre.** The approval is for an underground system, not the partially underground system proposed for San Onofre. “Pursuant to the regulatory requirements in 10 CFR 72.212(b), any general licensee that seeks to use this system must determine that the design and construction of the system, structures, and components are bounded by the conditions of the CoC by analyzing the generic parameters provided and analyzed in the FSAR [Final Safety Analysis Report] and SER [Safety Evaluation Report] to ensure that its site specific parameters are enveloped by the cask design bases established in these reports.”

See details on following pages.

## Key Portions of NRC Responses to Public Comments

### 1) Potential Supersonic Shear Earthquakes and Site Specific Seismic Standards

**These comments are outside the scope of this rulemaking** because they are not specific to the amendment at issue in the rule.

Under 10 CFR 72.212(b)(6), general licensees (power reactors seeking to use those CoC systems at their specific sites) are required to conduct a review of the CoC's Final Safety Analysis Report (FSAR) and the related NRC SER prior to use of the general license to ensure that the reactor site parameters, including analyses of earthquake intensity, are enveloped by the cask design bases considered in these reports. **This rulemaking makes no determination regarding the acceptability of this amended system for use at any specific site.**

### 2) Wind Effect on Underground Cask Maximum Heat Load

Commenters stated that according to NUREG-2174 "Impact of Variation in Environmental Conditions on the Thermal Performance of Dry Storage Casks" (ADAMS Accession No. ML15054A207), low-speed wind conditions increased the peak cladding temperature on underground systems, and asked whether this was considered in the development of the heat load limits of the HI-STORM UMAX Canister Storage System.

The comment is outside the scope of this rulemaking because it is not specific to the amendment at issue in the rule. The NRC evaluated and approved the HI-STORM UMAX Canister Storage System heat loads in the initial CoC certification, and this is provided in its SER (ADAMS Accession No. ML15093A510). The Amendment No. 1 application requested no thermal changes that required NRC evaluation.

### 3) MPC Seismic Evaluation

A commenter stated that the thin stainless steel MPC canisters are subject to pitting and corrosion (particularly from marine environments like chloride-induced stress corrosion cracking). According to the comment, since cracks may initiate during the initial licensing period in these canisters, cracking canisters should be included in the seismic analysis for MPC's stored while in the HI-STORM UMAX Canister Storage System since it would be of more concern in high risk seismic areas as proposed for this UMAX Amendment.

The comment is outside the scope of this rulemaking because it is not specific to the amendment at issue in the rule. The NRC staff has determined that the HI-STORM UMAX Canister Storage System, **when used within the requirements of the proposed CoC, [20 years]** will safely store SNF and prevent radiation releases and exposure consistent with regulatory requirements, including seismic requirements. This evaluation is documented in the NRC staff's SERs (ADAMS Accession Nos. ML15070A149 and ML14202A031).

### 4) Transfer cask

Commenters ask if the transfer casks were approved for storage of an MPC in case of a failed MPC.

To the extent that this comment raises a concern with the availability of a transfer cask, it raises an issue that was addressed in the NRC's evaluation of this amendment and fails to cite any specific information that would alter the NRC's conclusions. In this case, the transfer cask utilized in the HI-STORM UMAX Canister Storage System is described in the HI-STORM Flood/Wind (F/W) Multipurpose Canister (MPC) Storage System FSAR (ADAMS Accession No. ML15177A336). **The HI-STORM UMAX transfer cask is authorized to transfer intact MPC's in accordance with the CoC No. 1040 TSs.**

#### **5) Failed Canister Remediation**

A commenter asked if there is a plan to remediate a failed canister.

The comment is outside the scope of this rulemaking because it is not specific to the amendment at issue in the rule, but instead raises a concern with the general 10 CFR part 72 requirement and process for certification of the CoC systems. **Implementing corrective actions in the event of a failed MPC is the responsibility of the general licensee and those corrective actions are not incorporated into CoC No. 1040.**

#### **6) MPC Thickness**

Commenters questioned the maximum MPC thickness allowed in this amendment, noting that although the FSAR indicated 0.5" as the maximum thickness, Holtec has proposed using a thickness of 0.625 at San Onofre (SONGS). The commenters raised concerns regarding the implications of such a change outside of a license amendment where it could be properly evaluated to determine if the change in limiting parameters will affect seismic, thermal, weight, dimensions and other critical analyses.

The comment is outside the scope of this rulemaking because it is not specific to the amendment at issue in the rule, but instead raises concerns with the general 10 CFR part 72 requirements and process for certification of the CoC systems. **The nominal MPC thickness for the canisters certified under CoC No. 1040, Amendment No. 1 is 0.5". The NRC has no knowledge of a Holtec proposal to increase the thickness of an MPC to 0.625". If presented with an amendment request to do so, the NRC will evaluate it in accordance with 10 CFR part 72 requirements.**

#### **7) Definition of "Long-term"**

Commenters requested the NRC require a definition of "long-term" in the FSAR.

The comment is outside the scope of this rulemaking because it is not specific to the amendment at issue in the rule, but instead raises general concerns regarding terminology. The definitions required by the NRC to support the evaluation and approval of CoC No. 1040, Amendment No. 1, are provided in Appendix A of the CoC, Technical Specifications for the HISTORM UMAX Canister Storage System. **"Long-term" is a general descriptive term that is not required to support any regulatory or technical evaluation, and thus is not required to be more formally defined.**

#### **8) Definition of Underground**

Commenters requested the NRC define the term "underground" as used in this system. The comments raised concerns that a structure that is only partially underground, but

covered on the side with an “earthen berm,” could still be considered “underground” for compliance with this CoC.

The comments regarding the need to define the term “underground” as used in the HISTORM UMAX Canister Storage System are **outside the scope** of this rulemaking because they are not specific to the amendment at issue in the rule, but instead raise concerns with the general 10 CFR part 72 requirements and process for certification of CoC systems. In this instance, **Holtec has provided and analyzed specific structure placement parameters, and the NRC has evaluated these parameters that bound the placement of such a system in the ground. Pursuant to the regulatory requirements in 10 CFR 72.212(b), any general licensee that seeks to use this system must determine that the design and construction of the system, structures, and components are bounded by the conditions of the CoC by analyzing the generic parameters provided and analyzed in the FSAR and SER to ensure that its site specific parameters are enveloped by the cask design bases established in these reports.** The NRC is aware of the SONGS proposed configuration submitted to the California Coastal Commission and is closely monitoring this issue. The NRC will continue to ensure that the facility constructed at SONGS meets the requirements of the CoC and TS of the specific DCS system selected by Southern California Edison.

#### **9) Heat Load Charts**

One commenter stated that the FSAR indicates that changes to storage cell kW heat loads were made and requested that the NRC determine if this was evaluated in the amendment request. The comment also requested clarification on the placement configuration of SNF assemblies in the MPC, as well as the rationale for the heat load configuration.

This comment is **outside the scope** of this rulemaking because it is not specific to the amendment at issue in the rule, but instead raises concerns with the general 10 CFR part 72 requirements and process for certification of CoC systems. The comment is addressing revision bars that are incorporated into the HI-STORM UMAX Canister Storage System FSAR, Revision 2 (ADAMS Accession No. ML14202A031). The tables referenced in the comment were revised due to changes made during the original HI-STORM UMAX Canister Storage System evaluation; 10 CFR 72.248(a)(1) requires that an updated FSAR reflecting any changes made during the NRC review process be submitted within 90 days after an approval of the cask design. The loading patterns were evaluated and approved by the NRC staff in its initial SER (ADAMS Accession No. ML15093A510). The Amendment No. 1 application required no further changes to these tables requiring NRC evaluation.

#### **10) MPC Inspection**

A commenter requested that the NRC clarify that the MPC leak test inspection, that is used to verify the integrity of the confinement boundary, is performed before the MPC is loaded with fuel.

This comment is **outside the scope** of this rulemaking because it is not specific to the amendment at issue in the rule, but instead raises concerns with the general 10 CFR part 72 requirements and process for certification of CoC systems. The HI-STORM F/W MPC Canister System FSAR clearly **identifies the purpose of the MPC leak detection**



**requirement as a post fabrication certification test that is only required to be performed one time.**

#### **11) Assumption of No Fuel Cladding Degradation after Dry Storage is not Substantiated**

Some commenters raised an issue with Holtec's claim that there is no credible mechanism for gross fuel cladding degradation of fuel classified as undamaged during storage in the HI-STORM UMAX Canister Storage System.

These comments **are outside the scope** of this rulemaking because they are not specific to the amendment at issue in the rule. Instead, these comments raise issues that would be **addressed during any renewal application review. The NRC has determined that fuel cladding degradation is not an issue during the initial 20-year certification period, but instead, is an issue that would have to be addressed if a CoC holder requested renewal of the CoC for a period beyond the initial 20 years.** If a renewal application is filed, NRC regulations require that the application include programs to manage the effects of aging, including necessary monitoring and inspection programs. Those programs would have to be reviewed and determined acceptable by the NRC before any CoC renewal is approved.

#### **12) Vertical Ventilated Module Needs Substantiation for Expected Lifespan**

Commenters questioned Holtec's claims of a design life of 60 years, a service life of 100 years and a licensed life of 40 years. Since no substantiation was provided for these claims, the commenters requested the claims be removed from the FSAR.

This issue is **outside of the scope** of this rulemaking because the term of a certificate is determined in the original certification, not in amendments to that certification. This rulemaking seeks to add Amendment No. 1 to CoC No. 1040. **In this case, the UMAX CoC was approved on March 6, 2015 (80 FR 12073), for an initial 20-year term. This 20-year term will also apply to Amendment No. 1. Use of this system beyond the expiration date of 20 years would require an evaluation of a renewal application for this CoC which would be addressed in a subsequent rulemaking process.**

#### **13) Concrete Inspection and Inspection Limitations**

Some commenters questioned whether the HI-STORM UMAX Canister Storage System design provided a safe and accessible method to perform inspections within the license period given that high seismic risk areas are more likely to cause cracking or other structural changes, and indicated that such an evaluation should be part of the NRC's review process.

This comment is outside the scope of this rulemaking because it is not specific to the amendment at issue in the rule, but instead raises concerns with the general 10 CFR part 72 requirements and process for certification of CoC systems. **The NRC has determined that concrete degradation is not an issue requiring inspection during the initial 20-year certification period, but instead, is an issue that would have to be addressed if a CoC holder requested renewal of the CoC for a period beyond the initial 20 years.** If a renewal application is filed, NRC regulations require that the application include programs to manage the effects of aging, including necessary monitoring and inspection

programs. **Those programs would have to be reviewed and determined acceptable by the NRC before any CoC renewal is approved.**

#### **14) High Burnup Fuel**

Commenters also raised questions regarding the long-term acceptability of the extended storage of high burnup fuel (HBF).

**To the extent these comments raise issues about the storage of HBF in the CoC for the first 20 years, these comments are outside the scope of this rulemaking.** The NRC has evaluated the acceptability of storage of HBF for the initial 20-year certification term for the HISTORM UMAX Canister Storage System during its review of the initial certificate. As documented in the NRC staff's SER under Docket ID NRC-2014-0120, the NRC staff has determined that the use of the HI-STORM UMAX Canister Storage System, including storage of HBF, will be conducted in compliance with the applicable regulations of 10 CFR part 72, and the CoC should be approved for the initial 20-year term. This amendment does not impact the analysis conducted by the NRC staff during the initial certification of this system. **Additionally, to the extent these comments raise concerns regarding the storage of HBF beyond the initial term of 20 years, the comments are also outside the scope of this rulemaking. A request to store HBF beyond the initial 20 years provided in the certification of this system will require the applicant to submit a license renewal application with the inclusion of Aging Management Programs addressing HBF.** In that regard, a demonstration project is being planned by the U.S. Department of Energy to provide confirmatory data on the performance of HBF in DCS. The NRC plans to evaluate the data obtained from the project to confirm the accuracy of current models that are relied upon for authorizing the storage of HBF for extended storage periods beyond the initial 20-year certification term.

#### **References**

**Docket ID NRC-2015-0067:** List of Approved Spent Fuel Storage Casks: Holtec International HI-STORM UMAX Canister Storage System, Certificate of Compliance No. 1040, Amendment No. 1 Direct Final Rule, Effective September 8, 2015  
*<https://www.federalregister.gov/articles/2015/09/08/2015-22053/list-of-approved-spent-fuel-storage-casks-holtec-international-hi-storm-umax-canister-storage-system>*

**Federal Register:** List of Approved Spent Fuel Storage Casks: Holtec International HI-STORM UMAX Canister Storage System, Certificate of Compliance No. 1040, Amendment No. 1 Direct Final Rule, Federal Register Vol. 80, No. 173, pp 53691 – 53694, effective September 8, 2015  
*<http://www.gpo.gov/fdsys/pkg/FR-2015-09-08/pdf/2015-22053.pdf>*

**Public Inspection:** 10 CFR Part 72, [NRC-2015-0067], RIN 3150-AJ58, List of Approved Spent Fuel Storage Casks: Holtec International HI-STORM UMAX Canister Storage System, Certificate of Compliance No. 1040, Amendment No. 1  
*<https://s3.amazonaws.com/public-inspection.federalregister.gov/2015-22053.pdf>*

## Public Comments

**Scott Atwater**, underground system

<http://pbadupws.nrc.gov/docs/ML1521/ML15210A145.pdf>

**Paul Frey**, Supersonic Shear Earthquake Motion

<http://pbadupws.nrc.gov/docs/ML1521/ML15210A150.pdf>

**Donna Gilmore**, wind, seismic, transfer cask, failed canister remediation, thickness, long term, underground define, heat load charts, inspection, fuel clad failure after storage, HBF, lifespan, monitoring, concrete

<http://pbadupws.nrc.gov/docs/ML1521/ML15210A177.pdf>

**Rick Mogel**, vents, tsunami, cracking, inspection, transport, failed canister procedure, monitoring <http://pbadupws.nrc.gov/docs/ML1521/ML15210A166.pdf>

**Dorah Shuey**, concrete, seismic, inspection

<http://pbadupws.nrc.gov/docs/ML1521/ML15210A169.pdf>

**Libbe HaLevy**, early failure

<http://pbadupws.nrc.gov/docs/ML1521/ML15210A151.pdf>

**Laura Lynch**, wind effect, seismic evaluation, transfer cask, thickness, long-term, underground, Coastal Commission submittal, heat load, MPC leak test, lifespan, no monitoring required, concrete <http://pbadupws.nrc.gov/docs/ML1521/ML15210A155.pdf>

**demariarita@yahoo.com**, unsafe

<http://pbadupws.nrc.gov/docs/ML1521/ML15210A164.pdf>

**Anonymous**, supersonic sheer earthquakes, need field testing, vent blocking tsunami, Diablo & San Onofre field testing casks, nuclear experimental testing ground for untested casks <http://pbadupws.nrc.gov/docs/ML1521/ML15210A181.pdf>

**Gary Headrick**, support Donna Gilmore comments

<http://pbadupws.nrc.gov/docs/ML1521/ML15210A184.pdf>

**Street, Joseph@Coastal**

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**From:** Donna Gilmore <dgilmore@cox.net>  
**Sent:** Monday, September 21, 2015 5:57 PM  
**To:** Street, Joseph@Coastal  
**Cc:** Toni Iseman; Rita Conn  
**Subject:** Documents Detail How Nuclear Material Was Handled at San Onofre Nuclear Generating Station | NBC 7 San Diego

Is there any overlap between the Navy lease and the Coastal permit? Maybe the documents referenced in this article would be of interest to the Commission.

<http://www.nbcsandiego.com/investigations/Documents-Detail-How-Nuclear-Material-Was-Handled-at-San-Onofre-328292351.html>

Donna Gilmore

## Street, Joseph@Coastal

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**From:** Ted Quinn <tedquinn@cox.net>  
**Sent:** Tuesday, September 29, 2015 9:07 AM  
**To:** Street, Joseph@Coastal  
**Cc:** tedquinn@cox.net  
**Subject:** Letter Submittal related to Application No. 9-15-0228 (Southern California Edison Co., San Diego Co.)  
**Attachments:** Technology Resources Letter to CCC related to October 6 2015 AGENDA ON SONGS ISFSI 09272015.doc

TO: Dr. Joseph Street, California Coastal Commission

SUBJECT: **Application No. 9-15-0228 (Southern California Edison Co., San Diego Co.)**  
Construct and operate an Independent Spent Fuel Storage  
Installation (ISFSI) to store spent nuclear fuel from  
SONGS Units 2 and 3.

Attached is my letter to you regarding this subject coming up at the hearing next week.

Thanks for your consideration.

Edward (Ted ) Quinn  
Past President, American Nuclear Society  
Member, San Onofre Citizen's Engagement Panel (CEP)  
33 year resident of Dana Point, CA  
(949) 632-1369

## *Technology Resources*

September 27, 2015

CALIFORNIA COASTAL COMMISSION  
45 FREMONT, SUITE 2000  
SAN FRANCISCO, CA 94105- 2219

SUBJECT: **Application No. 9-15-0228 (Southern California Edison Co., San Diego Co.)**  
Construct and operate an Independent Spent Fuel Storage  
Installation (ISFSI) to store spent nuclear fuel from  
SONGS Units 2 and 3.

Dear Commissioners and Interested Parties,

I am writing to recommend approval of the application by Southern California Edison to expand the Independent Spent Fuel Storage Installation (ISFSI) at the San Onofre site, which is an agenda item for your upcoming meeting on October 6, 2015.

I am Past President of the American Nuclear Society (ANS), a Professional Society of 11,000 members, and currently a member of the SONGS Community Engagement Panel (CEP), a volunteer panel, which provides regular meetings in fostering communication between the public and the responsible parties involved in SONGS decommissioning.

I have reviewed the spent fuel situation in great detail and was a co-author on a white paper produced by the CEP last year to address all aspects of interim storage. The path forward selected for SONGS, is based on proven technology in the HOLTEC design, with a very large installed base across the U.S. and around the world at similar facilities. The NRC has also provided their approval of multiple HOLTEC designs currently installed in the U.S. My recommendation is for SONGS to expedite the transfer of spent fuel from the fuel pool to the dry cask storage, which has a higher degree of safety, because it does not required external action for cooling and can withstand external events better, including the unlikely events of coastal flooding or fires.

SONGS has proven to be a very safe operator of the current ISFSI and therefore, has all the knowledge and experience to apply to the expanded installation.

Thanks for your consideration of my technical and procurement related input. I am a 30 year resident of South Orange County and, as a local, have a vested interest in the long term safety and reliability of this facility.

Sincerely yours,



Edward L. Quinn  
President



# CITY OF OCEANSIDE

COUNCIL MEMBER  
JEROME M. KERN

September 29, 2015

Dr. Joseph Street  
California Coastal Commission  
45 Fremont, Suite 2000  
San Francisco, CA 94105-2219  
[Joseph.Street@coastal.ca.gov](mailto:Joseph.Street@coastal.ca.gov)

**Reference: CDP Application #9-15-0228**

Dear Dr. Street and Members of the Commission:

I write to reinforce the Sept. 25, 2015 recommendation by the staff of the California Coastal Commission for approval, with conditions, of Southern California Edison's coastal development permit to allow for expansion of used nuclear fuel storage at Edison's San Onofre nuclear plant. I offer this recommendation as a two-term Oceanside City Councilmember and member of the San Onofre Community Engagement Panel.

As a member of the San Onofre panel, I have been deeply involved in community-based discussions regarding the best approach to decommission San Onofre and assure the used fuel is secure until it can be removed from site. Without question, a recurring point of agreement at community and county meetings is the desire to move the fuel off site as soon as possible.

We have learned that a key step toward making that happen is placing the fuel in dry storage canisters so it is eligible for transport to a licensed storage facility. I prefer this dry storage technology to the "wet" pool storage because I believe it's safer. In addition, I have confidence in the defense-in-depth, dry cask storage technology Edison has selected.


I witnessed community sentiment regarding San Onofre fuel storage at a recent San Diego Board of Supervisors meeting when the board, after thoughtful discussion, voted to send a letter to the Department of Energy urging prompt removal of the waste from San Onofre. I spoke briefly in support of the resolution, as it reflects the sentiment I hear often in San Diego County.

A number of elected officials in Orange and San Diego counties are focusing their efforts on Consolidated Interim Storage (CIS) options under development in New Mexico and Texas that offer the best hope for prompt removal of the fuel from San Onofre. Your approval of the CDP authorizing Edison to place its remaining used fuel in dry storage is an essential first step toward meeting that goal.

Dr. Joseph Street  
Page 2  
September 29, 2015

I strongly encourage you to approve this permit so Edison can keep its commitment to the communities in Southern California to expeditiously place all San Onofre used fuel in dry storage by mid-2019, setting the stage for permanent removal of the fuel from California.

Sincerely,



Jerome M. Kern  
Council Member  
City of Oceanside

JMK:bs



September 30, 2015

Dr. Joseph Street  
California Coastal Commission  
45 Fremont Street, Suite 2000  
San Francisco, CA 94105-2219

**SUBJECT: Coastal Permit Application No. 9-15-0228**

Dear Dr. Street:

On April 27, 2015, I shared the perspectives of the Union of Concerned Scientists (UCS) on interim storage of spent fuel with the California Energy Commission (CEC). On June 11, 2015, Southern California Edison (SCE) Company applied for a permit (Application No. 9-15-0228) to construct and operate an Independent Spent Fuel Storage Installation (ISFSI) to store spent fuel from the Unit 2 and 3 reactors at its San Onofre Nuclear Generating Station. I have reviewed the staff report dated September 25, 2015, regarding the permit application as well as materials on the U.S. Nuclear Regulatory Commission's website regarding the dry storage technology selected by SCE for the proposed ISFSI.

As indicated on slide 14 of my presentation (enclosed) before the CEC, UCS made two recommendations for better management of the spent fuel storage risk at permanently shut down nuclear plants like San Onofre: (1) transfer from spent fuels into dry storage as soon as practical, and (2) protect the dry storage canisters against sabotage. We believe that issuing the permit for the proposed ISFSI is consistent with both of these recommendations.

In slide 18 of my CEC presentation, I advocated the construction of earth berms around the dry storage canisters holding spent fuel as a way to protect them against sabotage. The dry storage method selected by SCE and described in its application features an underground vault configuration marketed by Holtec. I have met with representatives from Holtec about their underground storage method. I consider the design to satisfy our sabotage protection criterion.

In summary, the California Coastal Commission issuing the subject permit would facilitate safer and more secure storage of spent fuel at the San Onofre nuclear plant.

Sincerely,



David Lochbaum  
Director, Nuclear Safety Project  
Union of Concerned Scientists  
PO Box 15316  
Chattanooga, TN 37415  
423-468-9272, office  
423-488-8318, cell

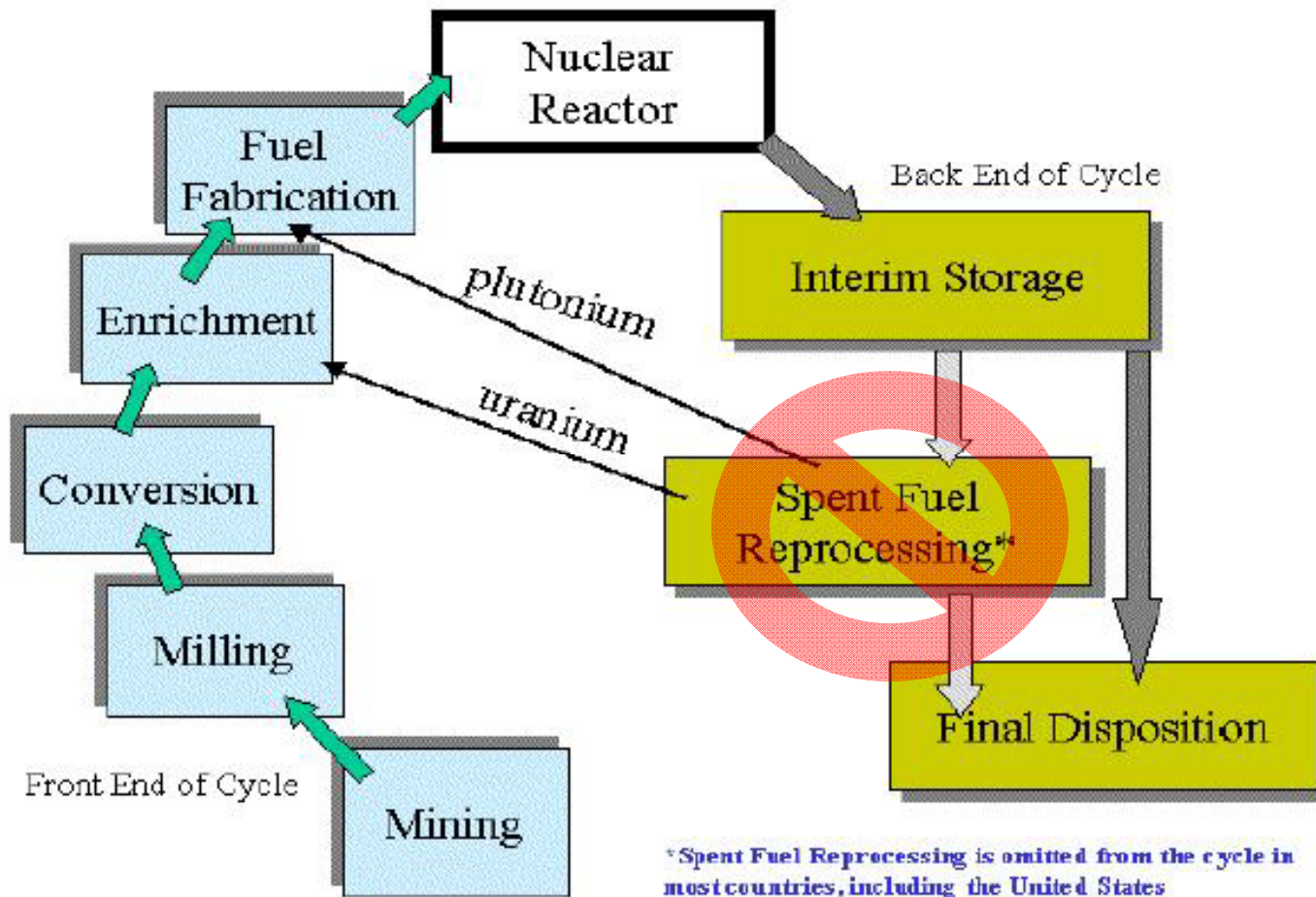
# Interim Storage of Spent Fuel

## Presentation to California Energy Commission

David Lochbaum  
Director, Nuclear Safety Project

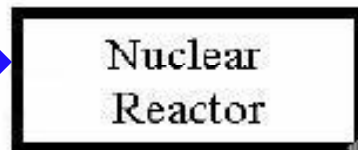
April 27, 2015

# Nuclear Fuel Cycle



# Interim Storage Risk

**Risk during reactor operation is so large that federal liability protection is required.**



Back End of Cycle



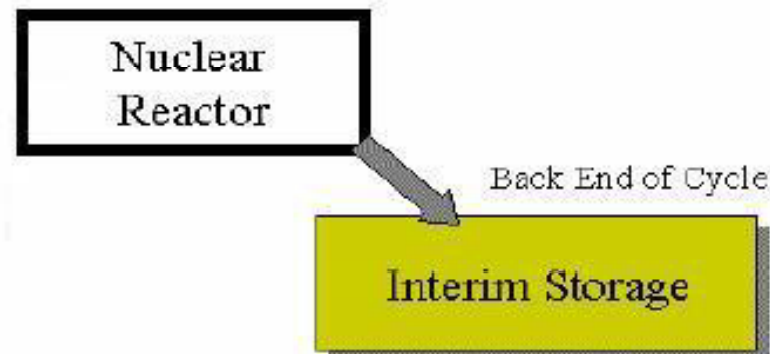
***Risk from irradiated fuel between these two high risk end points is also high.***



**Risk during final disposition is large because the hazardous material must be isolated from the environment for at least 10,000 years into the future.**



# Interim Storage Mess



**Under the Nuclear Waste Policy Act of 1982 as amended in 1987, the federal government was tasked with operating a repository for spent fuel disposal.**

**The Department of Energy signed contracts with plant owners and collected funds in exchange for the federal government accepting spent fuel for disposal beginning in 1998.**

**The federal government has taken billions of dollars, but not an ounce of spent fuel.**

# Interim Storage Mess

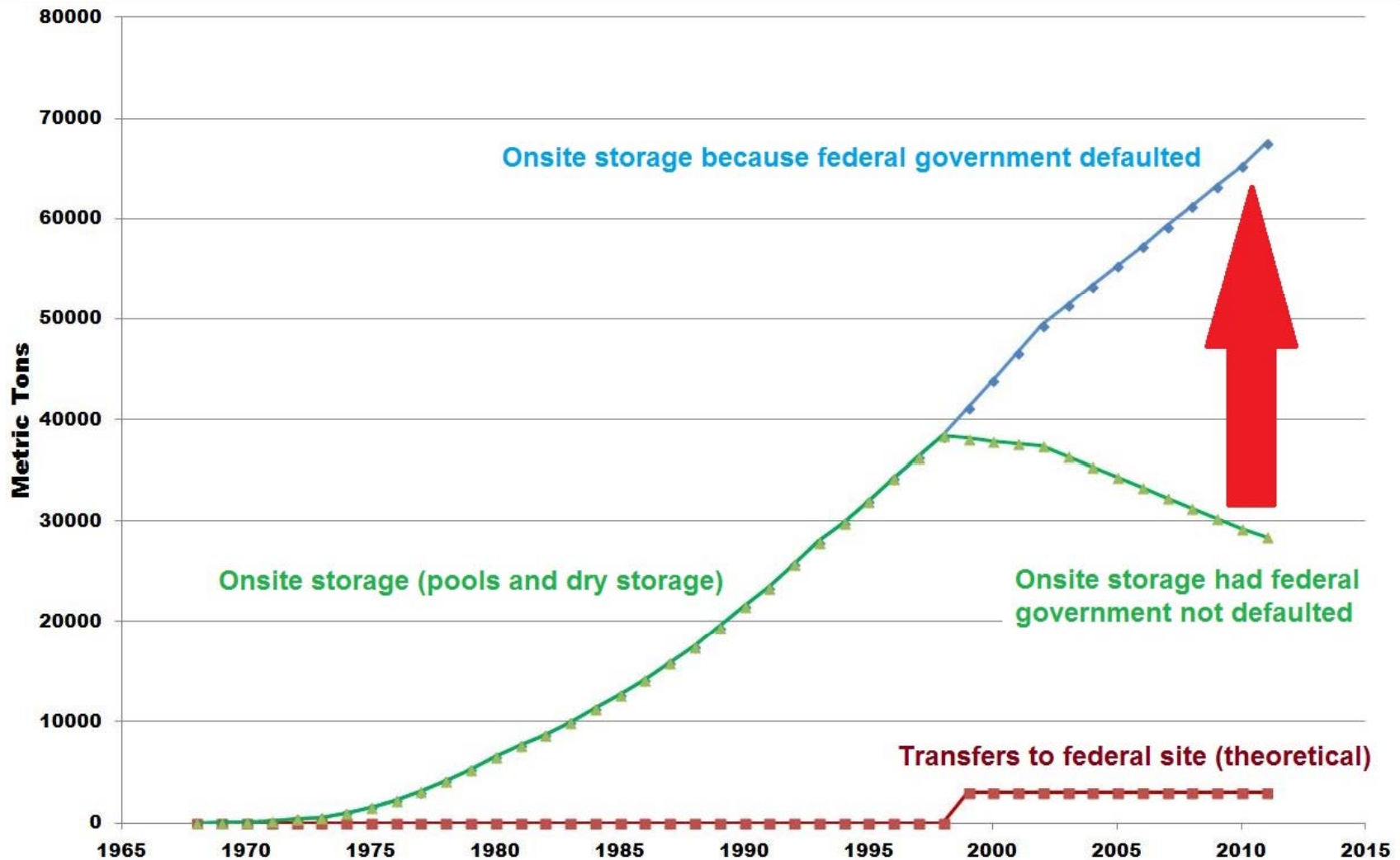


Image Source: UCS testimony to U.S. Senate, July 2013

## **At operating reactors:**

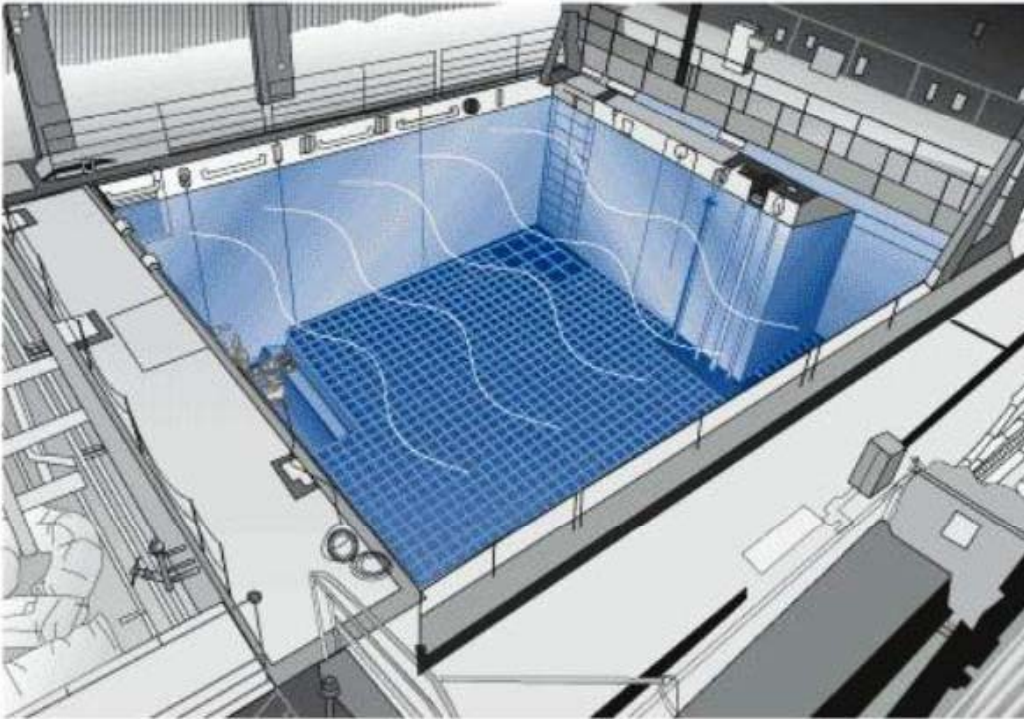
- *expedite the transfer of spent fuel to dry storage to minimize the inventory of irradiated fuel assemblies stored in the pools*
- *protect the dry storage canisters against sabotage*

## **At permanently shutdown reactors:**

- *complete the transfer of spent fuel to dry storage as soon as practical (closer to 6 years than the 60 years allowed by the Nuclear Regulatory Commission)*
- *protect the dry storage canisters against sabotage*



# Interim Storage - Pools

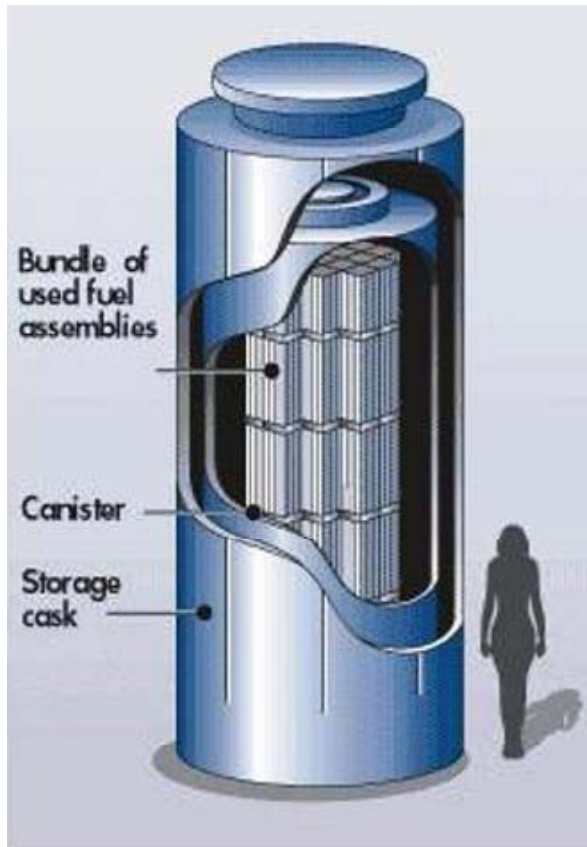


**Spent fuel assemblies are transferred underwater and placed in metal storage racks in the bottom of spent fuel pools.**

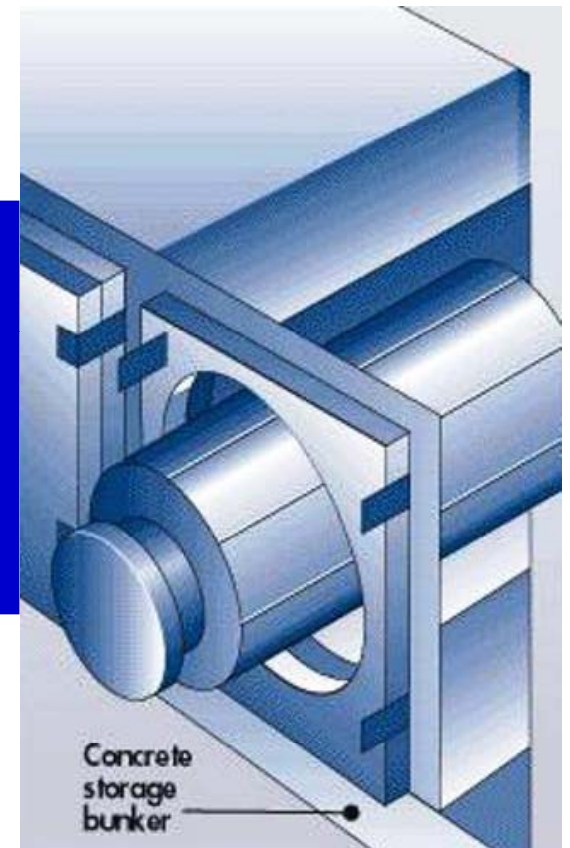
**The spent fuel pool's water is continuously cooled to remove the decay heat emitted by the spent fuel assemblies. The water is continuously treated to remain as pure as possible to retard corrosion of the metal fuel rods. The water also attenuates the intense radiation emitted by the fuel so people can work safely in the area.**



# Interim Storage – Dry



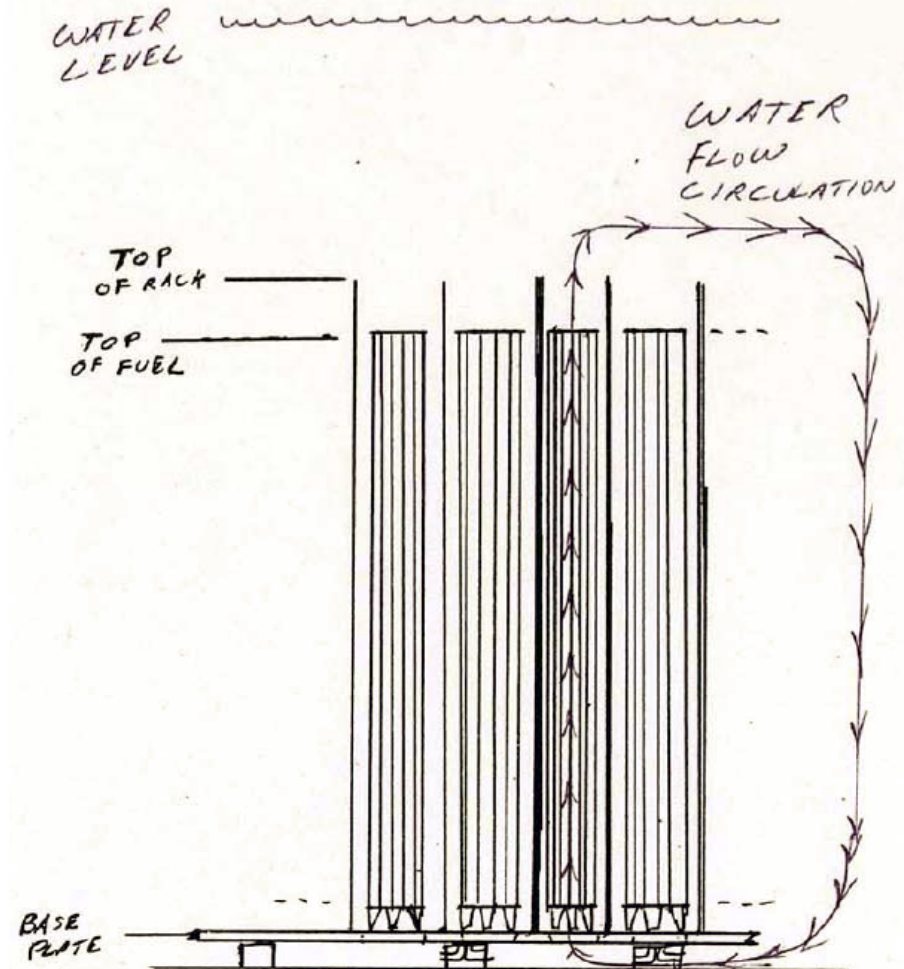
After a few years, spent fuel assemblies can be transferred into canisters that are placed inside vertical casks or horizontal bunkers.



The cooling is passive – decay heat emitted by the spent fuel assemblies is conducted through the metal canister wall and carried away by convective air flow (i.e., the chimney effect).

# Risks - Pools

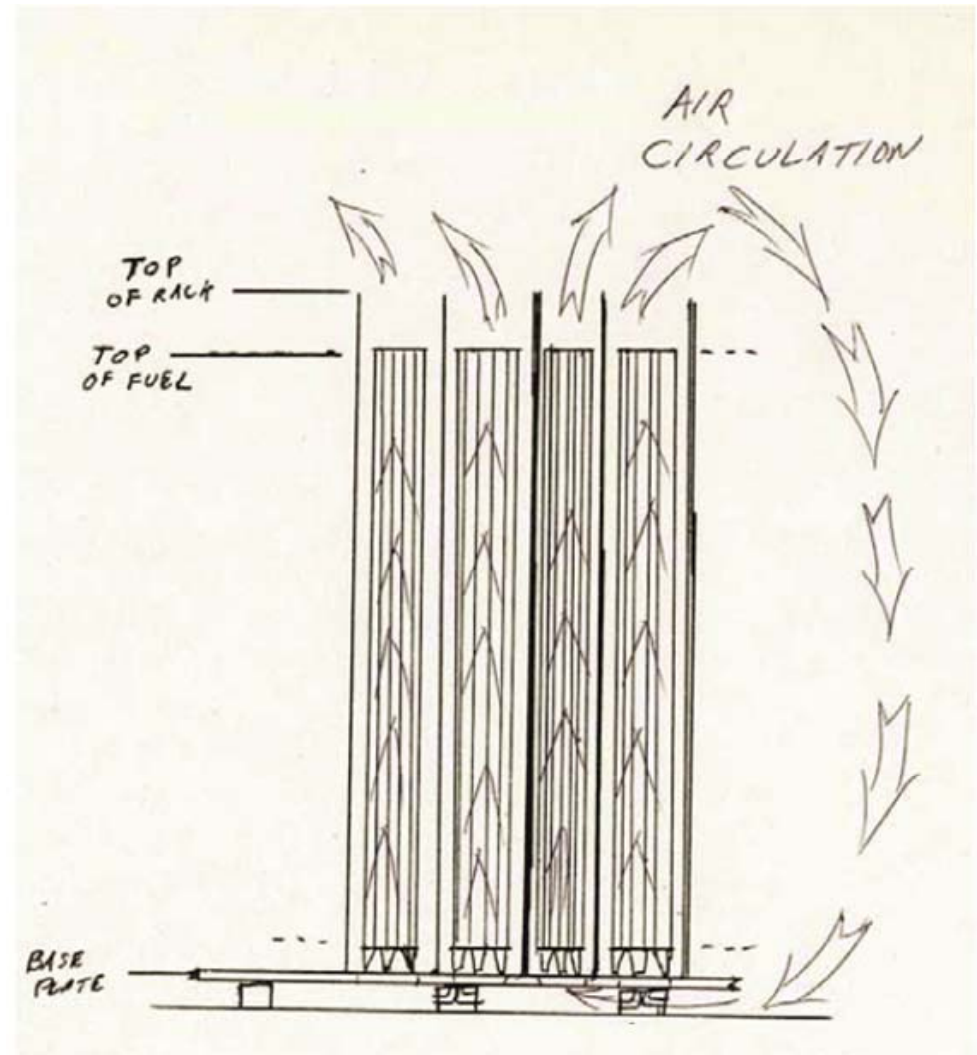
As shown in this cross-section view of a spent fuel pool, the storage racks have feet that provides a gap between the bottom of the racks and spent fuel pool's floor. Decay heat emitted from the spent fuel assemblies warms water, causing it to rise out the top of the racks. In turn, cooler water is drawn under the racks and up past the spent fuel assemblies.



# Risks - Pools

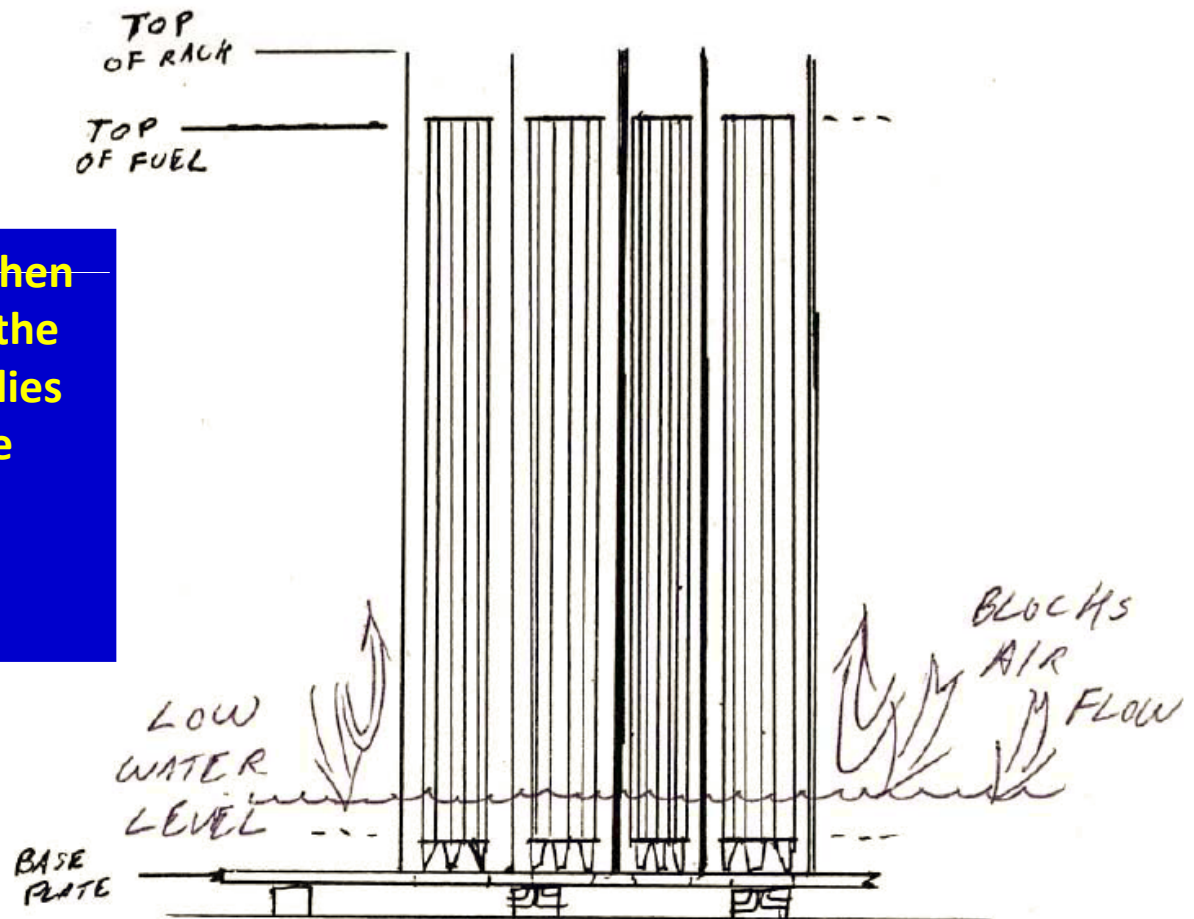
If all the spent fuel pool's water boiled or drained away, air flow would be sufficient to cool the spent fuel assemblies with the possible exception of any assemblies discharged from the reactor core within the past 60 days.

But air does not provide shield against radiation like water, so workers would likely be unable to enter the area of the pool.



# Risks - Pools

The primary hazard occurs when the water level drops below the top of the spent fuel assemblies but not all the way below the bottom. Partial draindown interrupts water cooling and blocks air cooling.





## Risks – Dry

Loaded canisters weighing nearly 100 tons must be lifted out of the spent fuel pools.

The primary safety hazard is dropping a canister. A 100-ton canister striking the wall or floor of a spent fuel pool can easily create an opening that allows water to drain out.

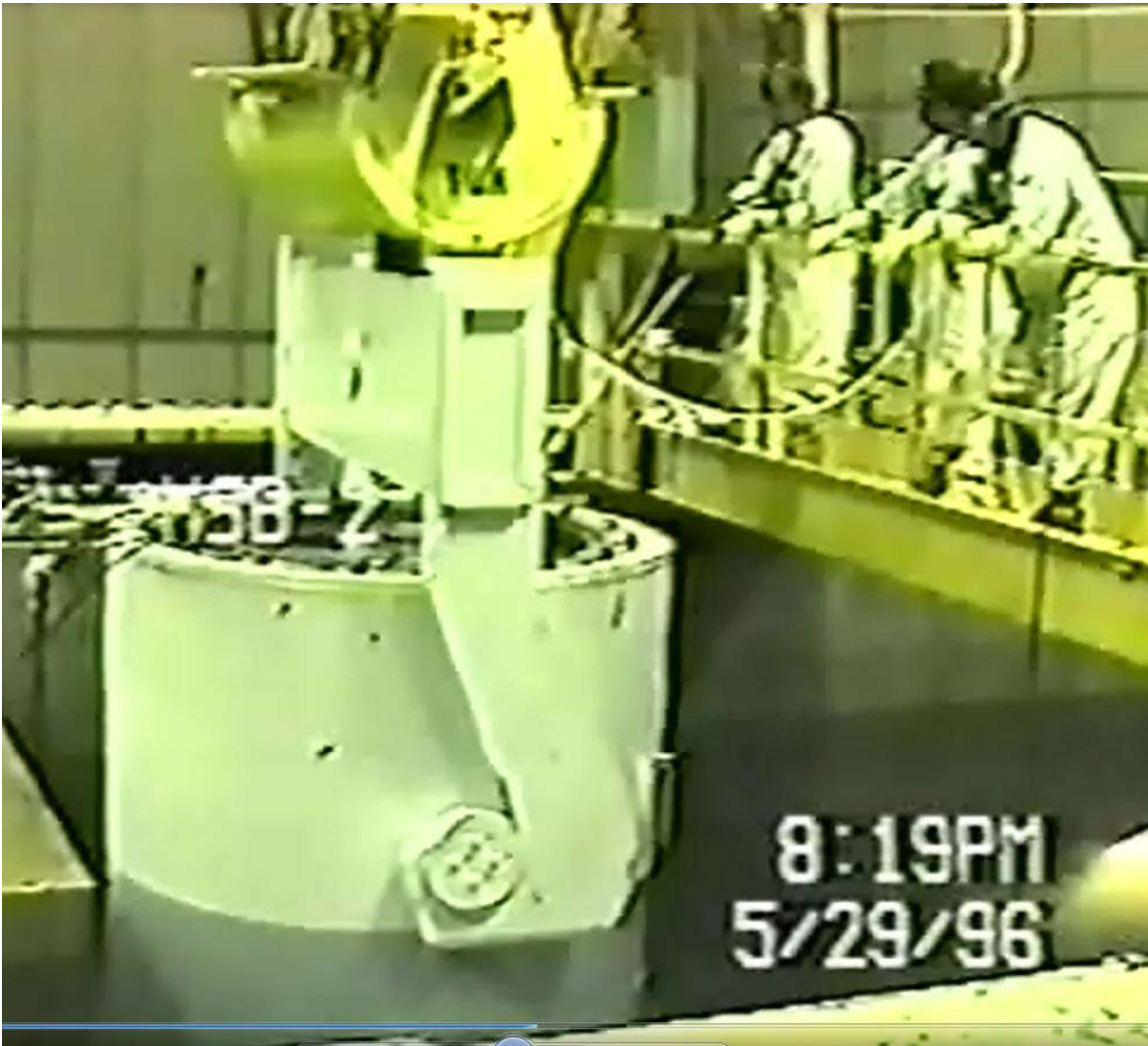


Image Source: UCS freedom of information act request for video of Point Beach cask transfer



**The primary security hazard involves sabotage. There are weapons that can breach the integrity of dry casks sitting on above-ground pads.**

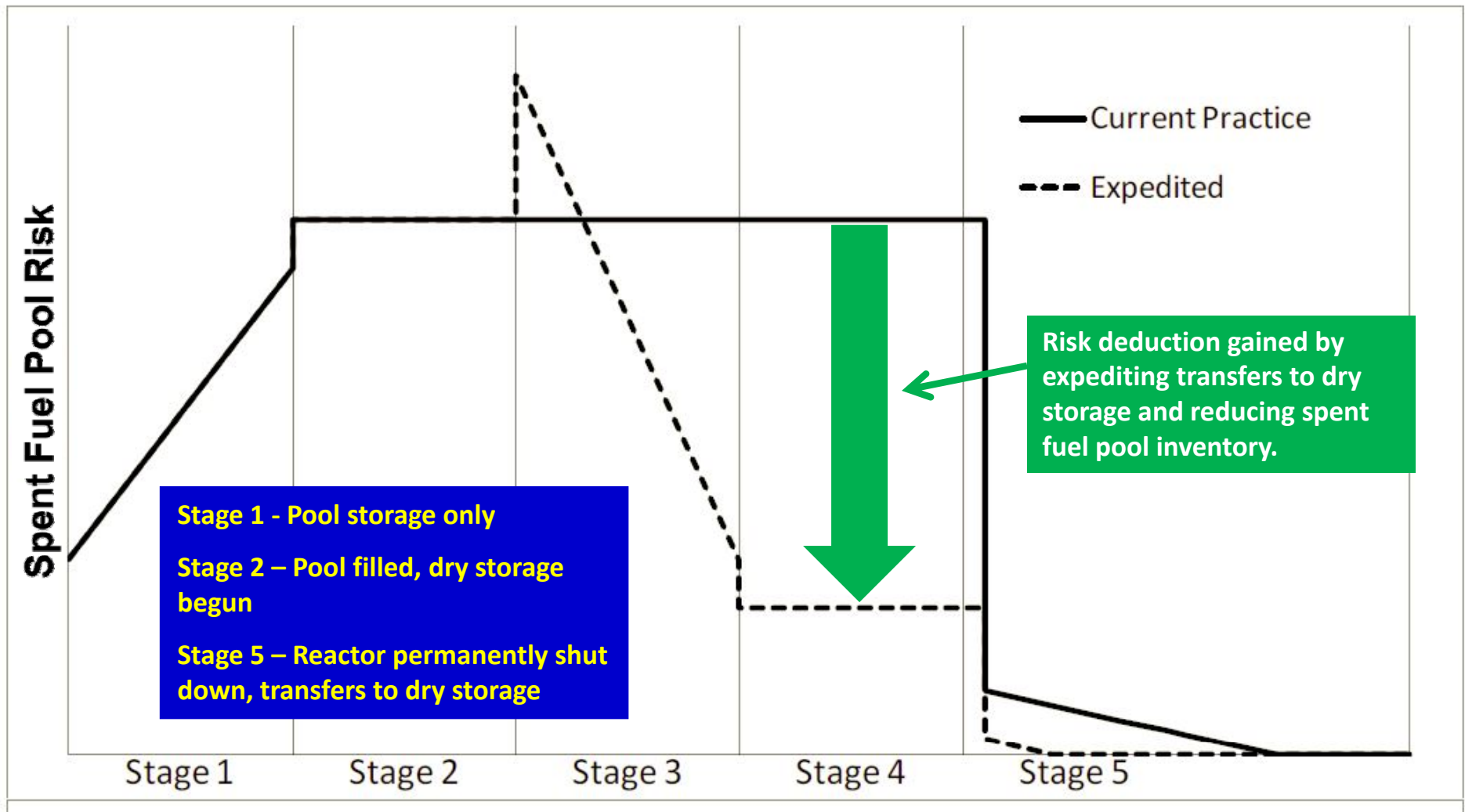
## **At operating reactors:**

- *expedite the transfer of spent fuel to dry storage to minimize the inventory of spent fuel assemblies stored in the pools*
- *protect the dry storage canisters against sabotage*

## **At permanently shutdown reactors:**

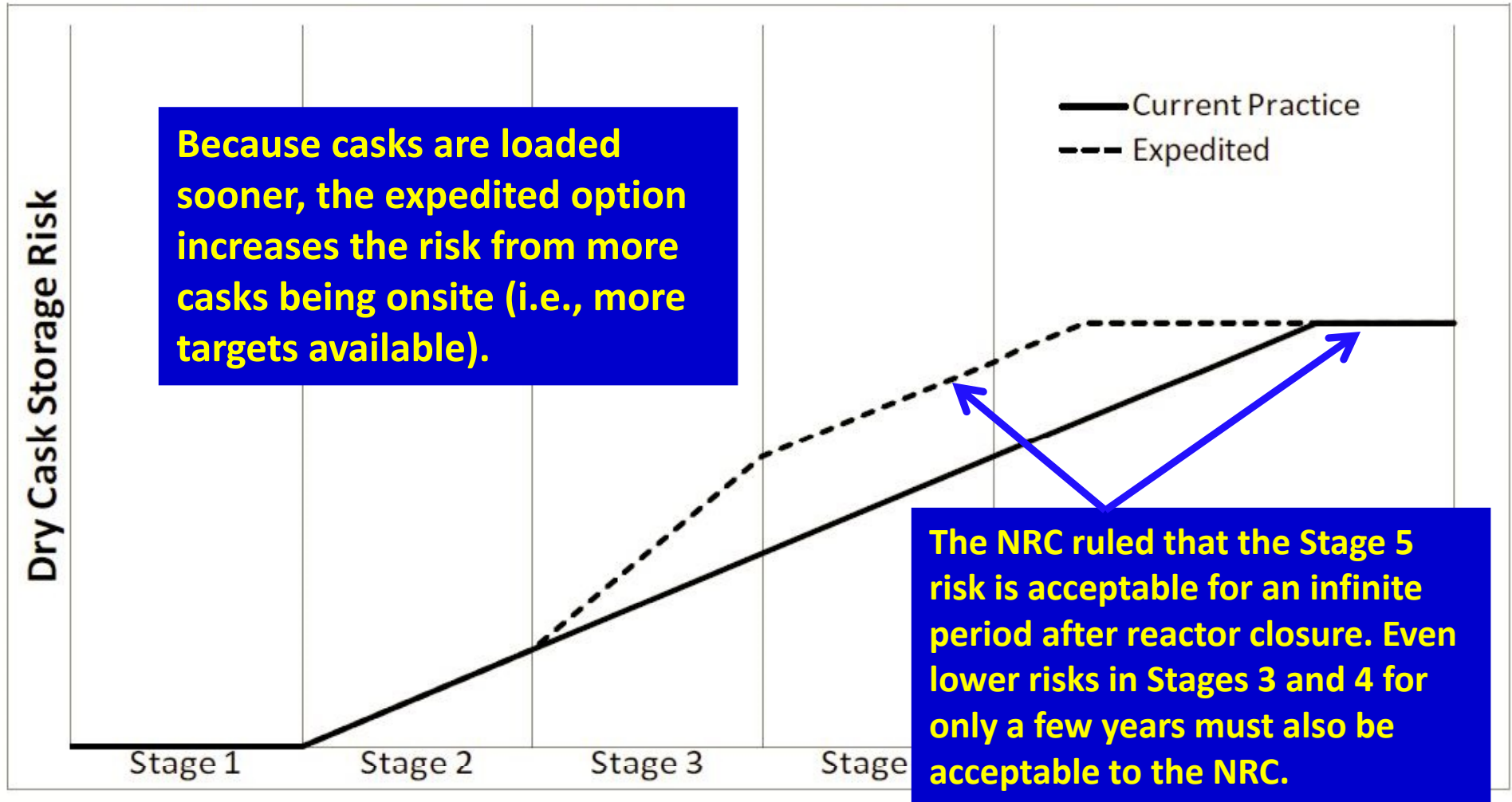
- *complete the transfer of spent fuel to dry storage as soon as practical (closer to 6 years than the 60 years allowed by the Nuclear Regulatory Commission)*
- *protect the dry storage canisters against sabotage*

# Managing Interim Risks





# Managing Interim Risks



# [Union of Concerned Scientists] Managing Risks - Pools

Table 33 Overall Consequence Results

SFP Fuel Loading	High Density (1x4)		Low Density	
High Density is Current Practice while Low Density is Expedited Transfer			1.7E-05	
50.54(hh)(2) Mitigation Credited	Yes	No	Yes	No
Conditional Probability of Release	0.036%	0.69%	0.036%	0.69%
Hydrogen Combustion Event	"Not Predicted"	"Possible"	"Not Predicted"	"Not Predicted"
Conditional Consequences (Release Frequency-Averaged <sup>4</sup> )				
Cumulative Cs-137 Release at 72 hours (MCi)	0.26	8.8	0.11	
0.5 MCi were released during the Fukushima meltdowns.		Related to Health and Safety of Individuals		
Individual Early Fatality Risk	0	0	0	0
Individual Latent Cancer Fatality Risk <sup>5</sup> Within 10 Miles	3.4E-04	4.4E-04	3.4E-04	2.0E-04
Measures Related to Cost Benefit Analysis				
Collective Dose (Person-Sv)	47k	350k	47k	27k
Land Interdiction (mi <sup>2</sup> )	230	9,400	230	170
Long-term Displaced Individuals	120k	4,100k	120k	81k

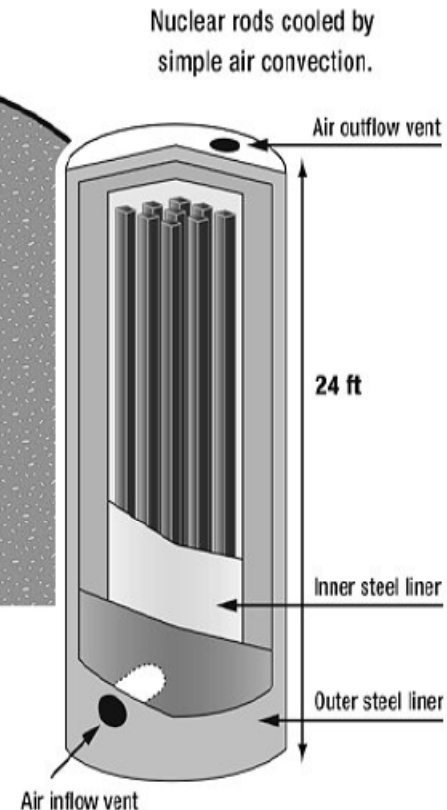
Image Source: NRC Spent Fuel Consequence Study, October 2013

# Managing Risks – Dry

Earth/gravel berms should surround each cask and hide from ground-level view.

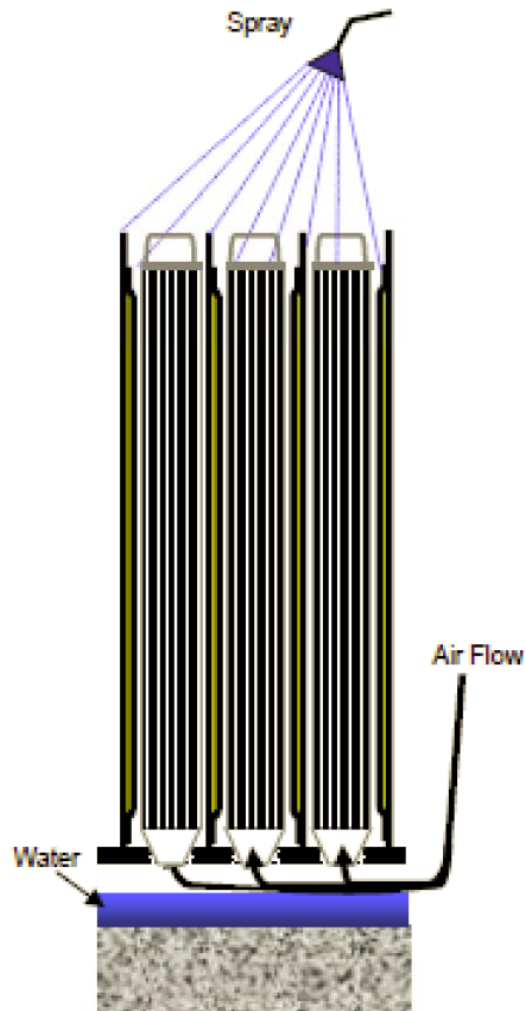


**Potential Target: 24 to 36  
Bundles of Nuclear Rods**



**UCS advocates literally dirt-cheap protection against sabotage for above-ground dry casks. Until the federal government figures out how to put spent fuel under the ground, the ground should be piled around the dry casks.**

# NRC's Bad Decision



The NRC decided NOT to require expedited transfer to dry storage based on a flawed analysis. They assumed every spent fuel pool would fully drain and that workers would always establish cooling spray (despite intense radiation levels) at the “Goldilocks” rate – not too little to cause fuel meltdown and not too much to cause blockage of the inlet air flow.

The NRC's assumption is simply wrong.

# **Wrong Ain't Right**

**Spent fuel pools are overcrowded today  
because DOE failed to open a repository.**

**Spent fuel pools are overcrowded today  
because NRC failed to properly evaluate the  
hazard.**

**Two wrongs *still* don't make a right.**

## **Links for More Info**

**Barto, Andrew and nine others. 2013. *Consequence Study of a Beyond-Design-Basis Earthquake Affecting the Spent Fuel Pool for a U.S. Mark I Boiling Water Reactor*, Nuclear Regulatory Commission. October. Online at <http://pbadupws.nrc.gov/docs/ML1325/ML13256A342.pdf>**

**Braun, Joseph C. 2010. *Operational Safety of Spent Nuclear Fuel*. Argonne National Laboratory. December 2. Online at [http://www-ns.iaea.org/downloads/ni/embarking/argonne\\_workshop\\_2010/Braun/L.6.2%20Braun%20Operational%20Safety%20of%20Spent%20Nuclear%20Fuel.pdf](http://www-ns.iaea.org/downloads/ni/embarking/argonne_workshop_2010/Braun/L.6.2%20Braun%20Operational%20Safety%20of%20Spent%20Nuclear%20Fuel.pdf)**

**Lochbaum, David. 2013. *Testimony to U.S. Senate on Spent Fuel*. Union of Concerned Scientists. July 30. Online at <http://allthingsnuclear.org/lochbaum-testimony-on-waste-bill-and-dry-casks/>**



**Street, Joseph@Coastal**

---

**From:** creedmail@cox.net  
**Sent:** Thursday, October 01, 2015 9:29 AM  
**To:** Street, Joseph@Coastal  
**Subject:** Fwd: re: protective commissions' life/threat decisions

Request to Commissioners, Director, staff: Please send today an update announcement of next week's CCC meeting in Long Beach May 6,7,8, with San Onofre site, and subject request specific, agenda description: presentation to public and site local cities and county elected officials, consideration of Edison application for undetermined length of experimental storage repository for San Onofre hazardous nuclear fuel rods.

(agendized Tuesday?)

Joseph this was prompted by a local news reporter.

Unless it is sent out quickly, the information will not reach those of our villages' city councils

that are dark on Fridays, and our news sources who may have set the original release aside, not understanding

the importance of it. Thank you much for this urgent service. Lyn Harris Hicks, for CREED Coalition for Responsible and Ethical Environmental Decisions.

----- Forwarded message -----

**From:** lyncharrishicks@cox.net  
**Date:** Mon Sep 28 08:12:46 PDT 2015  
**Subject:** re: protective commissions'life/death decisions  
**To:** creedmail@cox.net;

Date : Mon Sep 28 08:12:46 PDT 2015  
From : Lyn Hicks(lynharrishicks@cox.net);  
To : creedmail@cox.net;  
Subject : re: protective commissions'life/death decisions

**From:** [Jane Swanson](#)  
**To:** [Street, Joseph@Coastal](#); [Luster, Tom@Coastal](#)  
**Cc:** [Swanson, Jane](#)  
**Subject:** Comment on Application No. 9-15-0228 (SCE, San Diego Co.)  
**Date:** Thursday, October 01, 2015 1:50:48 PM

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Application 9-15-0228

October 1, 2015

TO: California Coastal Commission  
[joseph.street@coastal.ca.gov](mailto:joseph.street@coastal.ca.gov)  
[Tom.Luster@coastal.ca.gov](mailto:Tom.Luster@coastal.ca.gov)

FROM: Jane Swanson, Spokesperson  
San Luis Obispo Mothers for Peace  
[janeslo@icloud.com](mailto:janeslo@icloud.com)

RE: Application No. 9-15-0228 (Southern California Edison)

San Luis Obispo Mothers for Peace (SLOMFP) finds the proposed ISFSI location unacceptable. Placing it within 100 feet of an ocean bluff known to be eroding is illogical and unsafe. Likewise it is unsafe to locate the facility so close the level of ground water at a time when a rise in ocean levels is forecast.

SLOMFP joins with other organizations in urging rejection of this plan and the exploration of other alternatives. The convenience of Southern California Edison should not be the criteria. The safety of the millions of people living in close proximity to high-level radioactive wastes that will have to be stored for up to 600 years, according to the NRC, is the issue at hand.



October 1, 2015

Patricia Borchmann  
1141 Carrotwood Glen  
Escondido, CA 92026

California Coastal Commission

via email: Coastal Commission Staff member - [joseph.street@ca.gov](mailto:joseph.street@ca.gov)

Thank you for accepting public comments in advance of the October 6, 2015 Coastal Commission Meeting for October 6, 2015.

My comments pertain to Coastal Permit App – Agenda Item 14 for:

**App 9-15-0028 – Proposal by Southern California Edison (SCE) to construct ISFSI, for storage of spent nuclear fuel at San Onofre (SONGS), located in north San Diego County.**

I have reviewed Staff Report prepared for Commissioners on this item, and I have many safety concerns, and cost concerns, which do not appear to have been fully considered or mitigated, by Conditions proposed by Staff to apply to approval of this project.

The proposed ISFI would be located within SONGS North Industrial Area (NIA), which is former site of decontaminated Unit 1 power plant, adjacent to and seaward of an existing ISFI facility permitted in 2001 (Exhibit 2). **I am in full agreement Staff Report (at bottom on Page 1) which indicates “This fuel is highly radioactive and requires secure storage for thousands of years to prevent harm to humans and the environment”. I also agree with Staff conclusions on page 2 (paragraph 4) which indicates it is uncertain for the ISFSI to be removed as planned, in 2051, however the existence of that very uncertainty is the rub, because Licensee SCE is unable to guarantee removal of the ISFSI by 2051.**

**Nuclear Regulatory Commission plans to issue license with certification for 20 year period of use, however if containers become degraded to the point of becoming unsafe to transport, the proposed ISFSI could be required beyond 2051, possibly for many decades.** In that case, the ISFSI would require protection by replacing or expanding the existing SONGS shoreline armoring, and retention beyond 2051 would have potential to adversely affect marine and visual resources and coastal access. Stakeholders in California have extremely credible concerns, because during the initial 20 year License from NRC, there is absolutely NO requirement for Licensee SCE Edison to perform any detailed inspection of casks within the first 20 years of their emplacement. That fact is clearly stated on Staff Report’s page 38, in paragraph 1, last sentence. **“Though SCE has indicated it would seek to begin the monitoring and inspection of ISFI components well before end of initial license (20 years) phase, it is possible that no detailed inspection of casks would occur with first 20 years of their emplacement.”**

Stakeholders already know that SONGS’ existing spent fuel pools contain large inventories of spent fuel assemblies containing high burn-up fuel, and that there are numerous additional thermal, heating and other risks associated with high-burn-up spent fuel that have not yet been fully evaluated for behavior, under actual testing conditions, during constant exposure in the high-moisture marine environment at SONGS, located in such close proximity to the ocean, in area known to be seismically active.

The Staff Report for this item is extremely unusual, because it was necessary for staff to undertake extreme caution to create Conditions of approval that will specifically waive any liability, or any

subsequent legal action by stakeholders in the future who may sustain damages from flooding, sea level rise, instability, seismic threat, tsunami or other foreseeable threats, or radiation release. Stakeholders say this inability by Licensee to certify the mandated degree of public safety is an unacceptable threat, and stakeholders do not believe this Commission has the authority to make all the relevant FINDINGS, even with the extreme Conditions which have been defined by staff.

Additionally, stakeholders observed that in Staff Report there are clear indications that the proposed ISFSI would NOT be fully protected from impacts caused by global warming, potential rise in sea levels, flooding, tsunami, cask degradation caused by extreme and constant marine exposure to stress corrosion cracking and potential through-wall penetration of stainless steel casks beyond the 75% limit that SCE proposes to be an acceptable containment barrier to prevent cask rupture, or release of radiation.

Thank you to all Commissioners, for your full, thoughtful consideration on this item, especially while you are here visiting stakeholders in southern CA, near the Port of Long Beach. As you are well aware, this Port, as well as Port of Los Angeles handle most of this nation's delivery of imported products, and how Ports support extremely vital performance by multiple industries. Imagine the extent of economic damage, disruption, and catastrophic infrastructure damage which could be caused, by events which are NOT UNIMAGINABLE. They also said extreme events would not cause damage at TMI, Chernobyl, and at Fukushima in 2011. Do the Commissioners like to GAMBLE ? This project applicant and Licensee, Southern California Edison (SCE), and all its subsidiaries, subcontractors, and vendors obviously DO LIKE TO GAMBLE. That's what this project is all about. Their gamble, Coastal Commission's waiver from liability, public's threat, public's losses, and agency failure to FULLY protect public health and safety.

Patricia Borchmann

**From:** Donna Gilmore  
**To:** Street, Joseph@Coastal  
**Cc:** Rita Conn; NIRS Summit; John Geesman; David Pepper; StJohn-Inglis, Alison; Teri Sforza - OC Register; Jeff McDonald - old email; Michael Blood - AP Wire; Toni Iseman; Don Mosier; KCBS TV News; NBC - Vikki Vargas; Lori Donchak - City Council; Audrey Prosser - Laguna Beach; Verna Rollinger - Laguna Beach; Ann Doneen; Rima Nashashibi - Newport Beach Dem Club; Judy Jones - SONGS Demo; Dan Hirsch; Arnie Gundersen; Judy Jones - SONGS Demo; Matthew Freedman; RL Miller; Richard Mathews; Bart Ziegler; Marvin Lewis; Arjun Makhijani; Alex, Ken; Barker, Kevin@Energy; Eric Greene; Morey Wolfson; Bart Ziegler; Robert Alvarez  
**Subject:** San Onofre Independent Spent Fuel Storage Installation (ISFSI) Application 9-15-0228 for Tuesday 10/6 Long Beach Coastal Commission meeting  
**Date:** Thursday, October 01, 2015 5:31:42 PM

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To the California Coastal Commissioners and staff:

I recommend the Coastal Commission deny the application for this experimental unproven Holtec spent fuel dry storage system (Application 9-15-0228). This is a very important issue to rush through the approval process with so little time for the public to review the staff's recommendations and related material. However, even with the short review time, I have a number of reasons the proposed system by Southern California Edison (SCE) must be rejected.

The proposed Holtec UMAX underground dry storage system is an experimental unproven system. It cannot be inspected, repaired, maintained, or monitored and does not meet current Coastal Act requirements. The staff's "Approval with conditions" contains conditions that are unlikely to be met. The serious staff concerns that required these conditions demonstrates the inadequacy of this SCE proposed system. It is likely this system will be at our coast for decades, if not longer, as staff has indicated. There is adequate evidence to show that this experimental Holtec system will likely not meet Coastal Commission short term or long term storage and transport requirements. To assume the system can or will be relocated, as the staff suggests, is not a reasonable assumption, based on known evidence. These high capacity (37 fuel assembly) canisters with high burnup fuel may need to cool in dry storage for over 45 years before they are cool enough to transport. (See slide 10 of this Department of Energy presentation. <http://www.nwtrb.gov/meetings/2013/april/boyle.pdf>). The NRC has not approved this system in the configuration proposed by SCE and Holtec.

Additional comments and references below.

- **The report states SCE expects the service life of the ISFSI and casks to be at least 100 years and no major repairs are anticipated within 60 or 100 years. This is an unsubstantiated claim.** (Staff Report page 37). Please have SCE provide technical references for those statements. Are these Holtec technical documents submitted to the NRC? The NRC is only certifying the system for 20 years and is not considering degradation or other aging management issues that might occur after 20 years. The NRC doesn't consider claims by Holtec about those 60 and 100 years as anything the NRC has validated or approved (according to their Sept 2015 UMAX amendment 1 certification approval document). The staff report references email document "SCE 2015b." Please forward a copy of this document.

<http://www.gpo.gov/fdsys/pkg/FR-2015-09-08/pdf/2015-22053.pdf>

- **The statement "NRC has estimated that at least 30 years would be required for the initiation of stress corrosion cracking in steel fuel storage casks" is no longer valid.** (Staff Report Page 37). That statement is in the NRC 8/5/2015 meeting minutes on Stress Corrosion Cracking and Aging Management. The reason NRC said 30 years was because they assumed the canisters would not be cool enough for moisture to deliquesce (dissolve) salt on the canister for at least 30 years. However, at that time they were not aware of the **two-year old** Diablo Canyon canister that had temperatures low enough for salts to deliquesce. I participated in that and other NRC meetings on stress corrosion cracking in marine environments.

<http://pbadupws.nrc.gov/docs/ML1425/ML14258A081.pdf>

<https://sanonofresafety.files.wordpress.com/2011/11/diablocanyonscc-2014-10-23.pdf>

- **The Koeberg nuclear plant had a component that leaked from stress corrosion cracks in 17 years.** It is located in a similar environment as San Onofre (on-shore winds, moist ocean air, frequent fog). The NRC considers the Koeberg component (a waste water tank) comparable to a stainless steel canister (304L or 316L stainless steel). The Koeberg through-wall crack was 0.61" thick. About the same thickness as the proposed Holtec canisters (0.625" thick). San Onofre has also had stress corrosion cracking in stainless steel pipes that the NRC considers comparable to the thin steel canisters, so it's clear the environmental conditions are present at San Onofre. We do not need to wait 20 years to find this out, so the Coastal Commission should address this in the current application. References:

<http://pbadupws.nrc.gov/docs/ML1231/ML12319A440.pdf>

<http://pbadupws.nrc.gov/docs/ML1425/ML14258A082.pdf>

- **Existing Areva NUHOMS canisters have been loaded since 2003, so the idea that Edison needs to have an aging management plan in 20 years is not the case.** They need an aging management plan for their existing NUHOMS canisters and system. Does the existing NUHOMS canister ISFSI require a separate Coastal Commission renewal permit? Both the existing NUHOMS and proposed Holtec thin canisters are of the same materials (welded 316L stainless steel). We have only 5 years before we meet the Koeberg timeline. This idea we can wait 20 years is not realistic on many levels. To buy products originally designed for 20 years that do not have aging management built into the design is unacceptable. Edison should be required to provide their aging management plan now, so it can be fully evaluated by the Coastal Commission. What we already know is not adequate. This is too important an issue to base approvals on Edison promises of future solutions.
- **The UMAX system is an experimental unproven system.** Over 99 percent of dry storage system in the U.S. and the world are above ground systems. To claim this is typical or a proven U.S. systems is an inaccurate claim. On Staff Report page 11, the footnote states "A small HI-STORM UMAX system...is installed at Humboldt Bay Power Plant". This is not a UMAX system and has a very different design. The Humboldt Holtec HI-STAR HB system uses 1/2" thick canisters, but inserted them in thick steel bolted lid cask before placing them in the underground holes. Also, the fuel cooled for 35 years in the pools and was low burnup fuel, so no air vents were needed to cool the thin canister and fuel. In spite of this, water leaked into this system, which Holtec said would not happen. Their solution was to put caulking around the enclosure.

<https://sanonofresafety.files.wordpress.com/2011/11/ml13151a317.pdf>

<http://pbadupws.nrc.gov/docs/ML0531/ML053140041.pdf>

- **The Holtec UMAX system has not been approved by the NRC for the configuration planned for San Onofre and it has not been approved for the site.** The NRC will need a license amendment for the changes in order to properly evaluate for seismic, thermal and other technical requirements. The system is approved for 1/2" thick canisters, not 5/8" as proposed. The system is approved for a totally underground system, not the half underground system proposed. The NRC comments in their September 2015 UMAX approval make this clear. I explained this and other items in the letter I sent to staff on September 17, 2015. It appears some of the public comments I have made have not been addressed. Or has Edison or Holtec or the NRC provided you different information?

<https://sanonofresafety.files.wordpress.com/2013/06/ltrtocoastalcommissiondgilmore2015-09-17umax-amend1.pdf>

<http://www.gpo.gov/fdsys/pkg/FR-2015-09-08/pdf/2015-22053.pdf>

**Aging management of the Holtec system is inadequate.** Even the Holtec President, Dr. Singh, says the canisters cannot be repaired. They cannot even find cracks, let alone repair them.

<https://www.youtube.com/watch?v=euaFZt0YPi4&feature=youtu.be>

- **Relying on vendor promises of future solutions to be able to inspect and maintain the system should not be relied upon in Coastal Commission decision making.** The Coastal Commission should not make decisions based on "vaporware". State agencies are not allowed to procure "vaporware" (capabilities that do not exist), so why would the Coastal Commission make such an important decision assuming these most critical issue will be resolved by vendors?
- **The Coastal Commission should demand Edison use a proven system that can be inspected, maintained, have continuous monitoring, is transportable and doesn't crack.** This is the only way to meet Coastal Commission requirements. The NRC is only concerned with 20 years. The Coastal Commission is concerned with longer term requirements. Technology exists to meet both NRC and Coastal Commission requirements.
- **Rejecting the option of the thick casks, such as the German thick Castor casks (manufactured by Siempelecamp, designed by GNS), with the response "these thick-walled casks are not generally licensed for use at U.S. sites by the NRC" is not sufficient to reject thick casks.** (Staff Report page 20). There is also the option of thick metal casks such as the Areva TN-24 and TN-32 casks currently used in the U.S. Southern California Edison knows both the German and Areva thick metal casks have been licensed by the NRC, so there is every reason to believe they would receive a license for San Onofre. Given that these options are proven technologies used in the U.S. and are the main storage technologies used for the majority of the rest of the world for both storage and transportation, thick casks should not be a rejected alternative. This would better meet Coastal Commission requirements for longevity and transport and also meet NRC requirements. Thick casks are approximately 10 to 20 inches thick compared to the proposed thin canisters that are only 5/8th of an inch thick.

<https://sanonofresafety.files.wordpress.com/2011/11/reasonstobuythickcasks2015-04-16.pdf>

<https://sanonofresafety.files.wordpress.com/2013/06/germanycaskstoragegorlebengns.jpg>

- **There is already evidence for the staff to have sufficient probability that requirements to have canisters transportable and maintainable may not be met with the Holtec UMAX system.** Pushing the can down the road another 20 years isn't going to change that. The only reason no thin canisters have leaked yet is because they have not been in use long enough for cracks to go through the wall of the canister. We are at higher risk of cracks due to our corrosive coastal environment. We are the last location that should be using this inferior technology with materials known to crack from corrosive moist salt air. The NRC does not allow transport of cracking canisters. The underground portion of this system is subject to corrosive ground chemicals and yet cannot be inspected due to lack of technology to inspect this design.

<http://pbadupws.nrc.gov/docs/ML1432/ML14323A067.pdf>

- **Regarding Edison's promise of potentially moving the system to higher ground as the coastal environment degrades that would require a major expense and would likely cost over double the existing San Onofre Decommission Plan cost estimates.** The cost estimates they submitted to the NRC and CPUC assumes fuel will be picked up at the earliest DOE time frame, even though their documents state these dates are unlikely to be met. They also assume nothing will

go wrong with the canisters. They have budgeted about \$1.3 billion for spent fuel management and plan to spend it all. They also plan to spend the entire \$4+ billion Decommission Trust Fund, so no monies will be available. What is the basis for accepting Edison's promise? Will ratepayers be required to pay for this? Is their promise and this plan reasonable?

- **Choosing thick casks meet Coastal Commission requirements for both relocation on-site and transport.** Thick casks are transportable. No additional transportation casks are needed. No protective concrete structures would need to be destroyed and rebuilt. No transfer casks are needed. Systems are installed above ground. Thick cask have seals that can be monitored and replaced. Once a thin canister cracks, it is no longer usable and cannot be repaired.

As the staff report clearly indicates there are many uncertainties regarding when or if the Department of Energy will pick up the fuel and many uncertainties about environmental conditions in our future. Therefore, we need to plan now for the best option, not wait for 20 years and hope something magical will change and assume the Holtec system can be relocated or transported. Please protect our coastal resources and do not allow this experimental Holtec UMAX system in our coastal communities. It does not meet current Coastal Act requirements. It is folly to approve a system based on vendor and utility promises of future solutions when we have the facts we need to make better decisions now. Yes, we need an NRC approved system, but one that also meets Coastal Act requirements. Those two items are not mutually exclusive and are obtainable. Edison's unreasonably short artificial timeline should not be a driving factor for this decision that has long term implications for our Coastal resources.

Thank you,

Donna Gilmore  
SanOnofreSafety.org  
949-204-7794

Additional information and references

- Reasons to Buy Thick Casks and Nuclear Storage Myths
  - <https://sanonofresafety.files.wordpress.com/2011/11/reasonstobuythickcasks2015-04-16.pdf>
- SanOnofreSafety.org
  - <http://sanonofresafety.org/>
- Nuclear Waste Storage and Transport
  - <http://sanonofresafety.org/nuclear-waste/>
- Coastal Commission Staff Report
  - <http://documents.coastal.ca.gov/reports/2015/10/Tu14a-10-2015.pdf>
- Coastal Commission October 6 Agenda and Location
  - <http://www.coastal.ca.gov/mtgcurr.html>



**From:** [Dorah Shuey](#)  
**To:** [Street\\_Joseph@Coastal](mailto:Street_Joseph@Coastal)  
**Subject:** Deny SCE a permit for the Holtec underground storage system  
**Date:** Thursday, October 01, 2015 9:06:59 PM

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Dear Coastal Commissioners,

With all due respect, I urge you not to grant a permit to Southern Cal Edison for the Holtec underground spent fuel dry storage system (Application 9-15-0228). There are many dangers associated with the system. Not only that, the system itself is an unproven one and certainly the earthquake-prone environment of California's seaciffs are no place to experiment. Holtec and the utility company claim that there is a similar system in use already in California, in Humboldt Bay. The similarities are that the proposed system and the one in operation are both underground and both designed by Holtec. Otherwise they are quite different: different geological situations, different designs, different numbers of canisters, and different types of spent nuclear fuel.

There are less than 400 spent nuclear fuel assemblies of low burn up fuel are stored at Humboldt. There are over 2400 spent fuel assemblies of high burn up fuel stored at San Onofre because different technology is now being used at nuclear plants. I researched the proposed Holtec UMAX system as part of some work related to a CPUC hearing and am listing my grave doubts concerning the proposed system below.

The federal Department of Energy and the Nuclear Regulatory Commission both admit that it is unknown when the U.S. government will actually take control of the spent nuclear fuel. It is likely that the highly radioactive material will be on site for several human generations. Considering the uncertainties and dangers, it would be a dereliction of your duty to approve Application 9-15-0228.

Due to the highly radioactive material, which prevents people from being close to it and also affects sensors, cameras and other equipment, there is no current technology to inspect the system, either the concrete housing or the storage canisters for the radioactive spent nuclear fuel rods. It should not be possible to build a storage facility for highly dangerous fuel of any kind without a robust inspection regimen using tested protocols.

There is no current technology to repair the system, either the concrete housing or the storage canisters for the radioactive spent nuclear fuel rods. It should not be possible to build a storage facility for highly dangerous fuel of any kind without sure plans in place for maintenance and repair.

Obviously, these two reasons alone suffice as reasons to REJECT the Application 9-15-0228. But here are several other reasons to DENY the application:

- The concrete and the austenitic steel proposed for the storage of material that

will be "hot" for hundreds of thousands of years are both susceptible to corrosion in a marine environment.

- There are vents in the storage system which means that any release of radiation will get into the air.
- The vents can also allow water to get into the storage system, either from fog or rain. If radiation is released, it can also get into the water.
- If there is an earthquake or earthquake related disaster that causes the seacliff itself to crack or shear or break, obviously the Holtec system will fail.
- Predicted sea level rises caused by climactic change will have a potentially disastrous effect and increase the chances of damage from tsunamis.

Sincerely,

Dorah Shuey

Researcher for "Far Outside the Norm", a report on the steam tube failures at San Onofre Nuclear Plant, co-authored with Dan Hirsch



From: Ray Lutz  
To: Street\_Joseph@Coastal; Luster\_Tom@Coastal  
Cc: shutsanonofre@citizensoversight.org  
Subject: Written Comments on Application No. 9-15-0228  
Date: Thursday, October 01, 2015 10:36:11 PM  
Attachments: LetterToCEC-on-NuclearWasteDumpsFINALV14.pdf  
OffSiteISFSI-At-Fishel.CA\_V1.0.pdf

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[PLEASE ACTIVELY CONFIRM YOUR RECEPTION, THANK YOU!]

TO: CALIFORNIA COASTAL COMMISSION  
RE: APPLICATION No. 9-15-0228

Dear CA Coastal Commission:

After careful review of the current situation, I am convinced that the construction of this ISFSI at this location should not be approved at this time. There are many options that have not been explored and potential changes on the horizon. SCE has not explored other locations in California. They have not attempted to do anything except the path of least resistance, which results in nuclear waste being stored right on the coast in an area where no one would choose to put it. Construction of the ISFSI at this location will likely mean it will stay right here for 100s of years. Meanwhile, even their own analysis admits that the coast is likely to erode up to the ISFSI location within that time, as they say it could erode 1/3 of the way in 35 years. The canisters currently being used are too large, when coupled with the transportation overpack, to be placed on conventional train cars. The reality is that if this ISFSI is built here, then it will be extremely difficult to move it later.

Please find two documents attached,

1. the letter to the CA Energy Commission describing why this is a very bad idea to place this here, and
2. a recent document which proposes a OFF-SITE location in the California desert, "Fishel". This proposal is provided more as an exercise to allow specific issues to be revealed and perhaps put to bed some that really are not issues. The real problem here is that no one is actively attempting to do anything other than leave it where it is, including investigating other options that are much more reasonable. Take a look at the site at Fishel and compare the relative risks with the site being proposed here. Fishel has 0 population and is 50 miles from nowhere. San Onofre has 8.4 million within 50 miles radius, is near a major freeway, and is thus a prime terrorist target.

PLEASE REVIEW THESE DOCUMENTS AND DENY THE PERMIT FOR THIS CONSTRUCTION TO ALLOW MORE INVESTIGATION.

--> DO NOT APPROVE THIS BEFORE ANYONE HAS TRIED TO FIND OTHER PLACES FOR THE NUCLEAR WASTE!

It is my hope that you will take judicial notice of the action of the San Diego Board of Supervisors regarding their vote to send a letter to the DOE demanding that the nuclear waste NOT BE STORED HERE! We should allow this proposal and others to play out before additional construction on the coast is approved. I am hoping that we can see some progress in the requests made by the Board of Supervisors of San Diego County, and push for other alternatives rather than approving this ridiculous idea.

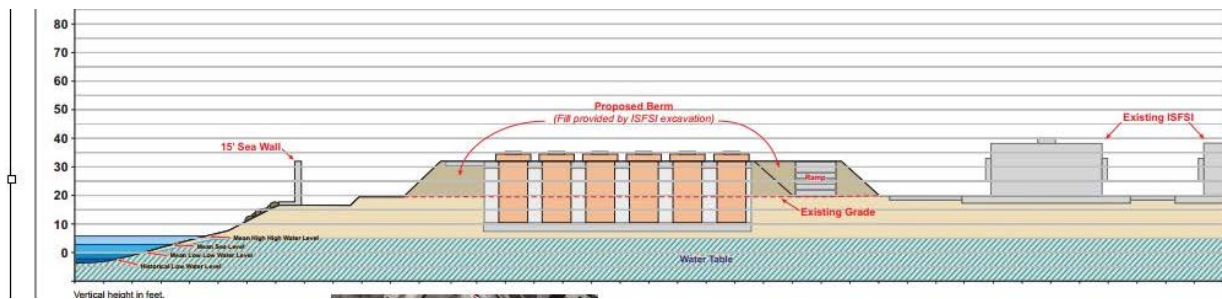
--> Please note: The once-through cooling can be removed and the fuel can remain in the fuel pools for a bit longer while this issue is investigated. The application makes it seem that building the ISFSI will remove the once-through cooling while the fact is that once-through cooling can be removed even if the ISFSI is not built at this time by using the active chiller system which is already planned.

The location of this project is patently absurd! Why is it that our government continues to make bad decisions? Just take a look at this picture and see if it makes any sense at all to put a nuclear waste dump right on the coast. Answer-- It does not!



I must admit that I must reject the notion that doing the right thing here means we will cause other mistakes to be made. This is a fallacy of causation which does not really exist, but if you get caught up in the thought process that results, you will find that you can do nothing because taking the right step now might allow something else that is worse. Therefore, I suggest that we unlink the status of this ISFSI from other decisions that are only remotely linked, if at all. Make the best decision you can make right now on this proposal. I believe that means you must push to block the approval at this time.

The ISFSI is closer to the ocean and closer to the ground water level than the existing ISFSI. The ground level is so close to the water level, they are needing to build the structure half out of the ground but then the ground water level is very close to the bottom. Any increase in ocean levels in the next 100 years will likely raise the ground water to exceed the bottom of the structure.



Look at this passage regarding BLUFF EROSION:

(USACE 1960). More recently, the U.S. Geological Survey has evaluated coastal bluffs to the north and south of SONGS, and estimated that long-term bluff retreat rates range from 6 -20 inches per year at the base of unprotected slopes within the San Mateo Formation (Hapke and Reed 2007; Hapke et al. 2007). Due to the presence of shoreline protection at the project site, no site-specific estimates of bluff retreat rates are available, but it is likely that the USGS upper estimate of 20 inches per year provides a conservative basis for evaluating the project's vulnerability to undercutting by coastal erosion in the absence of shoreline protection.

At its nearest, the proposed ISFSI pad would be located approximately 100 feet from the seawall adjoining the NIA (**Exhibit 3**), which, based on shoreline cross-sections provided by SCE, is assumed to correspond to the toe of the remnant bluff underlying the project site. The nearest UMAX storage module would be approximately 125 feet from the seawall. Discounting the presence of the existing shoreline armoring, a maximum average bluff retreat rate of 20 inches per year over the proposed 35-year life of the project would equate to a total bluff retreat of 29 feet, or about one-third of the distance between the existing seawall and the proposed ISFSI facility. Even recognizing that shoreline erosion processes are highly episodic, and that the

For some reason they assume the ISFSI will only be in place for 35 years when there is text elsewhere that speculates that the ISFSI may have to remain in place for 100 years or more. Worst case: This is a really bad location for this!

This location, near millions of residents within 50 miles, will continue to be a potential terrorist target. Move this somewhere else and it will not be as much of a target.

THE COASTAL COMMISSION SHOULD NOT APPROVE THIS!

--Ray Lutz  
Citizens Oversight  
619-820-5321  
[raylutz@citizenoversight.org](mailto:raylutz@citizenoversight.org)

P.S. I INTEND TO ATTEND THE MEETING IN LONG BEACH AND WOULD LIKE TO PROVIDE A PPT PRESENTATION ON THIS TOPIC.

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Ray Lutz  
Citizens' Oversight Projects (COPs)  
<http://www.citizenoversight.org>

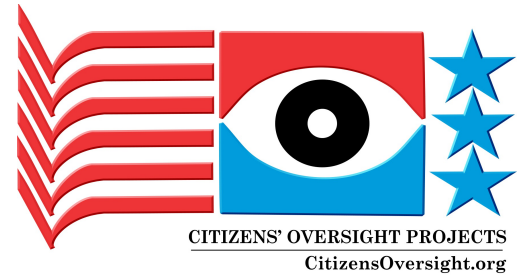
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Shutsanonofre mailing list  
[Shutsanonofre@citizenoversight.org](mailto:Shutsanonofre@citizenoversight.org)  
<http://lists.citizenoversight.org/mailman/listinfo/shutsanonofre>

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## Citizens' Oversight

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April 24, 2015

### To: California Energy Commission

Commissioner Andrew McAllister, Lead Commissioner for 2015 IEPR  
Chair Robert B. Weisenmiller, Lead Commissioner for Electricity and Natural Gas

### Re: Let's find a solution for Nuclear Waste in California

There is a very disturbing situation we can observe around the country: maintaining nuclear waste at sites of nuclear power plants indefinitely, meaning decades and centuries into the future. This situation is a result of an action by the Nuclear Regulatory Commission (NRC) last August in their “Waste confidence” initiative. In essence, the NRC directed all nuclear power plants to become indefinite waste dumps.<sup>1</sup>

Even a cursory review of this situation leads anyone to conclude that it probably isn't our best choice. Since San Onofre is being decommissioned, it is essential that we make a careful review of our options before plunging ahead with this default situation. Most specifically, we believe that the CEC should review our current situation and consider whether an off-site interim storage facility should be developed in California, away from coast and high-population areas for California stranded spent fuel<sup>2</sup>. We also have a proposed game-plan for progressing a review by the relevant institutions and organizations.

The underlying philosophy of this proposal is that each state that has chosen to build nuclear plants in their state should be responsible for their own interim storage. This is simply a matter of fairness and may also underscore the point that if you decide to open a nuclear plant, there are other long-term costs and obligations that you, yourself, must endure. That includes the risk of having this waste in your state.

We are very happy to see that the California Energy Commission is holding a workshop on April 27, 2015 called the “Joint Lead Commissioner Workshop on Nuclear Power Plant Issues,” including spent fuel storage. We would like to add our voice to the proposition that the state take immediate action to develop a solution to this problem at a state level, and we would like some time to present our views at this

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1 [http://www.huffingtonpost.com/2013/05/23/federal-nuclear-waste-rules\\_n\\_3328495.html](http://www.huffingtonpost.com/2013/05/23/federal-nuclear-waste-rules_n_3328495.html) -- “Federal Nuclear Waste Rules Need To Be Improved, Attorneys General Petition NRC”

2 “California Stranded Spent Fuel” is fuel that remains at plants that are being decommissioned, such as now at San Onofre, and in the future, at DCNPP, once it enters the decommissioning phase. We are not suggesting that the California solution become a magnet for fuel from other states of nationwide, it is not for spent fuel from DCNPP or other nearby nuclear plants.

meeting.<sup>3</sup> This letter is a community comment to the work on the IEPR and also includes some other ideas for a game plan to address these issues on an urgent basis.

The 2013 IEPR includes a historical summary of the various steps taken at a federal level regarding spent nuclear fuel. Since the CEC has been specifically tasked with this subject area, there is little doubt that you are likely the proper entity to spearhead the state-level activity to pursue a prudent solution to this dilemma. We understand, however, that you will need to work with other agencies and governmental institutions, and thus we have included this in our proposal and comments. We believe that most of the material below should be included in your IEPR or a related work.

## About us

Citizens Oversight, a 501(c)3 Delaware Corporation with offices in California, has been an active participant representing ratepayers in proceedings at the CPUC, including the San Onofre investigation (I.12-10-013), the 2012 Nuclear Decommissioning Cost Triennial Proceeding (NDCTP, A.12-12-012/013), and now the San Onofre Decommissioning Cost Estimate (A.14-12-007) and 2014 San Onofre Decommissioning Cost Reasonableness Reviews (A.15-01-014 and A.15-02-006). We represent ratepayers and have members who are ratepayers in the areas, some of whom reside very near to the plant.

## Our Comments

Based on this work for the past several years, and my background as a trained engineer<sup>4</sup>, we have the following observations and recommendations.

1. **Default Situation is Unsatisfactory:** Fuel stored in dry casks on the nuclear reactor sites stored in Independent Spent Fuel Storage Installations (ISFSI) was originally viewed as a temporary fix to allow the Department of Energy (DOE) to develop a solution for permanent disposal in a deep geologic repository, while at the same time spent fuel pools were filled to the brim. With the delay of the opening of any such repository coupled with the closure of the San Onofre plant, the current plan is to triple the size of the on-site ISFSI on a somewhat permanent basis, in that it may be there for many decades or hundreds of years<sup>5</sup>. The idea that nuclear waste would be stored at these sites has not been a well-thought-out conclusion, but rather one that is simply the default situation based on the inability of the DOE to establish a permanent repository and accept the spent fuel as originally planned.

There is some research already done on this topic by the Department of Energy in their Nuclear Fuels Storage and Transportation Planning Project regarding the issues related with relocating

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3 David Victor, chair of the “San Onofre Community Engagement Panel” (CEP), as well as members Tim Brown (Mayor, San Clemente, wireless communications business background) and Dan Stetson (Ocean Institute, MBA) joined in a memo sent to members of the CEP at the recent April 16 CEP meeting. The CEP is convened by Southern California Edison and other decommissioning utilities, is not an independent body, does not represent the community, does not vote on any matters, and is unable to have a position. Therefore, it is essential that the CEC view the submission by Victor, Brown, and Stetson as opinions of individuals hand picked by the utility, and not a consensus view. The CEP Charter is available here: ([http://www.songscommunity.com/docs/SONGS\\_Decommissioning\\_CEP\\_Charter.pdf](http://www.songscommunity.com/docs/SONGS_Decommissioning_CEP_Charter.pdf)).

4 Ray Lutz has an MSEE degree from SDSU, 1984.

5 The recent NRC “Waste Confidence Generic Environmental Impact Statement” NUREG 2157 -- <http://pbadupws.nrc.gov/docs/ML1322/ML13224A106.pdf> -- The NRC define “Short Term” as 60 years beyond licensed life and “long term” to be more than 100 years after the operation license. They assume that: a) Institutional controls would be in place; b) Spent fuel canisters and casks would be replaced approximately once every 100 years; c) Independent spent fuel storage installation (ISFSI) and dry transfer system (DTS) facilities would also be replaced approximately once every 100 years; d) A DTS would be built at each ISFSI location for fuel repackaging; e) All spent fuel would be moved from spent fuel pools to dry storage by the end of the short-term storage timeframe (60 years).

spent fuel from decommissioned reactors.<sup>6</sup>

2. **“Spent Fuel” is extremely dangerous:** A U.S. Nuclear Regulatory fact sheet states that after 10 years in a cooling pool, the surface radioactivity of a spent fuel assembly is still about 10,000 rem/hour. To understand the danger that poses to health, consider that a 500-rem dose delivered to a whole person in a single exposure is fatal. Close proximity to a single 10-year-old spent fuel assembly would deliver a fatal whole-body radiation dose in about three minutes.<sup>7</sup>

The toxic “lifespan” of spent nuclear fuel is about one million years.<sup>8</sup> Dry casks are designed for about 100 years of spent fuel storage, but that is only a claim, and it appears that the ones we have at San Onofre may not last more than 20 or 30 years.

Because a permanent solution has not been found in half a century of trying, owners of nuclear power plants are essentially required to manage this most hazardous of all man-made wastes forever. If new nuclear power plants are built, accumulation of this million-year waste will accelerate. Not only do the costs of storage become effectively unlimited; in addition, the risk of a devastating cooling pool accident becomes steadily more likely.<sup>9</sup>

3. **Removal of Stranded Fuel:** The California Energy Commission in the 2013 Integrated Energy Policy Report<sup>10</sup>, page 217:

In January 2012, the Blue Ribbon Commission on America’s Nuclear Future identified removal of stranded used nuclear fuel at shutdown sites as a priority so that these sites may be completely decommissioned and put to other beneficial uses. In September 2013, the DOE Office of Nuclear Energy, as part of the Used Fuel Disposition Campaign, released a preliminary evaluation of removing used nuclear fuel from nine shutdown sites, including Humboldt Bay Nuclear Power Plant and Rancho Seco Nuclear Generating Station. Objectives of the study will be to characterize the actions necessary to remove used nuclear fuel from the shutdown sites and develop a plan and schedule for key program activities.

4. **The Blue Ribbon Commission** suggested<sup>11</sup> that off-site ISFSIs may be a good interim solution while we wait for the Department of Energy (DOE) to open a deep geologic repository:

The arguments in favor of consolidated storage are strongest for “stranded” spent fuel from shutdown plant sites. Stranded fuel should be first in line for transfer to a consolidated facility so that these plant sites can be completely decommissioned and put to other beneficial uses. Looking beyond the issue of today’s stranded fuel, the availability of consolidated storage will provide valuable flexibility in the nuclear

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6 [http://www.pnnl.gov/main/publications/external/technical\\_reports/PNNL-22418.pdf](http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-22418.pdf) -- “Preliminary Evaluation of Removing Used Nuclear Fuel From Nine Shutdown Sites” -- DOE Nuclear Fuels Storage and Transportation Planning Project

7 <http://www.psr.org/environment-and-health/environmental-health-policy-institute/responses/the-growing-problem-of-spent-nuclear-fuel.html>

8 John Deutch and Ernest J. Moniz, et al., Massachusetts Institute of Technology Report, The Future of Nuclear Power: An Interdisciplinary MIT Study, 2003, 180 pages, accessed online April 16, 2011.

9 <http://www.psr.org/environment-and-health/environmental-health-policy-institute/responses/the-growing-problem-of-spent-nuclear-fuel.html>

10 <http://www.energy.ca.gov/2013publications/CEC-100-2013-001/CEC-100-2013-001-CME.pdf>, This report covers nuclear energy issues in chapter 6, pages 195-229

11 Blue Ribbon Commission on America’s Nuclear Future report, page xii  
[http://energy.gov/sites/prod/files/2013/04/f0/brc\\_finalreport\\_jan2012.pdf](http://energy.gov/sites/prod/files/2013/04/f0/brc_finalreport_jan2012.pdf)



waste management system that could achieve meaningful cost savings for both ratepayers and taxpayers when a significant number of plants are shut down in the future, can provide back-up storage in the event that spent fuel needs to be moved quickly from a reactor site, and would provide an excellent platform for ongoing R&D to better understand how the storage systems currently in use at both commercial and DOE sites perform over time.

5. **Not Part of the Bargain:** The general public did not agree to permanent nuclear waste storage at the nuclear plant sites when these plants were originally approved and installed. The plan has always to completely decommission and remove radioactivity so the sites could be returned to beneficial uses. Therefore, it is essential that our state institutions take action to find the best solution to this glaring problem.
6. **Dry Cask Storage is considered safer than storage in spent fuel pools**<sup>12 13</sup>. At Mark-I design nuclear plants, this is especially true since the fuel pools are three stories above ground level, as was the case at Fukushima. At San Onofre and the Diablo Canyon Nuclear Power Plant (DCNPP), the spent fuel pools are at grade level, but still must be actively cooled. Depending on how hot the fuel is, any interruption in the associated cooling system will result in evaporation of the water in the pool so as to expose the fuel to the air, resulting in auto-ignition and even an explosion of escaping hydrogen gas (perhaps within 133 hours for fuel in the pool for one year.)<sup>14</sup>
7. **At San Onofre:** Approximately 3.6 million pounds of high-level nuclear waste exists in the form of nuclear fuel assemblies. Most of this is in the two fuel pools that exist on the site, and the remainder is enclosed in 51 dry cask units<sup>15</sup>. The existing ISFSI will have to be expanded about three times its current size to accommodate all the spent fuel from the three units.
8. **NUHOMS®** -- The existing ISFSI at San Onofre uses the Areva Transnuclear NUHOMS® Dry Cask System<sup>16</sup> which uses (5/8") thick welded-shut stainless steel canisters, stored in a concrete overpack in a horizontal orientation. This is an above-ground

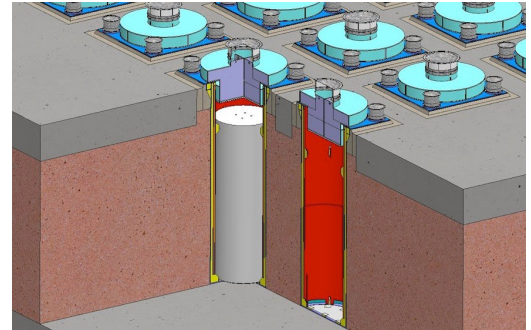


*Illustration 1: Areva NUHOMS system*

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- 12 <https://www.nirs.org/reactorwatch/security/nasrptsfp6.pdf> -- "Dry cask storage and comparative risks." NIRS.
  - 13 [http://www.princeton.edu/sgs/publications/articles/fvhippel\\_spentfuel/rAlvarez\\_reducing\\_hazards.pdf](http://www.princeton.edu/sgs/publications/articles/fvhippel_spentfuel/rAlvarez_reducing_hazards.pdf) -- "Reducing the Hazards from Stored Spent Power-Reactor Fuel in the United States" -- Alvarez, R.
  - 14 <http://pbadupws.nrc.gov/docs/ML0104/ML010430066.pdf> -- NUREG-1738, "Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants" -- "Autoignition is known to occur in zirconium alloys and zirconium hydride, especially when clean metal or hydride is suddenly exposed to air." [Page 100]; "... partial draindown will lead to a steam zirconium reaction producing hydrogen gas which could reach explosive concentrations in the atmosphere of the spent fuel building, potentially leading to a breach of that building." [Page A6-22].
  - 15 One dry cask contains "greater than class-c" (GTCC) Low Level Radioactive Waste (LLRW) and not spent fuel. GTCC LLRW is waste that is not generally acceptable for near-surface disposal and for which the waste form and disposal methods must be different and, in general, more stringent than those specified for Class C LLRW. NRC regulations require GTCC LLRW to be disposed of in a geologic repository as defined in 10 CFR Parts 60 and 63, unless proposals for an alternative method are approved by NRC under 10 CFR 61.55(a)(2)(iv). For more information, see [http://www.gtceis.anl.gov/documents/eis/GTCC\\_EIS\\_February2011\\_Summary.pdf](http://www.gtceis.anl.gov/documents/eis/GTCC_EIS_February2011_Summary.pdf) "Draft Environmental Impact Statement for the Disposal of Greater-Than-Class C (GTCC) Low-Level Radioactive Waste and GTCC-Like Waste (DOE/EIS-0375-D)"
  - 16 <http://us.aveva.com/EN/home-1497/new-challenges-proven-solutions-prevention-nuhoms-dry-cask-storage.html>

design which allows air to passively cool the canisters by entering in vents at the bottom and rising out of vents at the top. There is no way to seal the vents. One positive aspect of this design is that additional concrete containment overpacks can be constructed on an as-needed basis, even one at a time if necessary. Each canister weighs about 170,000 pounds loaded.

9. **Holtec Hi-Storm UMAX system:** Southern California Edison (SCE) has reviewed their options for expansion of the ISFSI. They have announced that they have selected the Holtec Hi-Storm UMAX system<sup>17</sup>, which uses similar canisters to those used in the NUHOMS design, except that they are placed vertically, below grade level, into cylindrical steel-lined wells in a massive block of concrete. Our limited review of this system is that it offers a few superior features over the NUHOMS design, including the fact that the wells can be sealed, the casks sit on a relatively thicker base (rather than on the thin canister walls.) Holtec claims that inspection may be easier to conduct as the walls of the canister are accessible but others have brought up the point that it may be required to excavate to check ground water corrosion for the cement structure of the buried canisters<sup>18</sup>. Air enters the top and passively circulates over the canister from the bottom up. This system must be built in batch fashion, i.e. a large number of wells for canisters must be built at one time in contrast with the Areva Transnuclear NUHOMS design where fewer concrete structures need be built at one time. Drawback to this design appears to be regarding draining the wells of water and keeping them dry.



*Illustration 2: Holtec UMAX Dry Cask System*

10. **Coastal Salt Air Harmful:** The salt air environment at the San Onofre and DCNPP sites poses increased degradation risks due to chloride-induced stress corrosion cracking (CISCC) due to proximity to the ocean and prevailing winds. Since our experience with storing these canisters over many decades is limited, the time for onset of CISCC is not well defined although the rate of crack development is bounded. The NRC is currently actively researching CISCC. Choosing a site at least a few miles from the coast will likely drastically reduce these risk factors.<sup>19</sup>
11. **Inspection Tools Need to be Developed.** There is currently no technology available to completely inspect the canisters for cracks. It seems feasible that such inspection technology will be developed as the underlying technology (high resolution cameras, etc) are readily available today, although perhaps not sufficiently radiation hardened. Whether they are used or not is another matter. A dry-cask design that relies on constant inspections is not robust enough for long term storage. These inspections will likely never be done, that is the sad truth of the matter.

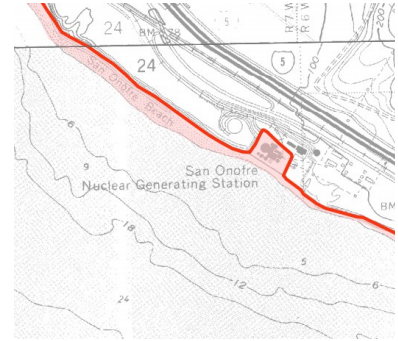
<sup>17</sup> <http://www.holtecinternational.com/productsandservices/wasteandfuelmanagement/hi-storm/> click on "UMAX"

<sup>18</sup> Conversation at CEP meeting with experts on Feb. 25, 2014 (Marni Magda)

<sup>19</sup> Our team was able to participate in the April 21, 2015 NRC meeting on Chloride Induced Stress Corrosion Cracking (CISCC). The NRC allows cracks to develop up to 75% of the thickness of the shell and have not included transportation integrity into their requirements. Thus, it is now apparent that these relatively thin canisters are insufficient for long-term storage, past the end of the operating life of the plant.



12. **Risk of Radioactivity Release Exists:** Storage of radioactive waste in dry cask system is not completely safe<sup>20</sup>. Some of these risks can be reduced through the careful siting and design of the ISFSI. The best choice is very important for us to make now so we are not stuck with disasters in the future. There is a risk that in accident conditions, fuel in the canisters will be damaged and may reach criticality (start a nuclear reaction). They won't explode like 150 Hiroshima bombs, but it can certainly start a nuclear reaction or a uranium fuel fire (not just a cladding fire like at Fukushima). If the canisters become breached in any way, the amount of radiation that could be released is quite significant. Our goal must be to completely avoid that possibility.



*Illustration 3: Tsunami Inundation Area (US Geologic Survey) includes the San Onofre plant*

13. These dry cask systems are designed to be passively cooled using airflow convection. Thus, if a canister were to develop a crack or be breached in some fashion, radioactivity would be released into the environment. There are no filters or “defense in depth” mechanisms. Typically, the canisters have a single wall between radioactivity and the environment.

14. **Ocean Proximity not Required:** Unlike the original nuclear plant which (by design) required cold ocean water to condense steam back to water (and so they were placed by the ocean) there is no need to site an ISFSI by the ocean. Locating the ISFSI away from the coast will also eliminate any risk from any tsunamis, even even if -- as at Fukushima -- it were to be a beyond design basis event. San Onofre is in a known tsunami inundation zone. No one would locate the ISFSI here if given a blank slate.

15. **High-burnup fuel** has been used at plants for a number of years now. The industry has little experience with degradation and transportation of high-burnup fuel in storage canisters. The NRC is actively researching how to do this safely. It may be necessary to wait for the fuel to cool longer in the fuel pools or in dry casks co-located at the nuclear plant sites before attempting to transport them. Some suggest that they will need additional enclosures inside the canisters, sometimes called “canning.”



*Illustration 4: GNS CASTOR system uses much thicker ductile cast iron walls*

16. **Thicker canisters are better.** The 5/8” wall canisters used in the Areva NUHOMS and Holtec HI-STORM UMAX systems were originally designed for storage at operating plants with the expectation that the fuel stored in them would be taken by the DOE to a permanent repository within a few decades.

Compare this with the CASTOR design<sup>21</sup> by the German company GNS<sup>22</sup> which uses ductile cast-iron material with walls almost 20” thick, nearly 32 times thicker than the thin canister designs by Areva and Holtec. This essentially eliminates any chance that a through-wall crack will develop due to corrosion and can provide a much more robust defense against many risk factors during

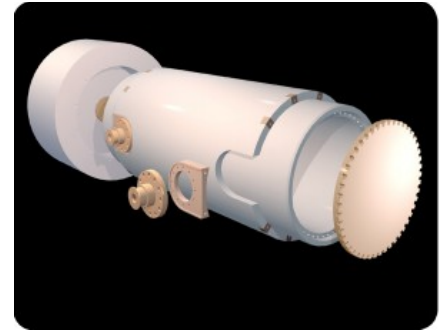
20 One canister contains something like 150 to 500 Hiroshima bomb's worth of radiation, based on 400,000 Curies per ton of spent fuel, 10 years after being removed from the reactor. It won't explode like a bomb, but it is very deadly to humans nonetheless.

21 [http://www.siempelkamp.com/fileadmin/media/Englisch/Nukleartechnik/produkte/CASTOR\\_A\\_high\\_tech\\_Product\\_made\\_of\\_ductile\\_Cast\\_Iron.pdf](http://www.siempelkamp.com/fileadmin/media/Englisch/Nukleartechnik/produkte/CASTOR_A_high_tech_Product_made_of_ductile_Cast_Iron.pdf) -- Specification Sheet or Castor V/19 cask by GNS.

22 <http://www.gns.de/language=en/21551/castor-v-19>

transportation and handling. They include a removable dual lid system with integrated pressure sensor to detect any leaks around the seals used in the bolted lids. These canisters absorb neutron radiation with polyester inserts in the walls and do not need a concrete structure around them. In Germany, they typically house these in a hardened building. These thicker canisters are not licensed for use in the U.S. at this time.

17. **Dual-Purpose Canisters.** Spent Fuel Canisters today must be “dual-purpose,” which can allow both storage and transportation without removing the fuel assemblies from those canisters. Thin-walled canisters such as the Areva or Holtec systems use a transportation overpack<sup>23</sup> which the manufacturers claim is designed to endure design-basis accidents without radioactivity releases<sup>24</sup>. (Not all canisters are dual purpose. The canisters and underground Holtec system used at the Humbolt Bay Power Plant may be too large to transport, although some references state the opposite.<sup>25</sup>) The thick-walled CASTOR design does not use an overpack per-se, but crushable ends are added for transportation, and are themselves transportable.



*Illustration 5: Areva MP197HB Transport Cask for the NUHOMS system*

18. **Transportation is Risky.** Simply said, the less these canisters are moved and handled, the better. Although unused nuclear fuel is moved around the country routinely, spent fuel is much more radioactive and dangerous than unused nuclear fuel. Any plan that includes transportation of the used nuclear fuel to another location must include the increase in risk implied by handling and transporting the fuel.
19. The Nuclear Regulatory Commission (NRC) licenses specific ISFSI designs and provides evaluation tools, but does not deal with the nuances of siting the ISFSI, such as whether one site is safer than another, and definitely they do not deal with cost issues directly. Therefore, it is up to the CEC, and others to help make informed choices in this area. We are concerned that the primary regulatory agency, the CPUC, concerns itself only with cost issues and is not necessarily seeking the best or safest solution.
20. **Fuel Pool Likely Required.** It may be necessary to maintain a fuel pool near any ISFSI so that any canister that develops a crack or otherwise is breached can be moved to the fuel pool and submerged so radioactivity will be absorbed by the water and the contents can then be removed and placed into a new canister. This is particularly true of the thin canister designs as they appear to have a high risk of developing cracks.

There has been some talk of dry-transfer facilities but those are not yet available. Repair of the canisters is not feasible, according to Holtec's Dr. Singh at the November 2014 CEP meeting when asked about repairing canisters. He said that there's no technology to repair cracks in thin-walled canisters and then went on to explain why you wouldn't even want to try. There is essentially no

23 [http://us.aveva.com/home/liblocal/docs/Catalog/AREVA-TN/ANP\\_U\\_354\\_V1\\_11\\_ENG\\_MP197HB\\_TC.pdf](http://us.aveva.com/home/liblocal/docs/Catalog/AREVA-TN/ANP_U_354_V1_11_ENG_MP197HB_TC.pdf) -- Transportation overpack for the Areva Transnuclear NUHOMS system, MP197HB.

24 The recent April 21, 2015 NRC meeting on cracking did not include transportation in their models.

25 <http://www.wmsym.org/archives/2010/pdfs/10217.pdf> -- “Dry Cask Storage Pacific Gas & Electric – Humboldt Bay Power Plant - 10217” -- “This cask system is also licensed to transport under 10 CFR 71, and requires no on-site transfer activities” (Page 7) -- This contradicts what we were told at the CEP meeting by Holtec representatives who stated that these canisters were too large to transport.

chance of through-wall cracking with the thick-walled canisters such as the CASTOR designs, and thus very remote likelihood that repair will be necessary.

21. **Away from Seismic Risks:** Although the dry cask systems are not as dangerous as an operating power plant in the event of natural disasters such as earthquakes and tsunamis, the human experience with the likely magnitude of such disasters is very limited. We note that the official tectonic plate theory was scientifically accepted only 50 years ago, and so we really have very little real experience to base any predictions on the upper limit of the magnitude of earthquakes in California. It seems that after each large earthquake, we are revising our numbers ever higher in terms of possible earthquake magnitudes. Even the movement of an inch can cause a large earthquake, and we are told the San Andreas Fault is some 20 feet behind its historical movement in some areas, and a quake in those areas is overdue.<sup>26</sup>

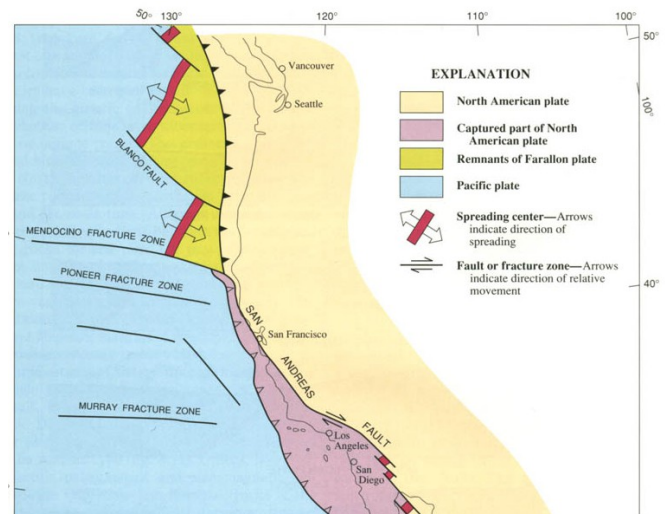


Illustration 6: Major Faults in California

Earthquake dangers were revised about a month ago because they discovered that earthquakes interact. Regional quakes are linked and increase the probability of other earthquakes. Thus, they have revised upward the probability of quakes and the associated tsunami risks.<sup>27</sup>

We know that when the DCNPP was first installed, claims were made that the closest fault was no closer than 30 km away. We now know that the Shoreline fault runs within 600 meters of the plant and the ISFSI<sup>28</sup>. Once closed, it will therefore be important to relocate the spent fuel from this site to a more stable area and it will be best to discontinue building any new ISFSI infrastructure at DCNPP if possible. As stated, our position is that the plant should be closed without delay.

California has areas with known earthquake dangers where long term storage of nuclear waste must not be allowed. The California desert provides areas away from populations and free of earthquake faults that are safer also due to the dry conditions. The challenges of heat could be mitigated by a cover structure over the ISFSI.

- 26 <http://pubs.usgs.gov/gip/earthq3/safaultgip.html> - US Geologic Survey -- "Along the Earth's plate boundaries, such as the San Andreas fault, segments exist where no large earthquakes have occurred for long intervals of time. Scientists term these segments "seismic gaps" and, in general, have been successful in forecasting the time when some of the seismic gaps will produce large earthquakes. Geologic studies show that over the past 1,400 to 1,500 years large earthquakes have occurred at about 150-year intervals on the southern San Andreas fault. As the last large earthquake on the southern San Andreas occurred in 1857, that section of the fault is considered a likely location for an earthquake within the next few decades." -- we can note that  $1857 + 150 = 2007$ . We are overdue for a very large quake in the southern section of the San Andreas.
- 27 <http://www.latimes.com/local/california/la-me-ventura-fault-20150420-story.html> -- "Earthquake fault heightens California tsunami threat, experts say," Los Angeles Times, 2015-04-20
- 28 [http://www.pge.com/includes/docs/pdfs/shared/edusafety/systemworks/dcpp/2\\_SFZ\\_EXECUTIVE\\_SUMMARY.pdf](http://www.pge.com/includes/docs/pdfs/shared/edusafety/systemworks/dcpp/2_SFZ_EXECUTIVE_SUMMARY.pdf) -- Shoreline Fault Zone Report (PG&E)

22. **Away from Dense Population Areas.** The original nuclear plant locations were partly chosen to be close to population centers and thus close to the users of the energy produced. There is no benefit to siting the ISFSI near densely populated areas and to allow them to stay in these locations increases the per-capita risk. In fact, it is obviously best to site these as far from people as reasonably feasible. There are many areas of the state that are far from human populations.

23. **Terrorist Risk Exists:** The risk of terrorist attack on the ISFSI is perhaps one of the most significant. However, the NRC Waste Confidence report said that the risk was both “unknown” and yet “small.” Due to security concerns, there is very little produced on this topic for public consumption. It is clear that there are many scenarios where an attack on San Onofre could occur with devastating results. Locating the plant in a very sparsely populated area can provide significant buffer zones around the plant which is not the case at San Onofre, as it is next to a major interstate freeway, train route, and coastal access points, and thus is difficult to defend. The fact that it is so close to densely populated areas means that any release also impacts a large population.

The SCE CEP meeting on April 16, 2014 on the subject of security made it clear that San Onofre as a long term interim storage is the wrong place because a terrorist attack with current weapons could not be stopped from the Interstate 5, the air, or the sea. Long term interim storage needs to have a no fly zone around it.

24. **Cost Effective.** An off-site ISFSI for California stranded spent fuel can reduce overall costs by:

1. sharing the same security infrastructure for all California stranded nuclear spent fuel
2. reducing the complexity of the security requirements by siting it in a defensible location.
3. sharing the same fuel pool or dry transfer facility
4. avoiding the construction of multiple ISFSIs, one on each reactor site and one at the common site.<sup>29</sup>

25. **Not a “Nuclear Waste Dump.”** There have been attempts to establish nuclear waste dump sites in California, and these have encountered significant resistance from the community. For example, the Ward Valley site was to accept low-level nuclear waste (such as hospital waste) by direct burial<sup>30</sup>. This is not comparable with the off-site ISFSI storage proposal. An off-site ISFSI is a much smaller project, does not require digging trenches 600 ft deep, is much more tightly controlled, and will have very little impact on the environment, compared with directly burying waste that is allowed to mingle with ground water, etc.

26. **Not Regional:** The position presented in this document is that each state should deal with its own waste. Thus, this is not a regional solution where spent nuclear fuel will be accepted from a much larger area. This is an important concern for many in the community.

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29 It may be useful to investigate alternatives for storage of dry casks at San Onofre to allow time for planning and constructing an off-site ISFSI site. For example, storing thick canisters on an existing concrete pad inside the containment structures might be a feasible option. However, any location must be licensed by the NRC as an ISFSI.

30 <http://energy-net.org/01NUKE/WV/WVALLEY.HTM> -- “The proposed design calls for open, unlined trenches, into which the waste will be dumped, covered with dirt and revegetated. The FEIR/S concludes that because the surface level of the basin is deep (estimated 600 feet), the region is arid and rainfall will not seep further than six inches, there is no danger of radionuclides migrating from the site into the water below. Because of the inaccessibility of the license Application, which contains the models and data used to reach these conclusions, independent hydrologists have been unable to test the veracity of these conclusions. The FEIR/S also presumes relatively short hazardous lives for the wastes (500 years or less) and states that even if migration were to reach the water, the hazard would by then have expired.”



27. **Must not Green-Light More Nuclear Plants** -- The Warren-Alquist Act which established the California Energy Commission includes provisions (25524.1-2) which prohibits the development of any new nuclear fission plant unless “(a) The commission finds that there has been developed and that the United States through its authorized agency has approved and there exists a demonstrated technology or means for the disposal of high-level nuclear waste.”<sup>31</sup>

There is an understandable concern that the establishment of a prudent interim off-site ISFSI might lead some to believe that this is considered “disposal of high-level nuclear waste,” and this would lead to a push to build new nuclear plants and also to extend the life of any existing plants.

Therefore, we believe it is essential to clearly state that any development of an off-site ISFSI is not considered “disposal” of the waste and thus will not trigger any concern regarding the expansion of nuclear-waste generating plants in the state.

Furthermore, we believe that the state should clearly state that no relicensing of the DCNPP will occur, to eliminate the concern that a prudent solution for our interim nuclear waste storage will improve the likelihood that the plant will be relicensed. Again, it is our view that the waste problem is so severe, and the benefits to running a plant minimal (and economically nonviable) that the DCNPP should be shut down without delay.

28. **Not for Operating Reactors** -- Such an off-site ISFSI must not be for fuel from operating reactors, such as from the DCNPP. It must be for “stranded” fuel only from plants that are currently undergoing decommissioning or completed decommissioning except for the remaining on-site ISFSI.
29. **Must not become a “Consolidated ISFSI”** -- There is a danger that solving the problem for San Onofre at a off-site ISFSI will mean that other plants from around the country will want to move their fuel to this storage site. Thus, this must not be considered a “consolidated ISFSI” which implies it will take fuel from all other states, but simply “off-site ISFSI for California stranded spent fuel.” Even with only taking fuel from stranded California sites will represent a net savings.
30. **Should Include Electronic Monitoring** -- Current ISFSI designs require manual monitoring and inspections. Electronic monitoring that can be maintained around the clock with defense-in-depth must be a goal for development. All three aspects should be respected. Best place, best system, and best procedures.
31. **Federal Issues** - Some federal involvement will be necessary:
1. More robust canister designs are still not licensed for use.
  2. The Nuclear Regulator Commission must license any off-site ISFSI.
  3. We understand that under current law, the state cannot operate an ISFSI, only a private company may do so. This seems backwards. If this is the case, this law may need revision.
  4. Since we propose building the off-site ISFSI within California, interstate transportation is not required
32. **Other Issues:** There are a great many issues that we do not know the answers to. For example:
1. We assume will CEC should spearhead site selection and characterization. Is this true?
  2. How will local communities be involved?

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31 <http://www.energy.ca.gov/2015publications/CEC-140-2015-002/CEC-140-2015-002.pdf> -- Warren-Alquist State Energy Resources Conservation and Development Act, Public Resources Code, Section 25000 et seq. (underlining added)

3. How would "local" approval be done?
4. Who needs to be involved? What other agencies need to sign off?
5. What laws have to be changed, amended, or what new laws are needed?
6. If it is a military site, what agency do we start with?
7. Do we need Camp Pendleton involvement, or are they a passive bystander?

### **33. Concerns:**

1. The Blue Ribbon Commission concluded that any decisions must be consent-based, and not rammed down the throat of any community. Therefore, any process undertaken should be approach with full transparency and community involvement.
2. This off-site solution should be a solution for STRANDED CALIFORNIA nuclear waste only.
3. Public land would be preferable, such as a military base, not private for cost and security reasons. Using a closed military base that is already ruined is preferred over building in a pristine area.
4. The taxpayer will pay for the contracted land, not the ratepayer or the utility.
5. The site should be a location in California to avoid interstate lawsuits during transportation, away from populations, fire storm, earthquake, and ocean environment challenges.
6. All California environmental laws should be upheld.
7. We suggest military DOD oversight of an off-site ISFSI. More not less security is needed.
8. A no fly zone over the facility and new regulations beyond NRC that deal with today's sabotage and human error realities.
9. The site should preferably be near railroad lines to facilitate transport of the casks.
10. No tribal solutions unless the State laws apply and DOD will be inspecting aging management for the centuries the fuel may remain at the site.
11. Private for-profit solutions are not recommended. Companies come and go. This plan must be here for the long-haul.

### **Recommendations:**

1. **Incorporate our Comments:** We feel that the IEPR is incomplete unless it fully addresses the issues above. This cannot be brushed aside as a federal-only issue.
2. **A "Nuclear Waste Summit,"** should be convened by the CEC to kick off this project, so that all the players are involved so as to develop legislation or modify regulations as needed to fully address this urgent issue. This is not envisioned as a new organization and does not usurp any independence or authority of any of the participants, but instead as a way to expedite an understanding of the problem with all the participants. The summit should be convened with representatives from all the relevant decision-making bodies regulatory agencies, and utility stakeholders, including (but not limited to, in alphabetical order):
  - California Coastal Commission
  - California Energy Commission
  - California Public Utilities Commission
  - Department of Energy
  - Department of the Navy (who owns the San Onofre site)
  - The Governor's Office
  - Nuclear Regulatory Commission
  - Senators Dianne Feinstein's and Barbara Boxer's offices
  - State Senate Committee on Energy, Utilities, and Communications, Sen. Ben Hueso, Chair

- State Assembly Committee on Utilities and Commerce, Asm. Anthony Rendon, Chair
- Utilities:
  - Pacific Gas & Electric (DCNPP & Humbolt Bay Power Plant)
  - Sacramento Municipal Utility District (SMUD -- Rancho Seco)
  - San Diego Gas & Electric (Their interest in San Onofre)
  - Southern California Edison (and other utilities involved in San Onofre)
- Others, such as ratepayer advocates (TURN, UCAN, A4NR, CitizensOversight, etc.), other representatives of stranded nuclear fuel (SMUD, Humbolt Bay NPP, etc.)

The summit will kick off the project to review potential off-site ISFSI sites (probably within California) to accommodate all existing and planned nuclear fuel waste from California nuclear plants and to make recommendations for changes required to carry out the plan.

3. **CEC (and others) should become a party in the CPUC proceedings on the topic.** The Energy Commission (and other interested parties) should probably become a party to the CPUC's decommissioning cost proceeding regarding the plans at San Onofre (A.14-12-007). One of the functions of this proceeding is to review the plans for the ISFSI at San Onofre in terms of cost and overall siting questions and generate a record of the facts surrounding the options for an off-site ISFSI.
4. **Construction Moratorium:** A moratorium should be placed on the construction of any new ISFSI structures at existing nuclear plants until the question is fully explored so as to avoid wasting resources on these structures and systems, and more fully inform those who are planning those projects of the possibility of a within-California solution. At San Onofre, the spent fuel can remain in the spent fuel pool until an off-site ISFSI is available.
5. **Consider an off-site ISFSI for California Stranded Fuel:** The position taken by this document is that the CEC and other agencies should consider developing an off-site ISFSI for California spent nuclear fuel that is "stranded" at decommissioned nuclear reactors, including San Onofre.
6. **What is a good site?** We understand that the CEC will likely want to do a thorough review of site options, but the following characteristics appear to be important in any off-site ISFSI site:
  - In California to avoid interstate issues and meet our philosophy of fairness and responsibility.
  - Away from the coast in an arid climate
  - On the North American tectonic plate, as far east of the San Andreas fault as possible, and away from known fault lines.
  - Near a rail line, with perhaps only the last leg needing construction.
  - Defensible location with buffer zones.
  - Not under air-traffic corridors and no-fly zone preferred.
  - Use an already-ruined closed military base or portion of a base that can be transferred to state ownership.
  - Upwind from sparsely populated or vacant lands.
  - Kept under governmental control with minimal private party influence and access.
  - Funding should be available from the Department of Energy and perhaps the Nuclear Waste Fund.
  - This should not be viewed as an opportunity for profiteering by private firms.



Without this prudent and systematic review of plans for caring for our nuclear waste, we are leaving a much larger problem to future generations. Storing more nuclear waste in densely populated salty coastal areas subject to tsunami and earthquake risks is simply unacceptable. We look forward to working with you on this issue.

Sincerely,

A handwritten signature in black ink, appearing to read 'Ray Lutz', with a horizontal line extending from the end of the signature.

Raymond Lutz  
National Coordinator, Citizens' Oversight Projects

Reviewed and endorsed by:

- San Clemente Green, Gary Headrick
- Roger Johnson, PhD, Professor Emeritus, San Clemente, CA
- Marni Magda, Laguna Beach Resident
- Dr. Jeffery Gordon M.D.
- CANDOO - Coalition Against Nuclear Dumps on Our Oceans
- (other groups are still reviewing our proposals)

# PROPOSED OFFSITE ISFSI LOCATION IN CALIFORNIA

V1.0 August 24, 2015

A proposal by Citizens' Oversight to increase public safety  
CitizensOversight.org

## Introduction

Moving the spent nuclear fuel away from San Onofre is essential to minimize our overall risk. But where to put it? Keeping it in California can minimize hoops to jump through, and can allow us to limit the spent fuel sent there to fuel from closed nuclear plants in California, and then not become a dumping area for all nuclear fuel in the multistate area. No matter where it is, many issues will have to be dealt with and those things will take at least two to ten years. But now is the time to start the process. This site is only put forward as an attempt to get the conversation started rather than a conclusion that this is the only and best site. Providing an off-site ISFSI location to avoid risks at closed plants must not become a green light to installing new nuclear plants.

Our proposal: near Fishel, CA 92277 (San Bernardino County)

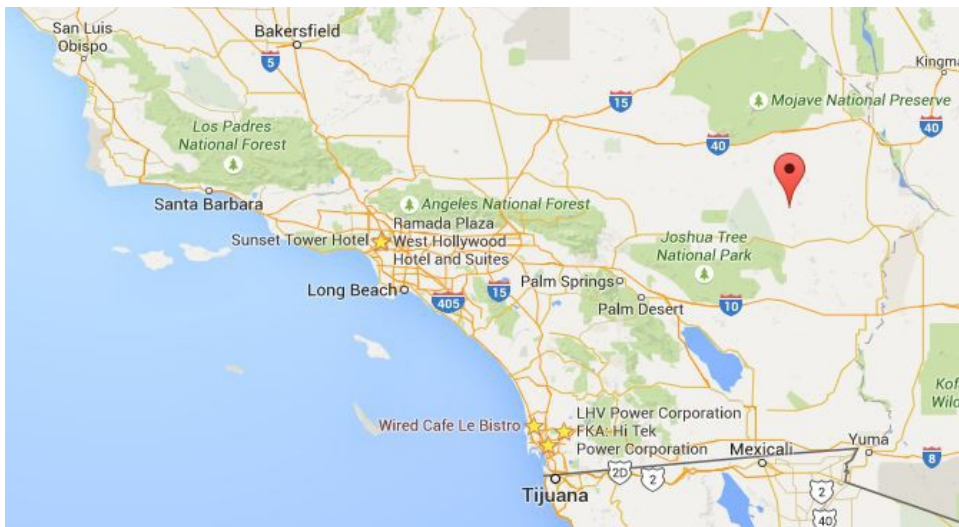
Link to the map: <https://goo.gl/maps/Z5Uzb>

### Key features:

- Population: 0
- Nearest improved property: >13 miles away (water pumping plant)
- Nearest private improved property: Cadiz ~20 miles away.
- Nearest larger cities: >50 miles away (Lake Havasu, Colorado River)
  - Twentynine Palms is about 47 miles from the site, three mountain ranges away.
  - Twentynine Palms/Yucca Valley and Needles are the minor civil divisions. They border on the ARZC railroad line.
- On the Arizona and California (ARZC) railroad about 21 miles from Cadiz where it connects to the BNSF railroad
- Total distance from Barstow BNSF switchyard is 100 miles to Cadiz, then 21 miles to Fishel.
- Near a road (Cadiz Road).
- On the North American Plate (earthquakes unlikely). Not on the moving Pacific Plate.
- Not close to any fault lines (See map below)
- Away from salty ocean air (chloride induced stress corrosion cracking less likely)
- Away from densely populated areas (>8.4 million near San Onofre)
- No Tsunami Risk (however flash flood risk must be evaluated)
- No mega freeway nearby (as we have at San Onofre). I-10 and I-40 are 40 and 33 miles away as the crow flies. By road, it is about 55 miles from I-10 (Desert Center) by road, and 65 miles from I-40 at Ludow.
- Political representation: California's 8th congressional district. Paul Cook, a Republican from Yucca Valley, has represented the district since January 2013.
- Very hot and dry with very little degradation over time due to the environment.
- Downside: hot air does not allow canisters to cool as well as a coastal environment.

Fishel is a spot on the map that has a name because it is a spot along a railroad line, but nothing is there. If this spot is not perfect, is there not another place in this vicinity that would work?

Here is a big-picture view of the location. It is roughly halfway between I-10 and I-40.



If we look at this location from satellite imagery, we see it is in perhaps one of the most desolate and unused portions of the state. This area is not in a preserve or wilderness area.



As we look closer, we see the “town” of Fishel is just a spot on the map rather than a place where anyone lives.



As we look north up this valley, which is called “Ironwood Wash” we see the darker areas to the east are the Turtle Mountains. It may be better to site the ISFSI in the harder rock of these mountains rather than in the wash but more research would be required to determine this. The foothills of those mountains are about 2 miles away. There are also other places along the railroad line that may be better but for discussion, we will assume somewhere near Fishel is the spot.

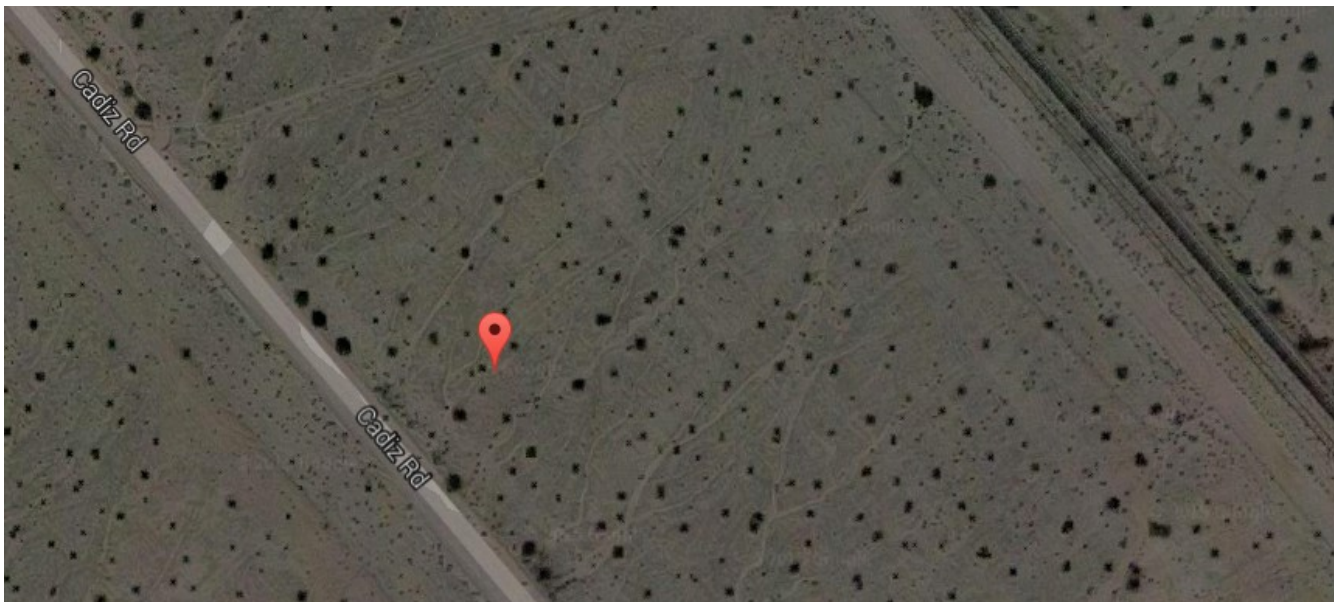




At about the same magnification looking straight down, as can see that the marker is near a road and railroad tracks.



As we zoom in a bit more, we can more clearly see that there is a road here, Cadiz Road, and a set of railroad tracks. This is the Arizona and California line which apparently is still used and in good repair.



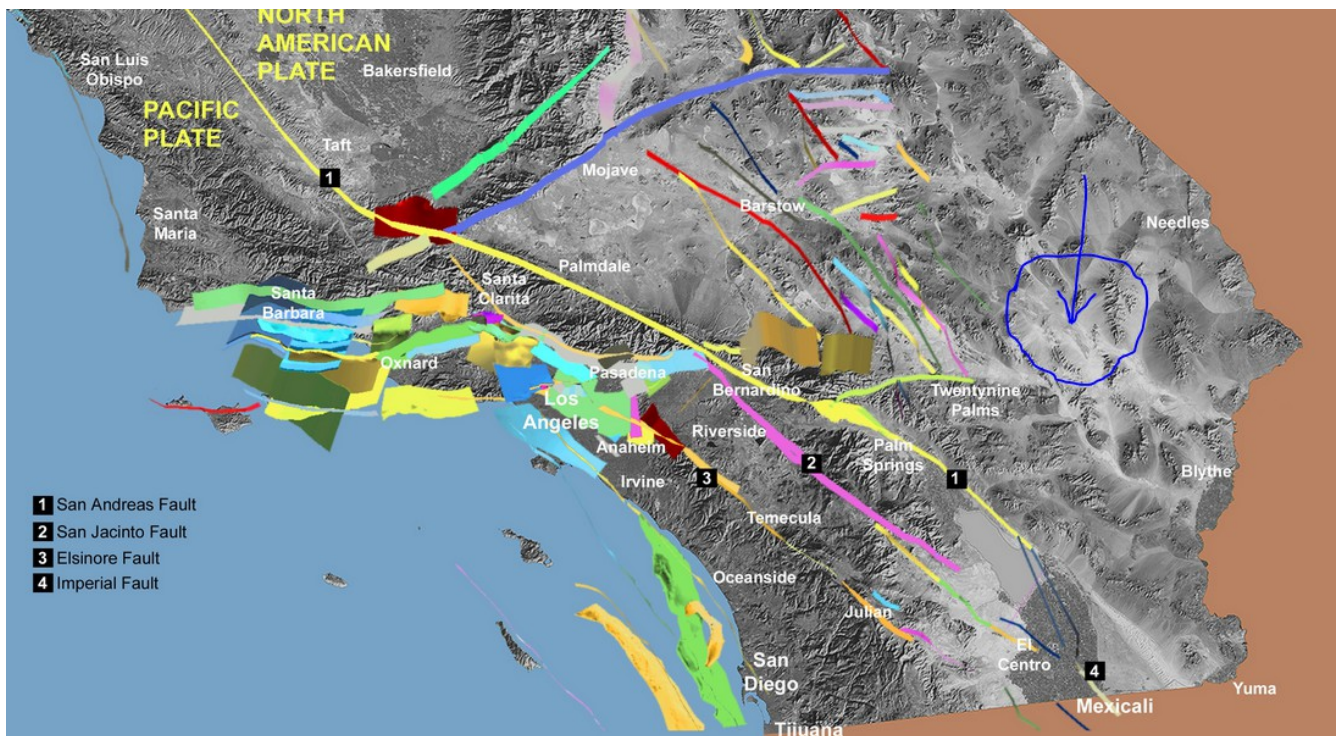
The nearest improved property is the Iron Mtn Pumping Station which pumps water over the mountain toward San Diego from the Lake Havasu area of the Colorado River, over 13 miles away (as the crow flies).

This pumping station is not the sole source of water for San Diego County, but does provide a significant percent. Its source water comes from the Colorado River about 10 miles south of Lake Havasu City. This plant and the surrounding area was chiefly developed during the depression era and built by the CCC.



## Seismic

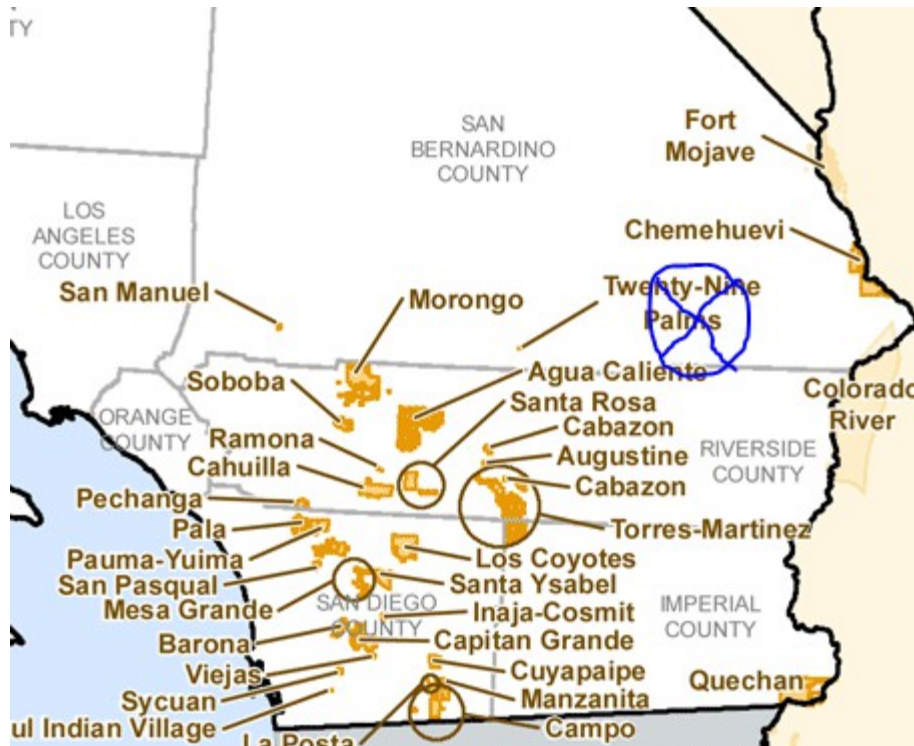
There are no major fault lines in this area. The USGS lists no hazards except for extreme heat.





## Proximity to Tribal Areas

We note also that this is not a tribal reservation area, so there may be few cultural resource issues here, although the entire area is certainly a region once used by Native American tribes. It is also the habitat of the desert tortoise.



## Not a Designated Wilderness

As mentioned, it is not in a designated wilderness area, and is mostly land owned by the government.





## Excellent Railroad Access

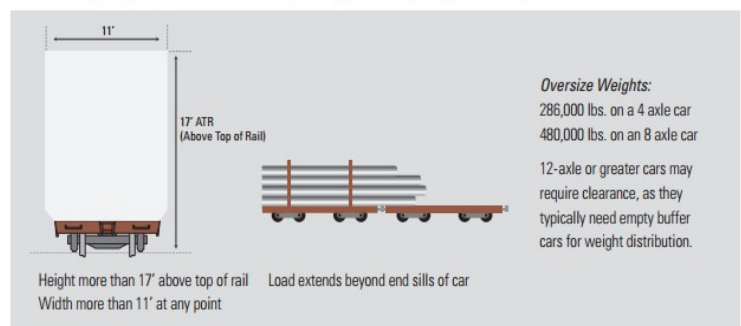
The site is about 120 miles from Barstow railroad switch yard, operated by BNSF. That includes about 100 miles on improved and active BNSF track to Cadiz and about 21 miles on the Arizona and California ARZC railway to Fishel. (Still investigating if this 21 mile spur would need to be improved.) The exact location of the Off-Site ISFSI would be probably +/- 10 miles from this location.



There is definitely some risk during transportation of the spent fuel from San Onofre to the proposed site. The Nuclear Regulatory Commission is responsible for ensuring safety through requirements for the canisters and transportation overpacks, which have to be able to maintain canister integrity in a set of design basis accidents.

The canisters weigh more than the capacity of a conventional 4-axle car which is limited to 286,000 lbs. However, by using an 8 axle car, up to 480,000 lbs can be accommodated, which should be sufficient to handle the Holtec canisters and the associated transportation overpack. The size of the load will likely be considered “oversize.” More options will be explained later.

Determine if your shipment is an oversized load according to BNSF by using the following criteria:



The BNSF line nationwide has 31,000 bridges and 68 tunnels. There are no major bridges and no tunnels at all along the route from San Onofre to Fishel. Smaller bridges and overhead and side clearances will have to be carefully analyzed by the railroad prior to shipment.

My review of the entire route using satellite photos resulted in the impression that the most likely area for needed additional repair and maintenance would be the many small bridges over water culverts.

There are about 30 such culvert bridges in the 21 mile stretch from Cadiz to Fishel alone. Thus, an estimate for upgrades to these lines would probably be up to the 100s of millions and not billions. This is a question that can be put to the railroad lines when they provide their bid on the project.

The BNSF railway now operates the rail line that would be used to transport the spent fuel most of the way to the site. The line to Fishel is shown in a lighter color denoting an “other railroad,” which is the mentioned ARZC line. The target region is circled.

[http://www.bnsf.com/customers/pdf/maps/div\\_ca.pdf](http://www.bnsf.com/customers/pdf/maps/div_ca.pdf)



The spur from the BNSF railroad to Fishel is operated by the Arizona and California Railroad, owned by Genesee & Wyoming, Inc. There are no bridges or tunnels along this 21 mile length of the railroad, except for small culverts for rare rain events.

[http://www.gwrr.com/operations/railroads/north\\_america/arizona\\_california\\_railroad](http://www.gwrr.com/operations/railroads/north_america/arizona_california_railroad)

Overview from their website:

The Arizona & California Railroad (ARZC) is a short line railroad that interchanges with BNSF. The ARZC began operations between 1903 and 1907 by the Arizona & California Railway. By 1910, the line had stretched its reach to Cadiz, California.

The ARZC operates 190 miles of main line track. At Cadiz, the ARZC begins with an interchange with the BNSF and continues southeast across the Mojave Desert to Rice, California, then east to cross the Colorado River Arizona/California state line at Parker, Arizona. The railroad continues east to Matthie. The ARZC also has trackage rights into Phoenix on the BNSF Phoenix Branch.

The major commodities moved on the ARZC are include petroleum gasses, steel and lumber, culminating in more than 12,000 cars per year. There are multiple petroleum facilities along the line, and the ARZC provides an important transportation service for customers in moving this product.

The entire length of the ARZC line is shown on the map below.

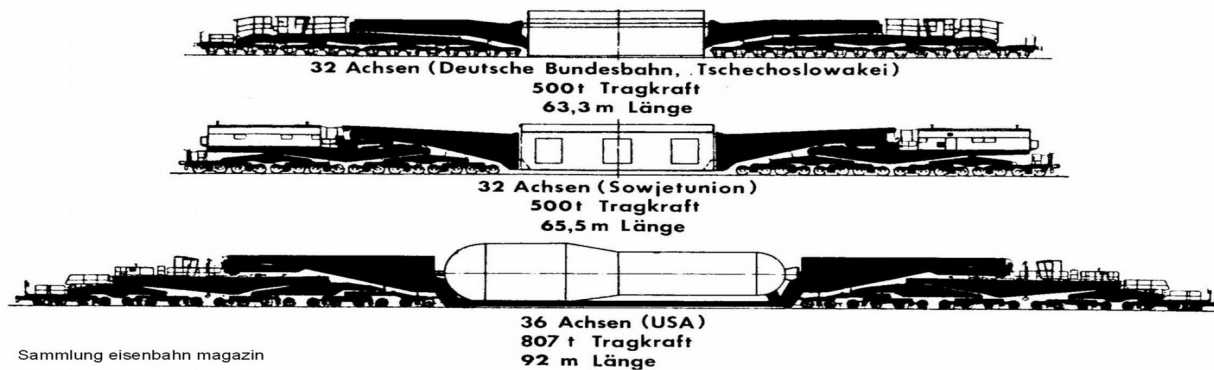


The BNSF lines are rated at 286,000 lbs, which is the net weight of the load (143 tons). The ARZC line may or may not be rated for that maximum net capacity (they are checking on this question).

The capacity of a heavy-axle railroad car is conventionally 158 tons (gross, including the car, which weighs about 15 tons.) Unfortunately, the design of the canisters + transportation overpacks exceed this weight by about 65 tons. To carry these heavy loads, either an eight-wheel car or a specially designed rail car, called a Schnabel car can be used to distribute the weight among many more wheels and over an area comprising two cars.

In the diagram below, the top two designs use a total of 64 wheels over the two halves and can carry 500 tons. The bottom example uses 72 wheels and can carry 807 tons. By adding more wheels and distributing the load to two cars increases the capacity by more than five times. This type of car may be needed to transport spent fuel in dry canisters and transportation overpacks. The only question then is the condition of the tracks. Spent fuel is transported on a dedicated train at a maximum speed of 15 miles per hour, and there are 151 cannisters.





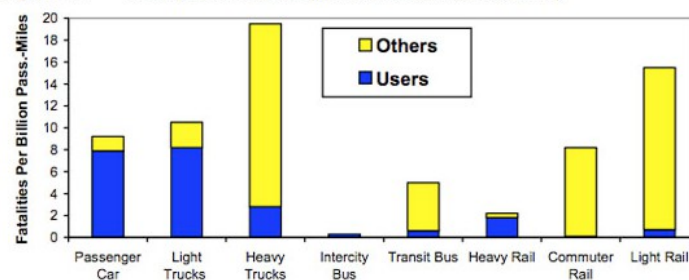
## Rail is the safest way to transport Hazardous Materials

Moving and handling spent fuel is where the highest risks of an unintentional accident may occur. Spent fuel canisters must be, by design, also able to be transported, although very few have been moved in the United States. Statistically, rail provides the safest form of transportation.<sup>1</sup>

Railroads and trucks carry roughly equal hazmat ton-mileage, but trucks have 16 times more hazmat releases than railroads. Statistically, railroads are the safer form of transportation for hazardous materials. ["Hazmat Transportation by Rail: An Unfair Liability", Association of American Railroads, Policy & Economics Dept., January, 2009, pgs. 1-2. In Spraggins, H. Barry, The case for rail transportation of hazardous materials, Journal of Management and Marketing Research]

To be fair, we have to assume that no matter how these are transported, they will be given special attention, including high security, low speeds, and carefully selected routes. However, considering only general operating statistics, heavy rail has much lower accident rates than roads.

**Figure 13** Transport Fatalities (FHWA and APTA Data 2002)



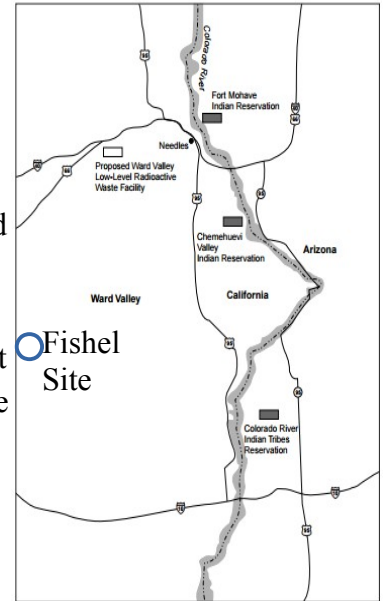
*Transit travel tends to have lower crash rates than automobile travel, even taking into account risks to other road users.*

<sup>1</sup> <http://steelinterstate.org/topics/rail-vs-truck-and-auto-safety-record>

## Comparison to Ward Valley

The Fishel area is about 40 miles south of the Ward Valley Low-Level Radioactive Waste Facility site selected attempted to be developed in the mid-1990s.

The Ward Valley project was scuttled because waste was to be directly buried in shallow, unlined trenches and there was a valid concern that the waste could contaminate an aquifer that communicates directly with the Colorado River, 18 miles away, which provides drinking water to some 24 million Southern Californians. Scientists and tribal leaders also cited the devastating impact that the dump—with the potential for radioactive leakage and unavoidable increase in human traffic—would have on the fragile desert, and especially on the desert tortoise<sup>2</sup>. This project was executed without much of any public involvement and released for the first time in the Federal Register announcement that the 1,000 acres of land would be used for this purpose. Lack of early public involvement was a serious mistake.



We can refer to the book “Ward Valley: An Examination of Seven Issues in Earth Sciences and Ecology”<sup>3</sup> which summarizes the seven issues which were important in stopping the project.

While DOI was considering the land transfer, three geologists from the U.S. Geological Survey (USGS) expressed seven concerns about the site and its evaluation in a memorandum to the Secretary of the Interior, Bruce Babbitt. Although Howard Wilshire, Keith Howard, and David Miller (referred to as the Wilshire group in this report) acted as individuals rather than in official USGS capacities, the DOI asked the National Research Council (NRC) to convene a committee to evaluate their seven technical concerns prior to the DOI decision on the land transfer.

The seven issues, as originally stated in the Wilshire group's memorandum, are:

1. Potential infiltration of the repository trenches by shallow subsurface water flow.
2. Transfer of contaminants through the unsaturated zone and potential for contamination of ground water.
3. Potential for hydrologic connection between the site and the Colorado River.
4. No plans are revealed for monitoring ground water or the unsaturated zone downgradient from the site.
5. Engineered flood control devices like those proposed have failed in past decades at numerous locations across the Mojave Desert.
6. Alluvium and colluvium derived from Cretaceous granite appears to make a very high quality tortoise habitat. Sacrifice of such habitat cannot be physically compensated.
7. Misconceptions about revegetation enhancement may interfere with successful reestablishment of the native community

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2 <http://www.sacredland.org/index.html@p=1985.html#sthash.Ia4VNpAh.dpuf>

3 <http://www.nap.edu/catalog/4939/ward-valley-an-examination-of-seven-issues-in-earth-sciences> -- published by the Committee to Review Specific Scientific and Technical Safety Issues Related to the Ward Valley, California, Low-Level Radioactive Waste Site, Board on Radioactive Waste Management, Commission on Geosciences, Environment, and Resources, National Research Council

It is useful to compare and contrast the Ward Valley project with an off-site ISFSI at Fishel, considering the Holtec underground design:

	<b>Ward Valley Low-Level Radioactive Waste Site</b>	<b>Fishel Off-site Independent Spent Fuel Storage Installation (Fishel ISFSI)</b>
<b>Size:</b>	1000 acres with 70 acres developed.	Maybe 50 acre buffer with maybe 3 acres impacted (Need more detailed design to know)
<b>Location:</b>	Only 18 miles from Colorado River.	50 miles from the Colorado River
<b>Hydrology:</b>	First 5 issues of 7 raised concerns about how ground water would percolate through unlined trenches of radioactive waste and then flow to the Colorado river. By design, contamination would occur.	The ISFSI is designed to be isolated from ground water. Without an unintended release due to an unlikely accident, there would be no contamination of the ground water. By design, no contamination would occur.
<b>Habitat:</b>	The last two of seven issues are of this type. A very large area of sensitive desert is impacted, is difficult to restore, and would impact the desert tortoise habitat.	Very small area is impacted. Site restoration and desert tortoise concerns are minimal.
<b>Cultural:</b>	Large area disturbed many cultural assets	Small area can be chosen to minimize cultural impacts.
<b>Primary Risk:</b>	The primary risk factor in this project was that the ground water would likely permeate through the radioactive waste and then pollute the Colorado river with radioactivity.	The primary risk factor in this project is that one or more of the canisters might develop a crack and release radioactivity. Worse, a canister could be dropped during handling and break open, and then the contents would need to be sequestered into a spent fuel pool to isolate it and allow it to be repackaged.

## Terrorist Risk

All spent fuel sites and ISFSIs will be subject to the risk of intentional releases by hostile actions. However, it seems clear that by moving the fuel to this site, the risk is much lower once we get it there. The San Onofre site is near millions of people while the Fishel site has almost no one within 50 miles. This makes it very unattractive as a terrorist target. Furthermore, the San Onofre site is particularly vulnerable, given that a major freeway is within the exclusion zone and the ocean is nearby, allowing an attack from the ocean without being detected until it is too late. Meanwhile, the Fishel site could be protected with a no-fly zone and fenced off so any attack would be much more difficult to conceal.

We must recognize that during the time the fuel is being transported to the site, the risk would be higher than when it is at San Onofre or the Fishel ISFSI site. Attacks could be launched targeting over 100 reactor sites throughout the U.S. and it is very uncommon, thank goodness. Long term, however, the risk is much lower at this site because it is a very unattractive target given that it is so remote.

We understand that the ISFSI at San Onofre will not be completely underground due to ground water levels. The ISFSI at Fishel could be better designed to thwart terrorist attacks through the use of berms and fenced buffer zones.

## Comparison with Status Quo at San Onofre

The current plan is to create a nuclear waste disposal ISFSI at San Onofre for indefinite waste storage. The utility likes to say that they expect the Department of Energy (DOE) to pick up the fuel in 2024 (first transfer in 2030), but honestly, no one really expects this to happen. The earliest we should expect a permanent disposal site is in 2048<sup>4</sup>. We should be somewhat pessimistic that this will happen given that decisions at a federal level are few and far between. The following table compares these options.

	Status Quo at San Onofre	Fishel ISFSI Option
<b>Seismic Risk</b>	Very high. On the moving Pacific Plate	Low. No faults near by. On the North American plate.
<b>Tsunami Risk</b>	Possible.	Zero
<b>Flash Floods</b>	Not a factor.	Needs review. Even if the site is inundated, it may not even need to be pumped out as the heat may evaporate it fairly quickly.
<b>Terrorism</b>	High risk. Near a freeway, near the ocean. Near many people. Hard to secure.	Much lower risk. Easy to secure. No payoff for terrorist attacks. Many other better targets makes this one unlikely.
<b>Population</b>	>8.4 million within 50 miles	almost no one within 50 miles.
<b>Chloride-induced stress corrosion cracking</b>	Very likely. Probably will degrade within decades due to proximity to salty ocean air. Would require replacement of canisters and the use of expensive thicker canisters.	Unlikely as humidity is very low. No salty ocean air for hundreds of miles. No need for very thick canisters, existing canisters would be sufficient for 100+ year period.
<b>Cost</b>	Relatively high because of expected degradation of the canisters due to the environment, resulting in frequent replacement.	Relatively low if we can avoid building the ISFSI at San Onofre to begin with, but transportation costs must be included.
<b>Heat Dissipation</b>	Better due to low ambient temperature	Not as good but surface temp of canisters (400 F) still is higher than ambient even on the hottest days.
<b>Environmental Impact</b>	ISFSI is built at an already contaminated site, so now other site is impacted	Would impact a small other site, of about 10 acres.
<b>Transportation &amp; Handling Risk</b>	Very low transportation and handling risk as canisters are moved only a short distance. However, the handling of the canisters outside the transportation overpacks is about the same.	Higher risk as each canister must be moved a few hundred miles. However, this transportation is entirely by heavy rail using transportation overpacks and thus risk is minimized compared with truck transport.
<b>Slippery Slope - new/extended life to nuclear plants in CA</b>	No direct slippery slope risk. However, not dealing with the waste properly will let everyone forget how difficult it is to deal with the waste properly.	Some risk exists that pro-nuclear advocates will use this installation as a means to excuse additional nuclear plants or extended life to existing plants. However, there are now many reasons to close Diablo Canyon and nuclear plants are generally economically nonviable, and this site could be limited to only closed nuclear plants in California.
<b>Slippery Slope: Fishel becomes a multistate solution</b>	no risk in this option.	If developed, there is always the risk that the off-site ISFSI would grow to accommodate waste from many states. The only defense to this is law limiting it to stranded California waste.
<b>Overall</b>	The primary issues of balance are near-term increased risk during the transportation phase compared with the much lower long-term risk during years of future storage. If the slippery slope issues can be avoided through law, then it seems that the offsite ISFSI deserves serious consideration.	

4 As expressed by the Blue Ribbon Commission on nuclear waste.



## Conclusion

Thus, this is one possible area for an off-site ISFSI which would likely provide much better safety for California as a temporary storage site for spent nuclear fuel until a permanent geologic disposal site could be located.

Our proposal is to start a serious project at the state level to look more carefully into this and any other siting option for an off-site ISFSI and halt work on building a permanent (100 yr) structure at San Onofre until the review is done and all options are considered.

We have some serious concerns about the slippery slope issues that have to be limited by law and agreements. Unless these issues can be addressed, such a site will not be embraced by those concerned with new nuclear plants or extending the life of existing plants in California. Also, there is a desire to limit the expansion of this site to accommodate only stranded California spent fuel and not become a general-purpose nuclear waste dumping ground.

--Ray Lutz  
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619-820-5321

**From:** [Laura Lynch](#)  
**To:** [Street\\_Joseph@Coastal](mailto:Street_Joseph@Coastal)  
**Subject:** San Onofre Independent Spent Fuel Storage Installation (ISFSI) Application 9-15-0228 for Tues 10/6 Long Beach Coastal Commission Mtg  
**Date:** Friday, October 02, 2015 8:50:39 AM

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To the California Coastal Commissioners and staff:

I recommend the Coastal Commission deny the application for this experimental unproven Holtec spent fuel dry storage system (Application 9-15-0228). This is a very important issue to rush through the approval process with so little time for the public to review the staff's recommendations and related material. However, even with the short review time, I have a number of reasons the proposed system by Southern California Edison (SCE) must be rejected.

The proposed Holtec UMAX underground dry storage system is an experimental unproven system. It cannot be inspected, repaired, maintained, or monitored and does not meet current Coastal Act requirements. The staff's "Approval with conditions" contains conditions that are unlikely to be met. The serious staff concerns that required these conditions demonstrates the inadequacy of this SCE proposed system. It is likely this system will be at our coast for decades, if not longer, as staff has indicated. There is adequate evidence to show that this experimental Holtec system will likely not meet Coastal Commission short term or long term storage and transport requirements. To assume the system can or will be relocated, as the staff suggests, is not a reasonable assumption, based on known evidence. These high capacity (37 fuel assembly) canisters with high burnup fuel may need to cool in dry storage for over 45 years before they are cool enough to transport. (See slide 10 of this Department of Energy presentation. <http://www.nwtrb.gov/meetings/2013/april/boyle.pdf> ). The NRC has not approved this system in the configuration proposed by SCE and Holtec.

Additional comments and references below.

- **The report states SCE expects the service life of the ISFSI and casks to be at least 100 years and no major repairs are anticipated within 60 or 100 years. This is an unsubstantiated claim.** (Staff Report page 37). Please have SCE provide technical references for those statements. Are these Holtec technical documents submitted to the NRC? The NRC is only certifying the system for 20 years and is not considering degradation or other aging management issues that might occur after 20 years. The NRC doesn't consider claims by Holtec about those 60 and 100 years as anything the NRC has validated or approved (according to their Sept 2015 UMAX amendment 1 certification approval document). The staff report references email document "SCE 2015b." Please forward a copy of this document.

<http://www.gpo.gov/fdsys/pkg/FR-2015-09-08/pdf/2015-22053.pdf>

- **The statement "NRC has estimated that at least 30 years would be required for the initiation of stress corrosion cracking in steel fuel storage casks" is no longer valid.** (Staff Report Page 37). That statement is in the NRC 8/5/2015 meeting minutes on Stress Corrosion Cracking and Aging Management. The reason NRC said 30 years was because they assumed the canisters would not be cool enough for moisture to deliquesce (dissolve)

salt on the canister for at least 30 years. However, at that time they were not aware of the **two-year old** Diablo Canyon canister that had temperatures low enough for salts to deliquesce. I participated in that and other NRC meetings on stress corrosion cracking in marine environments.

<http://pbadupws.nrc.gov/docs/ML1425/ML14258A081.pdf>  
<https://sanonofresafety.files.wordpress.com/2011/11/diablocanyonscc-2014-10-23.pdf>

- **The Koeberg nuclear plant had a component that leaked from stress corrosion cracks in 17 years.** It is located in a similar environment as San Onofre (on-shore winds, moist ocean air, frequent fog). The NRC considers the Koeberg component (a waste water tank) comparable to a stainless steel canister (304L or 316L stainless steel). The Koeberg through-wall crack was 0.61" thick. About the same thickness as the proposed Holtec canisters (0.625" thick). San Onofre has also had stress corrosion cracking in stainless steel pipes that the NRC considers comparable to the thin steel canisters, so it's clear the environmental conditions are present at San Onofre. We do not need to wait 20 years to find this out, so the Coastal Commission should address this in the current application. References:

<http://pbadupws.nrc.gov/docs/ML1231/ML12319A440.pdf>  
<http://pbadupws.nrc.gov/docs/ML1425/ML14258A082.pdf>

- **Existing Areva NUHOMS canisters have been loaded since 2003, so the idea that Edison needs to have an aging management plan in 20 years is not the case.** They need an aging management plan for their existing NUHOMS canisters and system. Does the existing NUHOMS canister ISFSI require a separate Coastal Commission renewal permit? Both the existing NUHOMS and proposed Holtec thin canisters are of the same materials (welded 316L stainless steel). We have only 5 years before we meet the Koeberg timeline. This idea we can wait 20 years is not realistic on many levels. To buy products originally designed for 20 years that do not have aging management built into the design is unacceptable. Edison should be required to provide their aging management plan now, so it can be fully evaluated by the Coastal Commission. What we already know is not adequate. This is too important an issue to base approvals on Edison promises of future solutions.
- **The UMAX system is an experimental unproven system.** Over 99 percent of dry storage system in the U.S. and the world are above ground systems. To claim this is typical or a proven U.S. systems is an inaccurate claim. On Staff Report page 11, the footnote states "A small HI-STORM UMAX system...is installed at Humboldt Bay Power Plant". This is not a UMAX system and has a very different design. The Humboldt Holtec HI-STAR HB system uses 1/2" thick canisters, but inserted them in thick steel bolted lid cask before placing them in the underground holes. Also, the fuel cooled for 35 years in the pools and was low burnup fuel, so no air vents were needed to cool the thin canister and fuel. In spite of this, water leaked into this system, which Holtec said would not happen. Their solution was to put caulking around the enclosure.

<https://sanonofresafety.files.wordpress.com/2011/11/ml13151a317.pdf>  
<http://pbadupws.nrc.gov/docs/ML0531/ML053140041.pdf>

- **The Holtec UMAX system has not been approved by the NRC for the configuration planned for San Onofre and it has not been approved for the site.** The NRC will need a license amendment for the changes in order to properly evaluate for seismic, thermal and other technical requirements. The system is approved for 1/2" thick canisters, not 5/8" as proposed. The system is approved for a totally underground system, not the half underground system proposed. The NRC comments in their September 2015 UMAX approval make this clear. I explained this and other items in the letter I sent to staff on September 17, 2015. It appears some of the public comments I have made have not been addressed. Or has Edison or Holtec or the NRC provided you different information?

<https://sanonofresafety.files.wordpress.com/2013/06/ltrtocoastalcommissiondgilmore2015-09-17umax-amend1.pdf>  
<http://www.gpo.gov/fdsys/pkg/FR-2015-09-08/pdf/2015-22053.pdf>

- **Aging management of the Holtec system is inadequate.** Even the Holtec President, Dr. Singh, says the canisters cannot be repaired. They cannot even find cracks, let alone repair them.

<https://www.youtube.com/watch?v=euaFZt0YPi4&feature=youtu.be>

- **Relying on vendor promises of future solutions to be able to inspect and maintain the system should not be relied upon in Coastal Commission decision making.** The Coastal Commission should not make decisions based on "vaporware". State agencies are not allowed to procure "vaporware" (capabilities that do not exist), so why would the Coastal Commission make such an important decision assuming these most critical issue will be resolved by vendors?
- **The Coastal Commission should demand Edison use a proven system that can be inspected, maintained, have continuous monitoring, is transportable and doesn't crack.** This is the only way to meet Coastal Commission requirements. The NRC is only concerned with 20 years. The Coastal Commission is concerned with longer term requirements. Technology exists to meet both NRC and Coastal Commission requirements.
- **Rejecting the option of the thick casks, such as the German thick Castor casks (manufactured by Siempelemp, designed by GNS), with the response "these thick-walled casks are not generally licensed for use at U.S. sites by the NRC" is not sufficient to reject thick casks.** (Staff Report page 20). There is also the option of thick metal casks such as the Areva TN-24 and TN-32 casks currently used in the U.S. Southern California Edison knows both the German and Areva thick metal casks have been licensed by the NRC, so there is every reason to believe they would receive a license for San Onofre. Given that these options are proven technologies used in the U.S. and are the main storage technologies used for the majority of the rest of the world for both storage and transportation, thick casks should not be a rejected alternative. This would better meet Coastal Commission requirements for longevity and transport and also meet NRC requirements. Thick casks are approximately 10 to 20 inches thick compared to the proposed thin canisters that are only 5/8th of an inch thick.

<https://sanonofresafety.files.wordpress.com/2011/11/reasonstobuythickcasks>

[sks2015-04-16.pdf](#)

<https://sanonofresafety.files.wordpress.com/2013/06/germanycaskstoragegorlebengns.jpg>

- **There is already evidence for the staff to have sufficient probability that requirements to have canisters transportable and maintainable may not be met with the Holtec UMAX system.** Pushing the can down the road another 20 years isn't going to change that. The only reason no thin canisters have leaked yet is because they have not been in use long enough for cracks to go through the wall of the canister. We are at higher risk of cracks due to our corrosive coastal environment. We are the last location that should be using this inferior technology with materials known to crack from corrosive moist salt air. The NRC does not allow transport of cracking canisters. The underground portion of this system is subject to corrosive ground chemicals and yet cannot be inspected due to lack of technology to inspect this design.

<http://pbadupws.nrc.gov/docs/ML1432/ML14323A067.pdf>

- **Regarding Edison's promise of potentially moving the system to higher ground as the coastal environment degrades that would require a major expense and would likely cost over double the existing San Onofre Decommission Plan cost estimates.** The cost estimates they submitted to the NRC and CPUC assumes fuel will be picked up at the earliest DOE time frame, even though their documents state these dates are unlikely to be met. They also assume nothing will go wrong with the canisters. They have budgeted about \$1.3 billion for spent fuel management and plan to spend it all. They also plan to spend the entire \$4+ billion Decommission Trust Fund, so no monies will be available. What is the basis for accepting Edison's promise? Will ratepayers be required to pay for this? Is their promise and this plan reasonable?
- **Choosing thick casks meet Coastal Commission requirements for both relocation on-site and transport.** Thick casks are transportable. No additional transportation casks are needed. No protective concrete structures would need to be destroyed and rebuilt. No transfer casks are needed. Systems are installed above ground. Thick cask have seals that can be monitored and replaced. Once a thin canister cracks, it is no longer usable and cannot be repaired.

As the staff report clearly indicates there are many uncertainties regarding when or if the Department of Energy will pick up the fuel and many uncertainties about environmental conditions in our future. Therefore, we need to plan now for the best option, not wait for 20 years and hope something magical will change and assume the Holtec system can be relocated or transported. Please protect our coastal resources and do not allow this experimental Holtec UMAX system in our coastal communities. It does not meet current Coastal Act requirements. It is folly to approve a system based on vendor and utility promises of future solutions when we have the facts we need to make better decisions now. Yes, we need an NRC approved system, but one that also meets Coastal Act requirements. Those two items are not mutually exclusive and are obtainable. Edison's unreasonably short artificial timeline should not be a driving factor for this decision that has long term implications for our Coastal resources.

Thank you,  
**Laura Lynch**  
[artistlauralynch@yahoo.com](mailto:artistlauralynch@yahoo.com)  
<https://www.facebook.com/artistlauralynch>  
<https://twitter.com/ecoArtistLynch>  
<http://weadartists.org/the-art-of-protest>  
<http://www.artistlauralynch.com>

#### Additional information and references

- Reasons to Buy Thick Casks and Nuclear Storage Myths
  - <https://sanonofresafety.files.wordpress.com/2011/11/reasonstobuythickcasks2015-04-16.pdf>
- [SanOnofreSafety.org](http://SanOnofreSafety.org)
  - <http://sanonofresafety.org/>
- Nuclear Waste Storage and Transport
  - <http://sanonofresafety.org/nuclear-waste/>
- Coastal Commission Staff Report
  - <http://documents.coastal.ca.gov/reports/2015/10/Tu14a-10-2015.pdf>
- Coastal Commission October 6 Agenda and Location
  - <http://www.coastal.ca.gov/mtgcurr.html>

**From:** [Steven Carlson](#) on behalf of [David G. Victor](#)  
**To:** [Street, Joseph@Coastal](mailto:Street, Joseph@Coastal)  
**Cc:** [David G. Victor](#); [Tim Brown](#); [Dan Stetson](#)  
**Subject:** Reference: CDP Application #9-15-0228  
**Date:** Friday, October 02, 2015 9:37:26 AM  
**Attachments:** [CEP leadership to Coastal Commission, 30 Sept 2015.pdf](#)

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Dr. Street,

Attached is a letter regarding CDP Application #9-15-0228. As the leadership of the Community Engagement Panel, we write to offer support for the prompt movement of the spent nuclear fuel at San Onofre.

All the best,

David Victor  
Chairman, Community Engagement Panel  
Professor, UC San Diego





DAVID G. VICTOR  
PROFESSOR and DIRECTOR  
LABORATORY ON INTERNATIONAL LAW AND REGULATION  
SCHOOL OF GLOBAL POLICY AND STRATEGY  
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30 September 2015

Dr. Joseph Street  
California Coastal Commission  
45 Fremont, Suite 2000  
San Francisco, CA 94105-2219

RE: CDP Application #9-15-0228

VIA EMAIL: Joseph.Street@coastal.ca.gov

Dear Commissioners,

We write to offer our strongest support for the prompt movement of the spent nuclear fuel at San Onofre from the storage pools into casks designed for long-term storage. Making that option viable requires approval of the expansion of the Independent Spent Fuel Storage Installation - the topic of the application before you.

We lead the Community Engagement Panel (CEP)—a group of 18 volunteers established in early 2014 to open a conduit between Edison (the operator of the San Onofre site) and the local communities that will be affected by the process of decommissioning. The CEP does not make decisions and thus the comments in this letter reflect our impressions of the CEP's work rather than formal views or decisions of the body.

The CEP has devoted a substantial part of our agenda over the last 18 months to the question of whether stainless steel casks are a safe and effective means of long-term storage of spent nuclear fuel. Last year one of us (David) chaired a group of CEP members that led to a [white paper](#) which evaluates the extant literature on this question and also recommended a program that Edison should follow as it implements long-term storage in casks at the site.

All of the recommendations that we made have been accepted by Edison, and one role of the CEP will be to provide ongoing discussion and oversight as this program is implemented. For example, our white paper calls for Edison and the vendor of the casks (Holtec) to articulate in plain English the long-term defense in depth program for ensuring integrity and security of the

site even as the casks age. Our white paper also requests that Edison take the lead in building a research program—in collaboration with others in the industry—that would monitor and assess the aging process.

We see that the staff report recommends offering only a 20-year approval of the site contingent upon the appearance of other risks as the site ages. We can't speak to the merits of that approach, but we note that a critical element over any long term plan for the site involves not just coastal hazards but also a good program for managing the aging process of the casks themselves. The current trends in the industry and the technology are in line with what will be needed.

Quite apart from the proposal on which you are ruling, we draw your attention to the fact that all of us would benefit from the rapid removal of the fuel from the site altogether. The option of sending the spent fuel to Yucca mountain in Nevada seems infeasible—perhaps forever. That reality makes the option of a consolidated interim storage (CIS) at private facilities—such as the sites now emerging in New Mexico and Texas—particularly important. The CEP is now quite focused on how to make CIS a reality for the fuel at San Onofre and other reactors in California.

It could be quite helpful if the Coastal Commission were to signal its general interest in making CIS a reality. This would be a huge advantage in moving spent fuel from all the sites that are located on our coastline.

Yours Sincerely,

(signed)  
David Victor  
Chairman,  
Community Engagement Panel  
Professor, UC San Diego

(Signed)  
Tim Brown  
Vice Chairman,  
Community Engagement Panel  
Councilman, City of San Clemente

(Signed)  
Daniel Stetson  
Secretary,  
Community Engagement Panel  
President Emeritus, The Ocean  
Institute

**From:** [Linda Anabtawi](#)  
**To:** [Street, Joseph@Coastal](#)  
**Cc:** [Cheddar, Ann@Coastal](#); [Kim Anthony](#); [Dettmer, Alison@Coastal](#)  
**Subject:** Comments on ISFSI CDP Staff Report  
**Date:** Friday, October 02, 2015 10:30:14 AM  
**Attachments:** [Comments on ISFSI CDP Staff Report.pdf](#)

---

Dear Dr. Street,

On behalf of its co-participants (San Diego Gas & Electric Company, the City of Anaheim, and the City of Riverside), Southern California Edison Company (SCE) submits the enclosed comments on the Staff Report for the Independent Spent Fuel Storage Installation Expansion Project. We appreciate Coastal Commission Staff's hard work and professionalism in generating a thorough Staff Report recommending approval of the Coastal Development Permit (CDP) for the Project. SCE agrees with the analysis and findings contained in the Staff Report and offers these minor comments as technical corrections and clarifications.

Please note that SCE's co-participants are included in the CDP application for the Project. Therefore, we request that they be identified as co-applicants and be named in the permit that is issued, should the Commission vote in favor of the Project.

Thank you for considering our comments. Please let me know if you have any questions.

Linda J. Anabtawi  
Senior Attorney  
SCE Law Department  
(626) 302-6832  
[linda.anabtawi@sce.com](mailto:linda.anabtawi@sce.com)

## ISFSI CDP Staff Report Comments

No.	Page	Staff Report	SCE Comment
1	Page 6, Section III	Special Condition 1 requires documentation demonstrating the U.S. Department of the Navy has renewed or extended its existing easement for use of the Part 50 licensed area.	SCE has commenced discussions with the Navy regarding an extension of the easement term to allow for the completion of decommissioning. However, according to the Navy, the process for drafting the new real estate document and conducting the associated environmental review under the National Environmental Policy Act will take 3-5 years. No prior approval from the Navy is required for construction of the ISFSI expansion. SCE will submit evidence of renewed land rights prior to expiration of the current easement in 2024. Request that Special Condition 1 be revised accordingly.
2	Page 7, Section III	Special Condition 3, subsection C, refers to "[a]ll development and redevelopment of the property..."	Special Condition 3, subsection C, is unnecessary because it is duplicative of subsections A and B. Request deleting subsection C in its entirety as the restriction on existing future shoreline protective devices for the ISFSI is already adequately addressed.
3	Page 9, Section IV.A	"The plant is collectively owned by...the City of Anaheim..."	The current owners of SONGS are SCE, SDG&E, and the City of Riverside. The City of Anaheim is a previous owner of the plant. Both current and previous owners (collectively referred to as "co-participants") are responsible for the cost of the ISFSI.
4	Page 10, Section IV.A	"...would occupy approximately 32,000 square feet..."	Area provided is based on originally proposed configuration. Revised configuration would occupy approximately 40,000 square feet.
5	Page 11, Section IV.A	"...approximately 111 ft wide by 211 ft long..."	Dimensions provided are for originally proposed configuration but are for the ISFSI pad itself excluding the surrounding berm. The dimensions including the berm are 145 feet wide by 246 feet long. Dimensions for the revised configuration including the berm are approximately 160 feet wide by 260 feet long.

## ISFSI CDP Staff Report Comments

No.	Page	Staff Report	SCE Comment
6	Page 11, Section IV.A	"...Cavity Enclosure container (CEC), comprised of a low carbon stainless steel Container Shell welded to a steel Base Plate."	The MPCs are comprised of a low carbon stainless steel and the CECs are comprised of stainless steel. Suggest revising as follows: "...Cavity Enclosure Container (CEC), comprised of a <del>low carbon</del> stainless steel Container Shell welded to a <u>stainless</u> steel Base Plate."
7	Page 11, Section IV.A, Footnote 1	"A small HI-STORM UMAX system...was previously installed at the Humboldt Bay Power Plant..."	The system installed at Humboldt Bay is the HI-STAR HB, which is a predecessor to the HI-STORM UMAX.
8	Page 12, Section IV.A	"The MPCs would be lowered into the pools, loaded with spent fuel assemblies..."	The MPCs would be placed inside a licensed transfer cask before being lowered into the pools.
9	Page 12, Section IV.A	"Water would be drained from the MPCs, the air inside of them would be replaced with helium, and they would be welded shut."	There is no air inside the MPCs. Suggest revising as follows: "Water would be drained from the MPCs, as water is removed it is replaced with helium, and they would be welded shut."
10	Page 15, Section IV.B	"SCE has requested Navy authorization to renew the grant of easement until 2051..."	To clarify, SCE has not formally requested a specific term for the renewed easement. However, the Navy is aware of SCE's decommissioning plans and schedule, which assume a 2051 completion date.
11	Page 17, Section IV.C	"For example, the SONGS ISFSI has been designed to withstand significantly greater ground shaking intensities (2.12 g) than the existing spent fuel pools (0.67 g)."	The SONGS ISFSI has been designed to withstand a <u>net</u> horizontal PGA of 2.12 g (1.5 g in each of two orthogonal directions). The design basis horizontal PGA for the SONGS site is 0.67 g in each of two horizontal directions. Therefore, a more appropriate comparison of the design basis earthquakes for the SONGS ISFSI versus the existing spent fuel pools is 1.5 g versus 0.67 g. Suggest revising discussion accordingly.

## ISFSI CDP Staff Report Comments

No.	Page	Staff Report	SCE Comment
12	Page 31, Section IV.D	"For several reasons, Commission staff believes that SCE's analysis underestimates the potential for future flooding at the project site."	Staff notes that SCE assumed short-term fluctuations in water level to amount to +1 foot. Staff suggests that a more conservative estimate would be approximately +2 feet. Thus, the "underestimate" in SCE's methodology amounts to 1 foot. As discussed in Comment Nos. 13 and 14, there are no other factors pointing to an underestimate in SCE's analysis. Request revising for clarity as follows: <del>"For several reasons, Commission staff believes that SCE's analysis underestimates the potential for future flooding at the project site</del> <u>by 12 inches.</u> "
13	Page 32, Section IV.D	"Second, SCE examined flooding only under mean tidal conditions of 5.8 feet MLLW."	<p>To clarify, SCE utilized 6.92 feet MLLW for the mean tidal conditions, which is close to the 7 feet recommended in the discussion. SCE's methodology for maximum wave runup for 2035 and 2051 is described below:</p> <p>Surge + Forcing = 1 ft</p> <p>Wave Runup = 22 ft referenced to MLLW tidal datum, which includes a sea level rise correction of 1.07 ft and a MHHW of 6.92 ft.</p> <p>Future Flooding (Year 2035) = 1.23 ft + 1 ft + 22 ft = <u>24.23 ft referenced to MLLW tidal datum.</u></p> <p>Future Flooding (Year 2051) = 2.04 ft + 1 ft + 22 ft = <u>25.04 ft referenced to MLLW tidal datum.</u></p>
14	Page 32, Section IV.D	"...wave runup in 2047, with 1.8 feet of sea level rise, could exceed 26 feet MLLW."	SCE's analysis indicates that wave runup in 2051 could reach 25.04 feet MLLW. Therefore, there is no significant difference between SCE's analysis and the potential for future flooding discussed in the Staff Report.
15	Page 38, Section IV.D	"In the Preliminary Safety Evaluation Report (SER) supporting the September X, 2015..."	Suggest referencing the approval date of September 8, 2015.



## ISFSI CDP Staff Report Comments

No.	Page	Staff Report	SCE Comment
16	Page 39, Section IV.D	Special Condition 4 requires the Permittee to assume the risks. Discussion on Page 39 states that the "landowners" assume the risks.	SCE is not the landowner. Suggest replacing "landowner" with "Permittee" consistent with Special Condition 4.
17	Page 43, Section IV.F	"Construction would not occur during weekends and holidays."	Construction generally would not occur during weekends and holidays with the possible exception of operations such as excavation, pouring concrete or other critical activities that require continuous work.
18	Page 52, References	Reference provided is the Preliminary Safety Evaluation Report for the HI-STORM UMAX system.	Suggest providing final document as a reference as follows: "U.S. Nuclear Regulatory Commission (2015). Safety Evaluation Report (Docket No. 72-1040), HI-STORM UMAX Canister Storage System Amendment No. 1, September 8, 2015."
19	Exhibit 4, Figure 1	"...is filled with a flowable grout material."	The fill material is concrete, not flowable grout.
20	Exhibit 5, Figure 9	Structures to be removed include pumps for the sump.	To clarify, if necessary, the pumps would be relocated, not removed.
21	Exhibit 6, Figure 3	"UMAX ISFSI Design Spectrum (PGA = 2.12 g)"	As noted above in Comment No. 11, the appropriate reference for comparison purposes is to 1.5 g, not 2.12 g. Suggest 2.12 g be corrected to 1.5 g.
22	Exhibit 6, Figure 4	"UMAX ISFSI Design Spectrum (PGA = 2.12 g)"  "SONGS Design Basis Earthquake (PGA = 0.67 g)"	The response spectra curves are mislabeled. Suggest correcting as follows:  UMAX ISFSI Design Spectrum (PGA = 1.0 g)  SONGS Design Basis Earthquake (PGA = 0.45 g)



UNITED STATES MARINE CORPS  
MARINE CORPS INSTALLATIONS WEST-MARINE CORPS BASE  
BOX 555010  
CAMP PENDLETON, CALIFORNIA 92055-5010

Mr. Joseph Street  
California Coastal Commission  
45 Fremont St., Suite 2000  
San Francisco, CA 94105

Dear Mr. Street:

The United States Navy (Navy) and the United States Marine Corps (USMC) take this opportunity to provide comments for the record on Southern California Edison's (SCE) coastal permit application No. 9-15-0228. This application is for the construction of an independent spent fuel storage installation, consisting of an approximately 25,000 square foot concrete pad and 75 fuel storage modules, at the San Onofre Nuclear Generating Station (SONGS) located on Marine Corps Base, Camp Pendleton, San Diego County. It is the Navy's and USMC's position that the California Coastal Commission lacks jurisdiction to require or issue a Coastal Development Permit (CDP) for actions at the SONGS site.

The proposed project would occur entirely within the previously developed SONGS site. In 1963, Congress, through Public Law 88-82, authorized the Secretary of the Navy to issue an easement on this site to SCE and San Diego Gas & Electric "for the construction, operation, maintenance, and use of a nuclear generating station, consisting of one or more generating units, and appurtenances thereto." In 1964, the Secretary of the Navy issued such an easement for a 60-year period. At the termination of the easement, the Secretary of the Navy may require SCE to remove all improvements and restore the site to its pre-easement condition.

The above clearly shows that the SONGS site is on land "the use of which is by law subject solely to the discretion of . . . the Federal Government, its officers or agents." (16 U.S.C § 1453(1)). As such, the SONGS site, under the Federal Coastal Zone Management Act (CZMA), is excluded from the coastal zone. While each State participating in the CZMA's federal-state cooperative program defines the boundaries of its coastal zone, Federal regulations require that the "boundary of a State's coastal zone must exclude lands owned, leased, held in trust or whose use is by law subject solely to the discretion of the Federal Government, its officers or agents." (Emphasis added). (15 C.F.R § 923.33). Thus, Federal law requires Federal land to be excluded from California's coastal zone as defined in the California Coastal Act. Since a CDP is issued for development in the coastal zone, the Commission is without jurisdiction to require or issue a CDP for actions outside the coastal zone, like the SONGS site.

The Navy and USMC position on this matter is fully consistent with the ruling in Manchester Pacific Gateway v. California Coastal Commission (S.D. Cal. 2008) (Manchester) (the jurisdiction in which the SONGS site is located) that found that the Commission did not have the authority to require a CDP for development actions at the Navy Broadway Complex (NBC) in San Diego. Like the NBC site, the SONGS site is on Department of the Navy-owned land, under exclusive federal legislative jurisdiction, where a particular development was specifically authorized by Congress, and a real estate instrument for use of this site was issued by the Navy and USMC. For the SONGS site, the

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instrument at issue is an easement, in which the federal agency retains even more rights to access the site subject to the easement than it does with a lease similar to that addressed by the federal district court in *Manchester*.

The Navy and USMC understand the commission's reliance on the *California Coastal Commission v. Granite Rock Co.*, (480 U.S. 572) case to assert jurisdiction under the California Coastal Act over this Federal property. The Federal property in *Granite Rock*, though, was under proprietorial jurisdiction where State law generally applies. The SONGS site, on the other hand, is under exclusive federal jurisdiction where State law generally does NOT apply. Thus, it is the Navy and USMC position that the Commission only has jurisdiction over the SONGS site through the consistency provisions of the Federal Coastal Zone Management Act. Therefore, the Navy and USMC object to the Commission requiring or issuing a Coastal Development Permit under the California Coastal Act for the proposed action at hand or for any other proposed action at the SONGS site.

Respectfully,



W. L. WHITMIRE  
CAPT, CEC, USN  
Assistant Chief of Staff, G-F  
Marine Corps Installations West-  
Marine Corps Base, Camp Pendleton

**From:** [Charles Langley](#)  
**To:** [Street, Joseph@Coastal](#)  
**Cc:** [Ivan.Penn@latimes.com](#); [jeff.mcdonald@sduniontribune.com](#); [Avina, Victor](#); [Parr, Matthew](#); [Aguirre Morris & Severson LLP](#)  
**Subject:** Coastal Commission Staff urges "Yes" vote on Nuke Waste Dump at San Onofre  
**Date:** Friday, October 02, 2015 10:55:15 AM  
**Attachments:** [Tu14a-10-2015.pdf](#)

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Dear Mr. Street,

I called you earlier this morning, but have not received a response to my questions. Given the urgency of this issue, I am putting my questions in writing.

It is my understanding that on Tuesday, October 6, the California Coastal Commission will vote to issue a "Regular Permit" allowing the creation of California's beach-front nuclear waste dump at San Onofre State Park.

Attached for your reference is a document that I believe you authored titled Tu14a-10-2015.pdf. This document recommends approval of Southern California Edison's plans to store the waste on the Beach until the year 2051 in containers that are designed to last no longer than 20-years.

Your attached recommendation also notes "This fuel is highly radioactive and requires secure storage for thousands of years ..."

In keeping with [Sec 3006](#) of the California Coastal Act of 1976, and the Coastal Commission's [mandate](#) to "*... protect, conserve, restore, and enhance environmental and human-based resources of the California coast and ocean for environmentally sustainable and prudent use by current and future generations,*" I request that you provide me with the following information:

- 1) When and where will the hearings take place** and when will public vote taken?
- 2) Will the public and political leaders be allowed to address the Commission prior to the vote**, and if so, what is the process for addressing the Commission?
- 3) What is the process for compelling the Commission to hold hearings in the affected communities** prior to the Commission's vote?

Specifically, the majority of the 8.5 million people who will be affected by this vote live in Orange County and

San Diego County. These residents, who must live with the consequences of this vote for the rest of their lives will not have an opportunity to address the Commission.

**4) What is the Commission's justification for voting to approve this permit without holding public hearings in the affected communities?** Is the decision to hold the vote far away from the affected communities a violation of [Sec 3006 of the California Coastal Act](#) of 1976?

Cordially,

Charles Langley  
Public Watchdogs  
(858) 752-4600

**From:** [Donna Gilmore](#)  
**To:** [Street, Joseph@Coastal](#)  
**Cc:** [Rita Conn](#); [NIRS Summit](#); [John Geesman](#); [David Pepper](#); [StJohn-Inglis, Alison](#); [Teri Sforza - OC Register](#); [Jeff McDonald - old\\_email](#); [Michael Blood - AP Wire](#); [Toni Iseman](#); [Don Mosier](#); [KCBS TV News](#); [NBC - Vikki Vargas](#); [Lori Donchak - City Council](#); [Audrey Prosser - Laguna Beach](#); [Verna Rollinger - Laguna Beach](#); [Ann Doneen](#); [Rima Nashashibi - Newport Beach Dem Club](#); [Judy Jones - SONGS Demo](#); [Dan Hirsch](#); [Arnie Gundersen](#); [Matthew Freedman](#); [RL Miller](#); [Richard Mathews](#); [Bart Ziegler](#); [Marvin Lewis](#); [Arjun Makhijani](#); [Alex. Ken](#); [Barker, Kevin@Energy](#); [Eric Greene](#); [Morey Wolfson](#); [Robert Alvarez](#)  
**Subject:** Re: San Onofre Independent Spent Fuel Storage Installation (ISFSI) Application 9-15-0228 for Tuesday 10/6 Long Beach Coastal Commission meeting  
**Date:** Friday, October 02, 2015 2:04:08 PM

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To California Coastal Commissioners and staff.

An additional comment is regarding the very short warranty for the Holtec system. Even though Holtec and SCE claim the system will last 60 to 100 years, the Holtec warranty is for only 10 years for the underground structure and only 25 years for the thin 5/8" thick steel welded canisters (MPC-37). Also, Edison is considering having Holtec load the existing Areva thin canisters into the Holtec system. The Holtec warranty is only two years for these canisters. The below linked Holtec warranty was provided to me by Edison as part of the CPUC Unit 2 and 3 Decommissioning proceedings.

<https://sanonofresafety.files.wordpress.com/2013/06/sce-dr-response-w-attachment-to-a-14-12-007-gilmore-sce-001-follow-up-2-q-09-q-12.pdf>

Donna Gilmore



**From:** [Donald Mosier](#)  
**To:** [Street\\_Joseph@Coastal](mailto:Street_Joseph@Coastal)  
**Subject:** Corrected Comments on Application 9-15-0228  
**Date:** Friday, October 02, 2015 2:40:11 PM

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Joseph,

I would like to echo Donna Gilmore's comments and add that the many concerns identified by the staff report for 9-15-0228 suggest that the application should be denied. However, if the commission should decide for approval with many conditions, I strongly urge that the approval period be for 10 years, not 20 years.

Donald Mosier

--

Dr. Donald Mosier  
Councilmember  
City of Del Mar

858-784-9121 daytime  
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Please conserve paper and energy: do not print this email or attachments unless essential.



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October 2, 2015

California Coastal Commission  
Joseph Street  
Sent to: [Joseph.Street@coastal.ca.gov](mailto:Joseph.Street@coastal.ca.gov)

**Re: Support--Item Tu14a- Application No. 9-15-0228-SONGS ISFSI Permit**

The Orange County Coastkeeper is a long established organization that protects, promotes and restores swimmable, fishable, drinkable and sustainable water. We appreciate the opportunity to comment on the proposed SONGS permit to construct an Independent Spent Fuel Storage Installation (ISFSI). In addition, I serve on the Community Engagement Panel established by Southern California Edison that promotes public discussion on the issues related to the decommissioning of SONGS.

Ultimately, Coastkeeper believes the best course of action is to remove all spent fuel from the SONGS site to an isolated regional or national repository site. The best course of action is **NOT** a storage site that is oceanfront, freeway-front, and railroad-front. Unfortunately, in reality there are no feasible options to achieve the best course of action. Due to the fact that the federal government has, to date, failed in its responsibility to provide a repository, the only real viable options today are to build a interim spent fuel storage facility or to leave the spent fuel assemblies at their current location, the cold-water pool, until a facility can be identified and developed.

There is no question that dry storage in appropriate certified sealed canisters is safer than storage in a cold-water pool. If we believed there was any near-term solution to a regional or national repository, we would support leaving the spent fuel in the pool until such a site could be developed. Unfortunately, this does not appear to be the reality. There currently is no interim solution for an offsite storage facility.

Given there is no viable alternative for off-site spent fuel storage and the fact that dry storage is safer than cold-water storage, Coastkeeper supports the Coastal Commission staff recommendations with the six special conditions.

Thank you for your consideration of our comments.

Sincerely,

A handwritten signature in black ink that reads "Garry Brown". The signature is written in a cursive, flowing style.

Garry Brown  
Founder & President  
Orange County Coastkeeper

**From:** [garyheadrick@gmail.com](mailto:garyheadrick@gmail.com) on behalf of [Gary Headrick](#)  
**To:** [Donna Gilmore](#)  
**Cc:** [Street, Joseph@Coastal](#); [Rita Conn](#); [NIRS Summit](#); [John Geesman](#); [David Pepper](#); [StJohn-Inglis, Alison](#); [Teri Sforza - OC Register](#); [Jeff McDonald - old\\_email](#); [Michael Blood - AP Wire](#); [Toni Iseman](#); [Don Mosier](#); [KCBS TV News](#); [NBC - Vikki Vargas](#); [Lori Donchak - City Council](#); [Audrey Prosser - Laguna Beach](#); [Verna Rollinger - Laguna Beach](#); [Ann Doneen](#); [Rima Nashashibi - Newport Beach Dem Club](#); [Judy Jones - SONGS Demo](#); [Dan Hirsch](#); [Arnie Gundersen](#); [Matthew Freedman](#); [RL Miller](#); [Richard Mathews](#); [Bart Ziegler](#); [Marvin Lewis](#); [Arjun Makhijani](#); [Alex, Ken](#); [Barker, Kevin@Energy](#); [Eric Greene](#); [Morey Wolfson](#); [Robert Alvarez](#)  
**Subject:** Re: San Onofre Independent Spent Fuel Storage Installation (ISFSI) Application 9-15-0228 for Tuesday 10/6 Long Beach Coastal Commission meeting  
**Date:** Friday, October 02, 2015 2:59:54 PM

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Coastal Commission and others:

San Clemente Green fully supports the findings and concerns expressed by Donna Gilmore. Our group of concerned citizens, currently numbering about 4,800 residents living near San Onofre expect Ms. Gilmore to get answers and documents pertaining to her reasonable requests. She has become our go-to person on the topic of nuclear waste and has our complete confidence. Her research and reporting is a valuable resource to all concerned. Please consider these factors while trying to balance your judgement against the onslaught of pressure from the industry to do what works best for them. We are counting on you as one of the few remaining regulating bodies that still act on behalf of those they are sworn to serve. We need realistic solutions to the waste problems that meet basic requirements. **The Coastal Commission should demand Edison use a proven system that can be inspected, maintained, have continuous monitoring, is transportable and doesn't crack.** Anything less would be a dereliction of your duties. Too much is at stake at this point to not deliberate sufficiently. Thank you for your long history of protecting our coast and consistent record of service and dedication. Please don't let us down now, when we need you more than ever.

Gary Headrick  
San Clemente Green - Founder  
2837 Penasco  
San Clemente, CA 92673  
[949 218 4051](tel:9492184051)

**Statement of Glenn Pascall, Chair  
Sierra Club Task Force on San Onofre**

**Re: California Coastal Commission  
Application No. 9-15-0228**

**Agenda of October 6, 2015**

I write in support of the application by Southern California Edison Company to construct and operate an Independent Fuel Storage Installation (ISFSI) for storage of spent nuclear fuel from Units 2 and 3 at the San Onofre Nuclear Power Station in San Diego County.

Those who care about the California coast have two primary concerns regarding spent nuclear fuel at San Onofre. The first concern is to move fuel rods from pools to dry cask storage as rapidly as possible. The second concern is to remove storage casks from the vulnerable San Onofre site at the earliest available opportunity.

Opinion is virtually unanimous that worst-case hazards are far more severe for nuclear waste stored in fuel pools rather than in dry casks. Construction of concrete structures holding steel canisters is an essential part of this transition.

Commission staff has wisely suggested that after 20 years an amendment be required to continue operation of the facility. This is appropriate not only as a checkpoint to determine whether the ISFSI is providing safe storage but is also timely for review of alternatives to on-site storage.

For more than 30 years it has been a matter of national policy – and of Sierra Club policy – that nuclear waste be removed from operating sites and stored at one or more remote long-term repositories. In the interim, no site has been licensed for operation. As a result, spent fuel has remained on-site at all decommissioned commercial nuclear power plants.

Some fear that construction of an ISFSI on-site at San Onofre will simply assure permanent storage there. Yet the ISFSI is essential to support dry storage and closure of spent fuel pools. To reconcile these concerns, we

would ask the Commission to note the following additional aspects of project design and operation:

- Dry cask storage should be in canisters that can be transported if the opportunity arises to remove them from San Onofre.
- Transportation connections at San Onofre should be maintained in a condition that enable spent fuel removal by rail or truck.
- Efforts at the state, regional and national level should be encouraged to develop safer, less exposed storage sites to which spent nuclear fuel can be moved from sites such as San Onofre that are subject to multiple risk factors.
- If such options develop, with the active support of Edison, responsible federal agencies should remove the canisters from the ISFSI and transport them to remote storage.

In conclusion, we support the Commission's authorizing timely construction of an ISFSI at San Onofre to mitigate unnecessary risks related to the extended use of wet storage when dry storage options are available onsite. Every possible threat (earthquakes, tsunamis, hostile acts, operational errors) that might potentially lead to the release of radiation from spent fuel in dry storage onsite is magnified many fold by additional risks arising from the potential loss of electrical power and water supply needed to keep spent fuel fully submerged and protected in pools.

Once power generation operations stop and remaining spent fuel is moved to wet storage, as has occurred at San Onofre, every available caution should be taken by moving the spent fuel to dry storage and ending any use of wet storage as soon as best practices allow.

Thank you for consideration of our thoughts.

Sincerely,

Glenn Pascall, Chair

Sierra Club Task Force on San Onofre

October 2, 2015  
Dr Charles Lester, Executive Director  
California Coastal Commission  
45 Fremont Street  
Suite 2000  
San Francisco, CA 94105  
(415) 904-5200

**RE: Agenda Item 14-A Public Meeting – October 6, 2015**

**Application No. 9-15-0228 (Southern California Edison Co., San Diego Co.)** Application of Southern California Edison to construct independent spent fuel storage installation (ISFSI), consisting of approx. 25,000 sq. ft. concrete pad and 75 fuel storage modules, at San Onofre Nuclear Generating Station, 5000 Pacific Coast Highway, San Diego County. (JS-SF)

Dear Dr Lester,

Please accept this into the public record and distribute to all Commissioners.

We thank you for the work you do to save our precious ocean and beach resources. This is a watershed moment and you have the ability to make a decision, the consequences of such, will either protect or destroy the San Onofre beach and ocean.

The San Onofre Nuclear Generating Station has been destroying the safety of our beaches and ocean for many years and if allowed to bury the unproven Holtec dry storage containers on the bluffs, they will continue to make this area unsafe for public access.

<ul style="list-style-type: none"><li>• <b><u>Radioactive Sand Contamination</u></b> of 21,900 cubic feet. Shipped to Richland, WA for burial.</li><li>• <b><u>Penetration of Seawall.</u></b> Damage “out of service” storm drain line that penetrates the Unit 1 seawall.</li><li>• <b><u>Leaks</u></b> of radioactive contaminated water from various Unit 1 systems collected in the yard drain system and entered the damaged discharge pipe.</li></ul>
<ul style="list-style-type: none"><li>• <b><u>Explosion</u></b> in radioactive gas holding tank: damages the tank and causes unplanned release of radioactive gases.</li></ul>
<ul style="list-style-type: none"><li>• <b><u>Spent Fuel Pool Leaks</u></b> water through pool's liner and filling the leakage collection system and well. Radioactively contaminated water penetrates the concrete wall of spent fuel pool and exuding from a outdoor concrete slab adjacent to the fuel handling building.</li><li>• <b><u>Leak</u></b> was patched with epoxy.</li></ul>
<ul style="list-style-type: none"><li>• <b><u>Tritium</u></b> levels of 50,000 to 330,000 picocuries per liter identified.</li></ul>
<ul style="list-style-type: none"><li>• <b><u>Radioactive water leak</u></b> from hose connection on recirculation line of a Unit 2 / Unit 3 refueling water storage tank onto the roof of the tank farm building.</li><li>• <b><u>Radioactive water discharged into ocean.</u></b> Roof drains carries water into the storm drain system and then into main circulating water outfall.</li></ul>
<ul style="list-style-type: none"><li>• <b><u>Radioactive water discharged into ocean.</u></b> Radioactive contaminated water enters the storm drain when the Unit 2 fuel handling building sump backed up.</li></ul>
<ul style="list-style-type: none"><li>• <b><u>Human Error.</u></b> Workers determine a sampling trough being used to collect relief leakage from Unit 2 and 3 secondary plant system sample valves drains to an unmonitored sump.</li></ul>

- **Radioactive water discharged into ocean.** Leak of 100 gallons of radioactive contaminated from Unit 3 refueling water storage tank during maintenance and went into storm drain system.

([http://www.beyondnuclear.org/storage/tritium\\_buriedpipes\\_groundwater\\_compendium\\_events\\_sorted\\_by\\_site.pdf](http://www.beyondnuclear.org/storage/tritium_buriedpipes_groundwater_compendium_events_sorted_by_site.pdf))

According to the investigative reporting of NBC, Edison's continues to be guilty of polluting our pristine beaches and ocean, creating unsafe standards for public use. (Please see attached report)

We must prevent Edison from continuing this crime.

Please insist that they not bury highly radioactive nuclear waste in thin stainless canisters that are subject to corrosion and cracking in a very short time.

We have collected almost 2000 signatures in protest. Our city, Laguna Beach, has issued a strong resolution; in addition our city council has signed our petition, which calls for:

“Any dry storage system for radioactive spent fuel that Edison purchases must have fully developed, available transport casks, are able to be inspected for cracks that would lead to radioactive leaks and be able to be repaired before such a disaster occurs.”

Keep California Citizens Safe

Isn't it just common sense that calls for time proven thick, transportable, above ground dry cask storage containers for the 1632 tons of dangerous radioactive nuclear waste at San Onofre?

YES, we all want the dangerous nuclear waste to be moved as soon as possible, but we must not make hasty decisions, based on inaccurate information provided to us by a company that historically puts profits over safety. The Department of Energy has finally agreed to consider removing the spent fuel rods to a temporary location. Any storage container used that is not fully accessible and transportable would be an obstruction to removal of the waste and thus the restoration of our beaches.

I urge you to reject the proposed unsafe canisters that cannot be transported. There is no urgency for the Commission to approve these canisters. Only Edison would benefit by using it to negotiate with the landowners by stating that they are permitted for storage. This could put the CC in conflict with the Marines and the Navy.

We urge you to not approve the thin experimental Holtec canisters proposed by Edison.

Thank you for your consideration,  
Rita Conn  
Chairwoman, Let Laguna Vote



# Explosive report on radioactive waste handling at San Onofre to air on NBC tonight.

## High radiation levels endangered employees

Get an advance link to the [story HERE](http://bit.ly/1JIEUyS). ( <http://bit.ly/1JIEUyS> )

San Diego's NBC affiliate is unleashing a story on nuclear waste deposited by Southern California Edison Corporation that may explain why the pristine State Beach is referred to in internal memos as "Jap Mesa."

Apparently the Geiger counter readings at some locations are so high that the site is reminiscent of Ground Zero at Hiroshima and Nagasaki.

## Key findings include...

### - Attempts to keep documents on toxic radiation a secret.

According to the NBC report, SCE is attempting to keep radioactive pollution a secret by forcing parties who are involved in negotiations about the future of the property to sign non-disclosure agreements.

### - Radioactive debris left on Beach and "Jap Mesa."

"Hundreds of pieces" of contaminated radioactive equipment was stored on both sides of the I-5, the heavily traveled freeway that bisects the San Onofre Nuclear Waste Dump that is currently under construction,

### - Radiation levels at the beach-front property so alarming,

that in places inspectors from the Nuclear Regulatory Commission refused to to perform routine radiation surveys.

### - Southern California Edison controlled NRC radiation inspections

According to a former SCE Safety Officer, Edison's cozy relationship with inspectors from the Nuclear Regulatory Commission prevented proper inspections. The former employee revealed that NRC inspectors rarely conducted inspections outside areas that were identified by SEC.

### - Trailers housing SCE employees had elevated readings

In an apparently rare incident where an NRC inspector conducted radioactive testing without SCE's supervision, a trailer housing security guards had elevated readings.

**- Calls for Third-Party Investigations**

Former San Onofre employee and Safety Officer Vinod Arora is calling on an independent third-party to thoroughly inspect the tainted 25-acre parcel at San Onofre.

Get the [full report](#) and the [confidential documents](#) here.



October 2, 2015

Dr. Joseph Street  
California Coastal Commission  
45 Fremont, Suite 2000  
San Francisco, CA 94105-2219  
[Joseph.Street@coastal.ca.gov](mailto:Joseph.Street@coastal.ca.gov)

Reference: CDP Application #9-15-0228

Dear Dr. Street and members of the Commission:

I am writing to you on behalf of the Industrial Environmental Association (IEA) to urge approval of Southern California Edison's coastal development permit to expand used nuclear fuel storage at San Onofre nuclear plant. The Industrial Environmental Association believes dry storage of used nuclear fuel is safer and more secure than storing San Onofre's fuel in spent fuel pools.

IEA is a 32-year-old organization made up of over 50 large manufacturing companies in the southern California region. IEA member companies are committed to environmental stewardship and compliance with regulations that protect the quality of life in our communities and in California. IEA's mission is to find a balance between environmental preservation and promoting industry in a manner that provides jobs and supports economic prosperity.

IEA believes that putting the fuel in sealed steel canisters is an important first step to moving San Onofre's fuel off site to a licensed repository. We applaud the efforts of local and state officials advocating for Consolidated Interim Storage (CIS) options proposed in New Mexico and Texas that offer the best hope for prompt removal of the fuel from San Onofre. And we are encouraged by the Sept. 29, 2015 announcement by U.S. Rep. Darrell Issa that he is co-sponsoring the Interim Consolidated Storage Act to facilitate establishment of an interim storage site.

By approving the San Onofre permit request, the California Coastal Commission can take an important step to protect California's environment until the federal government does its job and creates a storage facility elsewhere for San Onofre's used nuclear fuel.

Thank you for your consideration.

Sincerely,

A handwritten signature in black ink, reading "Jack Monger". The signature is fluid and cursive, with the first name "Jack" and last name "Monger" clearly legible.

Jack Monger

Executive Director

To: California Coastal Commissioners and staff

Re: Application 9-15-0228 Coastal Application 9-15-0228, Southern California Edison Company, Construct and operate an Independent Spent Fuel Storage Installation (ISFSI) to store spent nuclear fuel from SONGS Units 2 and 3

The Coastal Commission should not approve the application for this experimental unproven Holtec spent fuel dry storage system installation. This plan is based on unreasonable assumptions and inadequate evidence on many points.

Staff substantiated that this system may be at our coast long past year 2051, so we need to ensure now that the system is inspectable, maintainable, transportable and not subject to cracking and coastal corrosion. Edison's proposal does not meet those requirements and there is insufficient data to support this will change in 20 years. There is data to the contrary.

As the staff report states "*Crucially, however, it remains uncertain whether it will be possible for SCE to remove the ISFSI as planned, in 2051.*" Edison's claim of no other option is not true. We need to plan for this uncertainty now and not kick this can down the road.

Edison should be directed to return with a solution that meets Coastal Act requirements now and in the foreseeable future. Edison should provide a solution that meets both Coastal Commission and Nuclear Regulatory (NRC) requirements before the permit is granted, not after 20 years. The Nuclear Regulatory Commission (NRC) approves spent fuel storage systems, but does not force Edison into choosing a system that does not meet California Coastal Act requirements.

## SUMMARY

**It is unreasonable to assume the system can be moved, inspected or maintained after 20 year, as proposed in staff "Special Condition 2".**

- **Edison's solutions are based on vaporware – promises of solutions that do not exist.**  
Edison has chosen an unproven system that cannot be inspected, repaired or maintained and is not approved for transport of San Onofre's high burnup fuel. State regulations do not allow procurement of products with capabilities that do not exist. The Commission should also not approve a permit based on vaporware. *Would you buy a car that could not be inspected, maintained, repaired, and with no early warning system to identify something might fail? Would you take your family on a trip in that car?* Please don't put us in that "car".
- **Relocating the system on-site after 20+ years is not reasonable with the current system.**  
It requires destruction and rebuilding of the huge underground concrete system, relocating thin canisters, and then transporting and storing the radiated rubble to an unknown location. It is not reasonable to assume this will be done due to the hundreds of millions of dollars it would cost. No funds are allocated for such an endeavor and it took decades to build up the Decommission Trust Fund. This plan would likely burden ratepayers with higher electric rates. There are also safety risks to employees and the public. Those could play a factor in Edison receiving another "pass" to not relocate the system to a better on-site location. The system should be put in the best location the first time or at least use a storage system that is designed to be relocated.
- **The Holtec UMAX system is an unproven experimental underground system.** Almost all interim systems are above ground. The underground Holtec system in Humboldt Bay uses different technology. It is not a UMAX system as the staff report incorrectly states. It uses

both a thin welded canister and a thick bolted-lid casks. The thin canister is inserted in the unvented thick bolted-lid metal cask that is then loaded into an underground hole. Humboldt has less demanding fuel storage requirements (fewer fuel assemblies, no high burnup fuel, and no cooling requirements). However, even though it is a sealed system and Holtec promised it would never leak, it leaked water into the underground system. Holtec's solution was to seal with caulking. The proposed Holtec UMAX system does not use a thick cask and the underground system requires air vents to cool each extremely hot canister. Rain and other moisture (including corrosive salt air) enter through these vents and can corrode the thin steel canister. Underground drains are required, which is another maintenance challenge.

- **The NRC does not consider or require aging management capabilities in their initial 20 year license approvals.** They are currently developing aging management regulation (NUREG-1927), but the issues mentioned in this paper are not solved.

#### **Holtec UMAX 37- fuel assembly canister system inadequacies**

- Does not address coastal corrosion issues
- Cannot be inspected, repaired or maintained
- Subject to short-term stress corrosion cracking
- Does not meet current NRC approved UMAX technical specifications.
- No approved transport system for San Onofre high burnup fuel.
- Warranty is only 10 years on the underground structure, 25 years for the thin canister and 2 years for existing NUHOMS canisters that Holtec may load in the underground system.

**The system may require up to 45 years of cooling before transport to permanent storage** (due to the high number of fuel assemblies in one canister combined with the enriched high burnup fuel). If Edison used a cask or canister with only 24 fuel assemblies, it would result in decades less required cooling time. The existing NUHOMS canisters hold 24 fuel assemblies. See Cooling Chart (page 9). See also <http://www.nwtrb.gov/meetings/2013/april/boyle.pdf>

#### **No mitigation plans for failed canisters.**

- **Existing thin NUHOMS canisters may already be cracking**, but we have no way to know until they fail and Edison has no approved system in place to deal with these or Holtec failed canisters. A mitigation plan and system is needed now, not in 20 years.
- **A similar component at the Koeberg nuclear plant failed in 17 years.** San Onofre began loading canisters in 2003. That leaves only 5 years (not 20 years) for an in-place plan.
- **Spent fuel pools should not be destroyed**, since this is the only current method to move fuel to another canister. The NRC does not allow transport of cracking canisters.

#### **Special conditions staff proposes should be required now using proven solutions readily available in the marketplace.**

- **Thick casks can satisfy Special Condition 2.** They are accessible for inspection and maintenance and do not have the major corrosion and cracking problems of thin canisters, and no underground system than cannot be adequately inspected and maintained.
- **Edison's excuse that thick cask systems do not generally have a license is a misleading statement at best.** An NRC general or site license can be obtained in 18 to 30 months according to the NRC. However, no vendor will request an NRC license unless they have a customer, because the licensing process costs millions of dollars. Both thick steel casks (e.g., Areva TN-24) and thick ductile cast iron casks (e.g., Castor) are in use in the U.S. and have the longest proven track record internationally, even at Fukushima. See photos (page 8 & 9).

- **Thick cask storage systems used in the U.S. and internationally for both storage and transport meet American and International manufacturing certifications** – higher standards than current thin canister technology.
- **Thick cask systems are the most proven systems available and do not have short-term corrosion and cracking issues.** They are up to 20 inches thick (vs. 5/8 of an inch thick used at San Onofre).
- **Thick casks meet the requirements for inspection, maintenance and early warning.** The above ground metal casks are accessible for inspection and maintenance and have continuous remote early warning monitoring systems.
- **Thick casks are the only containers needed for both storage and transport.** They do not require a concrete infrastructure or thin canisters, such as Holtec's underground system. They do not require thick concrete overpacks like the existing NUHOMS canisters.
- **Thick casks are more suited for relocation,** since there are no concrete infrastructures/overpacks required, minimizing the amount of demolition and reconstruction, and transport and storage of the demolished rubble.

## DETAILED COMMENTS AND REFERENCES

### **Special Condition 2 should be required now, not after 20 years. It states:**

*In order to address these uncertainties, and assure that the ISFSI facility remains safe from geologic hazards and avoids adverse impacts to coastal resources over the actual life of the project, staff recommends Special Condition 2, which authorizes the proposed development for a period of twenty years and requires SCE to return for a CDP Amendment to retain, remove or relocate the ISFSI facility, supported by: (i) an alternatives analysis, including locations within the decommissioned Units 2 and 3 area; (ii) assessment of coastal hazards and managed retreat; (iii) information on the physical condition of the fuel storage casks and a maintenance and monitoring program; and (iv) proposed measures to avoid/minimize visual resource impacts.*

- **The staff report states SCE expects the service life of the ISFSI and casks to be at least 100 years and no major repairs are anticipated within 60 or 100 years. This is an unsubstantiated claim.** (Staff Report page 37). Please have SCE provide technical references for those statements. Are these Holtec technical documents submitted to the NRC? The NRC is only certifying the system for 20 years and is not considering degradation or other aging management issues that might occur after 20 years. The NRC doesn't consider claims by Holtec about those 60 and 100 years as anything the NRC has validated or approved (according to their Sept 2015 UMAX amendment 1 certification approval document). The staff report references email document "SCE 2015b." that is not included in the staff report. <http://www.gpo.gov/fdsys/pkg/FR-2015-09-08/pdf/2015-22053.pdf>
- Even though Holtec and SCE claim the system will last 60 to 100 years, the Holtec warranty is for only 10 years for the underground structure and only 25 years for the thin 5/8" thick steel welded canisters (MPC-37). Also, Edison is considering having Holtec load the existing Areva thin canisters into the Holtec system. The Holtec warranty is only two years for these canisters. See Holtec warranty below.  
<https://sanonofresafety.files.wordpress.com/2013/06/sce-dr-response-w-attachment-to-a-14-12-007-gilmore-sce-001-follow-up-2-q-09-q-12.pdf>
- **The statement "NRC has estimated that at least 30 years would be required for the initiation of stress corrosion cracking in steel fuel storage casks" is no longer valid.**



(Staff Report Page 37). That statement is in the NRC 8/5/2015 meeting minutes on Stress Corrosion Cracking and Aging Management. The reason NRC said 30 years was because they assumed the canisters would not be cool enough for moisture to deliquesce (dissolve) salt on the canister for at least 30 years. However, at that time they were not aware of the **two-year old** Diablo Canyon canister that had temperatures low enough for salts to deliquesce. I participated in that and other NRC meetings on stress corrosion cracking in marine environments.

<http://pbadupws.nrc.gov/docs/ML1425/ML14258A081.pdf>

<https://sanonofresafety.files.wordpress.com/2011/11/diablocanyonscc-2014-10-23.pdf>

- **The Koeberg nuclear plant had a component that leaked from stress corrosion cracks in 17 years.** It is located in a similar environment as San Onofre (on-shore winds, moist ocean air, and frequent fog). The NRC considers the Koeberg component (a waste water tank) comparable to a stainless steel canister (304L or 316L stainless steel). The Koeberg through-wall crack was 0.61" thick. About the same thickness as the proposed Holtec canisters (0.625" thick). San Onofre has also had stress corrosion cracking in stainless steel pipes that the NRC considers comparable to the thin steel canisters, so it's clear the environmental conditions are present at San Onofre. We do not need to wait 20 years to find this out, so the Coastal Commission should address this in the current application.  
<http://pbadupws.nrc.gov/docs/ML1231/ML12319A440.pdf>  
<http://pbadupws.nrc.gov/docs/ML1425/ML14258A082.pdf>
- **Existing Areva NUHOMS canisters have been loaded since 2003, so the idea that Edison needs to have an aging management plan in 20 years is not the case.** They need an aging management plan for their existing NUHOMS canisters and system. Does the existing NUHOMS canister ISFSI require a separate Coastal Commission renewal permit? Both the existing NUHOMS and proposed Holtec thin canisters are of the same materials (welded 316L stainless steel). We have only 5 years before we meet the Koeberg timeline. This idea we can wait 20 years is not realistic on many levels. To buy products originally designed for 20 years that do not have aging management built into the design is unacceptable. Edison should be required to provide their aging management plan now, so it can be fully evaluated by the Coastal Commission. What we already know is not adequate. This is too important an issue to base approvals on Edison promises of future solutions.
- **The UMAX system is an experimental unproven system.** Over 99 percent of dry storage system in the U.S. and the world are above ground systems. To claim this is typical or a proven U.S. system is an inaccurate claim. On Staff Report page 11, the footnote states "A small HI-STORM UMAX system...is installed at Humboldt Bay Power Plant". This is not a UMAX system and has a very different design. The Humboldt Holtec HI-STAR HB system uses 1/2" thick canisters, but inserted them in thick steel bolted lid cask before placing them in the underground holes. Also, the fuel cooled for 35 years in the pools and was low burnup fuel, so no air vents were needed to cool the thin canister and fuel. In spite of this, water leaked into this system, which Holtec said would not happen. Their solution was to put caulking around the enclosure.  
<https://sanonofresafety.files.wordpress.com/2011/11/ml13151a317.pdf>  
<http://pbadupws.nrc.gov/docs/ML0531/ML053140041.pdf>
- **The Holtec UMAX system has not been approved by the NRC for the configuration planned for San Onofre and it has not been approved for the site.** The NRC will need a

license amendment for the changes in order to properly evaluate for seismic, thermal and other technical requirements. The system is approved for 1/2" thick canisters, not 5/8" as proposed. The system is approved for a totally underground system, not the half underground system proposed. The NRC comments in their September 2015 UMAX approval make this clear. I explained this and other items in the letter I sent to staff on September 17, 2015. It appears some of the public comments I have made have not been addressed. Or has Edison or Holtec or the NRC provided you different information?

<https://sanonofresafety.files.wordpress.com/2013/06/ltrtocoastalcommissiondgilmore2015-09-17umax-amend1.pdf>  
<http://www.gpo.gov/fdsys/pkg/FR-2015-09-08/pdf/2015-22053.pdf>

- **Aging management of the Holtec system is inadequate.** Even the Holtec President, Dr. Singh, says the canisters cannot be repaired. They cannot even find cracks, let alone repair them. <https://www.youtube.com/watch?v=euaFZt0YPi4&feature=youtu.be>
- **Relying on vendor promises of future solutions to be able to inspect and maintain the system should not be relied upon in Coastal Commission decision making.** The Coastal Commission should not make decisions based on "vaporware". State agencies are not allowed to procure "vaporware" (capabilities that do not exist), so why would the Coastal Commission make such an important decision assuming these most critical issue will be resolved by vendors?
- **The Coastal Commission should demand Edison use a proven system that can be inspected, maintained, have continuous monitoring, is transportable and doesn't crack.** This is the only way to meet Coastal Commission requirements. The NRC is only concerned with 20 years. The Coastal Commission is concerned with longer term requirements. Technology exists to meet both NRC and Coastal Commission requirements.
- **Rejecting the option of the thick casks, such as the German thick Castor casks (manufactured by Siempelkamp, designed by GNS), with the response "these thick-walled casks are not generally licensed for use at U.S. sites by the NRC" is not sufficient to reject thick casks.** (Staff Report page 20). There is also the option of thick metal casks such as the Areva TN-24 and TN-32 casks currently used in the U.S. Southern California Edison knows both the German and Areva thick metal casks have been licenses by the NRC, so there is every reason to believe they would receive a license for San Onofre. Given that these options are proven technologies used in the U.S. and are the main storage technologies used for the majority of the rest of the world for both storage and transportation, thick casks should not be a rejected alternative. This would better meet Coastal Commission requirements for longevity and transport and also meet NRC requirements. Thick casks are approximately 10 to 20 inches thick compared to the proposed thin canisters that are only 5/8th of an inch thick.  
<https://sanonofresafety.files.wordpress.com/2011/11/reasonstobuythickcasks2015-04-16.pdf>  
<https://sanonofresafety.files.wordpress.com/2013/06/germanycaskstoragegorlebengns.jpg>
- **There is already evidence for the staff to have sufficient probability that requirements to have canisters transportable and maintainable may not be met with the Holtec UMAX system.** Pushing the can down the road another 20 years isn't going to change that. The only reason no thin canisters have leaked yet is because they have not been in use long enough for cracks to go through the wall of the canister. We are at higher risk of cracks due to our corrosive coastal environment. We are the last location that should be using this

inferior technology with materials known to crack from corrosive moist salt air. The NRC does not allow transport of cracking canisters. The underground portion of this system is subject to corrosive ground chemicals and yet cannot be inspected due to lack of technology to inspect this design. <http://pbadupws.nrc.gov/docs/ML1432/ML14323A067.pdf>

- **Regarding Edison's promise of potentially moving the system to higher ground as the coastal environment degrades that would require a major expense and would likely cost over double the existing San Onofre Decommission Plan cost estimates.** The cost estimates they submitted to the NRC and CPUC assumes fuel will be picked up at the earliest DOE time frame, even though their documents state these dates are unlikely to be met. They also assume nothing will go wrong with the canisters. They have budgeted about \$1.3 billion for spent fuel management and plan to spend it all. They also plan to spend the entire \$4+ billion Decommission Trust Fund, so no monies will be available. What is the basis for accepting Edison's promise? Will ratepayers be required to pay for this? Is their promise and this plan reasonable?
- **Choosing thick casks meets Coastal Commission requirements for relocation on-site and for transport.** Thick casks are transportable. No additional transportation casks are needed. No protective concrete structures would need to be destroyed and rebuilt. No transfer casks are needed to move fuel between the pool and an concrete overpack or transport cask. Systems are installed above ground. Thick casks have seals that can be monitored and replaced. Once a thin canister cracks, it is no longer usable and cannot be repaired.
- **DOE still requires fuel assemblies to be transferred into DOE approved casks.** This means we need to keep the spent fuel pools. They are evaluation the option of accepting existing canisters. However, they have serious concerns. "Direct disposal of dual purpose canisters may also pose engineering challenges, reduce flexibility on repository siting and design, and complicate evaluations of long-term disposal repository performance."  
<http://www.nwtrb.gov/meetings/2013/april/boyle.pdf>

## Additional information and references

- Reasons to Buy Thick Casks and Nuclear Storage Myths  
<https://sanonofresafety.files.wordpress.com/2011/11/reasonstobuythickcasks2015-04-16.pdf>
- SanOnofreSafety.org  
<http://sanonofresafety.org/>
- Nuclear Waste Storage and Transport  
<http://sanonofresafety.org/nuclear-waste/>
- Coastal Commission Staff Report  
<http://documents.coastal.ca.gov/reports/2015/10/Tu14a-10-2015.pdf>
- Coastal Commission October 6 Agenda and Location  
<http://www.coastal.ca.gov/mtgcurr.html>

## Long-Term Performance Challenges

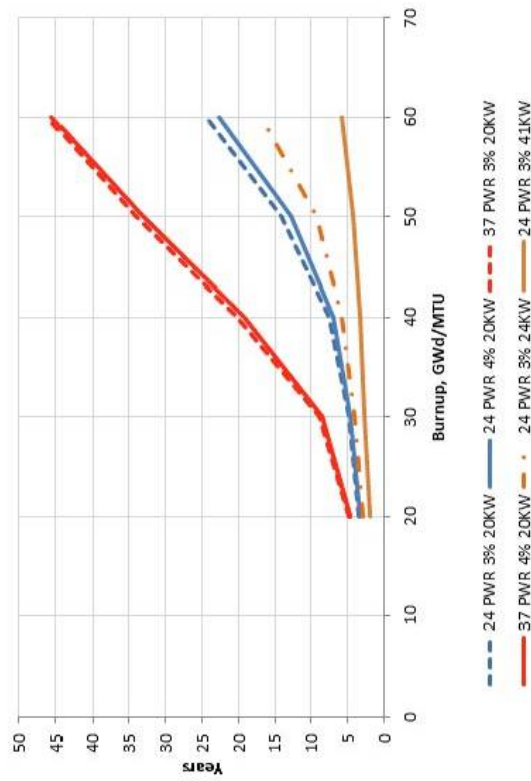
### ■ Thermal Load Management

- DPCs are now loaded at about 20 kW
- Canister design storage limits are typically 24 kW, maximum currently available is rated to 40.8 kW for storage
- Hottest waste packages considered for Yucca Mountain emplacement were 18 kW
- Other repository design concepts call for much cooler waste packages (e.g., SKB calls for initial load per package  $\leq 1.7$  kW)

### ■ Other performance considerations

- Engineered barrier performance at elevated temperatures (e.g., clay-based backfill/buffer performance)
- Criticality control

Estimated Cooling Time for PWR fuel to Reach Specified Thermal Power, as a Function of Canister Size and Burnup





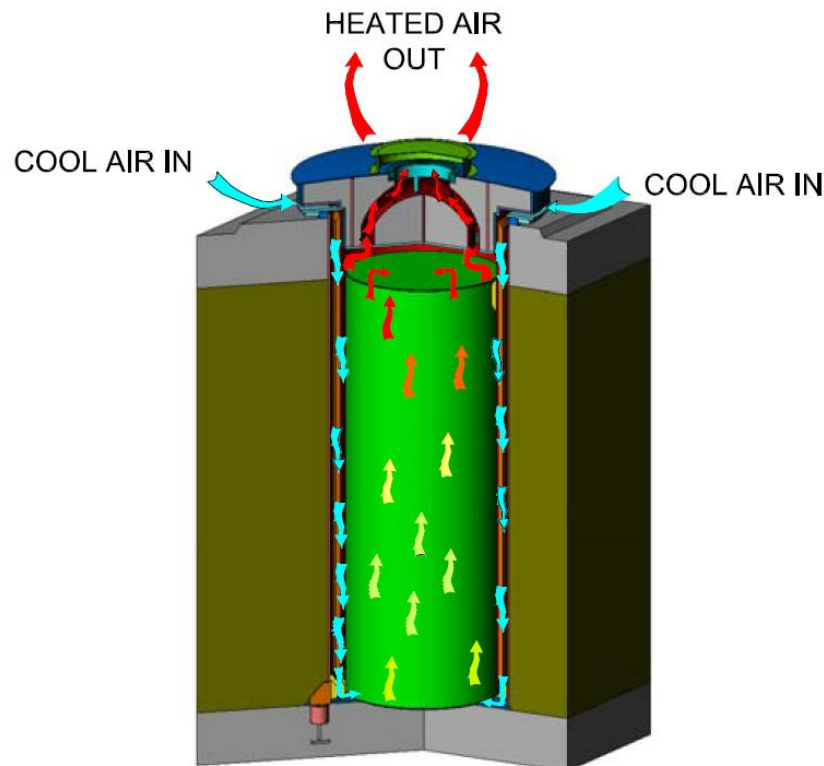
## Reasons to buy thick nuclear waste dry storage casks

Safety Features	Thin Canisters 1/2" to 5/8"	Thick Casks up to 20"
1. Thick walls		✓
2. Won't crack		✓
3. Ability to repair		✓
4. Ability to inspect exterior		✓
5. Early warning monitor		✓
6. ASME canister or cask quality certification		✓
7. Defense in depth (redundant systems)		✓
8. Stored in concrete building		✓
9. Licensed in U.S.	*	*
10. Market leader	U.S.	World



CASTOR® - Type V19 cask

## Holtec HI-STORM UMAX Spent Fuel Thin Canister System



## Germany thick casks in storage building



## Fukushima TN-24 thick casks in storage building



**From:** [Laura Lynch](#)  
**To:** [Street\\_Joseph@Coastal](mailto:Street_Joseph@Coastal)  
**Subject:** ADDENDUM: San Onofre IndependentSpentFuelStorageInstallation (ISFSI) Application 9-15-0228 for Tues 10/6 LongBeachCoastalCommission Mtg  
**Date:** Sunday, October 04, 2015 7:24:56 PM

---

Please add the following to my earlier letter addressed to you and the California Coastal Commissioners and staff (see below):

To California Coastal Commissioners and staff.

An additional comment regarding the very short warranty for the Holtec system: Even though Holtec and SCE claim the system will last 60 to 100 years, the Holtec warranty is for only 10 years for the underground structure and only 25 years for the thin 5/8" thick steel welded canisters (MPC-37). Also, Edison is considering having Holtec load the existing Areva thin canisters into the Holtec system. The Holtec warranty is only two years for these canisters. The below linked Holtec warranty was provided to me by Edison as part of the CPUC Unit 2 and 3 Decommissioning proceedings.

Begin forwarded message:

**From:** Laura Lynch <[artistlauralynch@yahoo.com](mailto:artistlauralynch@yahoo.com)>  
**Date:** October 2, 2015 8:50:29 AM PDT  
**To:** "Street, Joseph@Coastal" <[Joseph.Street@coastal.ca.gov](mailto:Joseph.Street@coastal.ca.gov)>  
**Bcc:** Laura Lynch <[artistlauralynch@yahoo.com](mailto:artistlauralynch@yahoo.com)>  
**Subject:** **San Onofre IndependentSpentFuelStorageInstallation (ISFSI) Application 9-15-0228 for Tues 10/6 LongBeachCoastalCommission Mtg**

To the California Coastal Commissioners and staff:

I recommend the Coastal Commission deny the application for this experimental unproven Holtec spent fuel dry storage system (Application 9-15-0228). This is a very important issue to rush through the approval process with so little time for the public to review the staff's recommendations and related material. However, even with the short review time, I have a number of reasons the proposed system by Southern California Edison (SCE) must be rejected.

The proposed Holtec UMAX underground dry storage system is an experimental unproven system. It cannot be inspected, repaired, maintained, or monitored and does not meet current Coastal Act requirements. The staff's "Approval with conditions" contains conditions that are unlikely to be met. The serious staff concerns that required these conditions demonstrates the inadequacy of this SCE proposed system. It is likely this system will be at our coast for decades, if not longer, as staff has indicated. There is adequate evidence to show that



this experimental Holtec system will likely not meet Coastal Commission short term or long term storage and transport requirements. To assume the system can or will be relocated, as the staff suggests, is not a reasonable assumption, based on known evidence. These high capacity (37 fuel assembly) canisters with high burnup fuel may need to cool in dry storage for over 45 years before they are cool enough to transport. (See slide 10 of this Department of Energy presentation. <http://www.nwtrb.gov/meetings/2013/april/boyle.pdf> ). The NRC has not approved this system in the configuration proposed by SCE and Holtec.

Additional comments and references below.

- **The report states SCE expects the service life of the ISFSI and casks to be at least 100 years and no major repairs are anticipated within 60 or 100 years. This is an unsubstantiated claim.** (Staff Report page 37). Please have SCE provide technical references for those statements. Are these Holtec technical documents submitted to the NRC? The NRC is only certifying the system for 20 years and is not considering degradation or other aging management issues that might occur after 20 years. The NRC doesn't consider claims by Holtec about those 60 and 100 years as anything the NRC has validated or approved (according to their Sept 2015 UMAX amendment 1 certification approval document). The staff report references email document "SCE 2015b." Please forward a copy of this document.

<http://www.gpo.gov/fdsys/pkg/FR-2015-09-08/pdf/2015-22053.pdf>

- **The statement "NRC has estimated that at least 30 years would be required for the initiation of stress corrosion cracking in steel fuel storage casks" is no longer valid.** (Staff Report Page 37). That statement is in the NRC 8/5/2015 meeting minutes on Stress Corrosion Cracking and Aging Management. The reason NRC said 30 years was because they assumed the canisters would not be cool enough for moisture to deliquesce (dissolve) salt on the canister for at least 30 years. However, at that time they were not aware of the **two-year old** Diablo Canyon canister that had temperatures low enough for salts to deliquesce. I participated in that and other NRC meetings on stress corrosion cracking in marine environments.

<http://pbadupws.nrc.gov/docs/ML1425/ML14258A081.pdf>  
[https://sanonofresafety.files.wordpress.com/2011/11/diablocan\\_yonscc-2014-10-23.pdf](https://sanonofresafety.files.wordpress.com/2011/11/diablocan_yonscc-2014-10-23.pdf)

- **The Koeberg nuclear plant had a component that leaked from stress corrosion cracks in 17 years.** It is located in a similar environment as San Onofre (on-shore winds, moist ocean air, frequent fog). The NRC considers the Koeberg component (a waste water tank) comparable to a stainless steel canister (304L or 316L stainless steel). The Koeberg through-wall crack was 0.61" thick. About the same thickness as the proposed Holtec canisters

(0.625" thick). San Onofre has also had stress corrosion cracking in stainless steel pipes that the NRC considers comparable to the thin steel canisters, so it's clear the environmental conditions are present at San Onofre. We do not need to wait 20 years to find this out, so the Coastal Commission should address this in the current application. References:

<http://pbadupws.nrc.gov/docs/ML1231/ML12319A440.pdf>

<http://pbadupws.nrc.gov/docs/ML1425/ML14258A082.pdf>

- **Existing Areva NUHOMS canisters have been loaded since 2003, so the idea that Edison needs to have an aging management plan in 20 years is not the case.** They need an aging management plan for their existing NUHOMS canisters and system. Does the existing NUHOMS canister ISFSI require a separate Coastal Commission renewal permit? Both the existing NUHOMS and proposed Holtec thin canisters are of the same materials (welded 316L stainless steel). We have only 5 years before we meet the Koeberg timeline. This idea we can wait 20 years is not realistic on many levels. To buy products originally designed for 20 years that do not have aging management built into the design is unacceptable. Edison should be required to provide their aging management plan now, so it can be fully evaluated by the Coastal Commission. What we already know is not adequate. This is too important an issue to base approvals on Edison promises of future solutions.
- **The UMAX system is an experimental unproven system.** Over 99 percent of dry storage system in the U.S. and the world are above ground systems. To claim this is typical or a proven U.S. systems is an inaccurate claim. On Staff Report page 11, the footnote states "A small HI-STORM UMAX system...is installed at Humboldt Bay Power Plant". This is not a UMAX system and has a very different design. The Humboldt Holtec HI-STAR HB system uses 1/2" thick canisters, but inserted them in thick steel bolted lid cask before placing them in the underground holes. Also, the fuel cooled for 35 years in the pools and was low burnup fuel, so no air vents were needed to cool the thin canister and fuel. In spite of this, water leaked into this system, which Holtec said would not happen. Their solution was to put caulking around the enclosure.

<https://sanonofresafety.files.wordpress.com/2011/11/ml13151a317.pdf>

<http://pbadupws.nrc.gov/docs/ML0531/ML053140041.pdf>

- **The Holtec UMAX system has not been approved by the NRC for the configuration planned for San Onofre and it has not been approved for the site.** The NRC will need a license amendment for the changes in order to properly evaluate for seismic, thermal and other technical requirements. The system is approved for 1/2" thick canisters, not 5/8" as proposed. The system is approved for a totally underground system, not the half underground system proposed. The NRC comments in their

September 2015 UMAX approval make this clear. I explained this and other items in the letter I sent to staff on September 17, 2015. It appears some of the public comments I have made have not been addressed. Or has Edison or Holtec or the NRC provided you different information?

<https://sanonofresafety.files.wordpress.com/2013/06/ltrtocoastalcommissiondgilmore2015-09-17umax-amend1.pdf>  
<http://www.gpo.gov/fdsys/pkg/FR-2015-09-08/pdf/2015-22053.pdf>

- **Aging management of the Holtec system is inadequate.** Even the Holtec President, Dr. Singh, says the canisters cannot be repaired. They cannot even find cracks, let alone repair them.  
<https://www.youtube.com/watch?v=euaFZtOYPi4&feature=youtu.be>
- **Relying on vendor promises of future solutions to be able to inspect and maintain the system should not be relied upon in Coastal Commission decision making.** The Coastal Commission should not make decisions based on "vaporware". State agencies are not allowed to procure "vaporware" (capabilities that do not exist), so why would the Coastal Commission make such an important decision assuming these most critical issue will be resolved by vendors?
- **The Coastal Commission should demand Edison use a proven system that can be inspected, maintained, have continuous monitoring, is transportable and doesn't crack.** This is the only way to meet Coastal Commission requirements. The NRC is only concerned with 20 years. The Coastal Commission is concerned with longer term requirements. Technology exists to meet both NRC and Coastal Commission requirements.
- **Rejecting the option of the thick casks, such as the German thick Castor casks (manufactured by Siemplekamp, designed by GNS), with the response "these thick-walled casks are not generally licensed for use at U.S. sites by the NRC" is not sufficient to reject thick casks.** (Staff Report page 20). There is also the option of thick metal casks such as the Areva TN-24 and TN-32 casks currently used in the U.S. Southern California Edison knows both the German and Areva thick metal casks have been licenses by the NRC, so there is every reason to believe they would receive a license for San Onofre. Given that these options are proven technologies used in the U.S. and are the main storage technologies used for the majority of the rest of the world for both storage and transportation, thick casks should not be a rejected alternative. This would better meet Coastal Commission requirements for longevity and transport and also meet NRC requirements. Thick casks are approximately 10 to 20 inches thick compared to the proposed thin canisters that are only 5/8th of an inch thick.

<https://sanonofresafety.files.wordpress.com/2011/11/reasonstobuythickcasks2015-04-16.pdf>  
[https://sanonofresafety.files.wordpress.com/2013/06/germany\\_caskstoragegorlebengns.jpg](https://sanonofresafety.files.wordpress.com/2013/06/germany_caskstoragegorlebengns.jpg)

- **There is already evidence for the staff to have sufficient probability that requirements to have canisters transportable and maintainable may not be met with the Holtec UMAX system.** Pushing the can down the road another 20 years isn't going to change that. The only reason no thin canisters have leaked yet is because they have not been in use long enough for cracks to go through the wall of the canister. We are at higher risk of cracks due to our corrosive coastal environment. We are the last location that should be using this inferior technology with materials known to crack from corrosive moist salt air. The NRC does not allow transport of cracking canisters. The underground portion of this system is subject to corrosive ground chemicals and yet cannot be inspected due to lack of technology to inspect this design.

<http://pbadupws.nrc.gov/docs/ML1432/ML14323A067.pdf>

- **Regarding Edison's promise of potentially moving the system to higher ground as the coastal environment degrades that would require a major expense and would likely cost over double the existing San Onofre Decommission Plan cost estimates.** The cost estimates they submitted to the NRC and CPUC assumes fuel will be picked up at the earliest DOE time frame, even though their documents state these dates are unlikely to be met. They also assume nothing will go wrong with the canisters. They have budgeted about \$1.3 billion for spent fuel management and plan to spend it all. They also plan to spend the entire \$4+ billion Decommission Trust Fund, so no monies will be available. What is the basis for accepting Edison's promise? Will ratepayers be required to pay for this? Is their promise and this plan reasonable?
- **Choosing thick casks meet Coastal Commission requirements for both relocation on-site and transport.** Thick casks are transportable. No additional transportation casks are needed. No protective concrete structures would need to be destroyed and rebuilt. No transfer casks are needed. Systems are installed above ground. Thick cask have seals that can be monitored and replaced. Once a thin canister cracks, it is no longer usable and cannot be repaired.

As the staff report clearly indicates there are many uncertainties regarding when or if the Department of Energy will pick up the fuel and many uncertainties about environmental conditions in our future. Therefore, we need to plan now for the best option, not wait for 20 years and hope something magical will change and assume the Holtec system can be relocated or transported. Please protect our coastal resources and do not allow this experimental Holtec UMAX system in our coastal

communities. It does not meet current Coastal Act requirements. It is folly to approve a system based on vendor and utility promises of future solutions when we have the facts we need to make better decisions now. Yes, we need an NRC approved system, but one that also meets Coastal Act requirements. Those two items are not mutually exclusive and are obtainable. Edison's unreasonably short artificial timeline should not be a driving factor for this decision that has long term implications for our Coastal resources.

Thank you,

**Laura Lynch**

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<https://www.facebook.com/artistlauralynch>

<https://twitter.com/ecoArtistLynch>

<http://weadartists.org/the-art-of-protest>

<http://www.artistlauralynch.com>

Additional information and references

- Reasons to Buy Thick Casks and Nuclear Storage Myths
  - <https://sanonofresafety.files.wordpress.com/2011/11/reasonstobuythickcasks2015-04-16.pdf>
- [SanOnofreSafety.org](http://SanOnofreSafety.org)
  - <http://sanonofresafety.org/>
- Nuclear Waste Storage and Transport
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- Coastal Commission October 6 Agenda and Location
  - <http://www.coastal.ca.gov/mtgcurr.html>

**From:** [Michael Aguirre](#)  
**To:** [Street, Joseph@Coastal](mailto:Street_Joseph@Coastal)  
**Subject:** Agenda Item 14 SCE Application for Nuclear Waste Permit  
**Date:** Monday, October 05, 2015 4:06:28 AM  
**Attachments:** [DktEntry 8-OPENING BRIEF.pdf](#)

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Mr. Street: Please find information providing additional support for questioning the reliability of SCE's statements and representations in support of its application. Reliance on SCE is unjustified and unreasonable regarding whether SCE has made a bona fide good faith effort to find an alternative site. Mike Aguirre

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No. 15-55762

UNITED STATES COURT OF APPEALS

FOR THE NINTH CIRCUIT

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CITIZENS OVERSIGHT, INC., a  
Delaware non-profit corporation, et al.,  
*Plaintiffs-Appellants*

v.

CALIFORNIA PUBLIC UTILITIES COMMISSION, et al.,  
*Defendants-Appellees*

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On Appeal From the United States District Court  
For the Southern District of California

Case No. 3:14-cv-02703-CAB (NLS)  
The Honorable Cynthia A. Bashant, Judge

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**APPELLANTS' OPENING BRIEF**

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## **CORPORATE DISCLOSURE STATEMENT**

Pursuant to Rule 26.1 of the Federal Rules of Appellate Procedure, Appellant Citizens Oversight, Inc., states that it is a Delaware non-profit corporation. It has no parent company, and no publicly held company holds more than ten percent of its stock.

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John Allen, <i>Combinations of Decision-making Functions, Ex Parte Communications, and Related Biasing Influences: A Process-Value Analysis</i> , 1993 UTAH LAW REVIEW 1135, 1197 (1993) .....	25
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### **STATEMENT OF JURISDICTION**

The district court had jurisdiction over this action pursuant to 28 U.S.C. §§ 1331, 1337 and 1343; and 28 U.S.C. §§ 2201 and 2202. Final judgment disposing of all claims was entered for defendants on April 16, 2015 and Appellants timely filed the notice of appeal on May 16, 2015 within the time provided by 28 U.S.C. § 2107(a).

This court has jurisdiction to hear this alleged violation of the United States Constitution under 28 U.S.C. § 1291.

### **RULING UNDER REVIEW**

The ruling under review is the question of whether the District Court under the Johnson Act [28 U.S.C. 1342 (3)] has to make an independent decision that the California Public Utilities Commission (CPUC) order making utility customers pay \$3,300,000,000 for the closed San Onofre electricity plant when it produces no electricity was issued after reasonable notice and hearing. In other words, does the district court have to determine whether the CPUC satisfied the notice and hearing requirements mandated by California state law. See, *ACTS Retirement-Life Cmtys*, 2012 WL 7277033 at \*6 (quoting *Tennyson*, 506 F.2d at 1141).

### **STATEMENT OF THE ISSUES PRESENTED**

This is an appeal from a final judgment in a case alleging property was taken without just compensation to pay for four failed steam generators at the now

mothballed San Onofre Nuclear Generating Station in northern San Diego County, California. (ER 50 judgment; ER 51-68 order granting motion to dismiss; ER 1445 complaint) Plaintiffs, a California non-profit organization and other concerned citizens, brought legal action on behalf of themselves and 17,400,000 Southern California utility customers whose property was taken without just compensation when the California Public Utilities Commission (CPUC) and Southern California Edison (SCE) forced its customers to pay more than \$700,000,000 for the failed Replacement Steam Generator (RSG) project and \$3,000,000,000 (\$3 billion) or more for the idle plant once it failed. (ER 1445-1446; 1450-1453)

The only way the CPUC could force customers to pay for the failed generators and closed plant would be with a showing under Cal. Pub. Util. Code § 451 that SCE acted reasonably in obtaining the generators. SCE and the CPUC did not attempt because substantial evidence exists to show SCE did not act reasonably when it obtained and deployed the steam generators. (ER 1446) SCE obtained and deployed the new steam generators without a safety license amendment from the Nuclear Regulatory Commission (NRC). Two engineers who worked on the steam generator project admitted avoiding of a safety license amendment was an SCE directive. (ER 1446)

The district court erroneously found the Johnson Act, 28 U.S.C. § 1342, divested the court from exercising jurisdiction over Plaintiffs' claims. (ER 017) The district court's error in granting Defendants' motions to dismiss present the following issues:

1. Did the Court below err when it found the only notice or hearing requirement was a CPUC Rule<sup>1</sup> requiring a conference with seven days notice prior to signing a settlement satisfied the Johnson Act?
2. Did the District Court err when it decided Plaintiffs are precluded from contesting whether Defendants complied with state mandated notice and hearing procedures when the CPUC issued an order requiring utility customers to pay the \$3,300,000,000 under the Johnson Act?

### **STANDARD OF REVIEW**

The district court's interpretation and construction of a federal statute are questions of law reviewed de novo. See *San Luis & Delta-Mendota Water Auth. v. United States*, 672 F.3d 676, 699 (9th Cir. 2012); *Lively v. Wild Oats Markets, Inc.*, 456 F.3d 933, 938 (9th Cir. 2006).

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<sup>1</sup> CPUC Rule of Practice and Procedure 12.1



## STATEMENT OF THE CASE

### I. FACTS RELEVANT TO ISSUES SUBMITTED FOR REVIEW

The pertinent facts underling the district court ruling under review are these. SCE is charging utility customers for the costs of the San Onofre Nuclear electricity plant (San Onofre), even though it has produced no electricity since January 2012. (ER 1445-1446) In December 2005, the CPUC allowed SCE to install four replacement steam generators at the San Onofre Nuclear power plant “followed by a reasonableness review of the project costs after completion.” (ER 1188, 39-42)

SCE was required to file an application with the CPUC for permission to put the replacement steam generator costs permanently in rates. (ER 455-456 ¶ 44) The application to put the steam generator costs permanently in rates was to be filed six months after the steam generators were installed and San Onofre was returned to commercial service. (ER 1456) San Onofre was returned to commercial service when the last steam generator was installed in February 2011. (ER 391) A date six months later would have required the application to have been filed by August 2011. (ER 1455-1456 ¶ 44) However, in April 2011, SCE informed the CPUC “of its current intent to file a single application, at the end of the **second quarter of 2012** (June 2012) that seeks authority: 1) to **permanently**

include in rates the capital costs incurred in the procurement an installation of replacement steam generators at [San Onofre].” (ER 391)

While SCE pushed off the date to apply for authority to put the steam generator costs permanently in rates, it collected them in rates on a provisional basis. (ER 459-460) On 27 December 2011, SCE sent an advice letter to the CPUC requesting to put \$115, 239, 000 of the steam generators’ costs in 2012 rates on an “interim basis (subject to refund).” (ER 458-460) While the project was underway but not completed, the CPUC had permitted SCE to provisionally collect in rates the steam generator costs “commencing on January 1 of the year subsequent to the date that installation of the new replacement steam generators is completed and they are placed in commercial operation.” (ER 459)

In December 2011, SCE employed this procedure for obtaining interim rates ten months after all four steam generators were installed and San Onofre had been returned to commercial service in February 2011. (ER 1457 ¶¶50, 391) All four steam generators failed by January 2012 (ER 1188-1189, 1454 ¶¶40), closing the plant (ER 1182, 821), and costing over \$3,300,000,000 (ER 1183). However, in June 2012, the CPUC allowed SCE to collect the 2012 rates \$115,000,000 of steam generator costs -- even though they had failed and the plant had closed. (ER 457) SCE evaded the hearing to determine if the steam generator costs should be

permanently in rates (ER 772-773) in deploying the four steam generators that together, lasted less than one year. (ER 1457 ¶ 50, 1183)

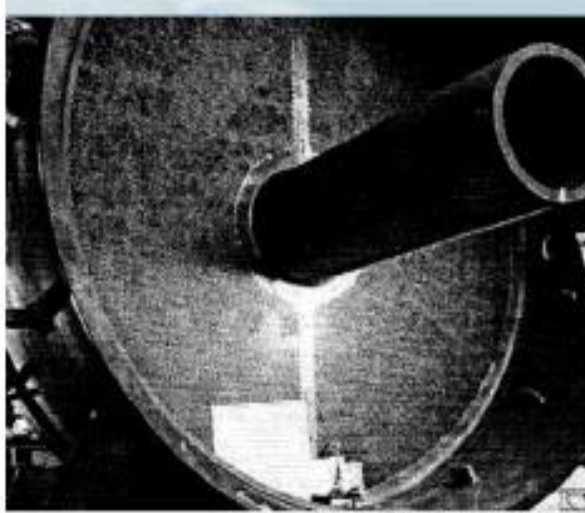
On 21 February 2013, one year after the steam generators failed, SCE was ordered to file an application to determine whether the steam generator costs could be recovered permanently in rates. (ER 1197) However, the CPUC put the application immediately on hold when it ruled examination of the question of whether SCE had acted reasonably was then “premature.” (ER 799)

The questions to be answered in the aborted investigation and reasonableness review were: (1) What error(s) led to the tube failure(s); (2) Who made those errors? (ER 717) SCE admits there were design errors that caused the steam generators to fail, but blamed them on the generator’s manufacturer. (ER 1448 ¶ 10) There was substantial evidence the errors were due to SCE’s decision to build “one of the largest steam generators ever built for the United States” (ER 386) that represented a “significant increase in the size from those” the SCE manufacturer had built and required it to “evolve a new design.” (ER 386)

As early as 30 November 2004, SCE knew about the potential that “design flaws” could cause “disastrous outcome.” (ER 388) In order to make room for 377 more tubes, SCE removed stabilizing components in the steam generators (ER 1447 ¶ 8):

8. The new design adopted for the new steam generators was materially different from the old steam generators. The new version raised serious safety issues which went unresolved, and eventually caused the generators to fail. The stay cylinders were removed, the “egg crate” protection was eliminated, while 4% more tubes at the center the new steam generators were added:

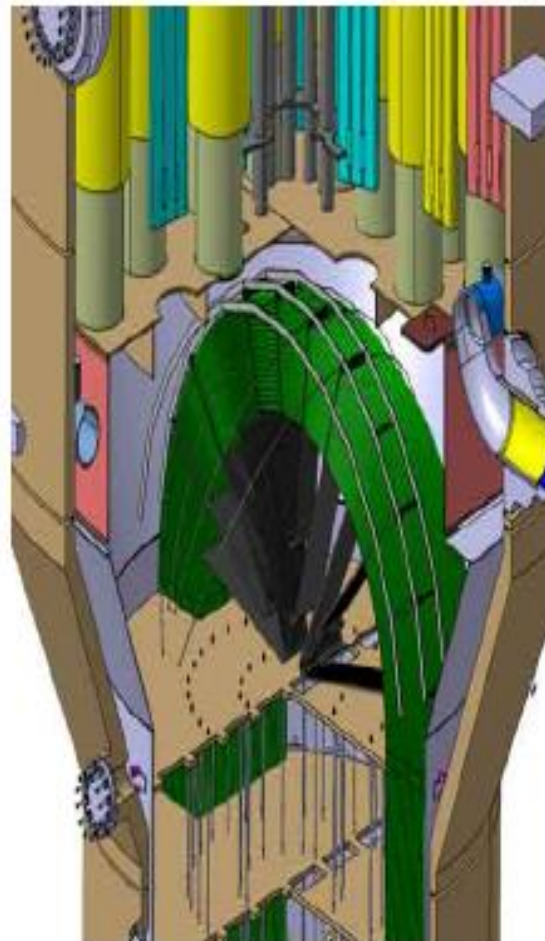
**STAY CYLINDERS WERE ELIMINATED**



**NO EGG CRATE TUBE PROTECTORS WERE INSTALLED**



**4% MORE TUBES ADDED AT THE CENTER**



The Atomic Safety and Licensing Board found SCE's new steam generators "differed in design from the original steam generators." For example, each new steam generator (1) has 9,727 tubes, which is 377 more than are in the original; (2) does not have a stay cylinder supporting the tube sheet; and (3) has a broached tube design rather than an "egg crate" tube support. (ER 288) The steam generator's manufacturer reported the design errors that crippled the generators that closed the plant were discovered, but not removed, so SCE could avoid having to request a safety license amendment from the Nuclear Regulatory Commission (NRC). (ER 1448 ¶ 10)

The CPUC then stalled the investigation and reasonableness review of San Onofre's shut down from January to November 2012. (ER 798) On 1 November 2012, the California Public Utility Commission (CPUC) issued an Order of Investigation (OII) to determine whether to order the "immediate removal \*\* of all costs related to the San Onofre Nuclear power station from utility rates." (ER 509-510) The category of the proceeding was determined to be rate setting. (ER 524) Communications with decision makers and advisors were thus subject to the restrictions of CPUC Rule 8.4 (ER 530) requiring notice of ex parte communications to be filed within three working days of the communication. (ER 360)

However, on 7 December 2012, after her ex parte communications (ER 37-49) with the SCE official in charge of San Onofre, the assigned Administrative Law Judge postponed indefinitely the investigation into whether SCE acted reasonably. (ER 042) This initial postponement was confirmed in January 2013. (ER 541, 1466 ¶ 82)

On 25 November 2014, without conducting either the reasonableness review or the investigation, the CPUC ordered utility customers to pay the \$3,300,000,000 in costs caused by the failed generators. (ER 1183, 1446 ¶ 4) The framework of the order that required utility customers to pay those costs was formed at a secret meeting in Warsaw, Poland on March 26, 2013 by then-CPUC President Michael Peevey and SCE Executive Vice President of External Relations, Stephen Pickett. (ER 118-119, 551-552)

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1. Pre-RSG investment: recover w/ debt-level return through 2022.
2. RSG and post-RSG investment: disallow "retroactively out of rate base" effective 2/1/2012 ~~effective 2/1/2012~~
3. Replacement power responsibility: customer
4. NEIL/insurance recoveries: to customers
5. MAI recovery: 1<sup>st</sup> to SCE to the extent of the disallowance  
2<sup>d</sup> to customers
6. Decommissioning costs: remain in rates through time of decommissioning -- periodic redetermination in CPUC proceedings as before
7. O&M:
  - a) Already approved GRC amounts through shutdown + 6 months
  - b) OII to determine shutdown O&M through end of 2017 (i.e., not in GRC)
  - c) shutdown O&M 2018 and beyond determined in GRC's
  - d) Shutdown O&M to include reasonable severance for SONGS employees - A per of \$50 million

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8. Environmental offset: SCE to donate \$5<sup>10</sup> million per year 2019-2022 to \_\_\_\_\_ {an agreed upon GHG, climate, or environmental academic research fund, institution, etc.}

9. Process
- a) settlement agreement approved in OJI
  - b) balance of OJI closed except for shutdown O&M phase
  - c) new OJI phase for shutdown O&M per 7(b) and 7(d) above
  - d) 2018 GRC for shutdown O&M 2018 and beyond
  - e) Usual CPUC proceedings for review of decommissioning costs

MHI Recovery

- 1- First \$200 million — 50% cost, 50% SCE
- 2- Next \$200 million — 70% cost, 30% SCE
- 3- Any above \$400 million — 80% to 5, 20% to 0 up to disallowance
- 4- Above disallowance — 25% SCE, 75% cost

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The notes about the replacement steam generator settlement (known as the “RSG notes”)<sup>2</sup> recording the settlement order’s framework were found and seized from CPUC President Michael Peevey’s home office desk by a California state criminal investigator executing a search warrant. (ER 758, 766) The RSG notes were made on the Bristol Hotel stationery where Peevey and Pickett had met in Warsaw, Poland in March 2013. The search warrant property receipt recorded the receipt of: “RSG Notes on Hotel Bristol stationery.”<sup>3</sup> The San Diego Union Tribune reported the State Attorney General investigator had seized the RSG notes at Peevey’s house on 30 January 2015:<sup>4</sup>

**AG cites possible felony crime in raid on ex-utility boss  
Warrant indicates notes involving San Onofre may  
have been among items seized**

**By Jeff McDonald (/staff/jeff-mcdonald/), 12:05 p.m.,  
Jan. 30, 2015**

State agents seized bank statements, computers, miscellaneous files and a host of other materials from the Los Angeles area home of former California Public Utilities Commission President Michael Peevey this week, indicating a public-corruption case is growing more serious.

According to the search warrant and an inventory of materials seized by Attorney General’s office

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<sup>2</sup> RSG refers to the defective four “Replacement Steam Generators” installed in 2010 and 2011 at the San Onofre nuclear power plant that failed, causing the plant to permanently close.

<sup>3</sup> ER 073-074

<sup>4</sup> ER 816

investigators, Peevey is suspected of committing at least one felony offense.

The 13-page document, obtained by U-T Watchdog on Friday, shows state agents executed a search warrant Tuesday at the La Canada Flintridge home Peevey shares with his wife, state Sen. Carol Liu.

“It is further ordered that affiant be allowed to share information with federal and state and criminal and civil law enforcement authorities who are also investigating this matter,” the records state.

The records show agents took an iMac computer, a MacBook Pro, three Dell computers, a thumb drive and six day planners.

They also seized “RSG notes on Hotel Bristol stationery,” which may be a reference to replacement steam generators – the fatally flawed project that led to the premature decommissioning of the San Onofre nuclear power plant on San Diego County’s north coast.

Also, they took a roster of utilities commission employees as of Dec. 2, 2014, which Peevey had at his home for some reason as he neared departure from his post.

Ratepayers in San Diego County and Southern California are covering \$3.3 billion out of \$4.7 billion in shutdown costs as a result of faulty steam generators that leaked in 2012 and prompted the plant to close for good in 2013.

On 9 February 2016, nine days after the Union Tribune reported criminal investigators under a search warrant had seized the RSG notes from the CPUC

President, and 683 days after SCE was supposed to report such ex parte communications, SCE admitted Pickett had met with Peevey in Warsaw:<sup>5</sup>

**SOUTHERN CALIFORNIA EDISON COMPANY'S  
(U 338-E)  
LATE-FILED NOTICE OF EX PARTE  
COMMUNICATION**

Southern California Edison (SCE) respectfully submits this late-filed Notice of Ex Parte Communication. On or about March 26, 2013, former SCE Executive Vice President of External Relations, Stephen Pickett, met with then-President Michael Peevey at this Bristol Hotel in Warsaw, Poland in connection with an industry event. To the best of Mr. Pickett's recollection, the meeting lasted approximately 30 minutes. Mr. Pickett recalls that Ed Randolph, Director of Energy Division, also was present for some or all of the meeting.

The meeting was initiated by Mr. Peevey, who had requested an update on the status of SCE's efforts to restart San Onofre Nuclear Generating Station (SONGS) Unit 2. Mr. Pickett provided the requested update. Thereafter, in the course of the meeting, Mr. Peevey initiated a communication on a framework for a possible resolution of the Order Instituting Investigation (OII) that he would consider acceptable but would nonetheless require agreement among at least some of the parties to the OII and presentation to and approval of such agreement by the full Commission. Mr. Pickett believes that he expressed a brief reaction to at least one of Mr. Peevey's comments. Mr. Pickett took notes during the meeting, which Mr. Peevey kept; SCE does not have a copy of those notes.

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<sup>5</sup> ER 551-552

The secret meeting in Warsaw was followed up with a score of secret meetings amongst CPUC officials, SCE executives, and two ratepayer advocates. (ER 75-77) At these meetings, the participants learned of the Warsaw meeting and the deal struck there. The CPUC and SCE initiated a media blitzkrieg to foist the deal on utility customers representing it as a \$1.4 billion refund to utility customers, when in fact, it was a \$3.3 billion charge. There were a series of other ex parte conferences between SCE and CPUC decision makers, and then in March 2014, the “settlement” was announced.

On 14 May 2014, a hearing on the settlement agreeent was held. However, the ex parte Warsaw, Poland meeting was not disclosed. A second search warrant was issued in connection with this hearing. The CPUC Administrative Law Judge who participated in undisclosed ex parte communications remains on the case to which utility customers have objected, blocking them from receiving a fair notice and hearing. (ER 37-47)

## **II. RELEVANT PROCEDURAL HISTORY**

Plaintiffs filed their complaint alleging an unlawful taking under the Fifth Amendment to the United States Constitution on November 13, 2014. (ER 1443-1470) Attached as an Exhibit to the complaint was the case *S. Cal. Edison Co. v Lynch*, 307 F.3d 794 (9<sup>th</sup> Cir. 2002) – a case filed by Defendant/Respondent here, Southern California Edison (SCE), in district court alleging a Fifth Amendment

taking by the California Public Utilities Commission when the CPUC refused to allow it to increase its rates it charged customers. (ER 1471-1490) Also attached to the complaint were emails and ex parte communications between the CPUC and the utility SCE (ER 1491-1513), and public records requests seeking to obtain such information. (ER 1514-1519)

Defendant SCE filed a motion to dismiss Plaintiffs' complaint that alleged a Fifth Amendment taking by the California Public Utilities Commission when the CPUC to increase the rates it charged customers for the failed steam generators without having provided reasonable notice and hearing. (ER 1116-1142; ER 1013-1016)

The CPUC also filed a motion to dismiss the complaint the case challenging jurisdiction under the Johnson Act. (ER 1143-1173; ER 1174-1442)

Plaintiffs opposed both motions, alleging the secret meetings in Warsaw and elsewhere, and meeting in disregard of the ex parte rules, did not provide reasonable notice and hearing. (ER 0281-1012) Defendants filed their reply brief. (ER 118-280)

Before the district court heard the case but after Plaintiffs' responsive briefing, Plaintiffs filed the recently released "RSG" Hotel Bristol Notes with the Court. (ER 103-107) Defendant SCE filed a Response (ER 081-083), and Plaintiffs filed a reply. (ER 069-080)

The court heard argument (ER 019-035) and issued an order confirming its tentative ruling. (ER 085-102; ER 051-068) Judgment was entered (ER 050) and the matter appealed. (ER 048-049)

## **SUMMARY OF ARGUMENT**

The United States District Court was not deprived of jurisdiction under the Johnson Act to hear utility customers' constitutional claim because there was not a fair or reasonable notice and hearing.

## **ARGUMENT**

### **I. INTRODUCTION**

Utility customers should not be ordered on the threat of losing their electricity service to pay over \$3,300,000,000 for the defunct San Onofre Power Plant (which produces no electricity) without a fair notice and hearing. When the shoe was on the other foot and SCE was providing electricity to utility customers, for which SCE was not paid, SCE had no difficulty recognizing that such an outcome violated the U.S. Constitution. *S. Cal. Edison Co. v. Lynch* 307 F.3d 794 (9<sup>th</sup> Cir. 2002) ("Lynch")

From *Lynch* we learned that "District courts have an obligation and a duty to decide cases properly before them." *S. Cal. Edison Co. v. Lynch*, 307 F.3d 794, 805 (9<sup>th</sup> Cir. Cal. 2002) We also learned that in both cases, the one here seeking relief from rates for electricity charged not produced, and the other in which rates



were sought for electricity produced and not paid for, the CPUC was on SCE's side and against the utility customers who the CPUC is supposed to protect. In fact, in *Lynch*, the CPUC "expressly waived any abstention defense to SoCal Edison's action and consented to the Stipulated Judgment." *S. Cal. Edison Co. v. Lynch*, 307 F.3d 794, 806 (9th Cir. Cal. 2002)

In *Lynch*, the Ninth Circuit instructed that "Due process requires that a party affected by government action be given "the opportunity to be heard at a meaningful time and in a meaningful manner." *S. Cal. Edison Co. v. Lynch*, 307 F.3d 794, 807 (9th Cir. Cal. 2002)

## **II. CPUC NOTICE AND HEARING REQUIREMENTS**

The utility customers were entitled to a hearing on whether SCE acted reasonably in deploying the defective steam generators before ordering utility customers to pay the \$3,300,000,000 in costs SCE caused. Cal Pub Util Code § 451. An order imposing the San Onofre costs on utility customers required notice and a hearing on the question of whether the defunct plant was used and useful. Pub Util Code 454.8.

The utility customers were entitled to the protection afforded them under the CPUC ex parte rules, which required ex parte communications with CPUC decision makers, like those that occurred at Warsaw, Poland, be reported in three days. CPUC Rule 8.4.

None of these protections were present here.

### **III. UTILITY CUSTOMERS WERE ENTITLED TO REAL NOTICE AND HEARING**

Before they could be ordered to pay the costs caused by the failed steam generators, customers were entitled to: “a real notice and [to be] afford[ed] a real hearing.” *Meridian v. Mississippi Valley Gas Co.*, 214 F.2d 525, 526 (5th Cir. Miss. 1954) Thus, the Johnson Act’s limit on a district court’s jurisdiction applies only when the parties “had an adequate opportunity to litigate.” *Brooks v. Sulphur Springs Valley Electric Corp* 951 F. 2d. 1050, 1055 (9th Cir. 1991)

The language of the statute is plain; it applies only when the “order has been made after reasonable notice and hearing.”<sup>6</sup> The language of the Johnson Act is so plain, the legislative history is so consonant with the language, the mischief it was designed to reach and the remedy determined upon and afforded by it is so clear as to make further discussion, and the citation of authorities in support of these views unnecessary. *Meridian v. Mississippi Valley Gas Co.*, 214 F.2d 525, 526 (5th Cir. Miss. 1954) Holding the notice and hearing essential in judicial proceedings would not seem to be indispensable' “if accepted and followed as to the promise of the Johnson Act for notice and hearing, would keep it to the ear while it breaks it to the

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<sup>6</sup> 28 U.S.C. 1342

hope.”<sup>7</sup> *Meridian v. Mississippi Valley Gas Co.*, 214 F.2d 525, 526 (5th Cir. Miss. 1954)

The legislative history makes clear the target of the (Hiram) Johnson Act was the utilities’ abusive practice of delaying Commission orders issued after fair notice and hearing by filing federal court cases:

The Johnson bill contains but one substantive proposition, and that is to divest the district courts of the United States of jurisdiction in public-utility rate cases of an intrastate character where-and I call attention particularly to these features of the bill--**a fair hearing after notice** has been had before the State public utility commission and where an adequate remedy for any wrong is provided in the courts of law and equity of that State. 78 Cong. 8338 (statement Rep. Tarver)

The question involves the resort of **the utility companies** to our Federal courts with the consequent delays and the expense and the alleged abuses to which such resort has given rise. 78 Cong. Rec 8322 (1934) (statement of Rep. O’Connor)

Is it not a fact that in many instances these **utility corporations**, when they cannot obtain all they desire from the utility commissions, jump into the Federal courts and go even as far as to demand and secure a receivership for corporations that should not be forced into receivership or bankruptcy, as has been done in several of the cities of the United States? 78 Cong. Rec 8323 (1934) (statement of Rep. Sabath)

After the telephone company finally lost the case they were directed to refund the money to the patrons, but they were not able to refund \$600,000 because in this long interval of time a sufficient number of patrons to be entitled to that sum of money had moved away, had died, or had become otherwise inaccessible, and, so far as the record discloses, the \$600,000 was converted into the treasury of the

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<sup>7</sup> Macbeth Act 5 Scene 8 They tricked me with their word games, raising my hopes and then destroying them. (in plain English)

telephone company, money to which it was not entitled, but which it was enabled to secure through this Federal court procedure. 78 Cong. Rec. 8338 (1934) (statement of Mr. Traver)

If **the utility** chooses to bring such action in the lower Federal courts, such courts are authorized by Federal law to try the case de novo and to substitute their judgment, both on the facts and the law, for the judgment of the State commissions. 78 Cong. Rec. 8324 (1934) (statement of Rep. Mapes)

The evidence at these hearings tended to establish that, under the present procedure in the Federal courts, grave abuses have arisen in some cases where **utility corporations** have sought injunctive relief from orders by State boards or commissions fixing rates. 78 Cong. Rec. 8326 (1934) (Reptr Majority Senate Judiciary Committee)

Citizens complaining of rates alleged to be excessive have sometimes been unable, because of limited funds, properly to present their case a second time in the United States court after having already presented it once fully before the board or commission, with the result, so it is claimed, that efforts to secure relief from extortionate rates have had to be abandoned. The mere threat by the **utility company** that it would seek an injunction in a United States court, involving the prospect or great additional expense and delay, has sometimes been sufficient to force a compromise unfavorable to the public interest. 78 Cong. 8326 (1934) (Rep Majority Senate Judicial Committee)

Today the course is not uncommon for a public utility whose rates have been fixed by a State utility regulatory body to proceed, if it desires, within the State court, obtain its injunction, try its case up to a certain point, and then, with the power that is given it under the diversity of the citizenship clause, take its case into the Federal district court as well, and there interminably delay the matter. 78 Cong. 8335 (1934) (statement Senator Johnson)

For instance, take the case of this sort: The largest utility corporation in the State of California is what is called the "**PG. & E.**", that is, the Pacific Gas & Electric Co. Recently there has been a trial before our railroad commission, a railroad commission of which Californians are very proud, and which has done a remarkably excellent work and in

its early stages a work under very great difficulty. There has been a trial there of the rates that have been fixed. The trial has lasted between 1 and 2 years I think. Upon both sides there has been an immense amount of testimony taken before the Railroad Commission of the State of California. On the testimony taken, the expert witnesses, money has been expended to a very, very large extent, both by the State and, legitimately, by the **utility**. The case finally is determined. The railroad commission decides what rates believes to be just. Not content with the remedy that is accorded by the State court; not content with their act, its ultimate appeal to the Supreme Court of the United States, the utility goes into the Federal district court, and the three-Judge District court, when its next term meets, grants an injunction against the acts of the railroad commission, appoints a master and this is the course, in general, of this sort of procedure. 78 Cong. 8335 (1934) (statement Senator Johnson)

But the then Governor of New York State found that they are just what I found when I was Governor of the State of California, and just what every other man has found that holds a public position in a State and tries to render and perform his duty unto the people of the State, rather than unto its corporations. And the Governor of New York found that situation confronting him, and in no uncertain tones he expressed himself. It was in 1930 that he said, in a message to the legislature:

The recent decision of the Federal Court in the Southern District of New York, permitting the New York Telephone Co drastically to raise its telephone rates, brings to the fore in a striking way the whole question of interference by the United States court with the regulatory powers of our Public Service Commission. • • •

It means that hearings and trials which rightfully should be held before our Public Service Commission or before State courts are, by a scratch of the pen, transferred to special master appointed by the Federal court. The State regulatory body • • • • is laughed at **by the utility** seeking refuge with a special master, who is unequipped by experience and training, as well as by staff and assistants, to pursue that searching inquiry into the claims of the property which the consuming public is entitled to demand. The special master becomes

the rate maker; the Public Service Commission becomes a mere legal fantasy. This power of the Federal court must be abrogated.

This is the language of the President when he was Governor of New York and he expresses very much better than most of us can express, exactly how the Iron has entered the soul of every man who, within his State, endeavors, with that State power, to give the remedy and relief to its people **from extortionate, outrageous, and shameful rates charged by a public utility**. He expresses it so well that I am very glad to adopt his language; and I wish It were possible for me to express myself with equal facility on this occasion. 78 Cong. 8336 (1934) (statement Sen. Johnson)

Everyone knows if there is anything wrong with the Johnson bill no one is to blame save the utilities themselves. They have brought this upon themselves by abusing their opportunity to invoke the jurisdiction of the Federal courts, invoking that jurisdiction not for the primary purpose of redressing a wrong or obtaining justice but primarily for the purpose of obtaining delay. 78 Cong. 8336 (1934) (statement Rep. McGugin)

When a public-service commission hears a case after notice and renders a fair decision, is that not due process of law. It is to the citizen who has to abide by it. Why should not the power company and the gas company or the telephone company abide by the same decision? 78 Cong. 8339 (statement of Rep. Tarver)

The people of the United States, it seems to me, will realize that this great octopus-this greedy monopoly, living on the pennies which are contributed by God's poor, stealing out of the school children's hands the pennies given to them by their parents, going into every home, into every little town, and taking their toll from the toil and sweat of millions of our people in order that they may debauch the very people they rob-presents a picture that ought to cause every man to raise his voice in condemnation of such an unholy, such a wicked, such an indefensible thing. 78 Cong. 8342 (statement Rep. Carpenter)

The miscarriage of justice in those cases were notorious. The companies were playing a game of fast and loose with both the State and the United States courts. When this was brought to my attention,

I introduced in the House the bill H.R. 73, a companion bill to that of Senator Johnson. 78 Cong. 8350 (1934) (statement Rep Martin)

A regulatory commission in your State decides to lower a rate that is being charged by some utility. What takes place? \*\* Then they will take you into the Federal court and do it all over again. You have to put in new evidence, because it is a trial de novo. 78 Cong. 8350 (1934) (statement Rep. McKeown)

#### **IV. DISTRICT COURT MUST MAKE INDEPENDENT DECISION**

The federal court must make an independent decision regarding the order requiring utility customers to pay over \$3,000,000,000 for the failed San Onofre plant that “has been made after reasonable notice and hearing.” *Meridian v. Mississippi Valley Gas Co.*, 214 F.2d 525, 526 (5th Cir. Miss. 1954) It is for the “court whose jurisdiction is invoked to determine whether reasonable notice and hearing, as provided in the [Johnson] Act, were afforded [not] for the defendant to determine this for itself and for the plaintiff to be bound by that determination.” *Id.*

Allowing the state agency under review to make the decision “would nullify the purpose of Congress to channel normal rate litigation into the State Courts while leaving Federal Courts free in the exercise of their equity powers to relieve against arbitrary action.” *Id.*

#### **V. ORDER REQUIRING UTILITY CUSTOMERS TO PAY \$3.3 BILLION WAS MADE WITHOUT REASONABLE NOTICE AND HEARING**

Ex parte communication is defined under the Federal Administrative Procedure Act as “an oral or written communication not on the public record with



respect to which reasonable prior notice to all parties is not given, but it shall not include requests for status reports on any matter or proceeding covered by this subchapter.” Administrative Procedure Act, 5 U.S.C. § 551(14)<sup>8</sup> Black’s Law Dictionary defines “ex parte” as “on one side only; by or for one party; done for, in behalf of, or on the application of, one party only.”

One of the primary purposes of restrictions on ex parte contacts with decision-makers is to prevent a party from gaining an unfair advantage in a contested matter. See, *Portland Audubon Society v. Endangered Species Committee*, 984 F.2d 1534, 1543 (9th Cir. 1993) By not being subject to the adversarial process, ex parte contacts violate the right to a fair hearing. C. Wolfram, MODERN LEGAL ETHICS, § 11.3 (“Such contacts violate the right of every party to a fair hearing, a corollary of which is the right to hear all evidence and argument offered by an adversary. The violation is particularly acute because the calculated secretiveness of such communications strongly suggests their inaccuracy.”); See, John Allen, *Combinations of Decision-making Functions, Ex Parte Communications, and Related Biasing Influences: A Process-Value Analysis*, 1993 UTAH LAW REVIEW 1135, 1197 (1993) (“Unchallenged evidence or

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<sup>8</sup> See, D. Behles & S. Weissman 1 Ex Parte Requirements at the California Public Utility Commission: A Comparative Analysis and Recommended Changes. [http://cdn.ca9.uscourts.gov/datastore/uploads/guides/appellate\\_jurisdiction\\_outline/Appellate%20Jurisdiction%20Outline%202012%20update\\_rev.pdf](http://cdn.ca9.uscourts.gov/datastore/uploads/guides/appellate_jurisdiction_outline/Appellate%20Jurisdiction%20Outline%202012%20update_rev.pdf) (utility customers draw heavily on the work product of this article)

arguments are more salient, more likely to be recalled by the decision maker, and more likely to carry inordinate weight in the mental process of reaching a final conclusion.”)

Improper ex parte communications have been referred to as fraud by the court, because they interfere with the decision-makers ability to make a fair decision. *See, e.g., State ex. Rel. Corbin v. Arizona Corp. Com’n*, 143 Ariz. 219 (1984). As one court summarized: “a party’s right to due process is violated when the agency decision-maker improperly allows ex parte communications from one of the parties to the controversy.” *State ex. Rel. Corbin v. Arizona Corp. Com’n*, 143 Ariz. 219 (1984)

Allowing ex parte contacts can essentially nullify the public’s right to attend and participate in agency decisions. As the Ninth Circuit observed:

The public’s right to attend all Committee meetings, participate in all Committee hearings, and have access to all Committee records would be effectively nullified if the Committee were permitted to base its decisions on the private conversations and secret talking points and arguments to which the public and the participating parties have no access. *Portland Audubon Society v. Endangered Species Committee*, 984 F.2d 1534, 1542 (9th Cir. 1993) (*citing United States Lines, Inc. v. Federal Maritime Comm’n*, 584 F.2d 519, 539 (D.C. Cir. 1978).

The ex parte meeting in Warsaw, where, according to SCE’s admission the “framework” of the settlement was discussed, was one in which the public did not attend and participate. This settlement, according to the Ninth Circuit, effectively

nullifies the public's right to attend. The Warsaw settlement framework is the exact type of secret talking points criticized by the Ninth Circuit.

The D.C. Circuit has further stated that ex parte contacts make a “mockery of justice.”

We think it is a mockery of justice to even suggest that judges or other decision-makers may be properly approached on the merits of a case during the pendency of an adjudication. Administrative and judicial adjudication are viable only so long as the integrity of the decision making process remains inviolate. There would be no way to protect the sanctity of the adjudicatory process if we were to condone direct attempts to influence decision-makers through ex parte contacts. *Professional Air Traffic Controllers Org. v. Federal Labor Relations Auth.*, 685 F.2d 547, 570 (D.C. Cir. 1982).

In addition to issues of general fairness and possible taint of the decision, ex parte contacts can also damage the “integrity of the decision making process itself, and the public's perception of the process.” *Re Contacts Between Public Utilities and Former Commissioners*, 82 P.U.R.4th 559, 1987 WL 257598 (Minn. P.U.C. 1987). Such ex parte discussions also offend the Bagley-Keene open meeting law and the California State Constitution's Article 1 § 3 which provides:

The people have the right to instruct their representatives, petition government for redress of grievances, and assemble freely to consult for the common good. The people have the right of access to information concerning the conduct of the people's business, and, therefore, the meetings of public bodies and the writings of public officials and agencies shall be open to public scrutiny.

On the record before this Court and the District Court below, the CPUC order requiring utility customers to pay SCE \$3.3 billion cannot be said, as a

matter of law, to have provided plaintiffs reasonable notice and hearing. Accordingly, the Johnson Act requirements are not met and the matter should be reversed and remanded.

### **CONCLUSION**

The order requiring utility customers to pay over \$3,300,000,000 was issued without fair notice or hearing, and therefore all the conditions of the Johnson Act are not met. The order below should be reversed, and the case remanded to the district court for further proceedings and discovery.

Respectfully submitted,

AGUIRRE & SEVERSON LLP

Dated: September 23, 2015

/s/Michael J. Aguirre  
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### **CERTIFICATE OF COMPLIANCE**

This brief complies with the type-volume limitation of Fed. R. App. P. 32(a)(7)(B) because this brief contains 6,108 words, excluding the parts of the brief exempted by Fed. R. App. P. 32(a)(7)(B)(iii).

This brief complies with the typeface requirements of Fed. R. App. P. 32(a)(5) and the type style requirements of Fed. R. App. P. 32(a)(6) because this brief has been prepared in a proportionally spaced typeface using Microsoft Office Word, Times New Roman, 14-point.

Respectfully submitted,

Dated: September 23, 2015

/s/Michael J. Aguirre  
Michael J. Aguirre  
Attorneys for Plaintiffs-Appellants

### **STATEMENT OF RELATED CASES**

Pursuant to Ninth Circuit Court Rule 28-2.61, Appellants advise they are not aware of any related cases pending in the United States District Court for the Ninth Circuit.

### **CERTIFICATE OF SERVICE**

I hereby certify that I electronically filed the foregoing APPELLANTS' OPENING BRIEF and APPELLANTS' EXCERPT OF RECORD with the Clerk of the Court for the United States Court of Appeals for the Ninth Circuit by using the appellate CM/ECF system on September 23, 2015.

Participants in the case who are registered CM/ECF users will be served by the appellate CM/ECF system.

/s/Michael J. Aguirre  
MICHAEL J. AGUIRRE



**From:** [Michael Aguirre](#)  
**To:** [Street, Joseph@Coastal](mailto:Street_Joseph@Coastal)  
**Subject:** Agenda Item 14 SCE Nuclear Waste Permit  
**Date:** Monday, October 05, 2015 4:15:55 AM  
**Attachments:** [Pages from naiic\\_report.pdf](#)

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Greetings: Please find the Diet Fukushima Report providing historical perspective and support for not granting the permit. Mike Aguirre

Mike Aguirre  
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501 West Broadway  
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The National Diet of Japan

*The official report of*

**The Fukushima  
Nuclear Accident Independent  
Investigation Commission**

*Executive summary*



# The National Diet of Japan Fukushima Nuclear Accident Independent Investigation Commission

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*Medical Doctor; Academic Fellow, National Graduate Institute for Policy Studies;  
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**THE NATIONAL DIET OF JAPAN**  
**FUKUSHIMA NUCLEAR ACCIDENT INDEPENDENT INVESTIGATION COMMISSION**  
 (NAIIC)

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To:

MR. TAKAHIRO YOKOMICHI, SPEAKER OF THE HOUSE OF REPRESENTATIVES

MR. KENJI HIRATA, PRESIDENT OF THE HOUSE OF COUNCILLORS

**THE NATIONAL DIET OF JAPAN**

THE UNPRECEDENTED NUCLEAR ACCIDENT that began on March 11, 2011 is the subject of the following report, which we hereby present to the members of the National Diet of Japan for their review. We do this in accordance with the Act Regarding the Fukushima Nuclear Accident Independent Investigation Commission.

Our investigative task is adjourned today, some six months after the appointment of our Chairman and Members in December of 2011.

This report is meant to reinforce the administrative authority of the legislative body and strengthen oversight activities on issues related to nuclear power. As the first independent commission chartered by the Diet in the history of Japan's constitutional government, we would like to emphasize how important it is that this report be utilized, for the Japanese people and for the people of the world.

CHAIRMAN:

KIYOSHI KUROKAWA

MEMBERS:

KENZO OSHIMA

HISAKO SAKIYAMA

MASAFUMI SAKURAI

YOSHINORI YOKOYAMA

MITSUHIKO TANAKA

KOICHI TANAKA

KATSUHIKO ISHIBASHI

REIKO HACHISUKA

SHUYA NOMURA





## Message from the Chairman

THE EARTHQUAKE AND TSUNAMI of March 11, 2011 were natural disasters of a magnitude that shocked the entire world. Although triggered by these cataclysmic events, the subsequent accident at the Fukushima Daiichi Nuclear Power Plant cannot be regarded as a natural disaster. It was a profoundly manmade disaster – that could and should have been foreseen and prevented. And its effects could have been mitigated by a more effective human response.

How could such an accident occur in Japan, a nation that takes such great pride in its global reputation for excellence in engineering and technology? This Commission believes the Japanese people – and the global community – deserve a full, honest and transparent answer to this question.

Our report catalogues a multitude of errors and willful negligence that left the Fukushima plant unprepared for the events of March 11. And it examines serious deficiencies in the response to the accident by TEPCO, regulators and the government.

For all the extensive detail it provides, what this report cannot fully convey – especially to a global audience – is the mindset that supported the negligence behind this disaster.

What must be admitted – very painfully – is that this was a disaster “Made in Japan.” Its fundamental causes are to be found in the ingrained conventions of Japanese culture: our reflexive obedience; our reluctance to question authority; our devotion to ‘sticking with the program’; our groupism; and our insularity.

Had other Japanese been in the shoes of those who bear responsibility for this accident, the result may well have been the same.

Following the 1970s “oil shocks,” Japan accelerated the development of nuclear power in an effort to achieve national energy security. As such, it was embraced as a policy goal by government and business alike, and pursued with the same single-minded determination that drove Japan’s postwar economic miracle.

With such a powerful mandate, nuclear power became an unstoppable force, immune to scrutiny by civil society. Its regulation was entrusted to the same government bureaucracy responsible for its promotion. At a time when Japan’s self-confidence was soaring, a tightly knit elite with enormous financial resources had diminishing regard for anything ‘not invented here.’

This conceit was reinforced by the collective mindset of Japanese bureaucracy, by which the first duty of any individual bureaucrat is to defend the interests of his organization. Carried to an extreme, this led bureaucrats to put organizational interests ahead of their paramount duty to protect public safety.

Only by grasping this mindset can one understand how Japan’s nuclear industry managed to avoid absorbing the critical lessons learned from Three Mile Island and Chernobyl; and how it became accepted practice to resist regulatory pressure and cover up small-scale accidents. It was this mindset that led to the disaster at the Fukushima Daiichi Nuclear Plant.

This report singles out numerous individuals and organizations for harsh criticism, but the goal is not—and should not be—to lay blame. The goal must be to learn from this disaster, and reflect deeply on its fundamental causes, in order to ensure that it is never repeated.

Many of the lessons relate to policies and procedures, but the most important is one upon which each and every Japanese citizen should reflect very deeply.

The consequences of negligence at Fukushima stand out as catastrophic, but the mindset that supported it can be found across Japan. In recognizing that fact, each of us should reflect on our responsibility as individuals in a democratic society.

As the first investigative commission to be empowered by the legislature and independent of the bureaucracy, we hope this initiative can contribute to the development of Japan’s civil society.

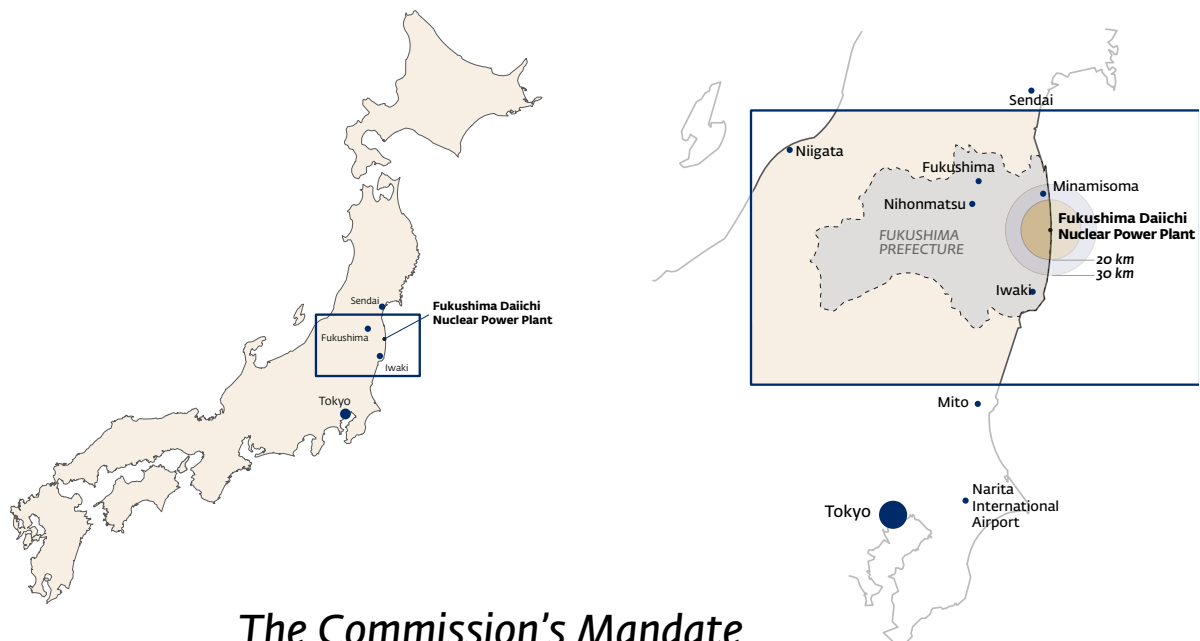
Above all, we have endeavored to produce a report that meets the highest standard of transparency. The people of Fukushima, the people of Japan and the global community deserve nothing less.

CHAIRMAN:

A handwritten signature in black ink, appearing to read 'Kiyoshi Kurokawa'.

KIYOSHI KUROKAWA

## Overview



## The Commission's Mandate

On October 30, 2011, the NAIIC Act (officially, the Act regarding Fukushima Nuclear Accident Independent Investigation Commission) was enacted, creating an independent commission to investigate the Fukushima accident with the authority to request documents and request the legislative branch to use its investigative powers to obtain any necessary documents or evidence required. This was the first independent commission created in the history of Japan's constitutional government.

On December 8, 2011, our chairman and nine other members were appointed, and charged by the Speaker and the President of the National Diet with the following mandate, in accordance with Article 10 of the NAIIC Act:

1. To investigate the direct and indirect causes of the Tokyo Electric Power Company Fukushima nuclear power plant accident that occurred on March 11, 2011 in conjunction with the Great East Japan Earthquake.
2. To investigate the direct and indirect causes of the damage sustained from the above accident.
3. To investigate and verify the emergency response to both the accident and the consequential damage; to verify the sequence of events and actions taken; to assess the effectiveness of the emergency response.
4. To investigate the history of decisions and approval processes regarding existing nuclear policies and other related matters.
5. To recommend measures to prevent nuclear accidents and any consequential damage based on the findings of the above investigations. The recommendations shall include assessments of essential nuclear policies and the structure of related administrative organizations.
6. To conduct the necessary administrative functions necessary for carrying out the above activities.

## Expectations of the Commission

Before the Commission began its investigation, we also received the following directives from the Joint Council of the Committee on Rules and Administration of Both Houses on the Accident at the Fukushima Nuclear Power Plants of the Tokyo Electric Power Company:

- The investigation is to be conducted thoroughly by experts from a logical, objective and scientific perspective, without bias for or against nuclear power.
- While an open and thorough investigation is the principle, parts of the investigation and the information gathered may be closed to keep the investigation process free of

outside influence.

- A global perspective should be emphasized, so that the results and conclusions will help to prevent nuclear accidents elsewhere.
- The investigation's priority should be on human safety, rather than the structural safety of nuclear reactors.
- The investigation should take place with the understanding that earthquakes and tsunamis are still unpredictable but unavoidable events in Japan.
- The investigation should result in recommendations to benefit the nation's future, and provide an opportunity for strengthening the legislative body of the nation.

## *What we did*

Our investigation included more than 900 hours of hearings and interviews with 1,167 people.

We made nine site visits to nuclear power plants including Fukushima Daiichi, Fukushima Daini, Tohoku Electric Power Company Onagawa Nuclear Power Plant, and The Japan Atomic Power Company Tokai Daini Power Plant, in order to conduct as thorough an investigation as possible.

To assure a maximum degree of information disclosure, all 19 of our commission meetings were open to public observation and broadcast on the internet (except for the first one), simultaneously in Japanese and English, to a total of 800,000 viewers. We also used social media, Facebook and twitter to communicate with the public, receiving over 170,000 comments. To gain a global perspective, we dispatched three teams overseas, and included interviews and hearings with experts from the U.S, France, Russia, Ukraine and Belarus.

In addition to this English version of the executive summary, the entire report will soon be published in English.

We focused on the selection of witnesses to those who held responsible positions at the time of the accident in the government, TEPCO and nuclear regulators.

In order to better comprehend the viewpoints of evacuees, we held three town hall meetings, at which we were able to hear first hand the opinions of more than 400 attendees. We also visited twelve municipalities—Futaba, Okuma, Tomioka, Namie, Naraha, Kawauchi, Hirono, Katsurao, Minamisoma, Tamura, Iitate, and Kawamata—within the designated evacuation area, to conduct interviews and survey the residents and workers at the nuclear power plant accident site. We received 10,633 responses to a survey of residents, and many responses from the on-site workers of about 500 related contractors.

## *What we did not do*

There were a number of things we did not do, either because of time constraints or because they did not fit into the scope of our priorities or our mandate.

We did not study matters related to the future energy policies of Japan, including the promotion or abolition of nuclear power.

We did not investigate the treatment and disposition of used nuclear fuel rods.

We did not undertake investigations that would require on-site visits to reactors with dangerous levels of radioactivity.

While we studied the damage compensation and decontamination issues from a systematic perspective, we did not look at specific processes.

We did not address issues related to where responsibility lies in the case of TEPCO being unable to pay accident-related costs.

We did not address any stock market-related matters as a consequence of the accident.

We did not address the recommissioning of Japan's nuclear reactors that have halted operations for various reasons.

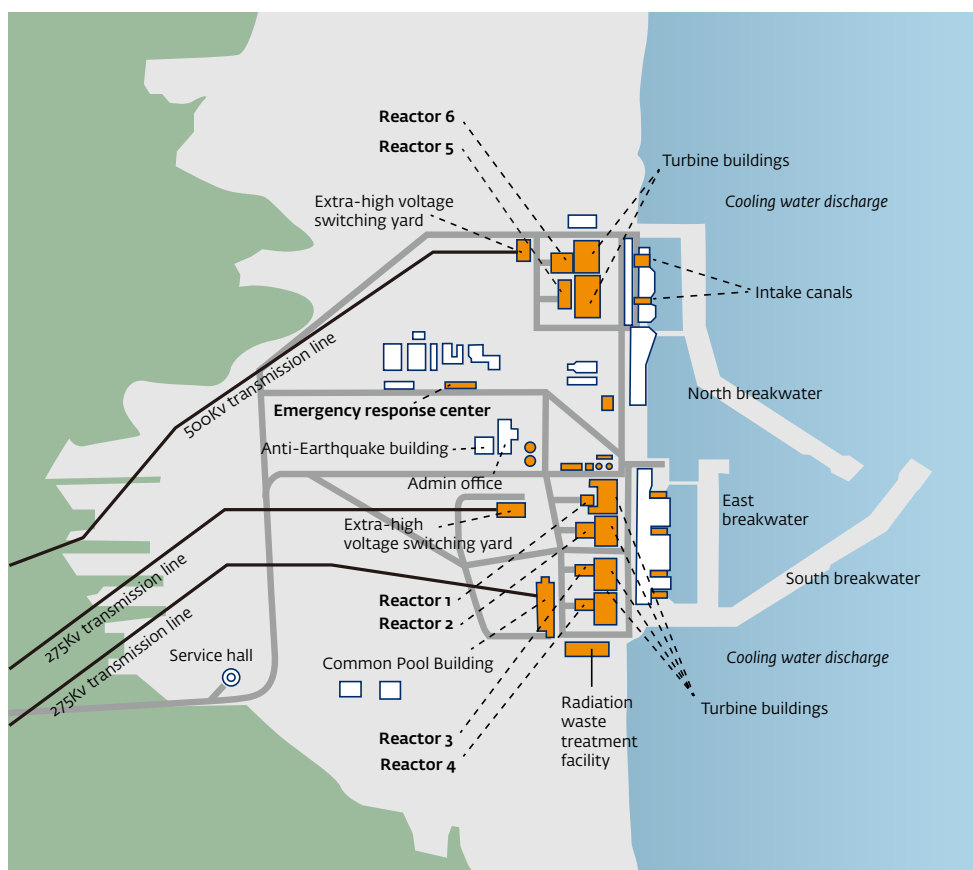
Nor did we study government administrative policies and regulations that are not related to nuclear safety issues.

We also did not directly investigate the condition of the Fukushima reactors involved in the accident, though we have become aware of the condition from other sources during our investigation. Nor have we attempted to assess the decommissioning methodology of the Fukushima reactors.

And, finally, we have not studied matters relating to the regeneration of the environment surrounding the power plant.

### Layout of the Fukushima Daiichi Nuclear Power Plant ►

Adapted from: INPO "Special Report on the Nuclear Accident at the Fukushima Daiichi Nuclear Power Station"



## The accident

On March 11, 2011, the Great East Japan Earthquake triggered an extremely severe nuclear accident at the Fukushima Daiichi Nuclear Power Plant, owned and operated by the Tokyo Electric Power Company (TEPCO). This devastating accident was ultimately declared a Level 7 ("Severe Accident") by the International Nuclear Event Scale (INES).

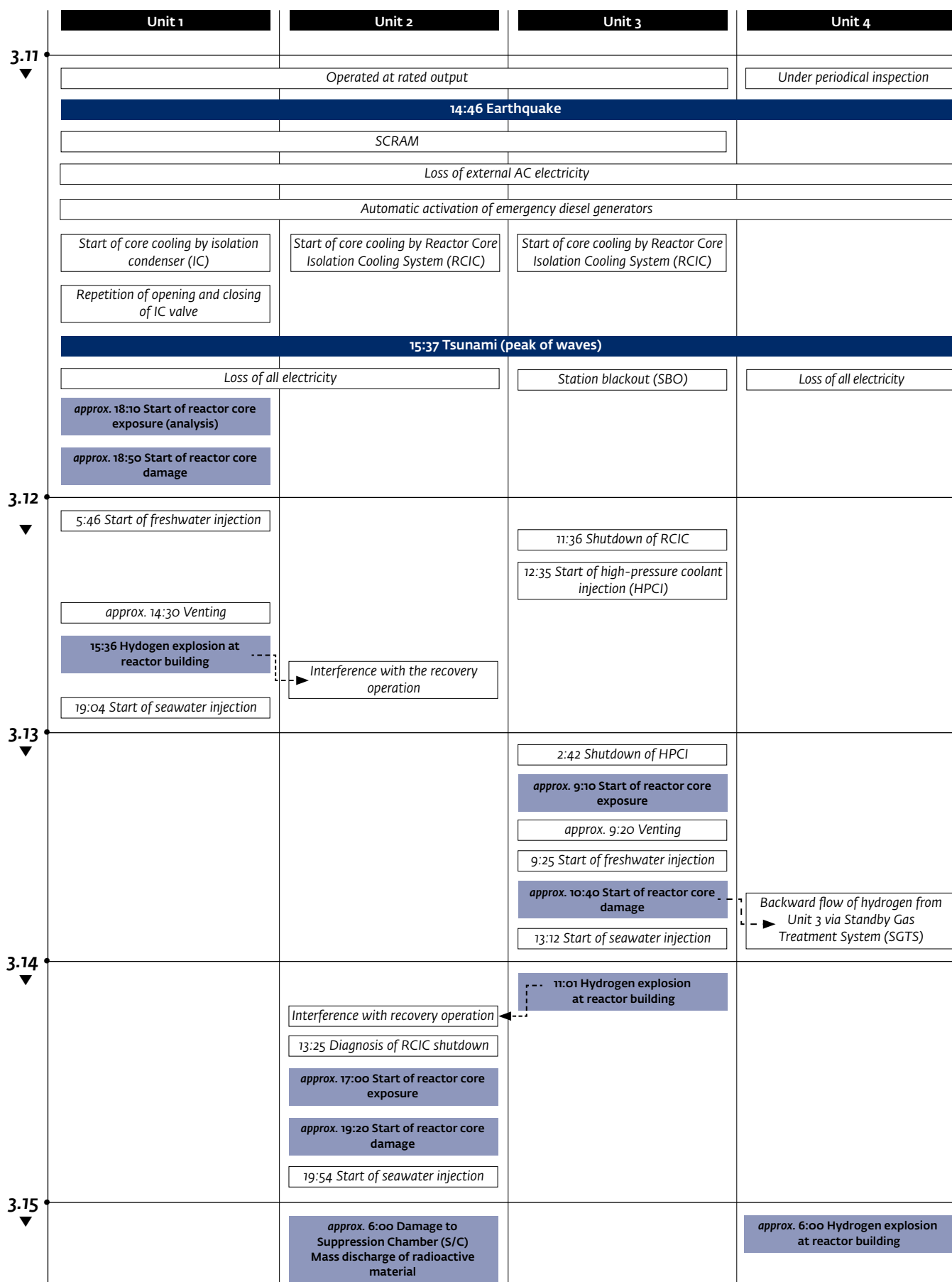
When the earthquake occurred, Unit 1 of the Fukushima Daiichi plant was in normal operation at the rated electricity output according to its specifications; Units 2 and 3 were in operation within the rated heat parameters of their specifications; and Units 4 to 6 were undergoing periodical inspections. The emergency shut-down feature, or SCRAM, went into operation at Units 1, 2 and 3 immediately after the commencement of the seismic activity.

The seismic tremors damaged electricity transmission facilities between the TEPCO Shinfukushima Transformer Substations and the Fukushima Daiichi Nuclear Power Plant, resulting in a total loss of off-site electricity. There was a back-up 66kV transmission line from the transmission network of Tohoku Electric Power Company, but the back-up line failed to feed Unit 1 via a metal-clad type circuit (M/C) of Unit 1 due to mismatched sockets.

The tsunami caused by the earthquake flooded and totally destroyed the emergency diesel generators, the seawater cooling pumps, the electric wiring system and the DC power supply for Units 1, 2 and 4, resulting in loss of all power—except for an external supply to Unit 6 from an air-cooled emergency diesel generator. In short, Units 1, 2 and 4 lost all power; Unit 3 lost all AC power, and later lost DC before dawn of March 13, 2012. Unit 5 lost all AC power.

The tsunami did not damage only the power supply. The tsunami also destroyed or washed away vehicles, heavy machinery, oil tanks, and gravel. It destroyed buildings, equipment installations and other machinery. Seawater from the tsunami inundated the entire building area and even reached the extremely high pressure operating sections of Units 3 and 4, and a supplemental operation common facility (Common Pool Building). After the water retreated, debris from the flooding was scattered all over the plant site,

## Timeline following the earthquake and tsunami



\*Start of reactor core exposure and start of reactor core damage times are both from TEPCO's MAAP analysis results.

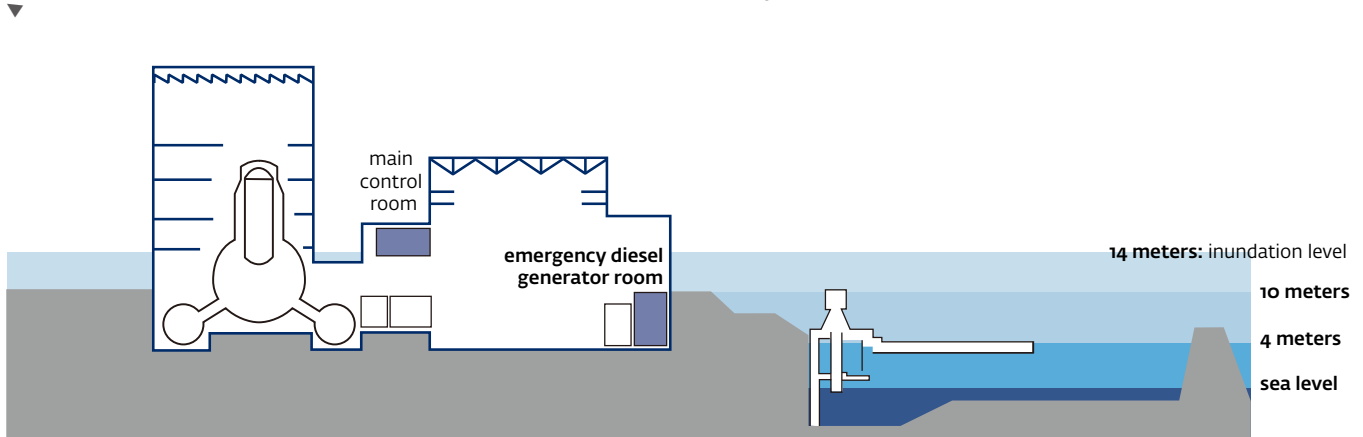


hindering movement. Manhole and ditch covers had disappeared, leaving gaping holes in the ground. In addition, the earthquake lifted, sank, and collapsed building interiors and pathways, and access to and within the plant site became extremely difficult. Recovery tasks were further interrupted as workers reacted to the intermittent and significant after-shocks and tsunamis. The loss of electricity resulted in the sudden loss of monitoring equipment such as scales, meters and the control functions in the central control room. Lighting and communications were also affected. The decisions and responses to the accident had to be made on the spot by operational staff at the site, absent valid tools and manuals.

The loss of electricity made it very difficult to effectively cool down the reactors in a timely manner. Cooling the reactors and observing the results were heavily dependent on electricity for high-pressure water injection, depressurizing the reactor, low pressure water injection, the cooling and depressurizing of the reactor containers and removal of decay heat at the final heat-sink. The lack of access, as previously mentioned, obstructed the delivery of necessities such as alternative water injection using fire trucks, the recovery of electricity supply, the line configuration of the vent and its intermittent operation.

The series of events summarized above are an overview of the severe accident that ultimately emitted an enormous amount of radioactive material into the environment. These are described in detail in the full-length report.

*Cross section of the plant showing the inundation level*



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# Conclusions and recommendations

# Conclusions

*After a six-month investigation, the Commission has concluded the following:*

***In order to prevent future disasters, fundamental reforms must take place. These reforms must cover both the structure of the electric power industry and the structure of the related government and regulatory agencies as well as the operation processes. They must cover both normal and emergency situations.***

## **A “manmade” disaster**

***The TEPCO Fukushima Nuclear Power Plant accident was the result of collusion between the government, the regulators and TEPCO, and the lack of governance by said parties. They effectively betrayed the nation's right to be safe from nuclear accidents. Therefore, we conclude that the accident was clearly “manmade.” We believe that the root causes were the organizational and regulatory systems that supported faulty rationales for decisions and actions, rather than issues relating to the competency of any specific individual. (see Recommendation 1)***

The direct causes of the accident were all foreseeable prior to March 11, 2011. But the Fukushima Daiichi Nuclear Power Plant was incapable of withstanding the earthquake and tsunami that hit on that day. The operator (TEPCO), the regulatory bodies (NISA and NSC) and the government body promoting the nuclear power industry (METI), all failed to correctly develop the most basic safety requirements—such as assessing the probability of damage, preparing for containing collateral damage from such a disaster, and developing evacuation plans for the public in the case of a serious radiation release.

TEPCO and the Nuclear and Industrial Safety Agency (NISA) were aware of the need for structural reinforcement in order to conform to new guidelines, but rather than demanding their implementation, NISA stated that action should be taken autonomously by the operator. The Commission has discovered that no part of the required reinforcements had been implemented on Units 1 through 3 by the time of the accident. This was the result of tacit consent by NISA for a significant delay by the operators in completing the reinforcement. In addition, although NISA and the operators were aware of the risk of core damage from tsunami, no regulations were created, nor did TEPCO take any protective steps against such an occurrence.

Since 2006, the regulators and TEPCO were aware of the risk that a total outage of electricity at the Fukushima Daiichi plant might occur if a tsunami were to reach the level of the site. They were also aware of the risk of reactor core damage from the loss of seawater pumps in the case of a tsunami larger than assumed in the Japan Society of Civil Engineers estimation. NISA knew that TEPCO had not prepared any measures to lessen or eliminate the risk, but failed to provide specific instructions to remedy the situation.

We found evidence that the regulatory agencies would explicitly ask about the operators' intentions whenever a new regulation was to be implemented. For example, NISA informed the operators that they did not need to consider a possible station blackout (SBO) because the probability was small and other measures were in place. It then asked the operators to write a report that would give the appropriate rationale for why this consideration was unnecessary. In order to get evidence of this collusion, the Commission was forced to exercise our legislative right to demand such information from NISA, after NISA failed to respond to several requests.

The regulators also had a negative attitude toward the importation of new advances in knowledge and technology from overseas. If NISA had passed on to TEPCO measures that were included in the B.5.b subsection of the U.S. security order that followed the 9/11 terrorist action, and if TEPCO had put the measures in place, the accident may have been preventable.

There were many opportunities for taking preventive measures prior to March 11. The accident occurred because TEPCO did not take these measures, and NISA and the Nuclear Safety Commission (NSC) went along. They either intentionally postponed putting safety measures in place, or made decisions based on their organization's self interest, and not in the interest of public safety.

From TEPCO's perspective, new regulations would have interfered with plant operations and weakened their stance in potential lawsuits. That was enough motivation for TEPCO to aggressively oppose new safety regulations and draw out negotiations with regulators via the Federation of Electric Power Companies (FEPC). The regulators should have taken a strong position on behalf of the public, but failed to do so. As they had firmly committed themselves to the idea that nuclear power plants were safe, they were reluctant to actively create new regulations. Further exacerbating the problem was the fact that NISA was created as part of the Ministry of Economy, Trade & Industry (METI), an organization that has been actively promoting nuclear power.

### **Earthquake damage**

***We conclude that TEPCO was too quick to cite the tsunami as the cause of the nuclear accident and deny that the earthquake caused any damage. We believe there is a possibility that the earthquake damaged equipment necessary for ensuring safety, and that there is also a possibility that a small-scale LOCA occurred in Unit 1. We hope these points will be examined further by a third party. (see Recommendation 7)***

Although the two natural disasters—the earthquake and subsequent tsunami—were the direct causes of the accident, there are various points in the unfolding of the event that remain unresolved. The main reason for this is that almost all the equipment directly related to the accident is inside the reactor containers, which are inaccessible and will remain so for many years. A complete examination and full analysis are impossible at this time.

TEPCO was quick, however, to assign the accident cause to the tsunami, and state that the earthquake was not responsible for damage to equipment necessary for safety (although it did add, “to the extent that has been confirmed,” a phrase that also appears in TEPCO reports to the government and to the IAEA). However, it is impossible to limit the direct cause of the accident to the tsunami without substantive evidence. The Commission believes that this is an attempt to avoid responsibility by putting all the blame on the unexpected (the tsunami), as they wrote in their midterm report, and not on the more foreseeable earthquake.

Through our investigation, we have verified that the people involved were aware of the risk from both earthquakes and tsunami. Further, the damage to Unit 1 was caused not only by the tsunami but also by the earthquake, a conclusion made after considering the facts that: 1) the largest tremor hit after the automatic shutdown (SCRAM); 2) JNES confirmed the possibility of a small-scale LOCA (loss of coolant accident); 3) the Unit 1 operators were concerned about leakage of coolant from the valve, and 4) the safety relief valve (SR) was not operating.

Additionally, there were two causes for the loss of external power, both earthquake-related: there was no diversity or independence in the earthquake-resistant external power systems, and the Shin-Fukushima transformer station was not earthquake resistant. (See Section 2 of the Summary of Findings)

### **Evaluation of operational problems**

***The Commission concludes that there were organizational problems within TEPCO. Had there been a higher level of knowledge, training, and equipment inspection related to severe accidents, and had there been specific instructions given to the on-site workers concerning the state of emergency within the necessary time frame, a more effective accident response would have been possible. (see Recommendation 4)***

There were many problems with on-site operations during the accident. Events make it clear that if there are no response measures for a severe accident in place, the steps that can be taken on-site in the event of a station blackout are very limited. Recovery work, such as confirming the operation of the isolation condenser (IC) in Unit 1, should have been conducted swiftly because of the loss of DC power, but was not. TEPCO did not plan measures for the IC operation, and had no manual or training regimens, so these are clearly organizational problems. Regarding the vent line composition, conducting line configuration work in a situation with no power and soaring radiation levels must have been extremely difficult and time consuming. On top of this, sections in the diagrams of the severe accident instruction manual were missing. Workers not only had to work using this flawed manual, but they were pressed for time, and working in the dark with flash-

lights as their only light source. The Kantei's (Prime Minister's Office) distrust of TEPCO management was exacerbated by the slow response, but the actual work being done was extremely difficult.

Many layers of security were breached simultaneously, and the power to four reactors was lost at the same time. Had there not been some coincidental events—such as the RCIC in Unit 2 operating for so many hours, the blow-out panel falling out and releasing pressure, and the speed with which subcontractors cleaned up wreckage—Units 2 and 3 would have been in an even more precarious situation. We have concluded that—given the deficiencies in training and preparation—once the total station blackout occurred, including the loss of a direct power source, it was impossible to change the course of events.

### **Emergency response issues**

***The Commission concludes that the situation continued to deteriorate because the crisis management system of the Kantei, the regulators and other responsible agencies did not function correctly. The boundaries defining the roles and responsibilities of the parties involved were problematic, due to their ambiguity. (see Recommendation 2)***

The government, the regulators, TEPCO management, and the Kantei lacked the preparation and the mindset to efficiently operate an emergency response to an accident of this scope. None, therefore, were effective in preventing or limiting the consequential damage.

NISA was expected to play the lead role as designated in the Act on Special Measures Concerning Nuclear Emergency Preparedness, which was enacted after a criticality accident at the JCO uranium conversion facility at Tokaimura, Ibaraki Prefecture in 1999. However, NISA was unprepared for a disaster of this scale, and failed in its function.

In the critical period just after the accident, the Kantei did not promptly declare a state of emergency. The regional nuclear emergency response team was meant to be the contact between the Kantei and the operator, responsible for keeping the Kantei informed about the situation on the ground. Instead, the Kantei contacted TEPCO headquarters and the Fukushima site directly, and disrupted the planned chain of command. A TEPCO-Kantei response team was created in TEPCO headquarters on March 15, but this body had no legal authority.

The Kantei, the regulators and TEPCO all understood the need to vent Unit 1. TEPCO had been reporting to NISA, as was the standard protocol, that it was in the process of venting. But there is no confirmation that the venting decision was conveyed to senior members of METI, or to the Kantei. This failure of NISA's function and the scarcity of information at TEPCO headquarters resulted in the Kantei losing faith in TEPCO.

The Prime Minister made his way to the site to direct the workers who were dealing with the damaged core. This unprecedented direct intervention by the Kantei diverted the attention and time of the on-site operational staff and confused the line of command. While TEPCO headquarters was supposed to provide support to the plant, in reality it became subordinate to the Kantei, and ended up simply relaying the Kantei's intentions. This was a result of TEPCO's mindset, which included a reluctance to take responsibility, epitomized by President Shimizu's inability to clearly report to the Kantei the intentions of the operators at the plant.

At the same time, it is hard to conclude that it was the Prime Minister who discouraged the idea of a full pullout by TEPCO, as has been reported elsewhere, for a number of reasons: 1) there is no evidence that the TEPCO management at the plant had even thought of a complete withdrawal; 2) There is no trace of a decision on a complete withdrawal being made at TEPCO headquarters; 3) The evacuation planned before Mr. Shimizu's visit to the Kantei included keeping emergency response members at the plant (though evacuation criteria were discussed); 4) The director-general of NISA reported that when Shimizu called him, he was not asked for advice on a full withdrawal; and 5) The off-site center, which was connected through a video conference system, claimed there was no discussion of a complete withdrawal. Crisis management related to public safety should be assured without having to rely on the capability and judgement of the prime minister of any given time.

### **Evacuation issues**

***The Commission concludes that the residents' confusion over the evacuation stemmed from the regulators' negligence and failure over the years to implement adequate mea-***

***asures against a nuclear disaster, as well as a lack of action by previous governments and regulators focused on crisis management. The crisis management system that existed for the Kantei and the regulators should protect the health and safety of the public, but it failed in this function. (see Recommendation 2)***

The central government was not only slow in informing municipal governments about the nuclear power plant accident, but also failed to convey the severity of the accident. Similarly, the speed of information in the evacuation areas varied significantly depending on the distance from the plant. Specifically, only 20 percent of the residents of the town hosting the plant knew about the accident when evacuation from the 3km zone was ordered at 21:23 on the evening of March 11. Most residents within 10km of the plant learned about the accident when the evacuation order was issued at 5:44 on March 12, more than 12 hours after the Article 15 notification—but received no further explanation of the accident or evacuation directions. Many residents had to flee with only the barest necessities and were forced to move multiple times or to areas with high radiation levels. There was great confusion over the evacuation, caused by prolonged shelter-in-place orders and voluntary evacuation orders. Some residents were evacuated to high dosage areas because radiation monitoring information was not provided. Some people evacuated to areas with high levels of radiation and were then neglected, receiving no further evacuation orders until April.

The Commission has verified that there was a lag in upgrading nuclear emergency preparedness and complex disaster countermeasures, and attributes this to regulators' negative attitudes toward revising and improving existing emergency plans.

### **Continuing public health and welfare issues**

***The Commission recognizes that the residents in the affected area are still struggling from the effects of the accident. They continue to face grave concerns, including the health effects of radiation exposure, displacement, the dissolution of families, disruption of their lives and lifestyles and the contamination of vast areas of the environment. There is no foreseeable end to the decontamination and restoration activities that are essential for rebuilding communities. The Commission concludes that the government and the regulators are not fully committed to protecting public health and safety; that they have not acted to protect the health of the residents and to restore their welfare. (see Recommendation 3)***

Approximately 150,000 people were evacuated in response to the accident. An estimated 167 workers were exposed to more than 100 millisieverts of radiation while dealing with the accident. It is estimated that as much as 1,800 square kilometers of land in Fukushima Prefecture has now been contaminated by a cumulative radiation dose of 5 millisieverts or higher per year. Insufficient evacuation planning led to many residents receiving unnecessary radiation exposure. Others were forced to move multiple times, resulting in increased stress and health risks—including deaths among seriously ill patients.

The government must move to analyze the state of the residents' lives in the affected areas and systematically map out measures to improve their quality of life. These measures should include the realignment of the evacuation zones, the restoration of the foundations of everyday life, decontamination issues, and realigning the medical and welfare systems to meet the public's needs. It has yet to do so. The more than 10,000 people who responded to our surveys, and the comments the Commission Members heard at town hall meetings offer harsh judgment of the government's present stance.

While exposure levels are set as a threshold against acute radiation disorder, there is no widely accepted threshold for long-term radiation damage caused by low doses. The international consensus, however, is that the risk does increase in proportion to the dose. The impact of radiation on health may vary from one person to another depending on age, sensitivity to radiation and other factors, some unknown. After the accident, the government unilaterally announced a benchmark on dosage without giving the specific information that residents needed, including answers to questions like: What is a tolerable level of exposure in light of long-term health effects? How do health implications differ for individuals? How can people protect themselves from radioactive substances?

The government has not seriously undertaken programs to help people understand the situ-

ation well enough to make their own behavioral judgments. They failed to explain, for example, the risks of radiation exposure to different segments of the population, such as infants and youths, expecting mothers, or people particularly susceptible to the effects of radiation.

### **Reforming the regulators**

***The Commission has concluded that the safety of nuclear energy in Japan and the public cannot be assured unless the regulators go through an essential transformation process. The entire organization needs to be transformed, not as a formality but in a substantial way. Japan's regulators need to shed the insular attitude of ignoring international safety standards and transform themselves into a globally trusted entity. (see Recommendation 5)***

The regulators did not monitor or supervise nuclear safety. The lack of expertise resulted in “regulatory capture,” and the postponement of the implementation of relevant regulations. They avoided their direct responsibilities by letting operators apply regulations on a voluntary basis. Their independence from the political arena, the ministries promoting nuclear energy, and the operators was a mockery. They were incapable, and lacked the expertise and the commitment to assure the safety of nuclear power. Moreover, the organization lacked transparency. Without the investigation by this Commission, operating independently of the government, many of the facts revealing the collusion between the regulators and other players might never have been revealed.

### **Reforming the operator**

***TEPCO did not fulfil its responsibilities as a private corporation, instead obeying and relying upon the government bureaucracy of METI, the government agency driving nuclear policy. At the same time, through the auspices of the FEPC, it manipulated the cozy relationship with the regulators to take the teeth out of regulations. (see Recommendation 4)***

The risk management practices of TEPCO illustrate this. If the risk factors of tsunami are raised, for example, TEPCO would only look at the risk to their own operations, and whether it would result in a suspension of existing reactors or weaken their stance in potential lawsuits. They ignored the potential risk to the public health and welfare. (See Section 5)

Problems with TEPCO's management style, based on the government taking final responsibility, became explicit during the accident. It prioritized the Kantei's intent over that of the technical engineers at the site. TEPCO's behavior was consistently unclear, and the misunderstanding over the “complete withdrawal” from the plant is a good example of the confusion that arose from their behavior. (See Section 3)

After the accident, TEPCO continued to avoid transparency in disclosing information. It limited disclosure to confirmed facts, and failed to disclose information that it felt was uncertain or inconvenient. Some examples of continuing disclosure issues include the delay in releasing electricity demand projections used as the basis for rolling blackouts, and the lack in up-to-date information on the core conditions at the plant.

### **Reforming laws and regulations**

***The Commission concludes that it is necessary to realign existing laws and regulations concerning nuclear energy. Mechanisms must be established to ensure that the latest technological findings from international sources are reflected in all existing laws and regulations. (see Recommendation 6)***

Laws and regulations related to nuclear energy have only been revised as stopgap measures, based on actual accidents. They have not been seriously and comprehensively reviewed in line with the accident response and safeguarding measures of an international standard. As a result, predictable risks have not been addressed.

The existing regulations primarily are biased toward the promotion of a nuclear energy policy, and not to public safety, health and welfare. The unambiguous responsibility that operators should bear for a nuclear disaster was not specified. There was also no clear guidance about the responsibilities of the related parties in the case of an emergency. The defense-in-depth concept used in other countries has still not been fully considered.



**Cosmetic solutions**

***Replacing people or changing the names of institutions will not solve the problems. Unless these root causes are resolved, preventive measures against future similar accidents will never be complete. (see Recommendations 4, 5 and 6)***

The Commission believes the root causes of this accident cannot be resolved and that the people's confidence cannot be recovered as long as this "manmade disaster" is seen as the result of error by a specific individual. The underlying issue is the social structure that results in "regulatory capture," and the organizational, institutional, and legal framework that allows individuals to justify their own actions, hide them when inconvenient, and leave no records in order to avoid responsibility. Across the board, the Commission found ignorance and arrogance unforgivable for anyone or any organization that deals with nuclear power. We found a disregard for global trends and a disregard for public safety. We found a habit of adherence to conditions based on conventional procedures and prior practices, with a priority on avoiding risk to the organization. We found an organization-driven mindset that prioritized benefits to the organization at the expense of the public.

# Recommendations

Based on the above findings, the Commission makes the following seven recommendations for the future. We urge the National Diet of Japan to thoroughly debate and deliberate on these recommendations.

## *Recommendation 1:*

### **Monitoring of the nuclear regulatory body by the National Diet**

A permanent committee to deal with issues regarding nuclear power must be established in the National Diet in order to supervise the regulators to secure the safety of the public. Its responsibilities should be:

1. To conduct regular investigations and explanatory hearings of regulatory agencies, academics and stakeholders.
2. To establish an advisory body, including independent experts with a global perspective, to keep the committee's knowledge updated in its dealings with regulators.
3. To continue investigations on other relevant issues.
4. To make regular reports on their activities and the implementation of their recommendations.

## *Recommendation 2:*

### **Reform the crisis management system**

A fundamental reexamination of the crisis management system must be made. The boundaries dividing the responsibilities of the national and local governments and the operators must be made clear. This includes:

1. A reexamination of the crisis management structure of the government. A structure must be established with a consolidated chain of command and the power to deal with emergency situations.
2. National and local governments must bear responsibility for the response to off-site radiation release. They must act with public health and safety as the priority.
3. The operator must assume responsibility for on-site accident response, including the halting of operations, and reactor cooling and containment.

## *Recommendation 3:*

### **Government responsibility for public health and welfare**

Regarding the responsibility to protect public health, the following must be implemented as soon as possible:

1. A system must be established to deal with long-term public health effects, including stress-related illness. Medical diagnosis and treatment should be covered by state funding. Information should be disclosed with public health and safety as the priority, instead of government convenience. This information must be comprehensive, for use by individual residents to make informed decisions.
2. Continued monitoring of hotspots and the spread of radioactive contamination must be undertaken to protect communities and the public. Measures to prevent any potential spread should also be implemented.
3. The government must establish a detailed and transparent program of decontamination and relocation, as well as provide information so that all residents will be knowledgeable about their compensation options.

## *Recommendation 4:*

### **Monitoring the operators**

TEPCO must undergo fundamental corporate changes, including strengthening its governance, working towards building an organizational culture which prioritizes safety, changing its stance on information disclosure, and establishing a system which prioritizes the site. In order to prevent the Federation of Electric Power Companies (FEPC) from being used as a route for negotiating with regulatory agencies, new relationships among the electric power companies must also be established—built on safety issues, mutual supervision and transparency.

1. The government must set rules and disclose information regarding its relationship with the operators.

2. Operators must construct a cross-monitoring system to maintain safety standards at the highest global levels.
3. TEPCO must undergo dramatic corporate reform, including governance and risk management and information disclosure—with safety as the sole priority.
4. All operators must accept an agency appointed by the National Diet as a monitoring authority of all aspects of their operations, including risk management, governance and safety standards, with rights to on-site investigations.

*Recommendation 5:*

**Criteria for the new regulatory body**

The new regulatory organization must adhere to the following conditions. It must be:

1. Independent: The chain of command, responsible authority and work processes must be: (i) Independent from organizations promoted by the government (ii) Independent from the operators (iii) Independent from politics.
2. Transparent: (i) The decision-making process should exclude the involvement of electric power operator stakeholders. (ii) Disclosure of the decision-making process to the National Diet is a must. (iii) The committee must keep minutes of all other negotiations and meetings with promotional organizations, operators and other political organizations and disclose them to the public. (iv) The National Diet shall make the final selection of the commissioners after receiving third-party advice.
3. Professional: (i) The personnel must meet global standards. Exchange programs with overseas regulatory bodies must be promoted, and interaction and exchange of human resources must be increased. (ii) An advisory organization including knowledgeable personnel must be established. (iii) The no-return rule should be applied without exception.
4. Consolidated: The functions of the organizations, especially emergency communications, decision-making and control, should be consolidated.
5. Proactive: The organizations should keep up with the latest knowledge and technology, and undergo continuous reform activities under the supervision of the Diet.

*Recommendation 6:*

**Reforming laws related to nuclear energy**

Laws concerning nuclear issues must be thoroughly reformed.

1. Existing laws should be consolidated and rewritten in order to meet global standards of safety, public health and welfare.
2. The roles for operators and all government agencies involved in emergency response activities must be clearly defined.
3. Regular monitoring and updates must be implemented, in order to maintain the highest standards and the highest technological levels of the international nuclear community.
4. New rules must be created that oversee the backfit operations of old reactors, and set criteria to determine whether reactors should be decommissioned.

*Recommendation 7:*

**Develop a system of independent investigation commissions**

A system for appointing independent investigation committees, including experts largely from the private sector, must be developed to deal with unresolved issues, including, but not limited to, the decommissioning process of reactors, dealing with spent fuel issues, limiting accident effects and decontamination.



# Summary of findings

**1**

## **Was the accident preventable?**

*The Commission has verified that on March 11, 2011, the structure of the Fukushima Daiichi Nuclear Plant was not capable of withstanding the effects of the earthquake and the tsunami. Nor was the Fukushima Daiichi Nuclear Plant prepared to respond to a severe accident. In spite of the fact that TEPCO and the regulators were aware of the risk from such natural disasters, neither had taken steps to put preventive measures in place. It was this lack of preparation that led to the severity of this accident.*

## **The yield strength of the Fukushima Daiichi Unit 1**

The structure of Fukushima Daiichi Unit 1 was incapable of withstanding the powerful earthquake and massive tsunami of March 11, 2011. The specifications for the plant lacked adequate anti-quake and anti-tsunami yield strengths because: 1) the guidelines for nuclear plant construction were insufficient at the time the construction permit was granted for Units 1 through 3 in the late 1960's, and 2) the area surrounding the plant was considered to have minimal seismic activity and had never experienced earthquake damage. Based on that assessment, a safety tolerance level for the maximum seismic acceleration in the anti-seismic design was set at 265 gal (i.e. unit of gravitational acceleration), a remarkably low earthquake resistance.

In 1981, a "Guideline for Anti-seismic Design Regarding Nuclear Reactor Facilities for Electricity Generation" was set by NSC. In 2006, NSC released a revised version of the former guideline. NISA acted to require that nuclear operators assess the anti-seismic safety of their sites according to the new guideline – the so-called "anti-seismic backcheck." In March 2008, TEPCO submitted an interim anti-seismic backcheck report on Unit 5 of Fukushima Daiichi, stating the safety of its anti-seismic measures, and assuming an increased safety tolerance level of the maximum seismic acceleration to 600 gal. In 2009, NISA accepted the contents of the interim report, even though the scope of the assessment included the reactor building and only seven of many other important safety installations and equipment. In June 2009, similar reports for Units 1 through 4 and 6 were submitted but these were similarly limited.

No further anti-seismic backcheck reports were released by TEPCO, because no significant anti-seismic safety assessments were performed. While the official deadline was June 2009, TEPCO made the decision internally and unilaterally to reschedule the deadline to January 2016. TEPCO learned through the interim report assessment process that many reinforcements were required to meet the standards of the new guideline, but our investigation verified the fact that TEPCO had added no reinforcements to Units 1 through 3 at the time of the March 11 earthquake. Although NISA had recognized the need for both the reinforcements and the backcheck, the regulator failed in its oversight of TEPCO's progress.

In their analysis and evaluation after the accident, both TEPCO and NISA confirmed that some of the important safety parts of piping and supports for Unit 5 were not up to the anti-seismic safety standards at the time of the quake. TEPCO reported that they did not find material damage to these parts in their visual inspection, but the Commission believes that a conclusion denying quake damage cannot be drawn, as inspection, including non-destructive inspection, is not complete. The Commission believes that the same is true for Units 1 through 3, which are much older than Unit 5. Section 2 includes details illustrating the fact that the recorded seismic motion at Fukushima Daiichi exceeded the assumption of the new guideline. It is clear that appropriate anti-seismic reinforcements were not in place at the time of the March 11 earthquake.

## **The lack of tsunami countermeasures**

The construction of the Fukushima Daiichi Plant that began in 1967 was based on the seismological knowledge at that time. As research continued over the years, researchers repeatedly pointed out the high possibility of tsunami levels reaching beyond the assumptions made at the time of construction, as well as the possibility of core damage in the case of such a tsunami. TEPCO overlooked these warnings, and the small margins of safety that existed were far from adequate for such an emergency situation.

Since 2006, the regulatory authorities and TEPCO have shared information on the possibility of a total outage of electricity occurring at Fukushima Daiichi should tsunami levels reach the site. They also shared an awareness of the risk of potential reactor core damage from a breakdown of seawater pumps if the magnitude of a tsunami striking the plant turned out to be greater than the assessment made by the Japan Society of Civil Engineers.

There were at least three background issues concerning the lack of improvements. First, NISA did not disclose any information to the public on their evaluations or their instructions to reconsider the assumptions used in designing the plant's tsunami defenses. Nor did NISA keep any records of the information. As result, third parties could never know of the true state of affairs.

The second issue concerned the methodology used by the Japan Society of Civil Engineers to evaluate the height of the tsunami. Even though the method was decided through



an unclear process, and with the improper involvement of the electric power companies, NISA accepted it as a standard without examining its validity.

A third issue was the arbitrary interpretation and selection of a probability theory. TEPCO tried to justify the belief that there was a low probability of tsunami, and used the results of a biased calculation process as grounds to ignore the need for countermeasures. TEPCO also argued that basing any safety assessment against tsunami on a probabilistic approach would be using a methodology of technical uncertainties, and used that argument to postpone considering countermeasures for tsunami.

As the regulatory agency, NISA was aware of TEPCO's delaying of countermeasures, but did not follow up with any specific instructions or demands. Nor did they properly supervise the backcheck progress.

The reason why TEPCO overlooked the significant risk of a tsunami lies within its risk management mindset—in which the interpretation of issues was often stretched to suit its own agenda. In a sound risk management structure, the management considers and implements countermeasures for risk events that have an undeniable probability, even if details have yet to be scientifically confirmed. Rather than considering the known facts and quickly implementing counter measures, TEPCO resorted to delaying tactics, such as presenting alternative scientific studies and lobbying.

### **Countermeasures not up to international standards**

All of the measures against a severe accident (SA) that were in place in Japan were practically ineffective. The assumptions made in SA countermeasures only included internal issues, such as operational human error, and did not include external factors such as earthquakes and tsunami, even though Japan is known to frequently suffer from these natural events.

From the outset, operators were allowed to set SA countermeasures autonomously. In 1991, the Common Issue Discussion Panel of NSC explicitly stated that “the accident management, including expedient and flexible measures that might be required under actual situations, shall be considered and implemented by the operators based on their ‘technical competency’ and ‘expertise,’ but shall not require authority to regulate the specific details of measures.”

The severe accident measures that were autonomously set did not even reach the standards of measures set by the regulatory agencies. In fact, the severe accident safety equipment turned out to have a lower yield strength than the safety equipment used during normal operation that met regulated requirements. Clearly, using severe accident safety equipment with lower capability than the equipment used in normal operations undermines the entire reason for developing these measures. As a result of inadequate oversight, the SA countermeasures implemented in Japan were practically ineffective compared to the countermeasures in place abroad, and actions were significantly delayed as a result.

Allowing autonomous SA countermeasures also left room for the operators to actively negotiate terms with the regulators via the Federation of Electric Power Companies (FEPC). This was especially true after 2010, when the regulators began leaning towards regulating SA countermeasures in step with global trends, and the operators, via FEPC, began to aggressively lobby the regulators to slow the process down. The operators negotiated with the regulators for two reasons: 1) to avoid or minimize the risk of potential lawsuits and 2) to avoiding backfitting requirements that would interfere with the operation of existing reactors. Again, this meant that no countermeasures had been prepared against severe accidents like the one that took place beginning on March 11—in other words, an accident that may have very small odds of occurring, but creates a catastrophic situation when it does.

**2**

## **Escalation of the accident**

*The Commission closely investigated the development of the accident. We studied whether the accident could have been contained, and whether it could have become even more serious. We also examined the role of the earthquake as a cause of the accident, and the validity of TEPCO's claim that the tsunami was the sole direct cause.*

## How the accident developed

The measures in place to prevent a severe accident at the Fukushima Daiichi Nuclear Power plant were far from sufficient. The power supply system was especially poor from a defensive perspective, and suffered from a lack of redundancy, diversity and independence.

Although there were a number of external power lines to the plant, there were only two source stations, and both were put out of commission by the earthquake, resulting in a loss of external power to all the units. The diesel generators and other internal power equipment, including the power distribution buses, were all located within or nearby the plant, and were inundated by the tsunami that struck soon after. The assumptions about a normal station blackout (SBO) did not include the loss of DC power, yet this is exactly what occurred.

In the chaos following the destruction wrought by the tsunami, workers were hindered greatly in their response efforts. The loss of control room functions, lighting and communications, and the struggle to deliver equipment and materials through the debris-strewn plant, were further hindered by continued aftershocks. These also had not been anticipated.

Response manuals with detailed anti-severe accident measures were not up to date, and the diagrams and documents outlining the venting procedures were incomplete or missing. Even emergency drills and training had not been sufficiently prioritized. These were all symptomatic of TEPCO's institutional problems.

Units 1, 3 and 4 exploded, and the containment vessel was breached in Unit 2. Core damage was avoided in Units 5 and 6, which shut down safely. The Commission discovered that, in reality, an even worse situation could have developed at Units 2 and 3, and the situations at Unit 5 and 6 could have easily worsened. If preventive measures against terrorist attacks had been implemented, the accident might have been handled and developed in a different way. Damage to the spent fuel of Unit 4 could have occurred, with greater affect to the wider surrounding environment. There was a distinct potential at the time for this disastrous accident to result in an even more frightening scenario.

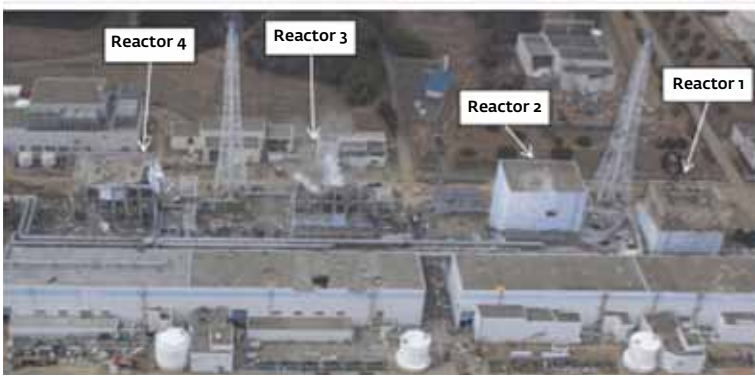
## Verification of events

The accident is clearly attributable to the natural phenomena: the earthquake and resulting tsunami. Yet a number of important factors relating to how the accident actually evolved remain unknown, mainly because much of the critical equipment and piping relevant to the accident are inside the reactor containment facility and are thus beyond the reach of inspection or verification for many years to come.

In spite of this, TEPCO specified in its interim investigation report that equipment providing key safety features was not damaged by the earthquake, and that the main cause of the accident was the tsunami. Included in the report was a disclaimer that the report is based on findings “to the extent confirmed.” The government also wrote a similar accident report that was submitted to the International Atomic Energy Agency (IAEA).

We conducted our investigations and hearings carefully, conscious of not jumping to conclusions based on preordained policy. The Commission recognizes the need for the regulators and TEPCO to investigate and verify causes of the accident based on the following facts:

1. Strong tremors at the facility began 30 seconds after the SCRAM, and the plant shook hard for more than 50 seconds. That does not mean, however, that the nuclear reactors were incapable of being impacted by the seismic movements. It is thought that the ground motion from the earthquake was strong enough to cause damage to some key safety features, because seismic backchecks against the earthquake design basis and anti-seismic reinforcement had not been done.
2. The reactor pressure and water levels make it obvious that a massive loss of coolant (LOCA) did not occur in the time period between the earthquake and the tsunami. However—as has been published by the Japan Nuclear Energy Safety Organization (JNES) in the “Technical Findings” composed by NISA—a minor LOCA, from a crack in the piping and a subsequent leak of coolant would not affect the water level or pressure of a reactor, and could have occurred without being apparent to operators. If this kind of minor LOCA were to remain uncontrolled for 10 hours, tens of tons of coolant would be lost and lead to core damage or core melt.
3. The government-run investigation committee's interim report, NISA's “Technical Findings,” and specifically TEPCO's interim report, all concluded that the loss of emergency AC power—that definitely impacted the progression of the accident—



▲  
Views of the reactor buildings  
following the explosions

“was caused by the flooding from the tsunami.” TEPCO’s report says the first wave of the tsunami reached the site at 15:27 and the second at 15:35. However, these are the times when the wave gauge set 1.5km offshore detected the waves, not the times of when the tsunami hit the plant. This suggests that at least the loss of emergency power supply A at Unit 1 might not have been caused by flooding. Based on this, some basic questions need to be logically explained before making a final determination that flooding was the cause of the station blackout.

4. Several TEPCO vendor workers who were working on the fourth floor of the nuclear reactor building at Unit 1 at the time of the earthquake witnessed a water leak on the same floor, which houses two large tanks for the isolation condenser (IC) and the piping for IC. The Commission believes that this was not due to water sloshing out of the spent fuel pool on the fifth floor. However, since we cannot go inside the facility and perform an on-site inspection, the source of the water remains unconfirmed.
5. The isolation condensers (A and B2 systems) of Unit 1 were shut down automatically at 14:52, but the operator of Unit 1 manually stopped both IC systems 11 minutes later. TEPCO has consistently maintained that the explanation for the manual suspension was that “it was judged that the per-hour reactor coolant temperature excursion rate could not be kept within 55 degrees (Celsius), which is the benchmark provided by the operational manual.” The government-led investigation report, as well as the government’s report to IAEA, states the same reason. However, according to several workers involved in the manual suspension of IC who responded to our investigation, they stopped IC to check whether coolant was leaking from IC and other pipes because the reactor pressure was falling rapidly. While the operator’s explanations are reasonable and appropriate, TEPCO’s explanation is irrational.
6. There is no evidence that the safety relief (SR) valve was opened at Unit 1, though this should have taken place in the case of an accident. (Such records are available for Units 2 and 3.) We found that the sound of the SR valve opening for Unit 2 was heard at the Central Control Room and at Unit 2, but no one working at Unit 1 heard the sound of the Unit 1 SR valve opening. It is therefore a possibility that the SR valve might not have worked in Unit 1. In this case, a minor LOCA caused by the seismic motion could have taken place in Unit 1.

## 3

# Emergency response to the accident

*The Commission investigated the accident response of TEPCO, the regulatory agencies, the government and the Kantei (Prime Minister's office)—including the early stages of the response, the development of the accident, the emergency response system and the crisis management system.*

## TEPCO's accident response

At the time of the accident, neither the Chairman nor the President of TEPCO were present or accessible, an inconceivable situation for an operator of nuclear power plants. The Chairman and the President also had different understandings of the emergency response structure, a fact that very likely contributed to the delay in TEPCO's response to the accident.

TEPCO's manual for emergency response to a severe accident was completely ineffective, and the measures it specified did not function. The manual assumed that reactor readings could be monitored, but failed to account for a prolonged station blackout like the one that occurred at Fukushima, which prevented any monitoring.

The chain of command was disrupted during the emergency. In an accident situation, TEPCO management at the plant was supposed to communicate with the Nuclear and Industrial Safety Agency (NISA) through the off-site Emergency Response Center (ERC), but this was not possible due to the malfunctioning of the off-site center, which was powerless from earthquake damage. The actual on-site situation of the vent in Unit 1 was not communicated to NISA or the Prime Minister's office, which helped create an atmosphere of distrust between TEPCO's on-site management, the regulatory agencies and the Prime Minister's office. The Prime Minister's consequential decision to go to the site and give directions not only took the time of the on-site operators, but caused a disruption in the planned chain of command for the nuclear power company, the regulatory agencies, and the Prime Minister's office. Had the head office of TEPCO actively communicated the on-site situation from the start, and explained the severity of the situation to the other parties, there is a possibility that the distrust—and the confusion in the chain of command that followed—could have been prevented.

Neither did TEPCO's head office offer sufficient technical support. As the situation at Unit 2 continued to deteriorate, Masao Yoshida, the general manager of the Fukushima plant, asked CEO and VP Sakae Muto for technical advice, but he was in transit from the off-site center at the time, and was unable to respond. TEPCO's headquarters also failed to protect Yoshida from direct questioning by the Kantei, and approved the instructions of NSC Chairman Madarame, despite being contrary to decisions made at the site, the true front line of the response.

Finally, TEPCO's management mindset of "obedience to authority" hindered their response. The confusion over the "withdrawal" comment by President Shimizu and the intervention by the Kantei arose from this mindset. Rather than make strong decisions and clearly communicating them to the government, TEPCO insinuated what it thought the government wanted and therefore failed to convey the reality on the ground. It is hard to conclude that it was the Prime Minister who discouraged the idea of a full withdrawal, as has been reported elsewhere, for a number of reasons: 1) management at the site never considered a full withdrawal of its workers; 2) there is no evidence that a decision for a full withdrawal was made at the TEPCO head office, 3) the evacuation plan, made before Mr. Shimizu's visit to the Kantei, included keeping emergency response members at the plant; 4) the Director-General of NISA, who Mr. Shimizu contacted, claimed that he was not asked for advice on a full withdrawal; and 5) staff at the off-site center, connected through a video-conference system, claim there was no discussion of a complete withdrawal. It is clear that there was a misunderstanding by the Kantei, but the fundamental cause lies in TEPCO's mindset of deference to and reliance on government authority, and the abdication of their own responsibilities, in spite of its position as a private-sector entity.

## The government's emergency response organizations

At the time of the accident, the government's accident response system did not function as planned. The systems that had been planned for use in a disaster—such as the communication and transportation infrastructure—were disabled due to the effects of the tsunami and the earthquake. The failure of the government's accident response system to function in the early stages was one of the reasons that the Kantei increased its involvement in the response to the accident.

The main organizations of the government's accident response system were the Prime Minister's Nuclear Emergency Response Headquarters, the Secretariat of the Nuclear Emergency Response Headquarters of NISA and the Regional Nuclear Emergency Response team. Overall, none of these organizations functioned as planned.

The Prime Minister's Nuclear Emergency Response Headquarters and its Secretariat were intended to lead the overall coordination of emergency response measures, such as



Former TEPCO president  
Masataka Shimizu at the  
18th Commission meeting



Former prime minister  
Naoto Kan at the 16th  
Commission meeting

deciding what measures to take to protect nearby residents, but they were unable to carry out these functions.

Although the intervention of the Kantei contributed to the worsening of the accident, the failure of the Secretariat of the Nuclear Emergency Response Headquarters to gather and share information concerning the development of the accident and the response was a significant factor. Additionally, the Regional Nuclear Emergency Response Team did not take the initiative in the local response to the accident, such as issuing the evacuation order. This was due to the earthquake, the tsunami and the nuclear accident occurring at the same time, and the lack of a prepared response to a prolonged, severe accident.

The Crisis Management Center, located in the Kantei building, already had its hands full with the earthquake and tsunami disaster, and was unable to respond to the nuclear accident. The Nuclear Safety Commission had many problems and was unable to provide advice based on the their own organization's knowledge. The Ministry of Education also failed to make use of the systems that it had prepared.

At a time of rapidly escalating events, it is absolutely vital that every stream of information be shared in real time. Although there was a teleconference system connecting the Kantei and each related organization, there is no evidence that the system was used, especially for sharing information between the Kantei and the related organizations. TEPCO brought its own teleconference system to the off-site center and used it to connect the head office with the plant in Fukushima. Had TEPCO connected its system to the government's teleconference system it may have been able to share information in real time in the early stages, but this was not done.

### **The Kantei's emergency response**

As the situation deteriorated and the planned government accident response systems failed to function, control of the emergency response was taken by the Kantei, with Prime Minister Kan at the center of an ad hoc group of politicians, advisors and the chairman of NISA. This group included people who were neither experts nor had an adequate understanding of the on-site situation.

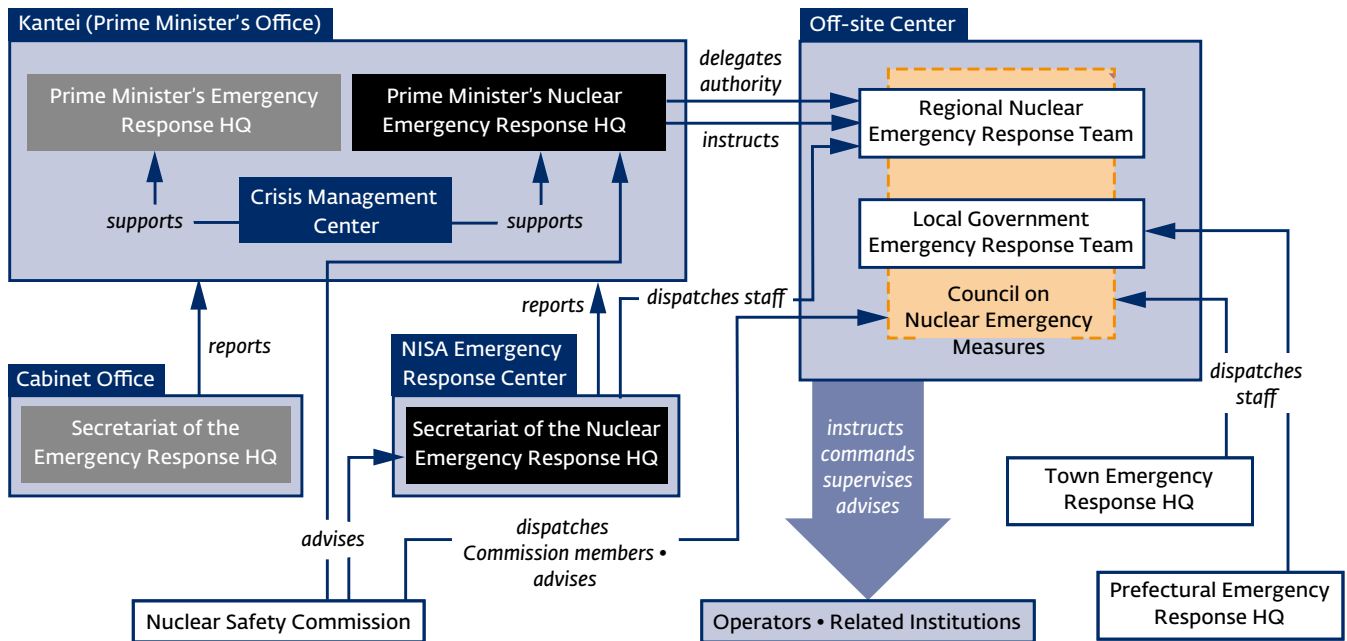
The Kantei had problems from the start. After being notified by TEPCO that the situation met the conditions of Article 15 of the Act on Special Measures Concerning Nuclear Emergency Preparedness, it took two hours to issue the Declaration of a Nuclear Emergency Situation, a necessary step in launching the emergency response. In fact, Prime Minister Kan was not fully aware that issuing the "Declaration of an Emergency Situation" was a necessary first step in response to the accident, and those around him failed to advise him correctly.

The Kantei group understood that the Crisis Management Center, which was responsible for the initial response, had their hands full dealing with the earthquake and tsunami. The senior members of NISA and NSC had joined the group in order to provide advice. They failed, however, to adequately answer questions, leading to a sense of distrust. This distrust reached its peak at the time of the Unit 1 explosion. From then on, the Prime Minister's office on the fifth floor of the Kantei effectively became the front line of the accident response efforts.

Although TEPCO and the regulators had agreed on how to deal with the vent and the injection of seawater, the Kantei was unaware of this, and intervened, resulting in further disorder and confusion. In the early morning of March 15, feeling a sense of urgency from the lack of information, Prime Minister Kan decided to visit the site himself. In response to TEPCO's bid to "pull out" from the increasingly worsening situation at Unit 2, Prime Minister Kan summoned President Shimizu to his office, where he rejected the withdrawal. Soon afterwards, the government decided to establish a government-TEPCO headquarters structure in the head office of TEPCO.

Throughout the course of this accident, the Prime Minister's office was also central in decisions regarding the evacuation zones. Contingency plans called for the on-site headquarters to have responsibility for drawing up evacuation proposals, with the duty being transferred to the Secretariat of the Nuclear Emergency Response Headquarters in the event that the on-site headquarters was unable to do so. This was exactly the case; but when the response from the Secretariat of the Nuclear Emergency Response Headquarters was delayed, the Kantei stepped in and ordered the evacuations. This resulted in the following problems: 1) as the decisions were made on an ad hoc basis, there was insufficient cooperation between the governmental agencies; 2) there was a deficiency in the details of evacuation





▲  
Diagram of the emergency  
communication protocol

operations; and 3) there was a lack of suitable explanation to the public. This led to an increased state of disorder and confusion on the ground.

### Evaluating the government and Kantei emergency response

We respect the efforts of the government and other concerned parties considering the extreme conditions in which they found themselves—dealing with the accident, the earthquake and tsunami at the same time under extremely high-pressure conditions. There was little time for a measured approach, and they were required to go without eating or sleeping for long periods of time.

But there are two points which must be stated. First of all, the group at the Kantei did not understand the proper role the Kantei should have taken in a crisis. There has been much attention given to the miscommunication between the Kantei and TEPCO on the issue of whether the withdrawal from the plant that TEPCO planned would be all of the workers or a fraction of them. However, the state of the reactors was so severe that TEPCO had to ask for some kind of retreat. In this situation, the Kantei should have confirmed the possibility that all workers would have to retreat, in order to plan the evacuation of residents and take other measures to protect residents.

It is clear that the Kantei should not have intervened in issues that TEPCO was capable of handling, such as the condition of the vent and the injection of seawater, and should have confirmed the meaning of President Shimizu's comments about the retreat. Its intervention, establishing a government-TEPCO headquarters at TEPCO, is equally unfathomable.

A second point is that the direct intervention by the Kantei, including Prime Minister Kan's visit to the Fukushima Daiichi plant, disrupted the chain of command and brought disorder to an already dire situation at the site. Starting with the Prime Minister's visit to the Fukushima Daiichi plant, a new route was established to communicate information between the Kantei and Fukushima Daiichi and the head office of TEPCO. This new route was contrary to the official information flow from Fukushima Daiichi to the head office of TEPCO and on to NISA and the Kantei (the Prime Minister's Nuclear Emergency Response Headquarters). The new route required TEPCO to communicate its information not only to NISA but also to the Kantei, contributing to the disruption of TEPCO's response and disorder in the plant.

At all times, the government's priority must be its responsibility for public health and welfare. But because the Kantei's attention was focused on the ongoing problems at the plant—which should have been the responsibility of the operator—the government failed in its responsibility to the public. The Kantei's continued intervention in the plant also set the stage for TEPCO to effectively abdicate responsibility for the situation at the plant.

According to the nuclear emergency manual, NISA and the other bureaucratic institutions have the responsibility to collect and organize information for delivery to the Nuclear Emergency Response Headquarters for use in decision-making. However, with the new route in place between the Kantei and TEPCO, the bureaucratic institutions' awareness of their responsibility decreased and their approach became passive. The vertical sectionalism of the various ministries involved also prevented effective information sharing. In order to guarantee public safety, it is necessary for these agencies not only to respond flexibly in times of crisis, but to raise their crisis management capability through a continuous training regimen.

### **Fukushima Prefecture's accident response**

Fukushima Prefecture's emergency response system was also built on the assumption that a nuclear disaster would not occur at the same time as an earthquake and tsunami. As a result, it was totally unprepared to respond to the accident.

The disaster response structure of Fukushima Prefecture was laid out in the Fukushima Prefecture Regional Disaster Prevention Plan, but this did not include the possibility of a nuclear disaster caused by natural disasters. Due to the breakdown in communication from the central government in the post-accident time period, neither the Fukushima prefectural government nor the central government were aware of each other's actions. Feeling a sense of crisis, the Fukushima prefectural government unilaterally ordered that residents within a two-kilometer radius of the plant be evacuated, based on prior emergency prevention training. This was followed 30 minutes later by the central government ordering the evacuation of residents within a three-kilometer radius. However, the earthquake and tsunami had seriously damaged the emergency communication systems, and it was difficult to transmit the order to local municipalities and the public.

Fukushima Prefecture also was unable to conduct emergency monitoring. Only one of the 24 fixed monitoring posts was still working; the others were either washed away or were no longer connected. Mobile monitoring posts were unusable until March 15 due to problems with the mobile telephone network. There was one vehicle equipped with monitoring equipment, but this was also out of action due to a lack of fuel.

### **Information disclosure by the central government**

Detailed accuracy was made a priority, at the expense of quickly getting the information to those who needed it for informed decisions. Mr. Edano, the cabinet secretary, repeatedly stated that there were no immediate health effects from the release of radiation, giving the public a false sense of security. In his statements, however, the necessity and urgency of the evacuations was never adequately explained from the residents' point of view, and the government never followed up with evidence that would support his statements. This caused a great deal of anxiety among the public. Last but not least, the government chose to release information purely from a subjective perspective, rather than reacting to the needs of the public.

## 4

# Spread of the damage

*The Commission made a number of findings regarding the spread of damages from the accident at the nuclear plant. We studied how decisions were made, and how the policies and defensive measures were communicated to the public. We also investigated these matters from the perspective of the residents affected by the accident damage.*

### **Damage from the nuclear power plant accident**

The effects of the accident, of course, are still being felt, and will continue to affect the country. As a result of the accident, approximately 900PBq of radioactive substances were emitted, 1/6 the amount of emissions from the Chernobyl accident when converted to iodine. There are now vast stretches of land—1,800 square kilometers—of Fukushima Prefecture with levels equaling a potentially cumulative dose of 5mSv/year or more.

Residents are greatly concerned about their radiation exposure levels. However, the health implications are still unknown because of the different conditions that apply to each individual. An estimate of the cumulative external exposure over the first four months following the accident for approximately 14,000 residents (excluding plant workers) from three towns and villages where radiation doses were relatively high, shows that 0.7 percent of the residents have been exposed to 10mSv or more, and 42.3 percent have been exposed less than 10mSv, of which 57 percent have been exposed to 1mSv or less. While the values are generally low, it is clear that residents are suffering from stress brought on by fear of the unknown.

### **Chaotic evacuation orders**

The Commission's investigation revealed that many residents were unaware that the accident had occurred, or of its drastic escalation and the radiation leakage, even after the government and some municipalities were informed.

As the damage from the accident began to escalate, evacuation destinations and other evacuation details were often revised. But, even during the escalation, most nearby residents remained unaware of the accident and its severity, not to mention the potential for increased danger.

A total of 146,520 residents were evacuated as a result of the government's evacuation orders. However, many residents in the plant's vicinity evacuated without accurate information. Unaware of the severity of the accident, they planned to be away only for a few days and evacuated with only the barest necessities. Evacuation orders were repeatedly revised as the evacuation zones expanded from the original 3-kilometer radius to 10 kilometers and later, 20 kilometers, all in one day. Each time the evacuation zone expanded, the residents were required to relocate. Some evacuees were unaware that they had been relocated to sites with high levels of radiation. Hospitals and nursing homes in the 20-kilometer zone struggled to secure evacuation transportation and find accommodations; 60 patients died in March from complications related to the evacuation. Frustration among the residents increased.

On March 15, residents in the zone between 20 and 30 kilometers from the plant were ordered to shelter-in-place. Since the order lasted for several weeks, these residents suffered greatly from a lack of communication and necessities. As a result, the shelter-in-place order was then revised to voluntary evacuation. Again, information on the basis for revising the evacuation order was sadly lacking, and residents found themselves having to make evacuation decisions without the necessary facts. The Commission concludes that the government effectively abandoned their responsibility for public safety.

The fact that some areas within the 30-kilometer zone suffered from high radiation levels was known after the System for Prediction of Environmental Emergency Dose Information (SPEEDI) data was released on March 23. But neither the government nor the nuclear emergency response headquarters made a quick decision to evacuate residents from those areas; it was only one month later that they were evacuated.

### **Lack of preparation for a nuclear disaster**

The regulators had become aware of a number of issues concerning nuclear disaster preparedness prior to the accident, but did not review disaster prevention measures. As a result, delays in taking action contributed to the inappropriate response seen during the accident.

The Nuclear Safety Commission (NSC) started reviewing the disaster-prevention guidelines in 2006 to accommodate new international standards. However, NSC was apprehensive that the residents could become concerned by the necessity of additional defense measures after being repeatedly assured of the safety of nuclear power, and that their worries might spill over to arguments against the plutonium-thermal project then in progress. NSC failed to explain how the civil defense initiative would benefit the residents, and failed to introduce the international standards in a substantial way. Although revision of the disaster-prevention guidelines continued after 2007, the accident broke out as the review was proceeding.

After the Niigata Earthquake in 2007, it was obvious that the assumption of a complex disaster should be included in nuclear accident prevention measures. Still, NISA continued with countermeasures based on assuming a low probability of a complex disaster. NISA eventually only provided passive advice regarding disaster drills based on a complex disaster.

Meanwhile, the government also failed to assume a severe accident or a complex disaster in its comprehensive nuclear disaster drills. As the scope of the drills expanded, they lost substance, and were performed for cosmetic purposes, rather than to develop preparedness. The irrelevant drills were lacking instruction in the necessity of using tools such as the radiation monitoring information from SPEEDI. Though it was applied in the annual drills, participants found the drills useless at the time of the accident.

The Emergency Response Support System (ERSS) and the SPEEDI system are in place to protect public safety. The environment monitoring guideline assumption is that ERSS predicts and forecasts the release of radioactive substances and release data, and SPEEDI predicts and forecasts the spread of radioactive materials based on ERSS. Public safety measures, including those for evacuation, should be planned based on the use of these systems.

If emission data cannot be retrieved from ERSS, the SPEEDI output is not accurate or reliable enough to use in delineating evacuation zones. Some of the people involved were aware of the limitations of the system, but no revisions were made before the accident. There was no other monitoring network in place that could supplement or replace the forecast systems.

The system failed. The emission data could not be retrieved from ERSS, and the government was unable to use the SPEEDI results in planning protection measures and fixing evacuation zones. A few weeks later, NSC released an estimation of the plume of radioactivity at the time of the accident. Though the NSC's estimation was created by reverse analysis based on long-term monitoring data, the public mistakenly believed that it was made with data from the time of the accident which the government had ignored or failed to release. This resulted in further public distrust.

At the same time, the emergency radiation medical systems had been established in a stopgap way, based on problems that arose during the JCO accident in 1999. No one had considered the need for preparation over a wide area of radiation exposure as happened in Fukushima. Because of this, most of the facilities were not used because of their location too close to the plant, their capacity, and the number of trained medical personnel. Those medical institutions with capacity for emergency radiation treatment did not function as anticipated.

### **Current and future health damage from radiation**

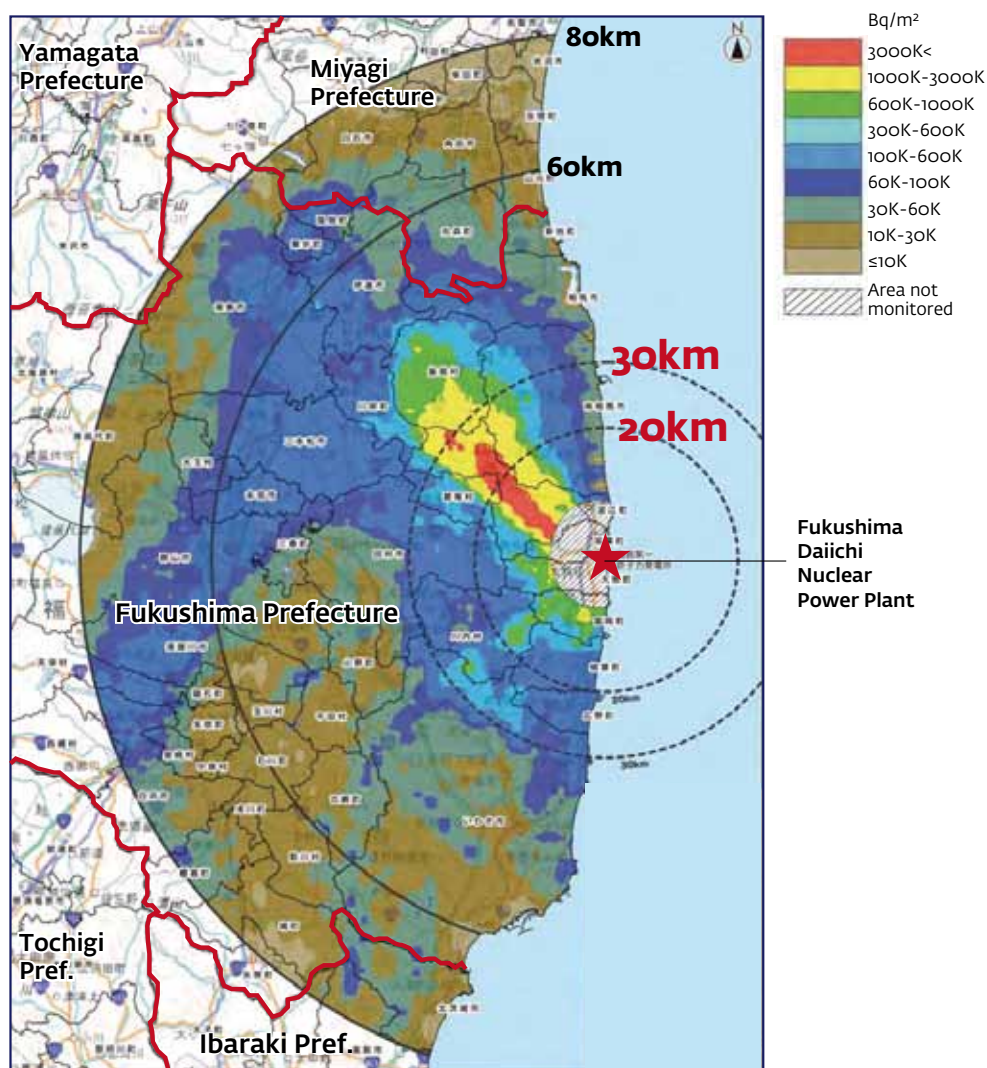
One of the biggest concerns among residents is the impact of radiation on their health. Nevertheless, the government and Fukushima Prefecture have yet to make a proper response to the pressing concerns of residents regarding radiation doses in their neighborhood, its impact on their health, and other radiation issues. What the government needs to do is convey detailed information to the residents and provide options for informed decision-making.

There is no consensus among experts on the health effects of low dose radiation exposure, but we agree that the limits should be set as low as can be reasonably achieved. The government needs to make efforts to explain the need for limits, and the levels decided, in ways that are clear and understandable to ordinary citizens. The government has not seriously undertaken programs to help people understand the situation well enough to make their own informed decisions. The government did not, for example, clearly explain the variations in the risk of radiation exposure to different segments of the population, such as infants and youths, expectant mothers, or others more susceptible to the effects of radiation.

Much was learned from the Chernobyl accident about low dose radiation exposure, including the risk of thyroid cancer among children. Although the positive effects of administering stable iodine and the proper timing were fully known, the government's nuclear emergency response headquarters and the prefectural government failed to give proper instructions to the public.

Appropriate control of the public's internal exposure is important for managing health over the mid- and long-term. Although standards have been categorized in detail, it is more important that the government communicates in ways that are clearly helpful to the public: identifying what is edible, what is the tolerable intake level, which foods continue to be safe, and whether tests are reliable. Through thorough inspection and transparent disclosure

Map showing accumulated cesium-137 ▶  
From data collected by MEXT  
on July 2, 2011



of information, the government should efficiently address public concerns. Neither the government nor Fukushima Prefecture have prepared plans to accumulate data on internal exposure to radioactive cesium.

TEPCO did not prepare worker safety measures in the case of a severe accident, and information on environmental dosage was not provided to them immediately after the accident. It is important that nuclear power plant workers' exposure be controlled properly, and securing the safety of workers during the accident response is critical.

At the same time, radiation exposure is not the only health issue. People in Fukushima are suffering from mental health issues, which evolved into a serious social problem among those affected by the Chernobyl accident. The Commission places the mental and physical health of the residents as the first priority, and concludes that action needs to be taken urgently. Surveys that monitor the health conditions of residents of Fukushima are necessary, but an adequate inspection system with inspection equipment is urgently needed. Measures need to be taken with a priority on public health. Unfortunately, we see few signs of anything being done.

### Prolonged environmental and decontamination issues

Once radioactive substances are released, they continue to affect the environment, and must be effectively dealt with. Of all the issues from the accident, the Commission considers the problem of environmental pollution to be the least addressed. As is apparent from the Chernobyl accident, radioactive fallout that spread over a broad area remains in mountain and forest areas for many years, and their levels do not naturally diminish for many decades. Wildfires, floods and other causes can spread contamination further.

Rainfall flushes radioactive materials and creates relatively high dose locations

(“hotspots”), in areas such as lakes. Highly contaminated deposits also tend to collect on the seabed. The government should address these problems promptly with a long-term view toward rectifying the situation.

The government is spending massive amounts of financing and energy on decontamination programs, but major issues have arisen regarding the implementation. Many regions have been unable to secure temporary storage sites for the contaminated debris, a problem exacerbated by the government’s unilateral action in pushing decontamination without first gaining consent from the residents. It has been proven that the better the communication between the residents and the municipal governments, the more success the community has in securing temporary debris storage sites.

The Commission recognizes that the residents also have different decontamination agendas depending on the region, and consideration needs to be given to their demands. Some want to remain in their homeland and actively support decontamination; others want to move away and are requesting compensation to support their relocation. Many residents have a choice and, in these cases, the government must help them make informed decisions.

It is time to begin monitoring decontamination cost effectiveness and its effect on the environment, as well as the methods used in the decontamination process. Without in-depth analysis, the major concerns of the residents will remain unanswered: Can they return home? If yes, when? If they return, will they be able to support themselves?

Decontamination should not be treated as a unilateral decision, but must be categorized according to its effect. It must be remembered that at the root of residents’ questions is not decontamination, but whether they can reconstruct their former lives. The government must continue the decontamination process while revising the plans to reflect the experiences gained.

## 5

# Organizational issues in accident prevention and response

*The Commission found a number of organizational issues regarding preventive measures prior to the accident, the causes of the accident and the crisis management response after the accident. We investigated the entire chain of events in order to discover what went wrong with the organizations and systems involved. We also examined the relationship between TEPCO and the regulatory agencies with a view to reform in the future.*



## Background issues

There were many opportunities for NISA, NSC and TEPCO to take measures that would have prevented the accident, but they did not do so. They either intentionally postponed putting safety measures in place, or made decisions based on their organization's self interest—not in the interest of public safety.

Following the implementation of new regulations in other countries, discussions were held about revising the guidelines to include a scenario where the AC power source was lost. The discussion also included reviewing the reliability of existing DC power sources. Unfortunately, these talks did not result in any revision to the guideline or the regulations, and at the time of the accident no serious consideration had been given to a scenario involving loss of AC power to the plant.

Both TEPCO and NISA were aware that if tsunami levels rose beyond the assumptions made by the Society of Civil Engineers, there was a risk of core damage from a malfunction of the seawater pumps. They were also aware that a tsunami with water levels above the ground level of the power plant was a possibility, and would result in a total loss of power.

Despite the fact that both TEPCO and NISA were aware of the risks, no attempts were made to amend the existing regulations or bring them in line with international standards. NISA gave no compulsory instructions to carry out specific measures, and TEPCO took no action.

NISA did instruct TEPCO to conduct an anti-seismic backcheck, but by not completing the backcheck as originally scheduled, TEPCO effectively invited the accident that followed. NISA is equally at fault because it did not ensure that the backcheck was completed in a timely fashion, despite its awareness of the backcheck's importance. NISA's failure to demand action, and TEPCO's failure to act, together constitute negligence which led to the accident. They cannot use the excuse of circumstances occurring that were beyond their expectations.

## The “regulatory capture” of Japan's nuclear industry

The fundamental causes of the accident, including the failure to carry out earthquake and tsunami measures and the lack of measures for dealing with a severe accident, can be also traced to the Federation of Electric Power Companies (FEPC). This is an unregulated lobbying association of electric power companies, and thus also bears a share of the responsibility.

Despite the fact that constant vigilance is needed to keep up with evolving international standards on earthquake safeguards, Japan's electric power operators have repeatedly and stubbornly refused to evaluate and update existing regulations, including backchecks and backfitting. The Japanese nuclear industry has fallen behind the global standard of earthquake and tsunami preparedness, and failed to reduce the risk of severe accidents by adhering to the five layers of the defense-in-depth strategy.

The Commission's examination of the way safety regulations are deliberated and amended reveals a cozy relationship between the operators, the regulators and academic scholars that can only be described as totally inappropriate. In essence, the regulators and the operators prioritized the interests of their organizations over the public's safety, and decided that Japanese nuclear power plant reactor operations “will not be stopped.”

Because the regulators and operators have consistently and loudly maintained that “the safety of nuclear power is guaranteed,” they had a mutual interest in averting the risk of existing reactors being shut down due to safety issues, or of lawsuits filed by anti-nuclear activists. They repeatedly avoided, compromised or postponed any course of action, and any regulation or finding that threatened the continued operation of nuclear reactors. The FEPC has been the main organization through which this intransigent position was maintained among the regulatory agencies and in the academic world.

Our investigation focused on the significant lobbying role taken by FEPC on behalf of the operators, and scrutinized the relationship between the operators and regulators. The Commission found that the actual relationship lacked independence and transparency, and was far from being a “safety culture.” In fact, it was a typical example of “regulatory capture,” in which the oversight of the industry by regulators effectively ceases. We found examples of this in the neutering of revisions in the Guideline for Anti-seismic Design, and the improper discussions that took place on regulating severe accident countermeasures.

## TEPCO's organizational issues

Again, we must point to TEPCO's organizational mindset as one cause of the accident: on

one hand they strongly influenced energy policy and nuclear regulations while abdicating their own responsibilities and letting METI take the responsibility on the front line. But they also manipulated the cozy relationship with the regulators to take the teeth out of rules and regulations.

TEPCO did hold meetings about what it viewed as risks to nuclear power production; such risks were defined as the potential loss of trust in the utility on the part of the public regarding natural disasters and possible decreases in the operation rates of reactors. The risk of a potentially severe accident never appeared in TEPCO's list of risks. TEPCO explained this glaring omission by arguing that nuclear safety was supposed to be dealt with by its on-site plant department, hence such risks were not to be recorded in the records of the central risk management meetings. The risk of damage to public health and welfare was not an issue for TEPCO.

As the nuclear power business became less profitable over the years, TEPCO's management began to put more emphasis on cost cutting and increasing Japan's reliance on nuclear power. While giving lip service to a policy of "safety first," in actuality, safety suffered at the expense of other management priorities. An emblematic example is the fact that TEPCO did not have the proper diagrams of piping and other instruments at the Daiichi plant. The absence of the proper diagrams was one of the factors that led to a delay in venting at a crucial time during the accident.

After the accident, TEPCO had the twin responsibilities of containing the accident situation and disclosing facts regarding the status of the accident to the surrounding residents, the nation and the international community in an appropriate and timely manner. We assert that the actual disclosure of facts by TEPCO was inappropriate, and that such inappropriateness was also an indirect cause of the deterioration of the situation. For example, regarding the disclosure of an increase of reactor vessel pressure at Unit 2, TEPCO issued a press release about seawater injection at 23:00 on March 14, but made no disclosure about an increase in radiation dosage at the entrance of the plant that occurred between 19:00 and 21:00 on the same day. TEPCO also downplayed the severity of the situation in their disclosure regarding the plague in the suppression chamber of Unit 2; moreover, there was a significant delay from when TEPCO informed the Kantei and when it disclosed the information publicly.

The Commission also found a record by TEPCO noting that they did not inform the public of an increase in reactor vessel pressure at Unit 3, as of 8:00 on March 14, because NISA had banned the release. In fact, the Kantei had merely instructed TEPCO to inform them of the contents of releases when they were made. In obeying NISA's order to halt the release of this crucial information, TEPCO effectively prioritized its own interests and those of NISA over the greater good of the public and their right to be informed.

### **Organizational issues concerning regulatory bodies**

Prior to the accident, the regulatory bodies lacked an organizational culture that prioritized public safety over their own institutional wellbeing, and the correct mindset necessary for governance and oversight. The Commission concludes that the structural flaws in Japan's nuclear administration must be identified through a critical investigation into the organizational structures, laws and regulations and personnel involved. We should identify the areas in need of improvement, recognize the lessons to be learned, and plot the fundamental reforms necessary to ensure nuclear safety in the future.

Autonomy and transparency must be built into the new regulatory organizations to be created. They must have significant powers of oversight in order to properly monitor the operators of nuclear power plants. New personnel with highly professional expertise must be employed and trained. It is necessary to adopt drastic changes to achieve a properly functioning "open system." The incestuous relationships that existed between regulators and business entities must not be allowed to develop again. To ensure that Japan's safety and regulatory systems keep pace with evolving international standards, it is necessary to do away with the old attitudes that were complicit in the accident that occurred.

## 6

# The legal system

*The Commission investigated the need for the fundamental reform of laws and regulations governing nuclear power. It outlined the need to prepare an organizational structure that would assure sound decision-making processes for the implementation of nuclear laws and regulations.*

**Laws and regulations governing nuclear power**

The Commission has found that prior to the accident, revision and amendments of laws and regulations were only undertaken on a “patchwork” basis, in response to micro-concerns. The will to make large, significant changes in order to keep in step with the standards of the international community was utterly lacking.

At the time of the accident, the laws, regulations and infrastructure were based on the assumption that the scope and magnitude of possible natural disasters would not exceed precedent. There was a failure to take into account the prospect of unprecedented events such as the earthquake and tsunami on March 11, 2011, despite the fact that the possibility of such events was known.

Those in charge of the laws and regulations that governed the nuclear power industry in Japan had a dogmatic mindset that failed to keep pace with evolving international laws, standards and practices, and which disregarded pertinent technological advice and improvements from abroad. As a result, the laws and regulations governing Japan’s nuclear power industry at the time of the accident were outdated relative to those of other countries and, in some cases, obsolete.

Prior to the accident, the primary purpose of the nuclear laws and regulations was the promotion of nuclear energy. The laws need to be rewritten with emphasis placed on prioritizing public safety, health and welfare. The roles, responsibilities and relationships of the operators, regulators and other involved entities need to be clearly delineated in the Act on Special Measures Concerning Nuclear Emergency Preparedness. The defense-in-depth needs to be formally enshrined in the regulations so that it will function properly when needed in the future.

The accident has highlighted the need for sweeping, fundamental reform of said laws and regulations to bring them into line with international standards, make use of cutting-edge technical knowledge and learn from other accidents around the world. It is necessary to create a system wherein regulators have an ongoing obligation to insure that the laws and regulations reflect changing international standards. A mechanism for monitoring the resulting infrastructural implementations must be devised.

Once such new systems, laws and regulations are established, they must then be retroactively applied to existing reactors. It should be explicitly stated in the laws that reactors that do not meet the new standards should be decommissioned or otherwise dealt with appropriately.

**From:** [Michael Aguirre](#)  
**To:** [Street, Joseph@Coastal](mailto:Street_Joseph@Coastal)  
**Subject:** Agenda Item 14 SCE Application for Nuclear Waste Permit  
**Date:** Monday, October 05, 2015 4:22:05 AM  
**Attachments:** [malfesance.pdf](#)

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Mr. Street: More support to question SCE's reliability regarding its representations in support of the SCE nuclear waste at San Onofre permit application. Mike Aguirre

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# **Report of Malfeasance and Institutional Corruption at the California Public Utilities Commission**

**07 January 2015**

**Aguirre & Severson, LLP**

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# Malfeasance at CPUC Threatens Security of the People of California



**2007 San Diego Fire  
Caused by SDG&E Equipment**



**2010 San Bruno Fire Caused by PG&E  
Gas Lines**



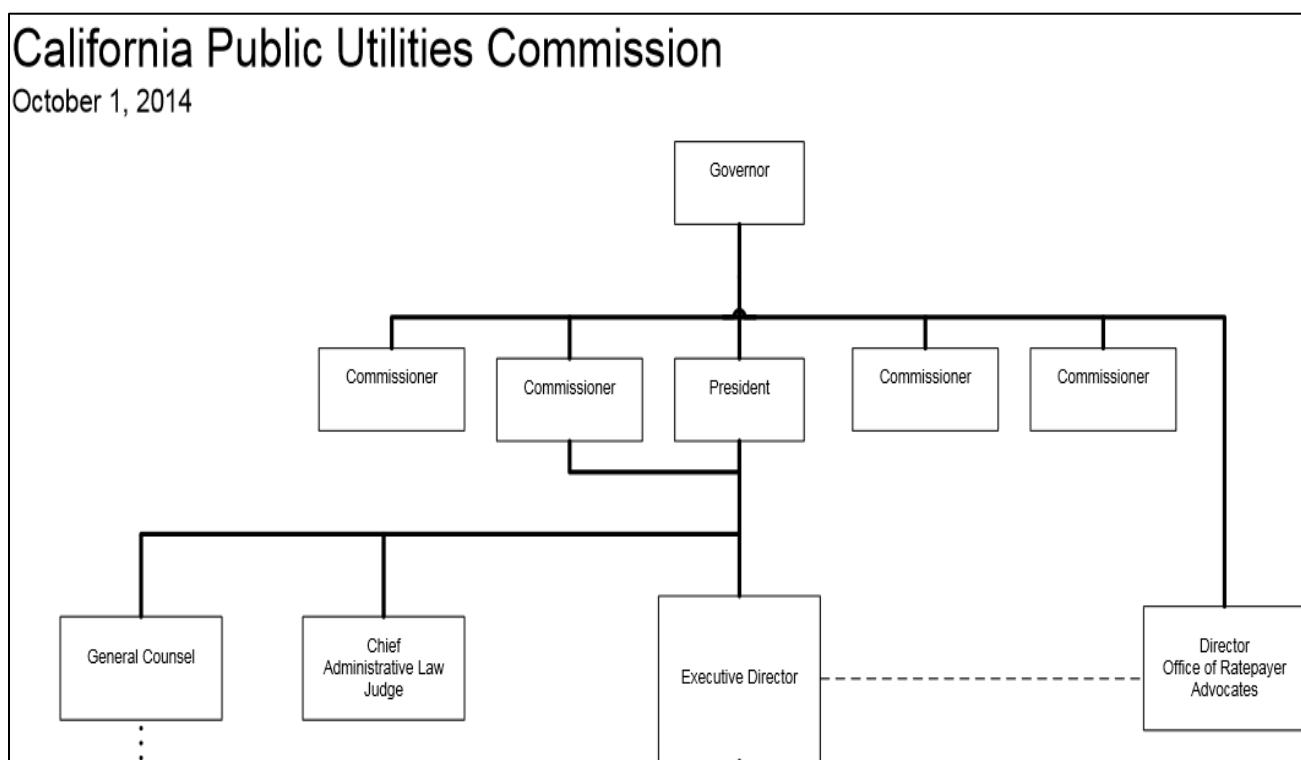
**2011 Fukushima nuclear plant**



**San Onofre: Disaster Waiting to  
Happen**

## INTRODUCTION

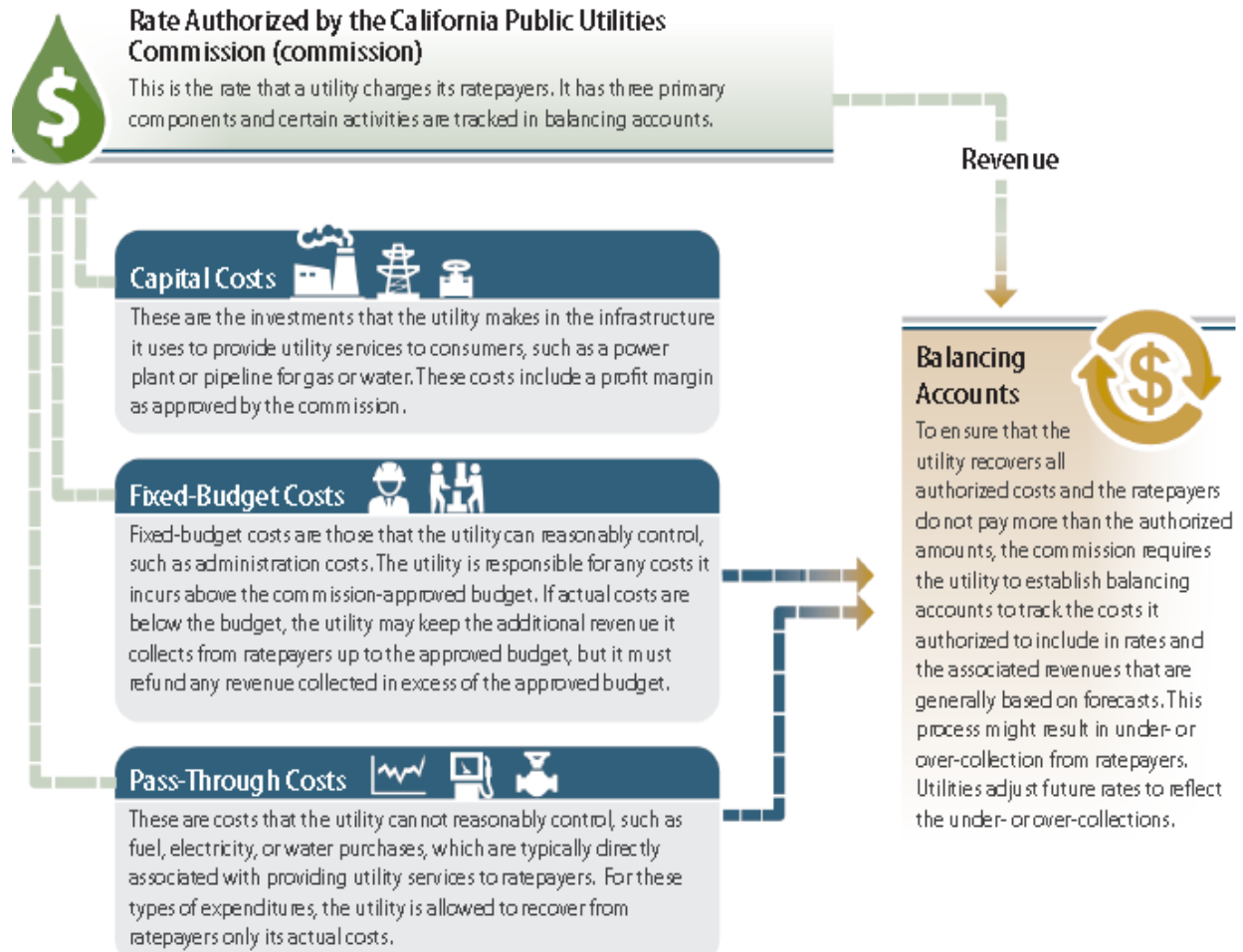
This report is written with the hope of inducing the people of California to action. Malfeasance has spread into the bone marrow of California government. The malfeasance of California's government is illustrated by the corruption at the California Public Utilities Commission (CPUC), which operates under the Governor of the State of California.



The CPUC has 1,000 staff positions and a budget of \$1,332,214,000. Under Public Util. Code § 431, the CPUC annually determines a fee to be paid by “every electrical, gas, telephone, telegraph, water, sewer system, and heat corporation and every other public utility providing service directly to customers or subscribers and subject to the jurisdiction of the Commission to produce a total amount equal to that amount established in the authorized CPUC budget for the same year,



including adjustments for increases in employee compensation and an appropriate reserve to regulate public utilities.<sup>1</sup> The rate structure is explained:

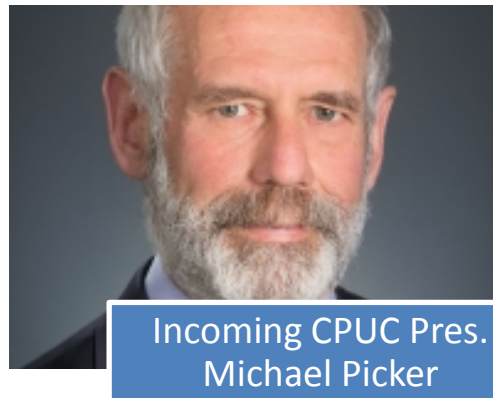
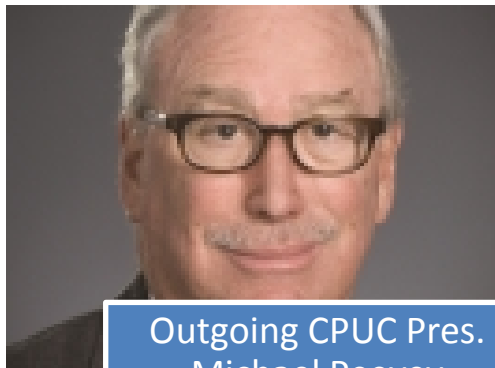


In addition, the CPUC has set up seventy energy programs and several nonprofits, discussed infra.

<sup>1</sup> Less the amount to be paid from special accounts or funds pursuant to Section 402, reimbursements, federal funds, and any other revenues, and the amount of unencumbered funds from the preceding year.

## CHANGING OF THE CPUC GUARD

Michael Peevey, President of the CPUC, was forced to step down in the face of a judge-fixing scandal. Another CPUC Commissioner has been exposed by his own emails to have been compromised by the utilities he is charged with regulating. As with Peevey, Michael Picker was a principal in a lobby firm known as Lincoln Crow Strategic Communications from 2001-2009. Governor Brown appointed Picker to the CPUC in January 2014. Picker voted with Peevey on matters before the CPUC approving the collusive San Onofre settlement.



The corruption and malfeasance identified in this report is integral to the ways and means the CPUC has come to operate. The departure of Peevey does not cleanse the bad practices; it may, in fact, create the false impression and diminish the energy behind CPUC reform. Californians spend more than \$47 billion annually for services from industries regulated by the PUC<sup>2</sup> (\$13,000,000,000 from the investor-owned electricity utilities). The people of California's safety must be maintained and the CPUC must ensure the utilities use customers' funds for their intended purposes. The CPUC must begin again to honor its purpose of protecting the people of California from unreasonable rates. Cal Pub. Util Code § 451.

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<sup>2</sup> 8660 Public Utilities Commission 2014 budget at GG2.

## **STORM WARNINGS SHOW THE CPUC CANNOT BE TRUSTED TO PROTECT THE PEOPLE OF CALIFORNIA**

The safety concerns are heightened in the case of San Onofre where tons of nuclear waste will be stored indefinitely.<sup>3</sup> High-level wastes are hazardous to humans and other life forms because of their high radiation levels that are capable of producing fatal doses during short periods of direct exposure.<sup>4</sup> High level radioactive (or nuclear) waste results from the fuel used by reactors to produce electricity.<sup>5</sup> Separated High-level waste and spent fuel rods from nuclear power plants must be handled and stored with great care since they contain the highly-radioactive fission products, plus uranium and plutonium.<sup>6</sup> Nuclear fuel rods are ceramic pellets of uranium oxide (UO<sub>2</sub>), about the size of a finger joint, stacked and sealed inside a long metal tube (cladding) about as big around as a Sharpie pen. The space between the pellets and cladding is filled with helium.<sup>7</sup>

### **ACTION MUST BE TAKEN**

The failure of the CPUC to protect ratepayers in the San Diego fire, San Bruno explosion, and San Onofre radiation leak and plant closure are “storm warnings” that the CPUC cannot be counted on to protect the people of California. The people of Okuma, Fukushima, Japan paid dearly for the failures of Japanese

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<sup>3</sup> <http://www.kpbs.org/news/2014/may/12/del-mar-councilman-testifies-senate-hearing-decomm/>

<sup>4</sup> <http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/radwaste.html>

<sup>5</sup> <http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/radwaste.html>

<sup>6</sup> <http://www.nrc.gov/reading-rm/doc-collections/fact-sheets/radwaste.html>

<sup>7</sup> “Spent fuel” refers to fuel used in a commercial nuclear reactor that has been removed because it can no longer economically sustain a nuclear reaction. Burnup refers to the uranium consumed in the nuclear reaction. It is expressed in gigawatt-days per metric ton of uranium (GWd/MTU)—a measure of how long a fuel rod is in the core and the power level it reaches. “High burnup fuel” is in the reactor core for longer than “low burnup fuel.”

regulators when the Tōhoku earthquake and tsunami struck their city, knocked out the Fukushima Daiichi nuclear power plant operated by Tokyo Electric Power Company (TEPCO):



Following the earthquake, a 15-metre tsunami disabled the power supply and cooling of three Fukushima Daiichi reactors, causing the nuclear accident on 11 March 2011. All three cores at the nuclear station largely melted in the first three days. A Japanese commission faulted the government, regulators, and TEPCO for not anticipating and preventing the crisis at the Fukushima Daiichi Nuclear Power Plant.<sup>8</sup> The destruction of the Fukushima plant resulted in massive radioactive contamination of the Japanese mainland.

In November 2011, the Japanese Science Ministry reported that long-lived radioactive cesium had contaminated 11,580 square miles (30,000 sq km) of the land surface of Japan. Some 4,500 square miles – an area almost the size of

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<sup>8</sup> <http://www.districtenergy.org/blog/2012/07/08/commission-concludes-fukushima-accident-was-manmade/>

Connecticut – was found to have radiation levels that exceeded Japan’s allowable exposure rate.<sup>9</sup> All of the land within 12 miles (20 km) of the destroyed nuclear power plant, encompassing an area of about 230 square miles (600 sq km), and an additional 80 square miles (200 sq km) located northwest of the plant, were declared too radioactive for human habitation. All persons living in these areas were evacuated and the regions declared permanent “exclusion” zones.<sup>10</sup>



**Fukushima Before Disaster**



**Fukushima After Disaster**

The people of California cannot ignore the “storm warnings” showing the CPUC has failed its duty to protect ratepayers from unreasonable rates. CPUC imposed rates on ratepayers, but then failed those funds were used to fix pipes, clear brush, obtain reliable steam generators instead of one that have not been used for their intended purposes.

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<sup>9</sup> The exposure rate was 1 mSV (millisievert) per year. About a month after the disaster, on 19 April 2011, Japan chose to drastically increase its official “safe” radiation exposure levels from 1 mSv to 20 mSv per year – 20 times higher than the US exposure limit. This allowed the Japanese government to downplay the dangers of the fallout and avoid evacuation of many badly contaminated areas.

<sup>10</sup> <http://www.psr.org/environment-and-health/environmental-health-policy-institute/responses/costs-and-consequences-of-fukushima.html>

## RATEPAYERS CHARGED UNREASONABLE RATES

Customers of utilities the CPUC “regulates” pay amongst the highest rates in the nation and more than their fellow citizens who buy their electricity from publicly owned utilities:



Rates have consistently gone up while electricity consumption has remained constant. Between 2009 and 2013, rates for investor-owned utility customers went up 19.16% between 2009 and 2013. In 2013, the investor-owned utilities charged ratepayers the greater part of \$13,000,000,000; this was up from \$10,373,000 (19.16%).

**Table II-2**  
**2013 Authorized Electric General Rate Case Revenue Requirements (\$ Million)**

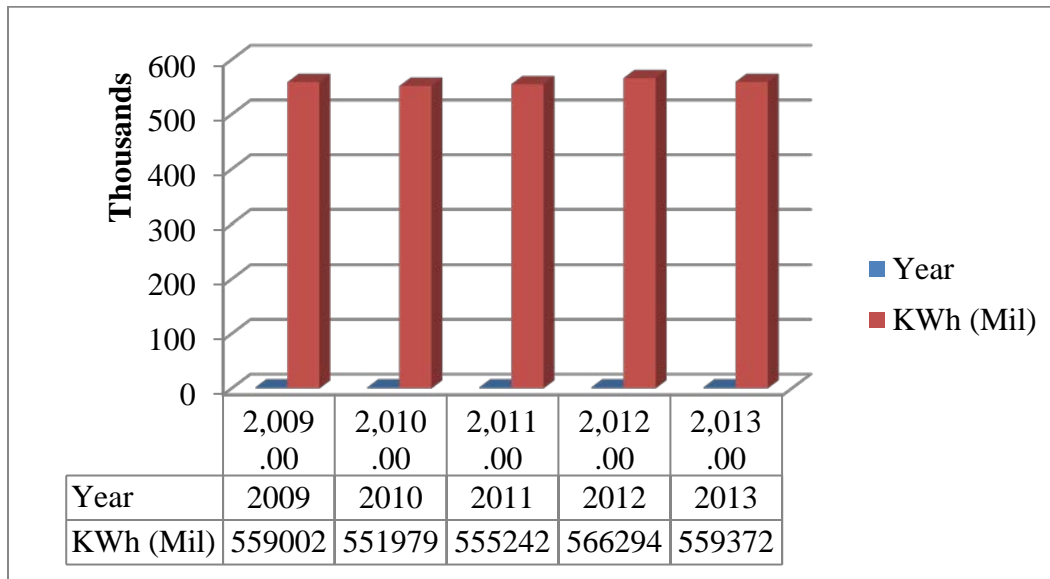
	PG&E	SCE	SDG&E
Operations and Maintenance	\$1,947	\$2,272	\$659
Depreciation	\$1,099*	\$1,222	\$274
Return on Rate Base	\$1,246	\$1,465	\$300
Taxes	\$734	\$712	\$207
Attrition **	\$295	\$358	\$40
<b>Total</b>	<b>\$5,321</b>	<b>\$6,029</b>	<b>\$1,481</b>



## 2009 General Rate Case Revenue Requirements (000)

	PG&E	SCE	SDG&E
Operations and Maintenance	\$1,827,122	\$1,853,119	\$445,646
Depreciation	\$1,019,254	\$1,106,992	\$285,756
Return on Rate Base	\$909,993	\$1,066,918	\$246,799
Taxes	\$617,138	\$819,612	\$176,474
<b>Total</b>	<b>\$4,373,507</b>	<b>\$4,846,641</b>	<b>\$1,154,675</b>

Even as rates utility rates increased by almost 20% for utilities, the consumption of electricity in California remained constant:



This report examines the CPUC’s decision to make ratepayers pay for the San Onfore nuclear power plant after it was permanently knocked out of service by Edison executives’ decision to obtain and deploy defective steam generators. The generators failed after less than 1 year of joint-use. The CPUC authorized Edison to charge customers the greater part of \$5,000,000,000 over the decade for a plant that has not—and will not—produce any more electricity. Worse, the CPUC is supporting Edison’s current plan to leave 1,631 tons—3.6 million pounds—of life-threatening nuclear waste stored on the ocean shore in North County San Diego. This will make San Diego one of the nation’s largest nuclear waste dumps.

The table below illustrates the magnitude of the waste:

<b>THE SAN ONOFRE NUCLEAR WASTE INDEX</b>
Total amount of spent fuel on site : 1631 tons
Amount of spent fuel currently stored in pools: 1099 tons
Amount of spent fuel in dry casks : 430 tons
Number of spent fuel rods generated by 44 years of reactor operations: 926,836
Amount of radioactivity in the spent fuel rods: 484 million curies
Amount of spent fuel to be stored in cooling pools: about 73 percent
Number of times the radioactivity in SONGS's cooling pools exceeds that in 177 waste tanks at the notorious Hanford , Wash., site: nearly 3
Percentage of radioactivity in SONGS' waste that is Cs-137, the most risky form: 43
Number of times the radioactivity in Cs-137 at SONGS exceeds all that released in atmospheric nuclear weapons tests: 6
Number of times it exceeds that released at Chernobyl: 89

Southern California Edison (Edison) was paid money for defective San Onofre steam generators. Later reports will examine the CPUC's conduct in the San Bruno explosion caused by PG&E gas lines. PG&E was paid ratepayer money to fix them, but failed to do so. This is no different than the ratepayer money awarded to SDG&E, despite the SDG&E equipment-caused 2007 San Diego fire. In each case, the CPUC granted rate increases—to buy new steam generators, to fix worn gas pipes, and to clear fire risk brush, but in each case the utilities failed to properly use ratepayer funds for their intended purpose. In each case, the CPUC blocked its own investigations into utility executive wrongdoing.

### **CPUC MALFEASANCE AT SAN ONOFRE**

One clear and unequivocal lesson arises from each of these disasters: the CPUC currently constituted cannot be trusted with the safety or security of the people of California.





In January 2004, a state-set mechanism expired that had allowed Edison to recover about 4 cents per kilowatt hour to pay San Onofre operating costs, including the plant's fuel and fuel financing costs, and incremental capital expenditures. Any money left over was passed on to shareholders. (Nucleonics Week 21 November 2004) In 2004, Edison embarked upon a scheme to obtain ratepayer funds through the CPUC to pay up front for new and more potent steam generators at its San Onofre Nuclear station before they were shown to be “used and useful.”<sup>11</sup> Under CPUC President Michael Peevey, the CPUC approved the new steam generator project in December 2005.

Peevey, a former Edison executive, had an extensive and long-term involvement in San Onofre. It was Peevey who defended Edison when a CPUC staff report recommended Edison “be barred from charging their customers for \$723 million of the cost of units 2 and 3 at the San Onofre nuclear power plant.” In

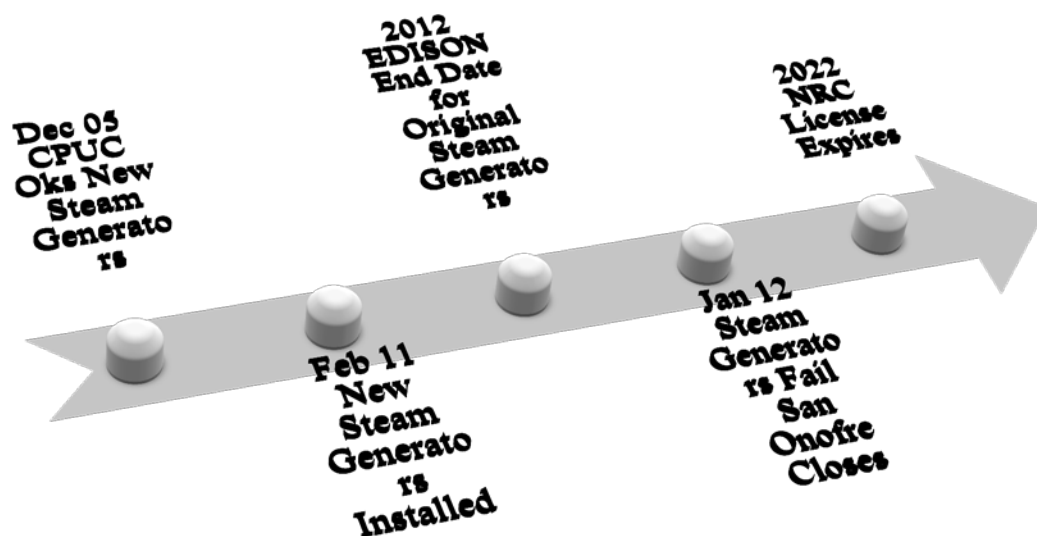
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<sup>11</sup> In any decision establishing rates for an electrical or gas corporation reflecting the reasonable and prudent costs of the new construction of any addition to or extension of the corporation’s plant, when the commission has found and determined that the addition or extension is used and useful, the commission shall consider a method for the recovery of these costs which would be constant in real economic terms over the useful life of the facilities, so that ratepayers in a given year will not pay for the benefits received in other years. Cal. Pub. Util. Code § 454.8; 8 Energy L. J. 303 (1987)

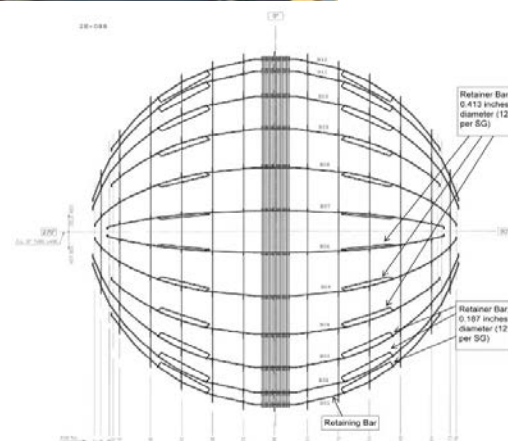
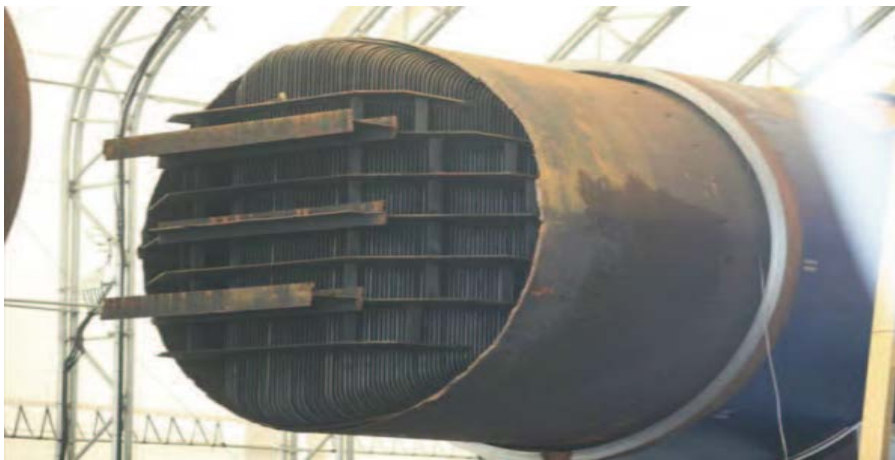
1970, Edison “estimated that the two units would cost \$437 million and be placed in operation in 1975 and 1976. Unit 2 began operation in 1983, and Unit 3 in 1984, at a combined cost of \$4.5 billion (10 times the original estimate), according to a 8 May 1985 Wall Street Journal report. Peevey, then a Senior Vice President at E Edison, defended the San Onofre overcharges:

We knew there was going to be some disallowance but were shocked at the magnitude," said Michael Peevey, senior vice president of Southern Californian Edison. "We believe it is totally unjustified."

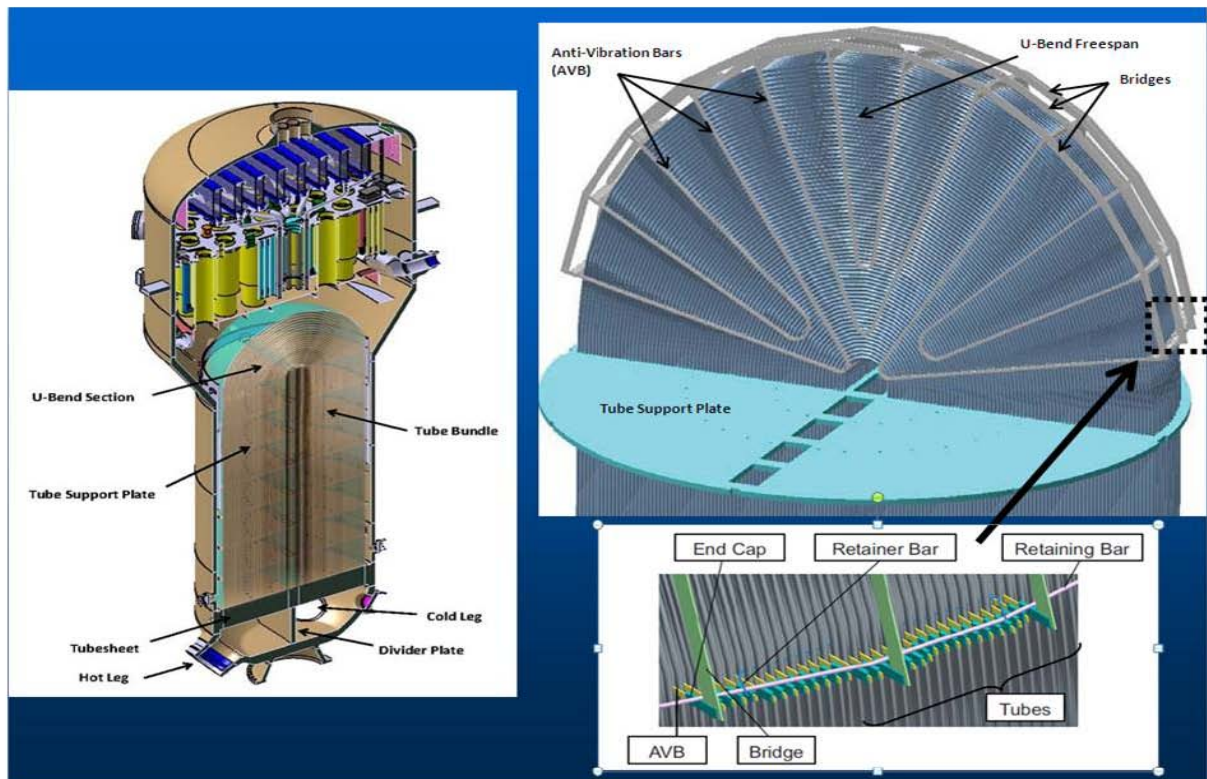
On 7 June 2006, Edison notified the Nuclear Regulatory Commission (NRC) of its intent and timeline to replace Unit 2 and Unit 3 steam generators under 10 CFR 50.59. (NRC Office of Inspector General Report San Onofre p. 7) The new steam generators were supposed to extend San Onofre for another 13 years (2009-2022). EDISON set a 21.4% plugging level as the technical end-of-life of the original steam generators (OSGs). The San Onofre worst-case forecast indicated that the 21.4% plugging level could be reached **as early as 2012**. (20 March 2012 Atomic Power Review, p. 1) The NRC license for San Onofre expires in 2022.



The Edison briefing document given to the NRC indicated there would be no associated “power uprate.” (NRC Office of Inspector General Report San Onofre, p. 7) But the new steam generators (with new turbines) was a power uprate—they produced 48 more megawatts of power —enough to support about 31,000 average-sized homes.<sup>12</sup> The new generators differed in design from the original steam generators: each had 9,727 tubes, which 377 more tubes than the originals, depicted here:

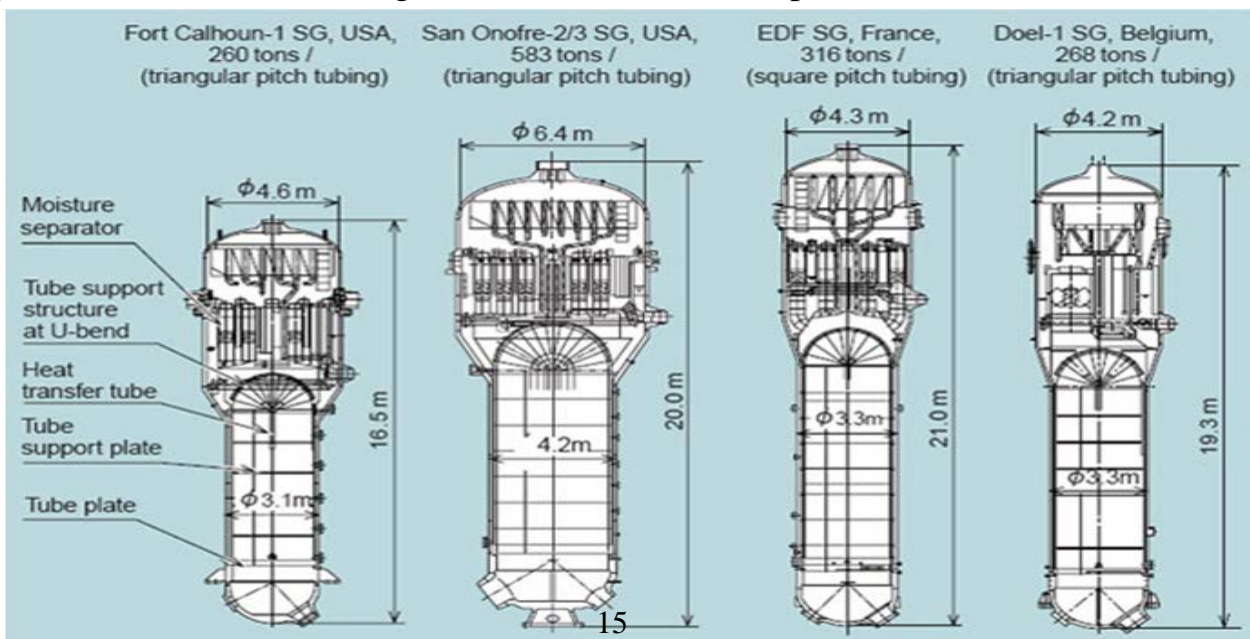


<sup>12</sup> To increase the power output of a reactor, typically more highly-enriched uranium fuel and/or more fresh fuel is used. This enables the reactor to produce more thermal energy and therefore more steam, driving a turbine generator to produce electricity.



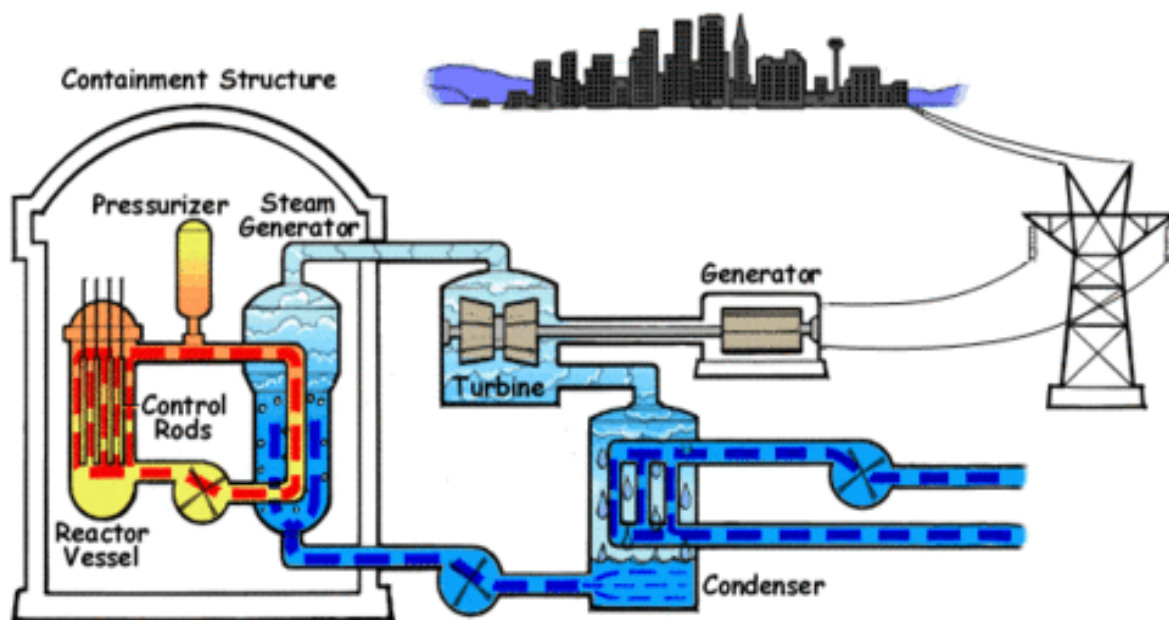
To evade a safety review of Edison's experimental design with an unprecedented tube increase, it eliminated the critical anti-vibration safety bars.

At 65 feet long, 23 feet wide and 621 tons in weight, the new steam generators were twice as big as those in most nuclear plants:





As shown in the following illustration, the steam generators produced steam, which turned turbines that generated electricity, as depicted below:



The two new turbines (costing ratepayers at least \$78,000,000) worked with the new steam generators to produce 48 more megawatts than the original steam generators.<sup>13</sup> Their installation was aborted when the steam generators failed in January 2012.<sup>14</sup>



**Neither used nor useful, the aborted turbine installation cost ratepayers \$78 million.**

<sup>13</sup> See testimony by Edison Witness Perez, Transcript pp. 514-515.

<sup>14</sup> ORA Report on the Results of Operation of Edison GRC Test Year 2012.

The new generators were designed and fabricated between 2004 and 2010. An immediate issue was whether Edison would obtain a safety license amendment from the NRC which would provide safeguards against Edison deploying and operating defective steam generators.

Nuclear power reactors are licensed based on a given set of requirements, depending primarily on the type of plant. This set of requirements is called the plant's "licensing basis." A principal licensing basis document is the plant's final safety analysis report (FSAR). The FSAR and the plant's NRC license and associated technical specifications are the principal regulatory documents describing how the plant is designed, constructed, and operated. The FSAR is also a key reference document used by NRC inspectors during both plant construction and operation, and it must be sufficiently detailed to permit the staff to determine whether the plant can be built and operated without undue risk to public health and safety.

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If any of the criteria in 10 CFR 50.59 are not met (i.e., the change involves modification to the technical specifications or involves one of the eight criteria), the license holder must apply to NRC for a license amendment and obtain NRC's approval before implementing the change. (NRC Office of Inspector General Report San Onofre pp. iii-iv)

Two engineers who worked on the new steam generator project for Edison and its manufacturer, Mitsubishi Heavy Industries (MHI)—Boguslaw Olech and Tomoyuki Inoue—admitted avoidance of NRC approval was a major premise of the RSG project: “At SONGS, the major premise of the steam generator replacement project was that it would be implemented under the 10 CFR 50.59 rule, that is, without prior approval by the US Nuclear Regulatory Commission (USNRC).” (January 2012 NEI, Article p. 2)

The CPUC refused to examine the question of whether Edison crossed over the line and went from avoidance, to evasion, of § 50.59 even before the “AVB Design Team recognized that the design for the SONGS RSGs resulted in higher steam quality (void fraction) than previous designs” but did not implement “changes in design to reduce the void fraction” because the potential changes “could impede the ability to justify the RSG design under the provisions of 10 C.F.R. 50.59.” (MHI Root Cause Report p. 22)

There is substantial evidence supporting the need for a careful investigation into whether Edison officials knowingly violated § 50.59 and were operating the steam generators at San Onofre in violation of the safety law when the replacement steam generators (RSGs) failed.

Former NRC Deputy Regional Administrator Elmo Collins explained that the design, as built, was fundamentally flawed and would not have been approved under any conditions. The new design was unacceptable because of adverse thermal-hydraulic conditions and inadequate upper tube structure support. (NRC Office of Inspector General Report San Onofre p. 24) On 23 December 2013, the NRC found EDISON had failed “to verify the adequacy of the thermal-hydraulic and flow-induced vibration design of the Unit 3 replacement steam generators, which resulted in significant and unexpected steam generator tube wear and loss of tube integrity on Unit 3 Steam Generator after 11 months of operation. (NRC Office of Inspector General Report San Onofre p. 9)

The design of the new steam generators was substantially different than the original. The largest in the industry, the original generators major design shortcoming proved to be tube wear, particularly in the U-bend region, requiring them to be replaced much sooner than stipulated by their design service life. (20 March 2012 Atomic Power Review, p. 1) The new design not only failed to correct

that shortcoming – it added to the likelihood of wear and malfunction by the significant increase in tubes and failure to eliminate vibration of those tubes.

Edison elevated its evasion of submitting the design of the RSGs to the NRC to the highest value, even over safety. (20 March 2012 Atomic Power Review, p. 2) The RSG design requirements and improvements had to be solved so they could be installed under the § 50.59 rule. (20 March 2012 Atomic Power Review, p. 2) This artificial requirement admittedly presented many challenges for the Edison and MHI project teams. (20 March 2012 Atomic Power Review, p. 2)

There were fundamental design changes that warranted taking the new steam generators out of the § 50.59 license exemption. For example, the stay cylinder supporting the tubesheet had to be eliminated. (20 March 2012 Atomic Power Review, p. 2) Removing the stay cylinder allowed for installation of more tubes than there were in the original steam generators. (20 March 2012 Atomic Power Review, p. 2) Thus, the replacement generators had 377 more tubes than the originals. The replacement generators did not have a stay cylinder supporting the tube sheet; they had a broached tube design rather than an “egg crate” tube support. (13 May 2013 US NRC Atomic Safety and Licensing Board pp. 3-4) Moreover, there were substantial changes in the Anti-vibration bars in the U Bend region (AVB), with the single major challenge here was control of the AVB thickness and flatness, and tube-to AVB gap size:

#### **AVB support structure**

The term ‘AVB structure’ describes tube supports in the tube bundle U-bend region. The AVB structure had to be designed such that the potential for tube wear due to flow induced vibration was minimized.



Edison officials learned these facts during the new steam generator design phase (2004-2010). Edison executives and engineers conducted meetings with MHI at which technical and production issues associated with the new steam generator design and fabrication were discussed.<sup>15</sup> Edison and MHI held formal and working meetings at SONGS, at MHI facilities in Japan, and at MHI subcontractor facilities. These meetings were held at both the working and executive levels. Technical issues were generally discussed at Design Review Meetings (“DRMs”), Technical Review Meetings, Executive Oversight Meetings, and Anti-Vibration Bar (“AVB”) Meetings. Meeting minutes were generally prepared after these meetings and exchanged between Edison and MHI. Edison had appointed a committee to look into installing new steam generators as early as October 2001. (NRC Office of Inspector General Report San Onofre pp. 6-7)

The Edison key players who worked on San Onofre were engineers and executives, depicted on the following page:

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<sup>15</sup> [http://www.songscommunity.com/docs/minutes/White\\_Paper-Summary\\_of\\_Key\\_Issues\\_Raised\\_During\\_Design\\_Oversight\\_Meetings\\_with\\_MHI\\_Final.pdf](http://www.songscommunity.com/docs/minutes/White_Paper-Summary_of_Key_Issues_Raised_During_Design_Oversight_Meetings_with_MHI_Final.pdf)



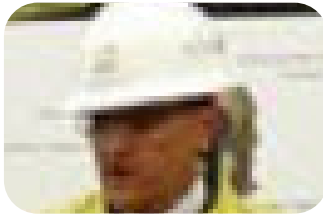
Alan J. Fohrer  
Edison CEO



Harold Ray SO  
Chief Nuclear  
Officer -2006



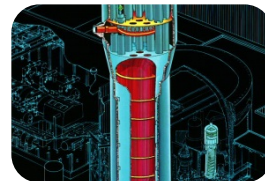
Michael P. Short  
SO VP



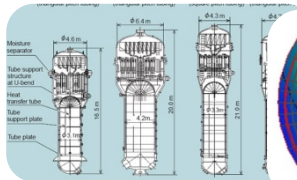
Mike Wharton  
Proj Manager



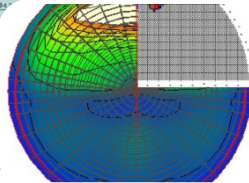
Peter Dietrich SO  
Nuke Office



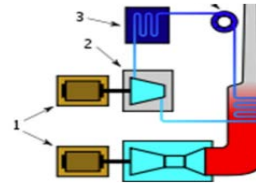
Mehrdad Hojati  
SO Design Engineer



Dwight Eugene  
Nunn Edison VP



Craig Harberts  
RSG Manager



Jonathan McGaw  
Edison Nuclear  
Engineer



Boguslaw J. Olech  
Edison Nuclear  
Engineer

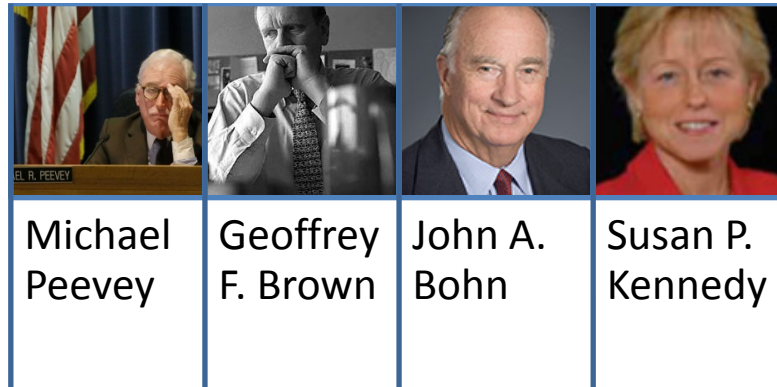
The Anti-Vibration Bar Design Team, recognizing that the design for the SONGS replacement steam generators (RSGs) resulted in higher steam quality (void fraction) than previous designs, considered making changes to the design to reduce the void fraction. But, each of the considered changes had unacceptable consequences and the AVB Design Team agreed not to implement them. Among the difficulties associated with the potential changes was the possibility that making them could impede the ability to justify the new design under 10 C.F.R. § 50.59. Even though “SCE is not expert in steam generator design or fabrication,” it chose not to submit to an NRC license amendment:

The new steam generators were installed in 2010 and 2011. The Unit 2 RSGs were delivered to SONGS in February 2009 and installed during a refueling outage between September 2009 and April 2010. The Unit 3 RSGs were delivered to SONGS in October 2010 and installed during a refueling outage between October 2010 and February 2011. (Root Cause Report p. 8/64)



## **PUC APPROVES NEW STEAM GENERATORS WITHOUT FINDING THEY ARE “USED AND USEFUL”**

The four CPUC Commissioners who approved the new San Onofre steam generators in December 2005 (Decision 5-12-040) were:



Gray Davis appointed Susan P. Kennedy and Peevey to the CPUC in December 2002. Kennedy served on the CPUC from 2003-2006. She was then appointed chief of staff to Governor Schwarzenegger in December 2005. Governor Schwarzenegger appointed Bohn to the CPUC in May 2005. Commissioner Geoff Brown was San Francisco’s long-time elected Public Defender.

The new generators installed were in 2011; they failed within a year, ending any further production of electricity at the plant in January 2012. Edison convinced the CPUC that because the cost of the new steam generators represented 5% of Edison’s rate base, the project was too “large amount to place at risk of cost recovery” on Edison shareholders. Edison claimed “it is essential for SCE to seek, and the Commission to grant, pre-approval of (San Onofre 2 and 3 new generators):

Pre-approval of (San Onofre) 2 & 3 SGRP (steam generator replacement program) means that the Commission finds it reasonable for SCE to replace (San Onofre) 2 & 3 steam generators as described in this Application. While the Commission will retain its full



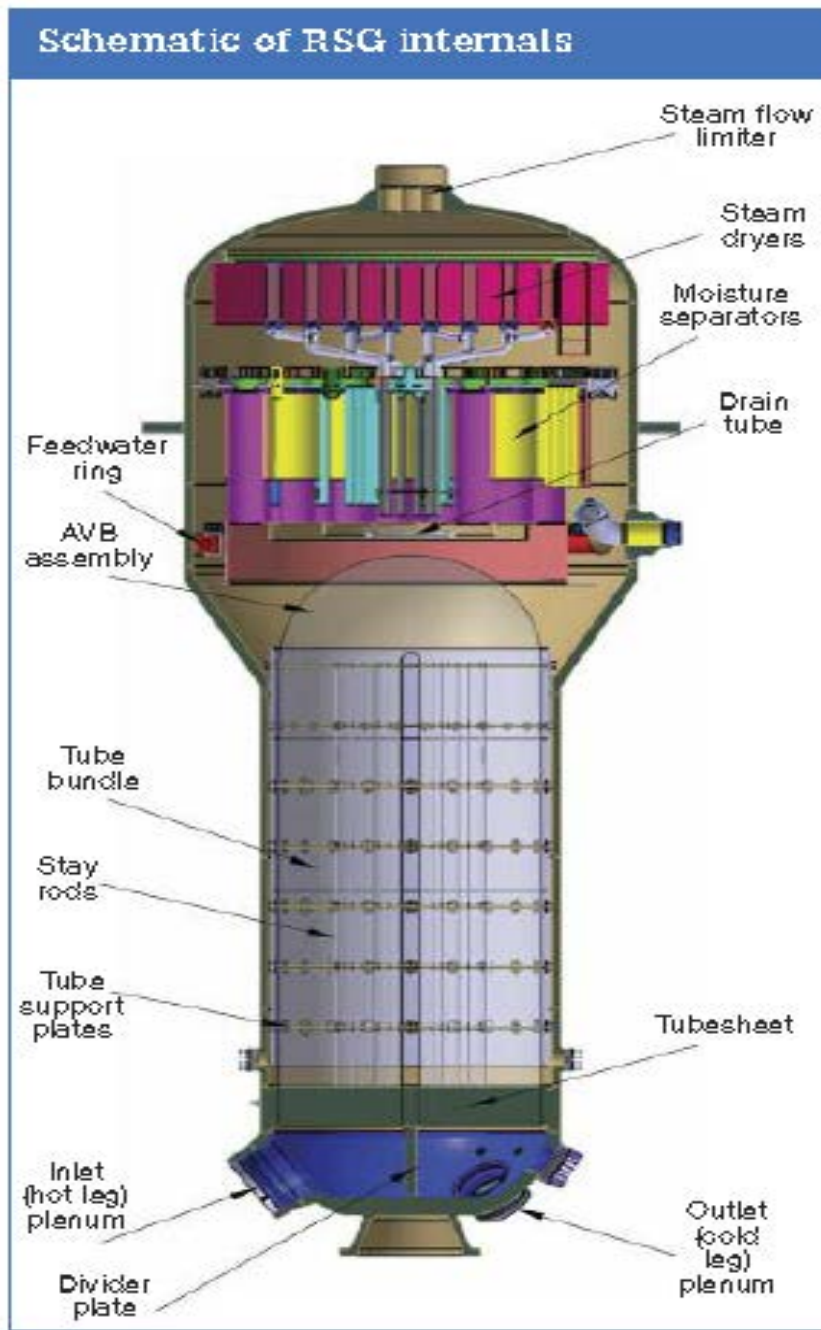
authority, at the completion of SGRP, to review the reasonableness of SCE's construction expenditures and practices, pre-approval means that the Commission may not disallow construction costs, CFC, and Removal and Disposal Costs or their recovery in rates on the ground that SONGS 2 & 3 SGRP was itself unreasonable.

On 31 January 2012 “At 1505 PST, Unit 3 entered Abnormal Operation Instruction S023-13-14 ‘Reactor Coolant Leak’ for a steam generator leak exceeding 5 gallons per day. At 1549 PST, the leak rate was determined to be 82 gallons per day. At 1610 PST, a leak rate greater than 75 gallons per day with an increasing rate of leakage exceeding 30 gallons per hour was established and entry into S023-13-38 ‘Rapid Power Reduction’ was performed. (On 12 June 2013, Edison certified to the NRC that Edison had permanently ceased operations at San Onofre. (12 June 2013 Edison Certification)



The NRC determined there was a “failure to verify the adequacy of the thermal-hydraulic and flow-induced vibration design of the Unit 3 replacement steam generators, which resulted in significant and unexpected steam generator tube wear and the loss of tube integrity on Unit 3 Steam Generator 3EO-88 after only 11 months of operation.”<sup>16</sup>

It was determined that all four new generators experienced higher than expected tube wear comprised of: (i) tube to tube wear in the tube free-span sections between the Anti-Vibration-Bars (AVBs) located in the U-bend region; (ii) tube to AVB wear, observed at discrete tube to AVB intersections; (iii) tube to Tube Support Plate (TSP) wear; and (iv) retainer bar to tube wear. (Root Cause Report 6/64)



<sup>16</sup> <http://pbdupws.nrc.gov/docs/ML1335/ML13357A058.pdf>

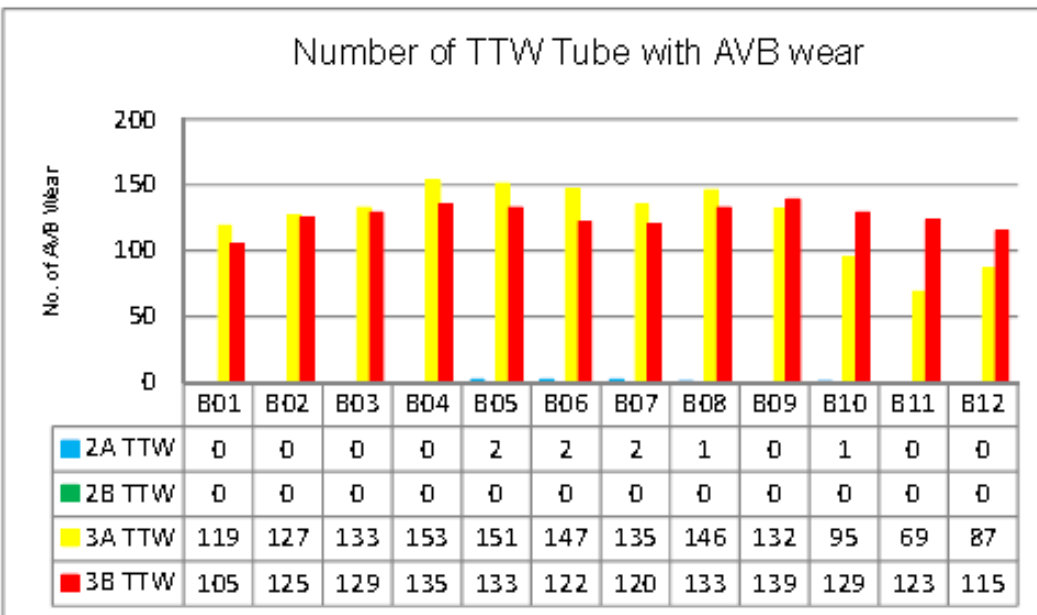
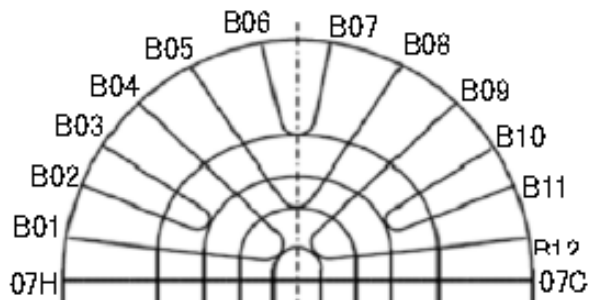
Unit 2 steam generator tubes also experienced high levels of tube degradation: <sup>17</sup>

**SONGS Unit 2 Steam Generators  
Wear Depths Summary**

Steam Generator SG2E88 (Through- Wall Wear)	Anti-Vibration Bar	Tube Support Plate	Tube-to- Tube Wear	Retainer Bar	Foreign Object	Total Indications	Tubes with Indications (out of 9727 total per SG)
≥ 50%	0	0	0	1	0	1	1
35 - 49%	2	0	0	1	0	3	3
20 - 34%	86	0	0	0	2	86	74
10 - 19%	705	108	0	0	0	813	406
< 10%	964	117	0	0	0	1081	600
<b>TOTAL</b>	<b>1757</b>	<b>225</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>1984</b>	<b>734*</b>

Steam Generator SG2E89 (Through- Wall Wear)	Anti-Vibration Bar	Tube Support Plate	Tube-to- Tube Wear	Retainer Bar	Foreign Object	Total Indications	Tubes with Indications (out of 9727 total per SG)
≥ 50%	0	0	0	1	0	1	1
35 - 49%	0	0	0	1	0	1	1
20 - 34%	78	1	0	3	0	82	67
10 - 19%	1014	85	2	0	0	1101	496
< 10%	1499	53	0	0	0	1552	768
<b>TOTAL</b>	<b>2591</b>	<b>139</b>	<b>2</b>	<b>5</b>	<b>0</b>	<b>2737</b>	<b>861*</b>

<sup>17</sup> Root Cause Report Supplemental Technical Evaluation Report 48/68.



The CPUC in November 2014 decided to make ratepayers pay more than \$3,300,000,000 for the inoperative plant including:

- Base Plant –.\$622,000,000
- Nuclear Fuel Investment \$487,000,000.
- Completed Construction Work In Progress (“Completed CWIP”) \$370,000,000.
- Cancelled Construction Work In Progress (“Cancelled CWIP”) \$155,000,000
- Materials & Supplies (M&S) \$99,000,000



CPUC officials worked with Edison to construct a decision that allowed Edison to continue to charge up to \$5 billion for the next decade for San Onofre. The CPUC estimated the financial burden on ratepayers; they will pay \$3,300,000,000.




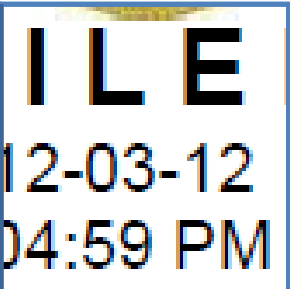
The CPUC claims these charges are for recovery of the **undepreciated net investment in San Onofre “assets”** (*e.g.*, Base Plant). The CPUC is also making ratepayers pay a 2.95% rate of return. (Final Decision p. 3) The CPUC claims ratepayers will be receiving “refunds” and “credits” of \$1,400,000,000. However, the so-called “refunds” are to come through a refund “mechanism” that makes it difficult if not impossible for ratepayers to determine they received an actual benefit.

The CPUC delayed, paused, and then stopped any investigation into whether Edison acted reasonably, and whether the plant remnants are used and useful for ratepayers. The CPUC also killed its own investigation into who and what was responsible for the plant’s failure after the CPUC’s own expert laid out a cogent investigative plan. Our investigation has uncovered the “delay, pause, and stop” plan to relieve Edison of any investigation into its conduct. The CPUC plan did not even permit ratepayers to determine the names of those involved in the decision-making under question.

On 19 December 2005, the CPUC allowed Edison to charge ratepayers for new generators so long as Edison submitted an application to put them in rates six months after San Onofre returned to commercial operation. The plant returned to commercial operation in February 2011, which required EDISON to file its application to put the new generators in rates by August 2011. However, on 13 April 2011, Edison told the CPUC it would not file to put the generator costs in rates until June 2012. No such application was filed.

However, the *timing* of the filing was discussed with CPUC Administrative Law Judge (ALJ) Melanie Darling on 4 December 2012. The CPUC Energy Division staff discussed Edison filing the application before the Prehearing Conference on 8 January 2013 in the Investigation case announced by the CPUC in November 2012. However, Edison declined to file in January 2013.

On 30 November 2012, Edison’s Les Starck and Mike Hoover gave the “pause and delay” plan to Commissioner Florio advisor, Sepideh Khosrowjah. Three days later (3 December 2012), Edison filed with the CPUC its pause and delay plan.

			
15 Dec 05 CPUC Decision says Edison to file to put new generator costs in rates 6 months after Comercial Operations	EDISON Les Starck at 30 Nov 12 Gave Florio (staff) Ex Parte EdisonPause and Delay Plan at CPUC in SF	Sepideh Khosrowjah (Florio) at 30 Nov 12 Received Edison Ex Parte: the Pause and Delay Plan	3 Dec 12 Edison Files Pause and Delay Plan with CPUC

The next day, 4 December 2012, ALJ Melanuie Darling called Edison’s Russell G. Worden (head of the San Onofre Strategic Review Project) to discuss the timing of Edison’s new steam generator cost application.



**4 Dec 2012 ALJ Darling  
Phoned EDISON Russell G.  
Worden about "timing" of  
steam generator cost filing.**



**4 Dec 2012 Russell Worden  
Returned call to ALJ Darling  
about "timing" of steam  
generator cost filing**

Edison waited until 6 December 2012 to file the notice of its Ex Parte (private) 30 November 2012 meeting with Commissioner Florio's office. On 7 December 2012, Edison filed the notice of ALJ Darling's Ex Parte phone call to Edison. On 10 December 2012, ALJ Darling issued a ruling adopting Edison's Pause and Delay Plan.

<p>6 Dec 12: Edison "Late Filed" Notice of 30 Nov 12 Pause and Delay Ex Parte with Florio (staff)</p>	<p>7 Dec 12: Edison Filed Notice of ALJ Darling 4 Dec 12 Ex Parte phone call about the timing of Edison new generator cost filing</p>	<p>10 Dec 12: ALJ Darling issued Ruling adopting Edison Pause and Delay Plan</p>

On 21 February 2013, ALJ Darling denied a motion to set a hearing on whether Edison acted reasonably, stating it would be disorderly and premature. On 1 December 2013, the CPUC's hired expert issued an investigative plan to find who and what caused the generators to fail. On 25 November 2014, the CPUC killed all investigations.



21 Feb 13: ALJ Rules

The Decision did not set a date to put costs in rates, describing it as premature and disruptive to hold hearings now



*Eureka (cry of joy upon discovery)*  
CPUC admitted in 25 Nov 14:

Final Decision not getting to the "cause of the damage" and ruled "No further reasonableness review of (generator) costs is required."

The CPUC and Edison used conflicting numbers and fuzzy math in favor of Edison and against ratepayers. For example, when it came to deciding whether Edison spent more than \$680,000,000 on the new steam generator project (the automatic trigger for a reasonableness review), the CPUC adopted Edison's contention that the replacement steam generators' total cost was \$612.1 million in 2004 dollars. (Decision 14-11-040 p. 29)

In the decision approving the project, the CPUC found the new steam generators were "cost-effective" at \$680,000,000 (\$569,000,000 for the new steam generators and \$111,000,000 for removal and disposal of the old ones). (Decision 05-12-040) Under the settlement agreement, the CPUC found the value of stopping collection for the new steam generators as of 31 January 2012 to be

\$1,000,000 (Decision 14-11-040 p. 2-3) The CPUC found the value of the settlement to ratepayers was \$1,450,000,000 (\$420,000,000 of which was from reducing Edison's rate of return). The CPUC found the primary result of the settlement is ratepayer refunds and credits of approximately \$1.45 billion. (Decision 14-11-040 pp. 2-3)

Ratepayers were given less than three hours to conduct an evidentiary hearing into the proposed settlement on 16 May 2014. At the hearing Peevey was asked but refused to answer whether he was in communication with Edison President Ron Litzinger.

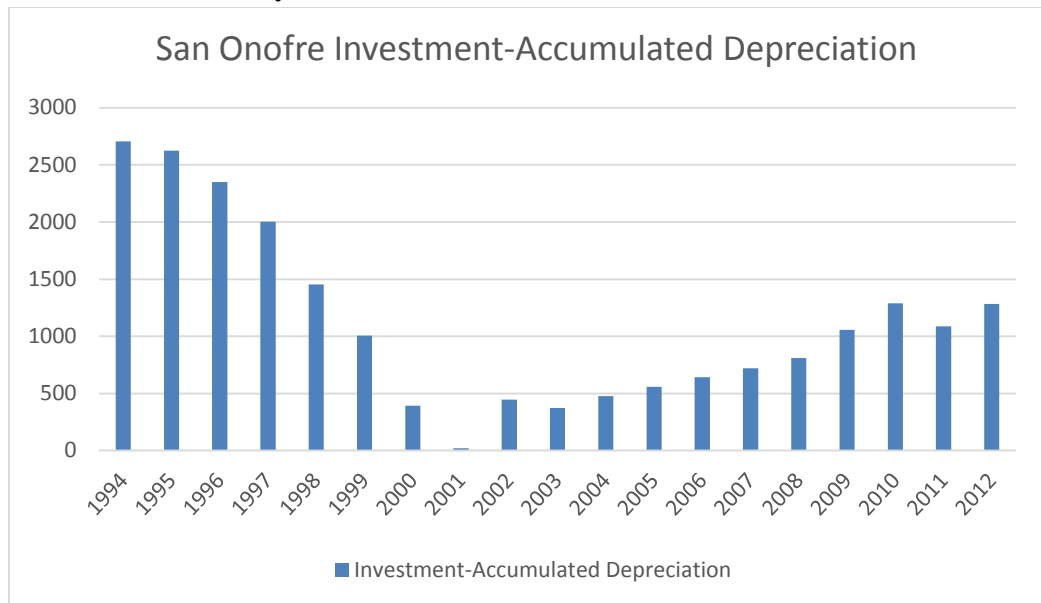
Emails obtained under the Public Records Act show Edison executives to were in regular contact with Peevey—each had the other's personal cell phone and spoke on the weekends. Edison reported San Onofre revenue requirement for 2011-2014 of almost \$2,000,000,000, of which \$361,000,000 was for the new generators even though they were idle:

<b>Year</b>	<b>General Revenue Requirement</b>	<b>New Steam Generator Revenue Requirement</b>	<b>Total</b>	<b>Source</b>
2012	\$498,087,000	\$115,239,000	\$613,326,000	2 Dec 2013 Edison Monthly Report
2013	\$504,253,000	\$130,722,000	\$634,975,000	30 Oct 2014 Edison Monthly Report
2014	\$545,950,800 <sup>18</sup>	\$115,770,000 <sup>19</sup>	\$661,720,800	2 Dec 2014 Edison Monthly Report
<b>Total</b>	<b>\$1,548,290,800</b>	<b>\$361,731,000</b>	<b>\$1,910,021,800</b>	

<sup>18</sup> Estimated based on year to date.

<sup>19</sup> Estimated based on year to date.

EDISON had recovered the costs of Units 2 and 3 from 1996 and had fully recovered its investment by 2003:



## PEEVEY FORCED TO RESIGN

CPUC President Michael Peevey was forced off the CPUC when his *quo pro* practices at the CPUC were made public by victims of CPUC malfeasance, beginning with the CPUC's efforts to conceal SDG&E's wrongdoing in connection with the catastrophic October 2007 fires in San Diego. Awareness of corruption was heightened by the September 2010 San Bruno gas explosion and the San Onofre nuclear power plant radiation leak in January 2012.

The CPUC is a constitutional office of the State of California (Art. 12) controlled by the Office of Governor. Peevey was appointed to the CPUC in 2002 along with Susan P. Kennedy. He was forced to resign in a CPUC judge-fixing scandal arising out of an effort to cover-up wrongdoing in the San Bruno fire explosion case. The CPUC awarded PG&E \$5,000,000 to repair gas lines running underground through the City of San Bruno. PG&E failed to make the repairs and



in September 2010, a deadly explosion and fire killed eight people and devastated a neighborhood in San Bruno.

PG&E was indicted for obstructing the federal government investigation into PG&E's conduct in failing to fix the gas pipes. After the CPUC staff recommended the CPUC fine PG&E \$2,500,000,000, Peevey obstructed the CPUC review of PG&E's request for additional rates which consumers feared would be used to pay the fine. Embarrassing emails to and from Peevey and his staff showed Peevey helping to fix which judge would hear PG&E's \$6,000,000,000 rate increase application.<sup>20</sup> The San Bruno explosion was horrific:



<sup>20</sup> <http://www.justice.gov/sites/default/files/usao-ndca/legacy/2014/07/30/PG%26E%20-%20Superseding%20Indictment.pdf>

The San Bruno investigation dragged on for four years until September 2014 when the Commission finally levied a \$1.4 billion fine against PG&E.<sup>21</sup> The matter remains tied up in litigation.

Under Peevey, the CPUC derailed its investigation into the SDG&E equipment that started two of the 2007 fires in San Diego. (Decision D.10-04-047) CPUC staff determined SDG&E was in violation of General Order 95, Rules 31.1<sup>22</sup> and 38<sup>23</sup> at the time of the fires. As in the case of San Bruno, the CPUC under Peevey imposed a fine but bestowed a rate increase large enough to absorb the penalty. (D1112023; Petition 07-11-007) Angry ratepayers were able to stop a CPUC plan to allow SDG&E to recover \$463,000,000 in costs from the fires caused by SDG&E equipment. Over 500,000 people were evacuated; 300,000 acres were charred; and 1,300 buildings were destroyed.



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<sup>21</sup> PG&E is under indictment for the judge-shopping conduct. <http://www.justice.gov/sites/default/files/usao-ndca/legacy/2014/07/30/PG%20E%20-%20Superseding%20Indictment.pdf>

<sup>22</sup> Rule 31.1 requires Electrical supply systems shall be designed, constructed, and maintained ... to enable the furnishing of safe, proper, and adequate service.

<sup>23</sup> Establishes Minimum Clearances of Wires from Other Wires.



Peevey rose up in the utility-lobby sector. Prior to joining the CPUC, Peevey was as an Edison lobbyist. Peevey enjoyed gifts from big utilities. Just after his appointment in 2003, it was disclosed Peevey took a \$2,134 gift from San Francisco Airport, over which the CPUC exercised regulatory authority in the form of free parking at the SF airport.<sup>24</sup> In July 2013, NBC news in San Francisco reported Peevey had accepted \$165,000 in free travel from nonprofits and special interests in the prior six years.

Peevey's emails produced in response to a Public Records Act request show he was in regular communication with Edison executives. They met in bars, dined from coast to coast and overseas, and talked on weekends. Peevey "skipped" a Commissioner only meeting to lunch privately with Edison's management. Emails show Peevey gave insight on Edison's public relations response to a Los Angeles Times negative story. Peevey shared VIP tickets for sporting events with Edison's Senior Vice President. Peevey promised his Edison cronies to hold off on proceedings involving Edison.

Peevey, as CPUC President, expanded the lobby function to create extended lobby junkets. For example, a few months after the San Bruno gas explosions caused by natural gas pipes PG&E failed to maintain (even after it had been given ratepayer funds to make needed fixes), Peevey embarked on a 12-day travel-study excursion, with stops in Sevilla and Barcelona, Spain – all sponsored by the California Foundation on the Environment and the Economy (CFEE). Peevey served as a CFEE official before joining the CPUC. Peevey's wife, California Sen. Carol Liu (D-Glendale), was along for the trip. Two other state senators, several members of the state Assembly, CPUC Commissioner Nancy Ryan, and a host of representatives from the energy industry attended too. High-ranking executives of

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<sup>24</sup> See, California Code of Regulations, Title 2, Sec. 18730.

the State's investor-owned utilities also participated, including Fong Wan, the Senior Vice President of energy procurement for PG&E.<sup>25</sup>

In 2013 under Peevey's reign, the three major electric utilities spent more than \$6,000,000 (PG&E \$2.2M; Edison \$2.41M, Sempra \$1.33M) to influence the CPUC and legislative policies.<sup>26</sup>

On 2 May 2013, NBC in San Francisco reported Peevey had ignored the call to answer tough questions by state senators in Sacramento and instead decided to attend a conference at an exclusive Napa resort and a reception at an upscale winery in St. Helena, both of which were captured on hidden camera by the NBC Bay Area Investigative Unit.<sup>27</sup>

Peevey had served as an Edison executive (SCECorp) from 1984 to 1993, and served as its president for 3 years (1990 to 1993). From 1993 to 1995, he served as a public affairs consultant for Winner & Associates, a public relations firm that works on a variety of political issues and public scandals. (Edison later hired Winner & Associates to deal with fallout from the California energy crisis.) In 1995, Peevey started New Energy Ventures, an energy provider that competed in California's newly deregulated market. He sold New Energy Ventures in 2000.

Peevey started TruePricing, a technology company that built software for large organizations to track and bring down energy costs. At the same time, he served on the boards of directors at Excelergy Corporation, a Massachusetts energy software company, and Electro Rent Corporation, which rents computer equipment. Peevey chairs the boards of directors of the California Emerging Technology Fund and the California Clean Energy Fund; both are nonprofit

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<sup>25</sup> <http://www.sfbg.com/2011/05/24/secret-life-michael-peevey>

<sup>26</sup> <https://www.opensecrets.org/lobby/indusclient.php?id=E08>

<sup>27</sup> <http://www.nbcbayarea.com/investigations/LEGALPeeveys-Priority--205838301.html>

collaborations between regulators and energy providers. On December 31, 2002, California Governor Gray Davis reappointed Michael R. Peevey to the CPUC and designated him as President. On the same day, Governor Davis appointed Susan P. Kennedy to serve as a CPUC Commissioner. (SCE 8-K 2003)

On 18 December 2014, the CPUC held its last session with Peevey presiding as President. Peevey orchestrated the meeting so supporters of Peevey's way of doing business at the CPUC took up the public comment period to praise Peevey. Who were these people who came forward to give character testimonials for Peevey? They comprise part of a network of special interests benefiting from the largess Peevey created for special interest groups while at the CPUC.

One group of Peevey defenders came from nonprofits, which the CPUC supports. Susan Wright McPeak, a long-time Bay Area politician, spoke for Peevey. Wright McPeak heads the California Emerging Technology Fund (CETF) established as a non-profit corporation pursuant to orders from the CPUC in approving the mergers of SBC-AT&T and Verizon-MCI in 2005. As a condition of approval of the mergers, AT&T and Verizon were required to contribute to CETF a total of \$60 million over 5 years "for the purpose of achieving ubiquitous access to broadband and advanced services in California, particularly in underserved communities, through the use of emerging technologies by 2010." AT&T will contribute \$9 million per year and Verizon will contribute \$3 million per year. The CPUC also directed that at least \$5 million should be used for telemedicine projects. Peevey served as Chairman of the California Emerging Technology Fund.

Five of the speakers were former CPUC Commissioners who served with, and were supportive of, CPUC favoritism towards utilities and against ratepayers. Another speaker was Gwen Moore, who served in the California Assembly from 1978 to 1994, part of which time Peevey was an Edison executive and lobbyist.

Peevey retired from Edison in 1993. Gwen Moore headed the Assembly Utilities and Commerce Committee. A 12 January 1989 LA Times article reported that Assemblywoman Gwen Moore (D-Los Angeles), whose office was raided in August by the FBI as part of its Capitol sting operation, had been elected majority whip by her fellow Democrats. A source close to Assembly Speaker Willie Brown (D-San Francisco) said the action was to let people know that "we have confidence" in Moore.

**PEEVEY Speakers in “GROUP 1”:**  
**CPUC, Former CPUC Officials**



Susan P.  
Kennedy CPUC  
Approved San  
Onofre



Timothy Alan  
Simon CPUC  
Commissioner



Diane M. Grueneich  
CPUC Commissioner



Paul Clanon  
CPUC Ex.  
Director



Dr. Nancy E. Ryan  
CPUC  
Commissioner



Rachelle Chong  
CPUC  
Commissioner



Gwen Moore  
Cal Assembly  
Member



SunneWright  
McPeak  
(CPUC AT&T)

A second group of Peevey supporters were made up of utility executives, utility investors, and those funded by utilities. One speaker from this group was Dan Adler Managing Director, CalCEF and President, CalCEF Ventures. Peevey served as CalCEF (California Clean Energy Fund) Chairman. CalCEF is a coalition of investors, utility industry players, and former government officials dedicated to advancing clean energy. Mason Wallrich, a former PG&E executive, also spoke from CalCEF.

Two other speakers came from the “Energy Efficiency Center” (EEC) at the University of California, Davis: Executive Director Ben Finkelor and Advisory Board Member Ralph Cavanaugh (also with the Natural Resources Defense Council). Peevey Chairs the EEC. The EEC was established out of the PG&E bankruptcy settlement with \$30 million. The EEC represents that it expects “to deliver market-based financial returns to its investors and positive environmental and economic returns to California, with a focus on PG&E’s service territory.”<sup>28</sup>

Under Peevey, settlements with regulated utilities were crafted to create non-profit corporations. In July 2013, California legislators debated whether to take away the PUC's authority to create nonprofits with funds from settlements.<sup>29</sup>

## CONCLUSION

Storm warnings require the people of California to act. They must demand fundamental reforms at the CPUC. The new President can either ratify and extend corruption at the CPUC, or break with the past to reinstate the CPUC to its Constitutional mission of providing customers with just and reasonable rates.

The public cannot have confidence the CPUC will protect their interests while Edison establishes one of the largest nuclear waste sites in the world in North County San Diego (3.6 million pounds of nuclear waste).



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<sup>28</sup> <http://eec.ucdavis.edu/about/sponsors-page/>

<sup>29</sup> <http://www.sfgate.com/bayarea/article/Budget-tightens-oversight-on-California-PUC-4646033.php>

**From:** [Michael Aguirre](#)  
**To:** [Coastal\\_coast4u](#); [Street\\_Joseph@Coastal](#); [mluevanocoastal@gmail.com](#); [cgroom@smcgov.org](#); [gregcoastal@sdcounty.ca.gov](#); [sarahcoastalcom@yahoo.com](#); [Lester\\_Charles@Coastal](#)  
**Subject:** Agenda Item 14 SCE Nuclear Waste Site  
**Date:** Monday, October 05, 2015 5:14:07 AM  
**Attachments:** [malfesance.pdf](#)

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Greetings: Southern California Edison (SCE) has a track record of dishonest dealings with federal and state regulatory agencies. SCE has an active program directly and indirectly to provide gifts, travel, campaign contributions to government officials and charitable organizations. SCE in turn calls upon the receivers of its largess to do favors for them when SCE profits are at issue. In this case the exchange of money is more blatant with SCE's proposed payment of \$5,000,000 to the Coastal Commission. The idea of a permit for a nuclear waste site on the shoreline of North County San Diego is perforce absurd. The suggestion there are no other sites other than the one SCE chose to put the nuclear waste from the years it operated San Onofre. If a business produces waste from its operations it falls upon the business to dispose of it. SCE consciously chose not to develop a site to move the waste during the last 30 years. SCE's attitude was grab the money from the operations and leave it to someone else to figure out what to do with the profits. SCE's irresponsible practices finally caught up with its leadership when the 4 replacement steam generators failed in January 2012. Rather than act responsibly SCE went into conspiracy mode going so far as Warsaw, Poland to form a secret plan with CPUC officials to make utility customers pay for SCE's decision to deploy new supplied steam generators without a safety license amendment. A key NRC official has admitted SCE would never have obtained the license had SCE been honest in making the application.

SCE's scheme to unlawfully make utility customers pay for the steam generators was uncovered when a state criminal investigator uncovered notes made at the secret meeting in Warsaw and an enterprising reporter wrote a related news story. SCE was forced to admit the secret meeting and the secret plan to make utility customers pay. SCE, federal and state prosecutors, and consumer advocates have been battling for months over the penalty SCE should pay.

The Coastal Commission is dealing with SCE as if its business as usual. The Coastal Commission has before a permit application that would put nuclear waste on the shoreline of North County San Diego permanently. SCE plans to

grab the \$4 billion in decommissioning money, disassemble the plant, and leave 3,600,000 lbs of nuclear waste behind stored in hard to move casks. This you cannot allow. You must require SCE to find an alternative site.

If you proceed and approve the permit there will be a thorough and complete investigation of the means SCE used to obtain your vote. We will obtain all financial records, and your records of meetings and emails. The decision will be challenged in court where if we find sufficient evidence we will ask for authority to take depositions of the key players.

The better course is to deny the permit and instead require SCE to do its homework to find another site e.g. Palo Verde. We are providing you with the Diet's Fukushima Report that found collusion to be the cause of the accident in Fukushima. We have provided the CPU Malfeasance Report showing SCE's duplicity at San Onofre and related legal filings.

Please do not let the circle of corruption expand from the CPUC to the Coastal Commission. Please do your duty and deny the permit. Thank You, Mike Aguirre

Michael J. Aguirre  
Aguirre & Severson  
501 W. Broadway  
Suite 1050  
San Diego, Ca 92101  
619 876 5364



**From:** [Michael Aguirre](#)  
**To:** [Coastal\\_coast4u](#); [Street\\_Joseph@Coastal](#); [mluevanocoastal@gmail.com](#); [cgroom@smcgov.org](#);  
[gregcoastal@sdcounty.ca.gov](#); [sarahcoastalcom@yahoo.com](#); [Lester\\_Charles@Coastal](#)  
**Subject:** Item 14 SCE Nuclear Waste Permit II  
**Date:** Monday, October 05, 2015 5:14:42 AM  
**Attachments:** [Pages from naiic report.pdf](#)

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**From:** [Michael Aguirre](#)  
**To:** [Coastal\\_coast4u](#); [Street\\_Joseph@Coastal](#); [mluevanocoastal@gmail.com](#); [cgroom@smcgov.org](#); [gregcoastal@sdcounty.ca.gov](#); [sarahcoastalcom@yahoo.com](#); [Lester\\_Charles@Coastal](#)  
**Subject:** Item 14 SCE Permit for Nuclear Waste III  
**Date:** Monday, October 05, 2015 5:16:32 AM  
**Attachments:** [DktEntry 8-OPENING BRIEF.pdf](#)

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**From:** [marvlewis](#)  
**To:** [joseph.street@cox.net](mailto:joseph.street@cox.net)  
**Subject:** Juno Email on the Web  
**Date:** Monday, October 05, 2015 5:45:42 AM

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[http://webmailab.juno.com/webmail/8?  
folder=Inbox&msgNum=0000rWG0:001M4TcH00003g02&block=1&msgNature=all&msgStatus=all&count=1444048443&randid=1993239222](http://webmailab.juno.com/webmail/8?folder=Inbox&msgNum=0000rWG0:001M4TcH00003g02&block=1&msgNature=all&msgStatus=all&count=1444048443&randid=1993239222)

Dear Mr. STREET,  
Allow me to join in Donna Gilmore's comments on San Onofre. The way that the nuclear industry approaches storage of spent fuel is deficient on its face, will cost lives and property, and have many unforeseen consequences.  
Respectfully submitted,  
Marvin Lewis, P. E. (Retired.)

Sent from Samsung tablet.

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**Meet the Graviteers: Ezekiel Victor**  
<http://www.gravity.com/blog/meet-the-graviteers-ezekiel-victor/>

**TU 14a 9-15-0228**

Southern California Edison Company

**EX PARTE COMMUNICATIONS**

**FORM FOR DISCLOSURE  
OF EX PARTE  
COMMUNICATION**

**Date and time of communication:** September 21, 2015 12:00

**Location of communication:** Sherman Oaks, CA

**Person(s) initiating communication:** David Neish, David Neish Jr.

**Person(s) receiving communication:** Wendy Mitchell

**Name or description of project:** CDP 9-15-0228 Southern California Edison Company

**Detailed substantive description of content of communication:**

Applicants' representatives provided an overview of the project plan and discussed the application history to date. A power point presentation was presented that identified project location, discussion of the proposed project, a description of the project purpose and benefits, a discussion of the impact on Coastal Resources, and regulatory oversight.

The applicants support the CCC Staff recommendation for approval and also the Special Conditions, although the CCC Staff Report has not been finalized, therefor they were not able to totally commit at this point.

There was a brief explanation on the decommissioning process and the permits that the Coastal Commission will be reviewing and acting upon prior to decommissioning. It was indicated that this CDP application for the expansion of the Independent Spent Fuel Storage Installation (ISFSI) which is the application that will be heard by the Commission is one of the key applications for the decommissioning process.

Date

9/24/15

Commissioner



# FORM FOR DISCLOSURE OF EX PARTE COMMUNICATIONS

Name or description of project, LPC, etc.: Bochco T14A SCE/San Onofre

Date and time of receipt of communication: 9/22/15 2pm

Location of communication: my office

Type of communication (letter, facsimile, etc.): \_\_\_\_\_

Person(s) initiating communication: David Neisd

Detailed substantive description of content of communication:

(Attach a copy of the complete text of any written material received.)

David Neisd & I briefly talked about the need to put spent fuel in dry storage. He gave me the presentation info. My site visit ex parte is on file

9/24/15  
Date

[Signature]  
Signature of Commissioner

If the communication was provided at the same time to staff as it was provided to a Commissioner, the communication is not ex parte and this form does not need to be filled out.

If communication occurred seven or more days in advance of the Commission hearing on the item that was the subject of the communication, complete this form and transmit it to the Executive Director within seven days of the communication. If it is reasonable to believe that the completed form will not arrive by U.S. mail at the Commission's main office prior to the commencement of the meeting, other means of delivery should be used, such as facsimile, overnight mail, or personal delivery by the Commissioner to the Executive Director at the meeting prior to the time that the hearing on the matter commences.

If communication occurred within seven days of the hearing, complete this form, provide the information orally on the record of the proceeding and provide the Executive Director with a copy of any written material that was part of the communication.

**FORM FOR DISCLOSURE  
OF EX PARTE  
COMMUNICATION**

**Date and time of communication:** September 24, 2015 1:00

**Location of communication:** San Onofre, CA

**Person(s) initiating communication:** David Neish, D.Neish Jr., Tom Palmisano, J.Madigan, D.Asti, M.Moran, J.Manzo, Ron Pontes

**Person(s) receiving communication:** Mark Vargas

**Name or description of project:** CDP 9-15-0228 Southern California Edison Company

**Detailed substantive description of content of communication:**

Applicants' representative provided an overview of the project plan and discussed the application history to date. A power point presentation was presented that identified project location, discussion of the proposed project, a description of the project purpose and benefits, a discussion of the impact on Coastal Resources, and regulatory oversight.

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**September 29, 2015**



Date

Commissioner



**FORM FOR DISCLOSURE  
OF EX PARTE  
COMMUNICATION**

**Date and time of communication:** September 22, 2015 11:30

**Location of communication:** Malibu, CA

**Person(s) initiating communication:** David Neish

**Person(s) receiving communication:** Roberto Uranga

**Name or description of project:** CDP 9-15-0228 Southern California Edison Company

**Detailed substantive description of content of communication:**

Applicants' representative provided an overview of the project plan and discussed the application history to date. A power point presentation was presented that identified project location, discussion of the proposed project, a description of the project purpose and benefits, a discussion of the impact on Coastal Resources, and regulatory oversight.

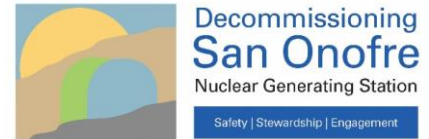
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Date

  
Commissioner

# Overview: Safe Storage of San Onofre Nuclear Plant Used Fuel



Now that the San Onofre nuclear plant is permanently shut down, Southern California Edison (SCE) is working to ensure continued safe storage of the plant's used nuclear fuel.

We are unable to move the fuel to a permanent storage facility because the Department of Energy (DOE) has defaulted on its legal obligation to open such a repository. SCE agrees with community leaders who want to remove the fuel from San Onofre as soon as possible. We also recognize two key steps must be taken first:

- The fuel must be placed in dry storage canisters before it can be received by an off-site storage facility;
- DOE must provide a licensed location to accept the fuel, whether it's an interim storage facility or a permanent repository.

Today, SCE can address only one of those issues: placing San Onofre's radioactive waste in robust, steel canisters housed in a concrete structure. This proven technology is called dry cask storage and it's been safely used in the U.S. for more than three decades, subject to review and licensing by the U.S. Nuclear Regulatory Commission.

Today, about one-third of San Onofre's used nuclear fuel is already in these steel and concrete containers. The other two-thirds is stored and cooled in what we call a spent fuel pool, a methodology known as wet storage. The 40-foot-deep concrete pools are lined with steel and filled with water to cool and shield the used fuel assemblies.

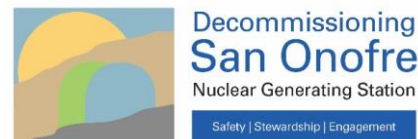
SCE plans to transfer all the used fuel in wet storage to dry cask storage by 2019, pending review and approval by the California Coastal Commission. The commission is scheduled to consider the San Onofre dry storage coastal development permit request in October.

Beyond the strong community support, SCE has identified environmental, safety, operational and financial reasons why dry storage makes sense.

Unlike wet storage, dry storage does not require any active cooling systems. It does not produce any air emissions or discharges from operation.

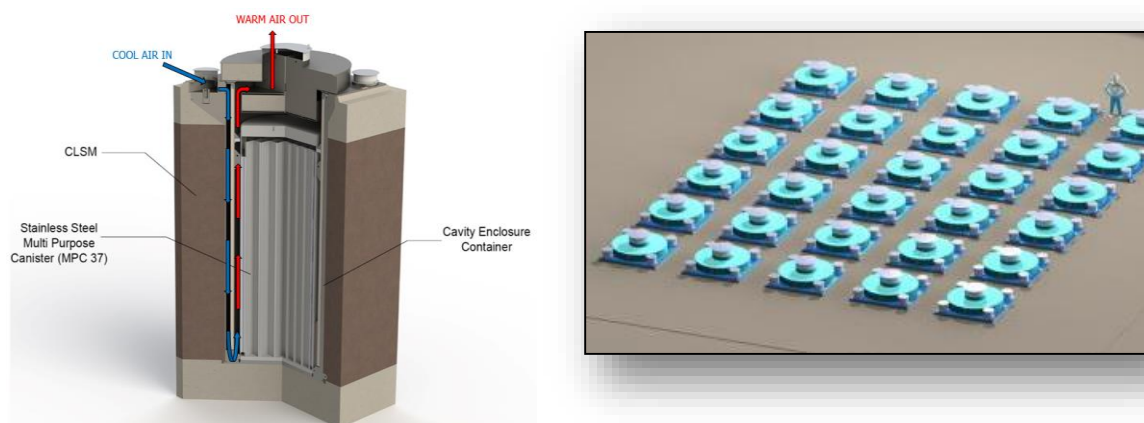
Dry storage enables SCE to eliminate active systems and components, including energized equipment and the associated maintenance, a change that enhances worker safety. Using less equipment means we can reduce the size of the San Onofre "footprint" that requires security surveillance. All of these changes set the stage for a more efficient decommissioning, and provide cost savings for customers.

# Overview: Safe Storage of San Onofre Nuclear Plant Used Fuel



SCE has chosen a partially below-ground storage system with casks made of the most corrosion resistant grade of stainless steel. The design exceeds California earthquake requirements and protects against hazards such as water, fire or tsunamis.

The casks are manufactured by a global supplier, Holtec International, which has two other nuclear fuel storage systems in California -- Humboldt Bay and Diablo Canyon. The Holtec canisters would be adjacent to the existing, horizontal dry cask storage vault supplied by Areva.



*At left is a side view of the Holtec canister showing multiple layers of protection, and, at right, an aerial view of a completed Holtec dry cask storage facility.*

The used nuclear fuel will remain in dry storage at San Onofre until an offsite storage location is available. SCE supports proposals to establish interim storage sites for used nuclear fuel in New Mexico and Texas until the federal government opens a permanent repository.

The San Onofre Community Engagement Panel (CEP), established by SCE to serve as a liaison to the community during decommissioning, has formally asked the California Energy Commission to advocate for interim storage options that expedite removing the used nuclear fuel from San Onofre. In addition, local elected officials working with the CEP are developing grassroots efforts to build support for a licensed interim storage facility that would expedite removal of the fuel from San Onofre.

Until licensed off-site storage is available, SCE will continue to do what we have done for the past 40 years -- safely manage and store San Onofre's used nuclear fuel.

*To learn more about efforts to establish an off-site, interim storage facility for San Onofre's used fuel, you may contact your Congressional representative, attend a [Community Engagement Panel meeting](#), write to the [California Energy Commission](#) or visit our website at [www.songscommunity.com](http://www.songscommunity.com) for updates on local and national initiatives.*

*Updated September 14, 2015*



# Decommissioning **San Onofre**

Nuclear Generating Station

# Independent Spent Fuel Storage Installation Expansion

Southern California Edison,  
San Diego Gas & Electric,  
Cities of Anaheim and  
Riverside

CDP Application #9-15-0228

September 2015



Decommissioning  
**San Onofre**  
Nuclear Generating Station

# Existing Independent Spent Fuel Storage Installation (ISFSI)



**NUHOMS “Dry Storage” System**





# ISFSIs Nationwide

Decommissioning  
San Onofre  
Nuclear Generating Station





Decommissioning  
**San Onofre**  
Nuclear Generating Station

# Dry Cask Storage

- First step toward transfer of fuel offsite
- Provides continued safe storage of spent fuel onsite
- Dry storage is preferable over wet storage for retired plants
- Safe, secure, passive, economical system





Decommissioning  
**San Onofre**  
Nuclear Generating Station

# Proposed ISFSI Expansion

- Current ISFSI nearing full capacity
- Offsite storage currently unavailable
- Selected Holtec system for expansion
- Proposed expansion will accommodate transfer of fuel from pools to ISFSI
- CCC CDP application filed February 2015

# SONGS Spent Fuel

## CURRENT STATE

Spent Fuel  
Pools

2668 fuel  
assemblies

Existing ISFSI  
50 canisters (1187  
fuel assemblies)

## EXPANDED ISFSI

100 canisters  
(2668 fuel  
assemblies)

+

existing 50  
canisters  
(1187 fuel  
assemblies)

## FUTURE STATE

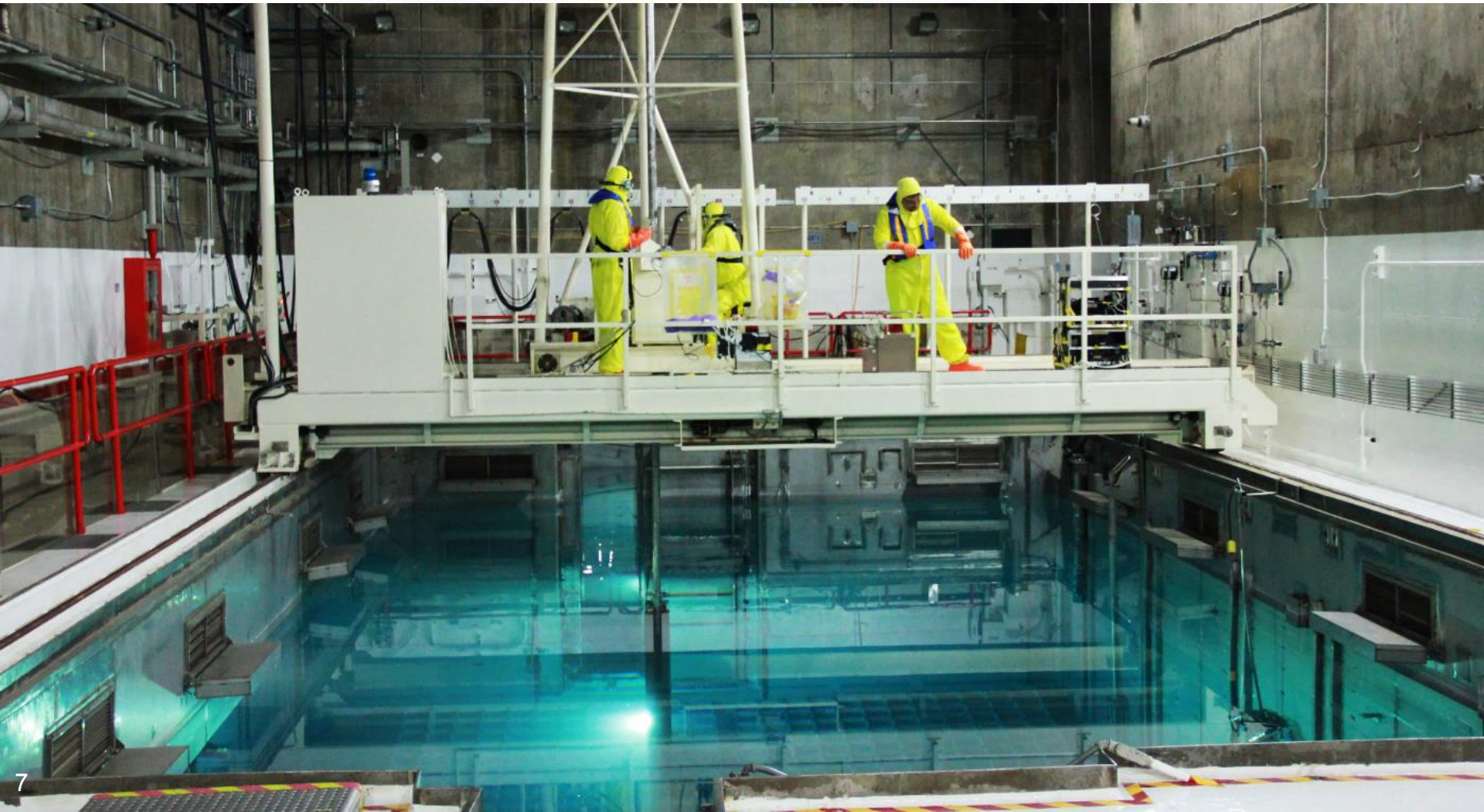
To the DOE:

3855 fuel  
assemblies in  
~150 canisters



Decommissioning  
**San Onofre**  
Nuclear Generating Station

# Spent Fuel Pool “Wet Storage”







Decommissioning  
San Onofre

# Plant Layout





# Proposed Configuration

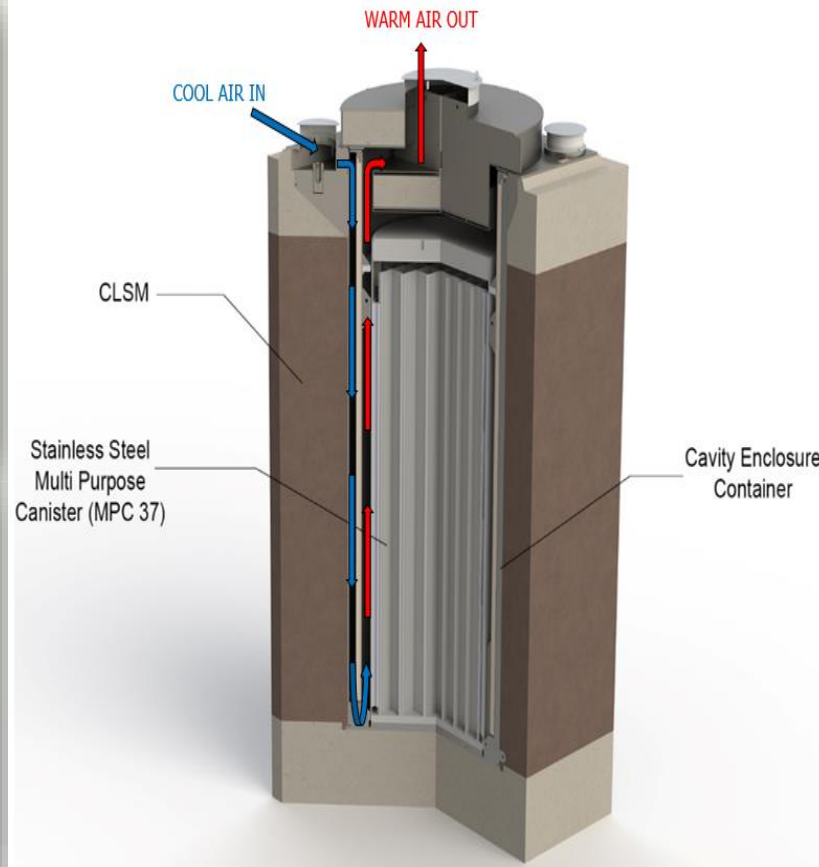
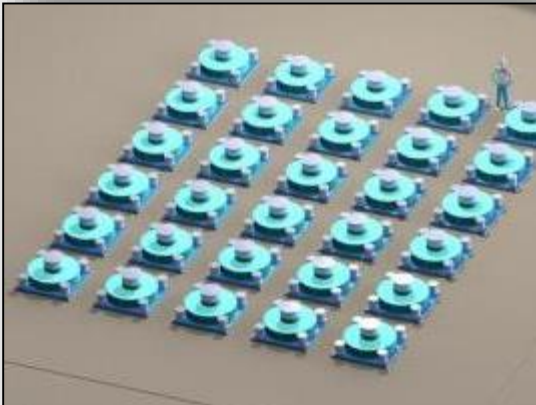






Decommissioning  
**San Onofre**  
Nuclear Generating Station

# Holtec UMAX System





Decommissioning  
**San Onofre**  
Nuclear Generating Station

# ISFSI Project Schedule

- **Oct 7-9, 2015:** CCC meeting (Long Beach)
- **Dec 2014 - Nov 2016:** Engineering design
- **Dec 2014 - Jan 2018:** Fabrication of casks
- **Oct 2015 - Aug 2017:** ISFSI construction
- **Aug 2017 - Mid-2019:** Transfer Fuel from Pool to Pad



From: **David Neish** <[dbneish@dbnplanning.com](mailto:dbneish@dbnplanning.com)>  
Date: 30 September 2015 at 11:16  
Subject: FW: Updated Commissioner Slide Deck  
To: Mary Luevano

Mary Attached is the Songs info that we will be discussing on Friday.

**From:** Linda Anabtawi [mailto:[Linda.Anabtawi@sce.com](mailto:Linda.Anabtawi@sce.com)]  
**Sent:** Friday, September 25, 2015 4:13 PM  
**To:** [dbneish@dbnplanning.com](mailto:dbneish@dbnplanning.com); David Neish <[djneish@dbnplanning.com](mailto:djneish@dbnplanning.com)>  
**Cc:** Kim Anthony <[Kim.Anthony@sce.com](mailto:Kim.Anthony@sce.com)>; Ed Yep <[Ed.Yep@sce.com](mailto:Ed.Yep@sce.com)>; David Asti <[David.Asti@sce.com](mailto:David.Asti@sce.com)>  
**Subject:** Updated Commissioner Slide Deck

David Jr and Sr,

We made some corrections to the slide deck you are using for your commissioner ex parte meetings. Please use the attached version of the document. Thanks.

Linda J. Anabtawi  
Senior Attorney  
SCE Law Department  
[\(626\) 302-6832](tel:(626)302-6832)  
[linda.anabtawi@sce.com](mailto:linda.anabtawi@sce.com)



# Decommissioning San Onofre

Nuclear Generating Station

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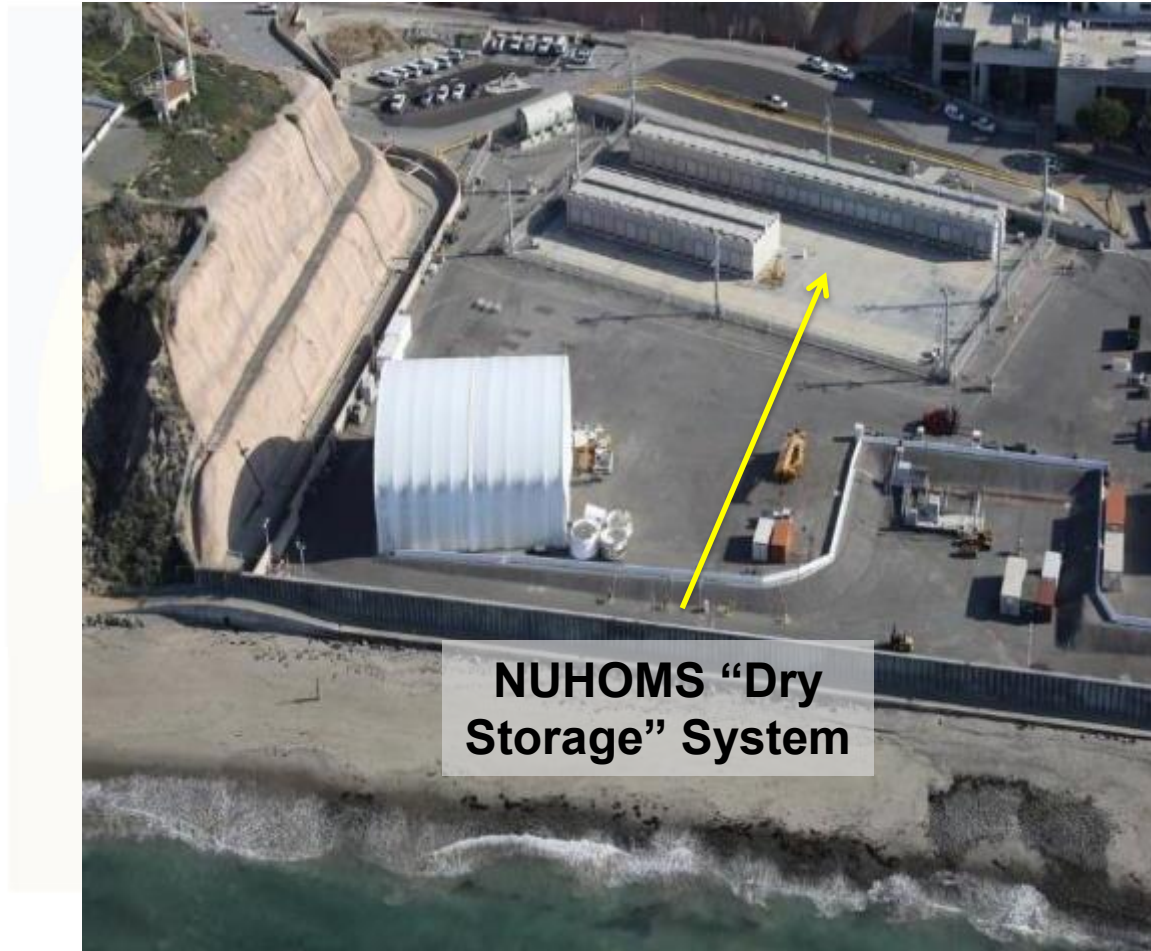
CDP Application #9-15-0228

October 6, 2015



Decommissioning  
**San Onofre**  
Nuclear Generating Station

# Existing Independent Spent Fuel Storage Installation (ISFSI)



**NUHOMS “Dry Storage” System**

# Licensed ISFSIs in U.S.



Decommissioning  
San Onofre  
Nuclear Generating Station





Decommissioning  
San Onofre  
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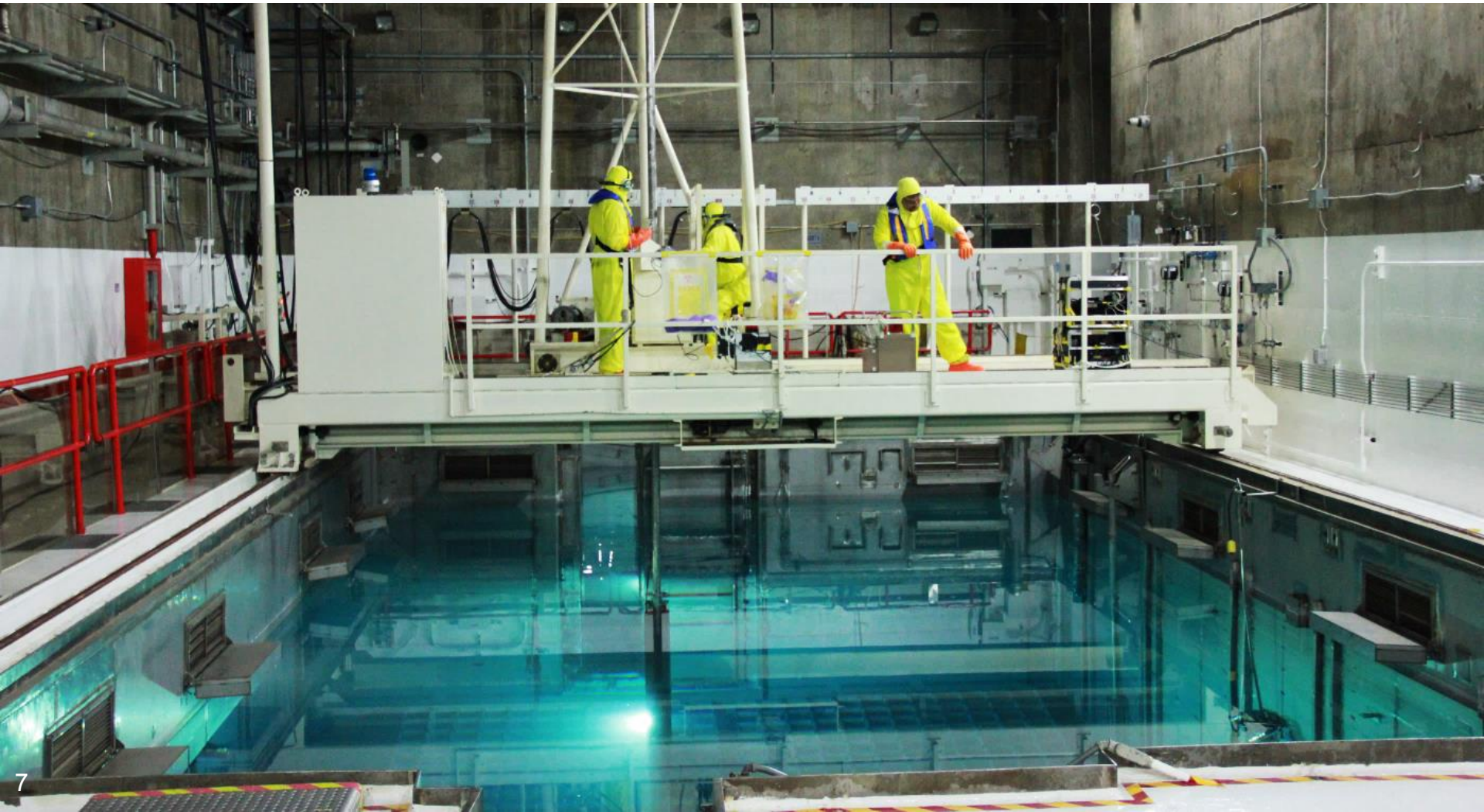
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Decommissioning  
**San Onofre**  
Nuclear Generating Station

# Spent Fuel Pool “Wet Storage”







Decommissioning  
San Onofre

# Plant Layout





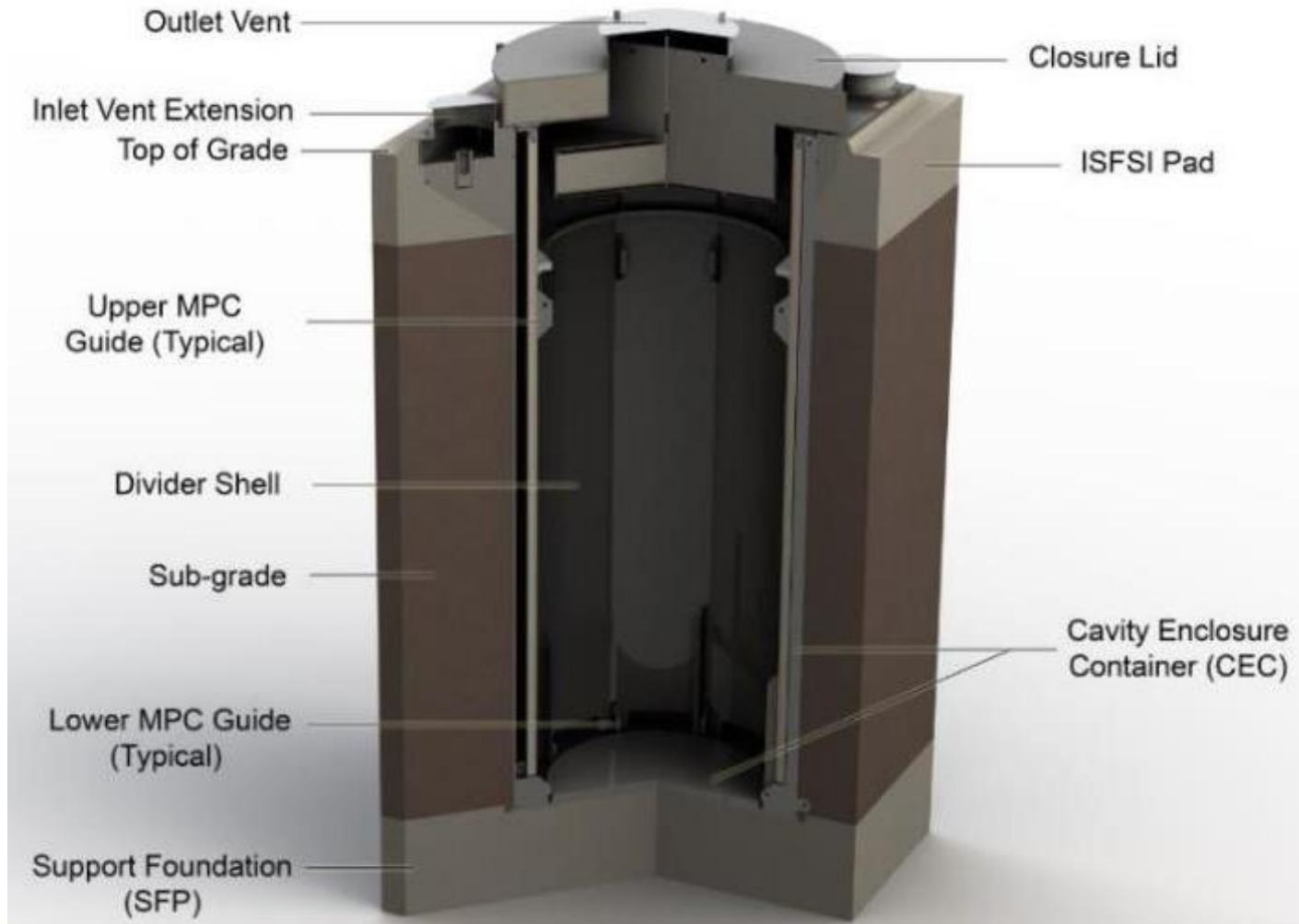
# Proposed Configuration





Decommissioning  
**San Onofre**  
Nuclear Generating Station

# Holtec UMAX System







Decommissioning  
**San Onofre**  
Nuclear Generating Station

# ISFSI Project Milestones

- **Oct 6, 2015:** CCC meeting in Long Beach
- **Nov 2015:** Engineering design complete
- **Jan 2016 - Aug 2017:** Construction of ISFSI
- **Sep 2017 - Mid-2019:** Transfer Fuel from Pool to Pad

Must Read

Item Tu6c

## EX PARTE COMMUNICATION DISCLOSURE FORM

Filed by Commissioner: Greg Cox

- 1) Name or description of project: **CDP 9-15-0228 SONGS ISFSI**
- 2) Date and time of receipt of communication: October 2, 2015 at 3:30pm
- 3) Location of communication: San Diego  
(If not in person, include the means of communication, e.g., telephone, e-mail, etc.)
- 4) Identity of person(s) initiating communication:  
David B. Neish
- 5) Identity of person(s) on whose behalf communication was made:  
Southern California Edison
- 6) Identity of persons(s) receiving communication:  
Greg Cox, and staff Greg Murphy
- 7) Identity of all person(s) present during the communication:  
David B. Neish, and David J. Neish

Complete, comprehensive description of communication content (attach complete set of any text or graphic material presented):

Applicants' representatives provided an overview of the project plan and discussed the application history to date. A power point presentation, which was also previously provided to staff, was presented that identified project location, discussion of the proposed project, a description of the project purpose and benefits, a discussion of the impact on Coastal Resources, and regulatory oversight.

The applicants support the CCC Staff recommendation for approval and also the Special Conditions.

10/2/15  
Date

Greg Cox  
Signature of Commissioner

**CALIFORNIA COASTAL COMMISSION**

45 FREMONT, SUITE 2000  
SAN FRANCISCO, CA 94105-2219  
VOICE AND TDD (415) 904-5200  
FAX (415) 904-5400



# Tu14a

Filed:	6/11/15
180 <sup>th</sup> Day:	12/8/15
Staff:	J. Street - SF
Staff Report:	9/25/15
Hearing Date:	10/6/15

## STAFF REPORT: REGULAR PERMIT

<b>Application No.:</b>	<b>9-15-0228</b>
<b>Applicant:</b>	<b>Southern California Edison Company</b>
<b>Location:</b>	San Onofre Nuclear Generating Station, San Diego County.
<b>Project Description:</b>	Construct and operate an Independent Spent Fuel Storage Installation (ISFSI) to store spent nuclear fuel from SONGS Units 2 and 3.
<b>Staff Recommendation:</b>	Approval with conditions.

---

## SUMMARY OF STAFF RECOMMENDATION

Southern California Edison Company (SCE) proposes to construct and operate a temporary facility to store spent nuclear fuel produced at the San Onofre Nuclear Generating Station (SONGS), on Camp Pendleton, in northern San Diego County (**Exhibit 1**). The facility, known as an Independent Spent Fuel Storage Installation (ISFSI), would consist mainly of a partially-below grade concrete and fill berm surrounding an array of 75 fuel storage modules, which would contain and protect stainless steel casks filled with spent fuel. The ISFSI would be located within the SONGS North Industrial Area (NIA), the former site of the decommissioned Unit 1 power plant, adjacent to and seaward of an existing ISFSI facility permitted in 2001 (**Exhibit 2**).

SONGS Units 2 and 3 were shut down in 2012, and some 2668 spent fuel assemblies remain in wet storage pools in the Units 2 and 3 fuel handling buildings. This fuel is highly radioactive and requires secure storage for thousands of years to prevent harm to humans and the environment.



Because the existing ISFSI does not have the capacity to hold the remaining spent fuel, a new ISFSI is being proposed in order to provide for the interim storage of the spent fuel until such time as it can be accepted at a federal permanent repository or other off-site interim storage facility. Removing the fuel from the existing wet storage pools would also facilitate the full decommissioning of SONGS Units 2 and 3 and the restoration of the site. The ISFSI is proposed to be installed beginning in 2016, fully loaded by 2019, and operated until 2049, when SCE assumes that the federal Department of Energy will have taken custody of all of the SONGS spent fuel. The facility would then be decommissioned, and the site restored, by 2051.

At present, there are no feasible off-site alternatives to the proposed project. No permanent fuel repository or other interim storage facility exists, and there are no near-term prospects for such a facility. SCE evaluated several on-site locations and ISFSI designs, and found the proposed project to be preferable in terms of site suitability and geologic stability, security, and cost, among other considerations. However, additional potentially superior on-site locations will become available for consideration upon completion of Units 2 and 3 decommissioning in 2032.

Within SCE's proposed 35-year timeframe, the siting and design of the ISFSI would be sufficient to assure stability and structural integrity against geologic hazards, including seismic ground shaking, slope failure, tsunamis and flooding, and coastal erosion, without requiring shoreline protection. Operation of the ISFSI would not involve the discharge of contaminants into coastal waters, and the implementation of construction BMPs designed to control runoff and prevent sediment and debris from entering the storm drain system would protect water quality and marine resources. Because of its location within the previously-developed SONGS site, the ISFSI would not interfere with coastal access and recreation within the proposed project life and would not significantly degrade visual resources so long as the other SONGS facilities remain in place.

Crucially, however, it remains uncertain whether it will be possible for SCE to remove the ISFSI as planned, in 2051. In the event that no permanent repository or other offsite interim storage facility emerges, if the shipment of SONGS spent fuel to an off-site location is otherwise delayed, or if the steel fuel storage casks proposed for use in the ISFSI (which is certified by the Nuclear Regulatory Commission for a 20-year period of use) degraded to the point of becoming unsafe to transport, the proposed ISFSI could be required beyond 2051, possibly for many decades. The ISFSI would eventually be exposed to coastal flooding and erosion hazards beyond its design capacity, or else would require protection by replacing or expanding the existing SONGS shoreline armoring. In either situation, retention of the ISFSI beyond 2051 would have the potential to adversely affect marine and visual resources and coastal access.

In order to address these uncertainties, and assure that the ISFSI facility remains safe from geologic hazards and avoids adverse impacts to coastal resources over the actual life of the project, staff recommends **Special Condition 2**, which authorizes the proposed development for a period of twenty years and requires SCE to return for a CDP Amendment to retain, remove or relocate the ISFSI facility, supported by: (i) an alternatives analysis, including locations within the decommissioned Units 2 and 3 area; (ii) assessment of coastal hazards and managed retreat; (iii) information on the physical condition of the fuel storage casks and a maintenance and monitoring program; and (iv) proposed measures to avoid/minimize visual resource impacts.

Staff also recommends **Special Condition 3**, which requires SCE to agree to not enlarge or replace the existing NIA seawall for purposes of protecting the proposed project from coastal hazards. Additionally, staff is recommending **Special Conditions 1, 4, 5, and 6** which require evidence of the Applicant's legal ability to undertake the development as conditioned by the Commission, assumption of risk, liability for attorney's fees, and restrictions on future development.

The staff recommends the Commission find that, as conditioned, the project would be consistent with the hazards, marine resources, water quality, and view protection policies of the Coastal Act, and therefore recommends that the Commission **APPROVE** coastal development permit application 9-15-0228, as conditioned.

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## APPENDICES

Appendix A – Substantive File Documents

Appendix B – Ground Shaking as a Measure of Earthquake Strength

## EXHIBITS

Exhibit 1 – Project Vicinity

Exhibit 2 – SONGS Site and On-site Location Alternatives

Exhibit 3 – Project Plans

Exhibit 4 – ISFSI Components

Exhibit 5 – Structures to Be Removed

Exhibit 6 – ISFSI Seismic Design Spectra

Exhibit 7 – Flood Risk in Year 2117

Exhibit 8 – Views of Existing Seawall

Exhibit 9 – Site Views and Visual Simulations

## I. MOTION AND RESOLUTION

### Motion:

*I move that the Commission **approve** Coastal Development Permit 9-15-0228 subject to conditions set forth in the staff recommendation specified below.*

Staff recommends a **YES** vote on the foregoing motion. Passage of this motion will result in approval of the permit as conditioned and adoption of the following resolution and findings. The motion passes only by affirmative vote of a majority of Commissioners present.

### Resolution:

*The Commission hereby approves the Coastal Development Permit for the proposed project and adopts the findings set forth below on grounds that the development as conditioned will be in conformity with the policies of Chapter 3 of the Coastal Act. Approval of the permit complies with the California Environmental Quality Act because either 1) feasible mitigation measures and/or alternatives have been incorporated to substantially lessen any significant adverse effects of the development on the environment, or 2) there are no further feasible mitigation measures or alternatives that would substantially lessen any significant adverse impacts of the development on the environment.*

## II. STANDARD CONDITIONS

This permit is granted subject to the following standard conditions:

1. **Notice of Receipt and Acknowledgment.** The permit is not valid and development shall not commence until a copy of the permit, signed by the applicant or authorized agent, acknowledging receipt of the permit and acceptance of the terms and conditions, is returned to the Commission office.
2. **Expiration.** If development has not commenced, the permit will expire two years from the date on which the Commission voted on the application. Development shall be pursued in a diligent manner and completed in a reasonable period of time. Application for extension of the permit must be made prior to the expiration date.
3. **Interpretation.** Any questions of intent of interpretation of any condition will be resolved by the Executive Director or the Commission.
4. **Assignment.** The permit may be assigned to any qualified person, provided assignee files with the Commission an affidavit accepting all terms and conditions of the permit.
5. **Terms and Conditions Run with the Land.** These terms and conditions shall be perpetual, and it is the intention of the Commission and applicant to bind all future owners and possessors of the subject property to the terms and conditions.

### III. SPECIAL CONDITIONS

This permit is granted subject to the following special conditions:

1. **Evidence of Landowner Approval.** PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT, the applicant shall submit to the Executive Director for review and approval evidence of their legal ability to undertake the development as conditioned by the Commission. Such evidence shall include documentation demonstrating that the U.S. Department of the Navy has renewed or extended its existing easement for use of the Part 50 licensed area for a term encompassing the authorized development (i.e., through October 6, 2035).
2. **Duration of Approval.** This coastal development permit authorizes the approved project for a period of twenty years from the date of approval (i.e., until October 6, 2035). No later than six months prior to the end of this authorization period, the Permittee shall apply for an amendment to this coastal development permit to retain, remove or relocate the ISFSI facility. This application shall be supported by:
  - a. An evaluation of current and future coastal hazards based on the best available information;
  - b. An analysis examining the merits and feasibility of off-site and on-site alternatives, including potential locations that are landward and/or at a higher elevation within areas made available by the decommissioning of SONGS Units 2 and 3;
  - c. A plan for managed retreat, if retention of the ISFSI facility beyond 2051 is contemplated and coastal hazards may affect the site within the timeframe of the amended project;
  - d. Evidence that the fuel storage casks will remain in a physical condition sufficient to allow off-site transport, and a description of a maintenance and inspection program designed to ensure that the casks remain transportable for the full life of the amended project.
  - e. An evaluation of the effects on visual resources of retaining the project, an analysis of available project alternatives and their implications for coastal visual resources, and proposed mitigation measures to minimize adverse impacts to coastal views.

Provided the application is received no later than six months prior to the end of the twenty-year period of development authorization, the date of development authorization shall be automatically extended until the time the Commission acts on the application. Failure to obtain an amendment to this coastal development permit by the specified deadline shall constitute a violation of the terms and conditions of this permit.

3. **No Future Shoreline Protective Device(s) to Protect the Proposed Development.**
  - A. The existing shoreline protective devices (rock revetment, concrete retaining wall, and steel sheet-pile seawall) located seaward of the North Industrial Area shall not be extended, expanded, enlarged or replaced for purposes of protecting the development approved by this coastal development permit. As used in this condition, replaced is

defined to include either an alteration of 50% or more of a shoreline protective device or an alteration of less than 50% or more of a shoreline protective device wherein the alteration would result in a combined alteration of 50% or more of the structure from its condition on October 6, 2015.

PRIOR TO ISSUANCE OF THE COASTAL DEVELOPMENT PERMIT, the Applicant shall submit evidence of the condition of each of the shoreline protective devices adjoining the North Industrial Area.

- B. No new shoreline protective device(s) shall ever be constructed to protect the development approved pursuant to Coastal Development Permit #9-15-0228, including the ISFSI facility, associated ancillary structures and any future improvements, in the event that the development is threatened with damage or destruction from erosion, landslides, waves, storm conditions, flooding, sea level rise or other natural coastal hazards in the future. By acceptance of this permit, the applicant hereby waives, on behalf of itself and all successors and assigns, any rights that may exist under Public Resources Code Section 30235 to augment, enlarge and/or replace any of the existing shoreline protective devices adjoining the NIA in order to protect the development approved by this coastal development permit.
  - C. All development and redevelopment of the property by the Permittee shall be sited and designed to ensure geologic stability without reliance on any of the existing shoreline protective devices adjoining the North Industrial Area. As used in this condition, redevelopment is defined to include: (1) additions, or; (2) expansions, or; (3) demolition, renovation or replacement that would result in 50% or more of a structure, structural wall or structural foundation, or; (4) demolition, renovation or replacement of less than 50% of a structure where the renovation or addition would result in a combined alteration of 50% or more of the structure from its condition on October 6, 2015.
4. **Assumption of Risk, Waiver of Liability and Indemnity.** By acceptance of this permit, the Permittee acknowledges and agrees:
- a. That the site may be subject to hazards from coastal erosion, storm conditions, wave uprush, and tsunami runup;
  - b. To assume the risks to the Permittee and the property that is the subject of this permit of injury and damage from such hazards in connection with this permitted development;
  - c. To unconditionally waive any claim of damage or liability against the Commission, its officers, agents, and employees for injury or damage from such hazards; and,
  - d. To indemnify and hold harmless the Commission, its officers, agents, and employees with respect to the Commission's approval of the project against any and all liability, claims, demands, damages, costs (including costs and fees incurred in defense of such claims), expenses, and amounts paid in settlement arising from any injury or damage due to such hazards.

5. **Restriction on Future Development.** This permit is only for the development described in the project description set forth in this staff report. Pursuant to Title 14 California Code of Regulations (CCR) Section 13253(b)(6), the exemptions otherwise provided in Public Resources Code (PRC) Section 30610(b) shall not apply to the development governed by this permit. Accordingly, any future improvements to this structure shall require an amendment to this permit from Commission, including but not limited to an increase in storage capacity of spent fuel. In addition, a permit amendment shall be required for any repair or maintenance of the authorized development identified as requiring a permit in PRC Section 30610(d) and Title 14 CCR Sections 13252(a)-(b).
6. **Liability for Costs and Attorneys Fees:** SCE shall reimburse the Coastal Commission in full for all Coastal Commission costs and attorneys fees -- including (1) those charged by the Office of the Attorney General, and (2) any court costs and attorneys fees that the Coastal Commission may be required by a court to pay -- that the Coastal Commission incurs in connection with the defense of any action brought by a party other than SCE against the Coastal Commission, its officers, employees, agents, successors and assigns challenging the approval or issuance of this permit, the interpretation and/or enforcement of permit conditions, or any other matter related to this permit. The Coastal Commission retains complete authority to conduct and direct the defense of any such action against the Coastal Commission.

## IV. FINDINGS AND DECLARATIONS

### A. PROJECT DESCRIPTION AND BACKGROUND

#### Project Purpose

The primary purpose of the project is to move spent nuclear fuel from its current location in a wet storage facility at Units 2 and 3 of the San Onofre Nuclear Generating Station (SONGS) to a dry storage system, known as an Independent Spent Fuel Storage Installation (ISFSI). An existing ISFSI at SONGS contains approximately 51 fuel storage modules filled with spent fuel from SONGS Units 1, 2 and 3, with space for 38 more. SCE proposes to construct a new ISFSI, with a capacity of 75 fuel storage modules (**Exhibit 3**), because the existing facility soon will reach full capacity while hundreds of spent fuel assemblies remain in the Units 2 and 3 pools. Only fuel and material generated at the SONGS is proposed to be stored at the ISFSI. Moving the spent fuel out of wet storage would facilitate dismantling the nuclear units at SONGS Units 2 and 3 and would allow their eventual decommissioning.

SCE proposes to store the material at the ISFSI until it can be moved to an off-site permanent repository to be established by the federal government. The ISFSI is proposed to remain in place through the year 2051. SCE plans to begin relocating SONGS spent fuel to the DOE as early as 2030, and to continue this process until 2049, when the last remaining spent fuel storage casks would be removed from the site (SCE 2014b). Based on the federal Department of Energy's (DOE) statutory obligation to accept commercial spent fuel (see below) and SCE's planned schedule for shipping the spent fuel to a federal off-site repository, the final two years of the proposed project term would be devoted to the decommissioning and removal of the ISFSI and site restoration. However, as discussed in more detail below, no such federal permanent



repository currently exists, alternative interim off-site storage options (e.g., state- or privately-operated ISFSIs or repositories) are not currently available, and it is uncertain when or if such off-site facilities will become available. Thus, there is a possibility that the ISFSI would remain at SONGS beyond 2051.

The spent fuel that would be stored in the ISFSI is considered high-level radioactive waste and must be stored securely for tens of thousands of years. As the fuel is used in a nuclear reactor, its level of radioactivity increases significantly due to radioisotopes formed during the nuclear fission process. When the fuel is removed from the reactor, it is initially stored in a “wet storage” pool adjacent to the power plant. The water in the pool and the materials used in the pool’s construction provide the shielding necessary to prevent human and environmental exposure to the high level of radioactivity present when the fuel is first removed from the reactor. The fuel must remain in the pool for several years until that initial level of radioactivity, and the heat that it produces, is reduced. It can then be relocated to another facility, if one is available. At SONGS, all fuel has been removed from the nuclear reactors and placed in the spent fuel pools. The spent fuel currently stored in the SONGS pools has been there for varying amounts of time; some of the fuel has been cooling for decades, such that much of its capacity to generate heat and radiation through radioactive decay has dissipated, while the youngest fuel assemblies in the pools have been cooling for only two to three years since the permanent shutdown of the Units 2 and 3 reactors. The SONGS spent fuel pools also contain a large number of “high burn-up” fuel assemblies, which produce greater amounts of radiation and heat and require more time to cool than regular fuel assemblies. In all cases, the inventory of spent fuel at SONGS requires secure storage, whether on-site or elsewhere, for many thousands of years.

### **Site Characteristics & Background**

SONGS occupies an 84 acre site on the northern San Diego County coast, within the U.S. Marine Corps Base, Camp Pendleton, and approximately 2.5 miles south of the city of San Clemente (**Exhibit 1**). SONGS is bounded on the north and northeast by Old Pacific Coast Highway and Interstate 5 (I-5), on the northwest by a surface parking lot for SCE employees, and on the west and south by San Onofre State Beach and the Pacific Ocean. The SONGS site comprises just over one mile of shoreline. The northern and southern portions of the site, consisting mostly of parking lots and auxiliary structures and facilities, respectively, are located on top of coastal bluffs of up to 120 feet above mean lower low water (MLLW). The generating units and other core facilities are located along the central portion of the site on a set of artificially-graded terraces, ranging in elevation from 13 to 80 feet MLLW, cut into the bluff at the time of construction. Shoreline protection devices, including a rip-rap revetment, a concrete bulkhead supporting a public access walkway, and a seawall, extend for approximately 2000 feet along the shoreline in front of the Units 1, 2 and 3 areas. **Exhibit 2** provides an overview of the SONGS site and its major features.

The plant is collectively owned by SCE (75.05% interest), San Diego Gas and Electric Company (20%), the City of Anaheim (3.16%) and the City of Riverside (1.79%), and operates subject to a long-term easement granted by the U.S. Department of the Navy (Navy), executed in 1964 and effective through 2024.

SONGS previously consisted of three nuclear power reactors operated by SCE. The 430 MW generator at Unit 1 began operations in 1968, was shut down in 1992, and has since been decommissioned and dismantled. CDP #E-00-001, approved by the Commission on February 15, 2000, authorized the demolition of the structures comprising Unit 1 and the construction of an ISFSI comprising 19 fuel storage modules, located within the Unit 1 area (now referred to as the North Industrial Area) (**Exhibit 2**).

SONGS Units 2 and 3 were constructed beginning in 1974 (under CDP #183-73), and operated as twin 1127-MW commercial nuclear power plants beginning in 1983 and 1984, respectively. In 2000, in order to create additional storage capacity needed as the existing spent fuel pools begin to fill, SCE applied for and was granted authorization (CDP #E-00-014) for the construction of a much larger ISFSI facility (of up to 104 fuel storage modules) to store Units 2 and 3 spent fuel. The new ISFSI was co-located with and integrated into the previously-approved Unit 1 ISFSI. At present, the existing ISFSI contains 51 loaded and 12 empty fuel storage modules, with space remaining for an additional 26 modules. The location of the existing ISFSI within the North Industrial Area (NIA) is shown in **Exhibits 2 and 3**. Power generation at Units 2 and 3 ceased in 2012. Following an extended shutdown period, SCE announced plans to decommission Units 2 and 3 on June 7, 2013. Since then, SCE has taken a number of actions in preparation for decommissioning, including the installation of new electrical systems needed to supply the plant with power now that electricity generation at SONGS has ceased (CDP Waiver # 9-14-1550-W) and back-up diesel generators (CDP Waivers # 9-14-1550-W and 9-15-0265-W). Most recently, SCE has received Commission approval for projects to install a new spent fuel pool cooling system to replace the existing ocean water once-through cooling system (CDP 9-15-0162), and to replace the large seawater intake pumps serving Units 2 and 3 with smaller pumps better suited to the plant's reduced water needs (CDP Waiver #9-15-0417-W).

### **Project Description**

SCE proposes to construct a new ISFSI incorporating 75 fuel storage modules within the NIA. The ISFSI, including its concrete approach aprons, would occupy approximately 32,000 square feet and would be located immediately seaward of the existing ISFSI, approximately 100 feet inland of the seawall adjoining Unit 1 (**Exhibit 3**). In addition, the proposed project includes the construction of a new security building within the NIA to the east of the ISFSI, a new perimeter security fence, and associated lighting and security equipment. The total project area, including the ISFSI, ancillary structures, and security perimeter, is approximately 100,000 square feet.

There are several types of ISFSI designs, with most being a variation of different types of storage casks bolted to a thick concrete pad within a secured area. The storage casks are generally multi-layer containers made of concrete, steel and other metals, designed to contain most of the radiation emanating from the spent fuel assemblies. Depending on the ISFSI design, storage casks may be stored horizontally or vertically within a concrete superstructure or outer shell. To date, the NRC has licensed 75 ISFSIs at nuclear power plants around the country. Many power plants have constructed ISFSIs to provide additional storage in their wet storage pools for ongoing power plant operations. At SONGS, there is no additional spent fuel being produced, but SCE is proposing the ISFSI in part to allow the emptying of the existing spent fuel pools and to facilitate decommissioning of the power plant complex.

The ISFSI design at SONGS would differ from most other ISFSIs in that the storage casks would be stored partially below grade, encompassed by a berm composed of concrete and fill. The ISFSI system, known as a HI-STORM UMAX, is expected by its manufacturer (Holtec International) to provide better performance during seismic events, provide better security, and reduce radiation doses at the site boundary in comparison to competing designs (Holtec 2014a).<sup>1</sup> The HI-STORM UMAX “ventilated vertical module” (VVM) is a vertical underground storage system designed to accommodate multi-purpose container (MPC) models produced by Holtec. The MPCs proposed for use at SONGS are Holtec MPC-37 canisters, composed of 5/8-inch thick austenitic stainless steel. Each MPC-37 contains an internal grid or “basket” allowing for the storage of up to 37 individual spent fuel assemblies. A 9.5-inch thick canister lid would be welded to the canister shell after loading.

As proposed, the SONGS facility would consist of 75 VVMs set in a surrounding berm measuring approximately 111 ft wide by 211 ft long by 24.5 ft in vertical height, including a 3-foot thick concrete foundation pad. Although the HI-STORM UMAX system has been designed to be 24.5 ft in vertical height, the proposed ISFSI would be installed 12.25 ft below the existing grade. In order to fully enclose the structure, as intended for the underground system, the portion of the structure above the NIA grade (approximately 12.25 feet) will be encased in a berm sloped from the top of the structure to the grade elevation at an approximate forty-five degree angle. As a result, no vertical wall of the concrete structure will be exposed. The top of the ISFSI pad would be at an elevation of approximately 32 feet MLLW. In addition to the array of VVMs, the ISFSI structure would include a reinforced concrete ramp and approach apron for use during the loading, unloading, and maintenance of the storage modules at the top of the ISFSI pad. Plan-view and cross-sectional diagrams of the proposed ISFSI are shown in **Exhibit 3**.

Within the HI-STORM UMAX, each individual VVM would operate independently from any other, and would allow for the storage of one MPC in a vertical configuration inside a cylindrical cavity entirely below the top of grade of the facility. The MPC storage cavity is defined by a so-called Cavity Enclosure container (CEC), comprised of a low carbon stainless steel Container Shell welded to a steel Base Plate. Internal parts within the CEC include MPC bearing surfaces, upper and lower guides to aid in the insertion of the MPC into the CEC and limit lateral movement of the MPCs during an earthquake, and a metal Divider Shell, which separates the space between the MPC and the wall of the CEC to allow for the inflow and outflow of air around the MPC. The CEC is capped with a 24,000-pound Closure Lid made of steel and concrete, which provides radiation shielding at the top of the ISFSI. The Closure Lid also includes inlet and outlet vents which connect to the ventilation space within the CEC and allow for the air cooling of the MPCs. Diagrams of the HI-STORM UMAX storage system and components are provided in **Exhibit 4**.

The ISFSI “berm”, or surrounding support structure, would consist of a foundation pad and top pad (“ISFSI Pad”) made of 3-foot thick reinforced concrete, and subgrade fill. The interstitial spaces between and surrounding the fuel storage modules would be composed of self-consolidating concrete with a minimum compressive strength of 3000 psi, while the subgrade of the outer perimeter of the berm would be composed of the material excavated from below the

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<sup>1</sup> A small HI-STORM UMAX system with six storage modules was previously installed at the Humboldt Bay Power Plant (see CDP #E-05-001).

NIA grade during site preparation. The subgrade, foundation pad, and top pad and Closure Lid would completely surround the CECs and provide radiation shielding for the long-term storage of the MPCs.

### *Construction*

The proposed project is anticipated to be constructed in a single phase, with field work commencing in January 2016. Construction activities, including site preparation and removal of several existing structures, grading, excavation and material placement, ISFSI construction, and the construction of the new security building, fencing, and lighting, are expected to continue for approximately one year. Most of the existing structures to be removed are temporary facilities storing non-radioactive remnants from Unit 1 (**Exhibit 5**). Because the proposed ISFSI would be installed partially below the existing NIA grade, project construction will require the excavation of approximately 14,800 cubic yards of material. This material would be stored on-site following SONGS best management practices and is proposed to be used in the peripheral berm surrounding the ISFSI. Project construction would also include utility extensions to existing water, sewer, electric, and telephone lines to accommodate operational activities at the proposed security building.

Project construction will require heavy equipment, only some of which is currently located on the SONGS site. Off-site construction vehicles (such as delivery trucks) would access the site via Old Pacific Coast Highway and Interstate 5. In general, construction activities would be limited to daylight hours, with the possible exception of operations requiring the continuous placement of concrete, which could last for 12 to 16 hours and result in a limited amount of nighttime operations.

### *Fuel Loading and Transfer of Casks from Spent Fuel Pools to the ISFSI*

To transfer the spent fuel from wet to dry storage, the MPCs would be brought to the wet storage pools, located in the Units 2 and 3 Fuel Handling Buildings approximately 1,200 feet east of the project site. The MPCs would be lowered into the pools, loaded with spent fuel assemblies, and then removed from the pools. Water would be drained from the MPCs, the air inside of them would be replaced with helium, and they would be welded shut. Subsequently, the MPCs would be placed in a licensed transfer cask and loaded onto a transfer vehicle that would use existing roads within the SONGS Protected Area to move the MPCs to the project site. The transfer vehicle would access the top of the ISFSI pad using the built-in access ramp and approach pad (*see Exhibit 3*), and the MPCs would be loaded into the fuel storage modules and capped. Approximately six days are required to complete the transfer of one MPC, though more than one MPC can be processed for loading at any given time. SCE expects to begin the transfer of spent fuel to the new ISFSI facility beginning in 2017, and to complete the effort by June 2019.

### *Maintenance & Monitoring*

The NRC requires licensees to implement an Aging Management Plan (AMP) to provide for the continued safe dry cask storage of spent fuel in order to renew the initial 20-year license for the HI-STORM UMAX ISFSI. SCE has indicated that it will develop its aging management program shortly after the fuel is transferred to the proposed ISFSI, in advance of NRC requirements. In a 9/14/2015 document submitted to Commission staff (SCE 2015f), SCE described this program as follows:

*SCE's program will focus on engineered controls (i.e., conservative design, material selection and fabrication controls), operational controls (e.g., inspection and monitoring) and developing mitigation plans to address material degradation and/or mitigate its consequences. Site monitoring of environmental parameters such as temperature and humidity will be used to help determine the risk of corrosion to the canister and predict the time of onset of degradation. Inspections will include visual observation, collection of surface deposits and temperature, and more extensive non-destructive examination (NDE) techniques. Industry efforts are well underway to develop NDE methods, deployment methods, qualification processes and acceptance criteria. It is not unusual for such efforts to evolve over time and with greater collective experience. With the commitment that SCE will not wait until it is required by the NRC to implement an AMP, SCE expects to be an early, if not the first, user of such techniques.*

*One of the challenges of inspections is getting to the entire surface of the loaded canisters which have a radiation environment that limits access. Remote surface inspection tools are currently being developed and are expected to be available for use at SONGS shortly after the fuel is transferred to the expanded ISFSI. In addition to developing these remote inspection tools, SCE will place an empty canister in the same environment as the loaded systems. This type-test specimen (i.e., coupon) can be thoroughly inspected and monitored in ways that a loaded canister cannot due to the presence of a spent fuel assembly. SCE has selected a canister to test, which will be located in the vicinity of the proposed ISFSI pad and will begin its initial exposure by the fourth quarter of 2015.*

*SCE's AMP will include a combination of the inspections described above to monitor the condition of the ISFSI components throughout their service life. This will provide assurance that the ISFSI components are performing as designed and allow for the spent fuel to be safely removed when the DOE is ready to transfer the fuel to an interim storage facility or permanent repository.*

In summary, SCE's intended aging management program would include (a) the monitoring of environmental conditions, such as temperature and humidity, that could influence the risk of corrosion and degradation of the stainless steel MPCs; (b) visual observation, surface measurements, and other inspection techniques to provide information on the physical condition of the MPCs; and (c) use of an empty cask ("coupon") as a surrogate for filled casks to allow for more thorough inspection and evaluation. However, the "non-destructive examination techniques", "remote surface inspection tools" and "NDE methods, employment methods, qualification processes and acceptance criteria" referenced by SCE are "in development", and their utility for the maintenance and monitoring of the spent fuel casks has not been demonstrated. Nor is it clear when these techniques, tools and standards would become available for use at SONGS.

#### *Off-site Transport & ISFSI Decommissioning*

Transportation of commercial spent nuclear fuel is regulated by the US Department of Transportation (49 CFR Part 172) and the NRC (10 CFR Part 71). The SONGS operating license issued by the NRC (10 CFR Part 50) allows for the off-site shipment of spent fuel, with no additional licensing action, so long as the transportation cask to be used has a current NRC Certificate of Compliance (CoC). Holtec has recently applied (August 7, 2015) to the NRC for a

CoC for a new spent fuel transport cask (HI STAR 190) which would be designed and licensed to ship the MPC-37 storage casks that would be used in the proposed ISFSI (SCE 2015e). SCE anticipates that the HI STAR 190 transportation casks will have received NRC approval prior to the first planned shipments in 2030. When another facility becomes available for spent fuel storage (e.g., a federal repository, federal interim storage site, or a private storage site) the MPCs to be stored in the proposed ISFSI would be removed from the fuel storage modules and placed in transport casks, which would then be loaded onto transport vehicles (railcar or truck).

The timing of spent fuel shipments to an off-site storage site depends in part on the NRC requirements related to fuel composition, cooling time, the type of cladding used to shield the fuel assemblies, and the capabilities and design of the storage and transportation casks that would be used. Based on these factors, SCE anticipates that all of the Units 2 and 3 fuel assemblies currently stored in the spent fuel pools and awaiting transfer to the proposed ISFSI would be available for transportation between 2025 and 2030 (SCE 2015e). The actual removal of this fuel from the SONGS site would additionally depend on the availability of a permanent or interim storage site, and in the case of a federal repository, the DOE's need to coordinate spent fuel shipments from other nuclear power plants. Under the schedule contemplated in SCE's final SONGS Irradiated Fuel Management Plan (IFMP) and Decommissioning Cost Estimate (DCE) submitted to the NRC, offsite shipment of spent fuel would begin in 2030 and be completed by 2049 (SCE 2014a, 2014b).

The decommissioning of SONGS Units 2 and 3, comprising several distinct stages, is scheduled to continue through 2032. Major above-grade structures are slated to be removed by 2028, and sub-surface structures would be removed by 2031 (SCE 2014a). Due to the potential for effects on coastal resources, the deconstruction and removal activities associated with decommissioning will require Commission review under one or more separate CDP applications. Site clean-up, removal of the retaining walls, shore protection, berm and guard house and final disposition of other facilities will be addressed in these later permits.

## **B. OTHER AGENCY APPROVALS**

### **U.S. Nuclear Regulatory Commission**

The construction and operation of new facilities at SONGS are subject to the approval and oversight of the federal Nuclear Regulatory Commission (NRC) pursuant to NRC regulations. The NRC regulates ISFSIs pursuant to 10 CFR Part 72. Part 72 provides for two types of licenses for ISFSIs:

- (1) General license. The wet storage of spent fuel generated at a nuclear power plant is authorized under the plant's existing license issued pursuant to 10 CFR Part 50 (or Part 52 for newer plants). A plant may extend this general license to cover an ISFSI facility, without the need for a license amendment, by satisfying the requirements in Subpart K to 10 CFR Part 72, which include a variety of siting, safety and security requirements.
- (2) Specific license. In order to construct and operate an ISFSI outside the licensed 10 CFR Part 50 area of a nuclear power plant, an operator (or other entity) must apply for and be granted a specific license from the NRC pursuant to 10 CFR Part 72. Such applications are subject to NRC review and approval and public hearing requirements.

The proposed ISFSI would be installed under SCE's 10 CFR Part 50 general operating license, and thus does not require additional NRC approval, though it is subject to NRC oversight to assure compliance with Part 72, Subpart K and other applicable regulations. The SONGS Part 50 license requires specific performance standards and operating conditions at the facility, including design specifications, testing requirements, security measures, and other measures. When the NRC acknowledged the cessation of power operations at SONGS, the Part 50 license was modified to allow for the possession of nuclear fuel by SCE and prohibit further power operations. NRC regulations provide for a 60-year decommissioning period once power operations have ceased. No further action is required by SCE unless the license cannot be terminated within 60 years. SCE will request NRC approval to reduce the licensed area to that of the ISFSI and its security footprint on or about 2031, as Units 2 and 3 decommissioning nears its conclusion. The SONGS Part 50 general operating license can only be terminated after meeting all the conditions specified in 10 CFR 50.82 for license termination, including the decontamination and demolition of the ISFSI.

#### *Federal Pre-emption*

The NRC has exclusive jurisdiction over radiological aspects of the proposed project. The state is preempted from imposing upon operators of nuclear facilities any regulatory requirements concerning radiation hazards and nuclear safety. The state may, however, impose requirements related to other issues. The U.S. Supreme Court, in *Pacific Gas and Electric Company v. State Energy Commission*, 461 U.S. 190, 103 S.Ct. 1713 (1983), held that the federal government has preempted the entire field of "radiological safety aspects involved in the construction and operation of a nuclear plant, but that the states retain their traditional responsibility in the field of regulating electrical utilities for determining questions of need, reliability, costs, and other related state concerns." The Coastal Commission findings herein address only those state concerns related to conformity to applicable policies of the Coastal Act, and do not evaluate or condition the proposed project with respect to nuclear safety or radiological issues.

#### **U. S. Department of the Navy**

SCE operates the SONGS site under the terms of a 60-year grant of easement from the U.S. Department of the Navy (Navy), executed on May 12, 1964 and effective through May 12, 2024. The easement was authorized by an act of Congress (Public Law 88-82, July 30, 1963). SCE has requested Navy authorization to renew the grant of easement until 2051, at which time SCE expects to have completed plant decommissioning and required site restoration, and transferred all SONGS spent fuel to DOE custody.

Pursuant to Coastal Act section 30601.5, where the Applicant is not the owner of a fee interest in the property on which a proposed development is to be located, but can demonstrate a legal right, interest, or other entitlement to use the property for the proposed development, the commission shall not require the holder or owner of the fee interest to join the applicant as co-applicant. Prior to issuance of the CDP, however, the Applicant must demonstrate their ability to comply with all conditions of approval. Accordingly, the Commission is imposing **Special Condition 1**, which requires SCE to submit, for the Executive Director's review and approval, evidence of their legal ability to comply with all conditions of approval, including documentation demonstrating that the U.S. Department of the Navy has renewed or extended its easement in a manner allowing for compliance with all conditions of approval.



## C. OTHER PROJECT-RELATED ISSUES

### Lack of a Permanent Storage Facility

The need for onsite storage of spent nuclear fuel at power plants around the country is a consequence of the United States not yet establishing a permanent and safe repository for spent fuel and other nuclear materials. In 1977, the federal government announced it would take on the responsibility for spent fuel from all nuclear power plants in the U.S. In 1982, the Nuclear Waste Policy Act required the Department of Energy to accept spent fuel for permanent disposal by 1998. In 1987, after studies of several potential sites, the Act was amended to make a site at Yucca Mountain, Nevada, the only site undergoing further consideration. Spent fuel was to be shipped to the Yucca Mountain facility from power plants around the country in priority order – generally, the older the fuel, the earlier it would be accepted.

Since that time, the U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency (EPA), and the NRC have conducted numerous studies at Yucca Mountain and have constructed parts of the facility. It has not yet opened, however, due to several significant technological issues and court challenges. The facility was scheduled to start accepting materials in 2010; however, in July 2004, a decision by the District of Columbia Circuit Court (*Nuclear Energy Institute, Inc. v. Environmental Protection Agency, D.C. App. 2004, No.01-1258*) found that the EPA had improperly set the facility's design standard well below the safety level required by Congress.<sup>2</sup> In 2008, the DOE applied to the NRC for license to dispose of spent fuel at Yucca Mountain. However, the application received strong opposition from the State of Nevada and several local governments, as well as several threats of litigation. Following the 2008 presidential election, the Obama administration decided not to pursue the license application, and in 2010, the DOE filed a motion with the NRC seeking permission to withdraw its application for the Yucca Mountain repository. Although the motion was denied, the NRC process was subsequently suspended due to a lack of congressional funding. Although the federal government has continued to study options for permanent or interim repositories, no federal facility for the disposal of spent fuel currently exists, and there are no near term prospects for the licensing and development of such a repository. As a result, it remains uncertain when, or if, the DOE will be in a position to accept SONGS spent fuel.

Commission staff is aware of two active proposals to develop private interim storage facilities that would, if built, accept commercial spent fuel. Waste Control Specialists (WCS) has announced its intention to apply for a 10 CFR Part 72 site-specific license for an ISFSI at the site of its existing low-level waste storage facility in Andrews County, Texas. WCS believes it could begin accepting spent fuel as early as December 2020 (SCE 2015c). More recently, Holtec and Eddy Lea Energy have announced plans to develop an underground consolidated interim storage facility in southeastern New Mexico. The facility is envisioned to consist of a greatly enlarged

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<sup>2</sup> In 2002, Congress determined that the facility must meet an "individual risk standard" for exposure to radioactive elements "based on and consistent with" the recommendations of the National Academy of Sciences. The Academy determined that the facility required designs ensuring exposures would not be exceeded for tens to hundreds of thousands of years. The EPA, however, set the exposure standard at 10,000 years. The court determined the EPA's selection of the 10,000 year standard was not "based upon and consistent with" the recommendations of the National Academy of Sciences, as had been required by Congress.

version of the HI-STORM UMAX system proposed for use at SONGS. While these private storage facilities hold promise for expanding the range of long-term storage options in the absence of a permanent federal repository, both proposals are likely to face significant opposition and have yet to undergo NRC licensing, and it is unclear when, or if, either would become available, or if they would be able to accept all of the SONGS spent fuel.

### **Project Alternatives**

As part of its proposal, and in response to Commission staff queries, SCE evaluated several alternatives to the proposed project. These included a “no action” alternative, shipping the material offsite, siting the ISFSI at other locations on the SONGS site, and consideration of several design and configuration alternatives for the facility (SCE 2015a, b, c). In addition, Commission staff has evaluated the implications of several different project timeframes.

As detailed below, many of the potential alternatives were determined by the SCE to be infeasible. “Feasible” is defined in Coastal Act section 30108 as capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social and technological factors. SCE has indicated that a key project objective is to offload the spent fuel pools by mid-2019, and that a multi-year delay in meeting the project objective would significantly disrupt its schedule for decommissioning SONGS Units 2 and 3 and introduce significant new costs in comparison to the proposed project.

#### *No Action*

In the absence of the proposed project, the SONGS 2 and 3 spent fuel would remain in the existing spent fuel pools until it could be transferred to an off-site permanent repository or interim storage facility. While the NRC considers wet storage pools to provide adequate safety for the stored materials, as a general matter, dry cask storage is thought to provide an increased margin of safety. In part, this is because ISFSIs are a passive storage system, and unlike fuel pools, do not depend on active cooling systems or require continual maintenance (though they do require regular inspections). The ISFSIs additionally encapsulate the spent fuel into hardened structures, which are less likely than the wet storage pools to be affected by forces such as seismic activity, terrorist attack, or other phenomena. For example, the SONGS ISFSI has been designed to withstand significantly greater ground shaking intensities (2.12 g) than the existing spent fuel pools (0.67 g). SCE has also indicated that keeping the spent fuel in the existing pools would interfere with the planned decommissioning of Units 2 and 3, and would require SCE to maintain more infrastructure and active systems than the dry storage option. For these reasons, SCE does not consider continued storage of spent fuel in the pools as the preferred alternative.

#### *Off-site Locations*

Of the offsite storage alternatives considered by SCE, all were either unavailable or otherwise found to be infeasible. Alternatives considered included:

- Shipping the material to a reprocessing facility: There are several reprocessing facilities in other countries, but none in the U.S. This option was not considered feasible due to several significant political, legal, and logistical uncertainties.
- Shipping the material to a private storage facility: While there is one proposed private facility currently licensed by the NRC (at Skull Valley, Utah), the developer has been unable to obtain required non-nuclear permits from other agencies and the facility was

never constructed. At present, there are no further plans to construct and operate the Skull Valley ISFSI. There are two active proposals to develop interim consolidated dry spent fuel storage facilities in New Mexico and Texas, respectively (see above). However, these facilities are not licensed and have not been constructed, and it is uncertain if or when these facilities might become available. There are no other private storage facilities available in the U.S. Therefore, this alternative is unavailable.

- Shipping the material to another nuclear power plant that had sufficient storage space: SCE found that other nuclear power plants either do not have adequate storage or have not included in their storage licenses the possibility of accepting spent fuel from other power plants. While in concept it may be possible for a plant to amend its license to accept fuel generated off-site, actually doing so would depend on another reactor operator being willing to take possession of SONGS spent fuel. Any such proposal would be controversial, as it would involve the shipment of spent fuel from one location to another, and in the unlikely event that another licensee were willing to accept the fuel, the NRC license amendment process would likely take a number of years, preventing the project from being accomplished within a reasonable timeframe. Thus, this alternative was deemed infeasible.
- Shipping the material to an off-site ISFSI to be developed by SCE: In theory, SCE could apply for a specific license to develop its own ISFSI away from the SONGS licensed area. In order to construct an ISFSI at an off-site location, SCE would need to identify suitable available land under its ownership, acquire new land, or obtain landowner approval for a project on land it did not own.

One potential location evaluated by SCE and Commission staff is the SONGS “Mesa”, a SCE-operated, non-nuclear auxiliary facility located within Camp Pendleton immediately north and inland of SONGS proper. While the Mesa has the advantages of being a previously-developed site also under SCE control, it is, like SONGS, located on an easement granted by the Navy, which is planned to be terminated in 2017 (SCE 2014a). Camp Pendleton representatives have informed Commission staff that the Marine Corps has other development plans for the off-site Mesa location once the site has been restored, and that the authorization of new SONGS-related projects here was highly unlikely.

More generally, at any off-site location, SCE would need to evaluate the site suitability, including geological characteristics, against NRC criteria, a process which could take several years with no guarantee of a favorable outcome. For example, an ISFSI located outside the SONGS Part 50 licensed area could not be authorized under the general license provisions of 10 CFR Part 72 and a new, site-specific license would be required. As discussed above, the process of acquiring a new site-specific license is expected to take many years and would exceed the timeline for completion of the proposed project.

SCE has stated that it will continue to monitor the availability of offsite alternatives – in particular the emerging proposals for private consolidated storage facilities -- and will evaluate the feasibility of moving the SONGS spent fuel if other options become available.

*On-site Locations within SONGS Part 50 Licensed Area*

SCE evaluated possible on-site storage locations and haul paths as a part of the initial project design process (SCE 2015a, b, c). Taking into account the estimated area of the ISFSI footprint (including safety and security requirements), SCE selected five locations for further evaluation: the NIA, the Reservoir, the K Buildings, the MUD Area, and the South Yard (**Exhibit 2**). SCE then ranked these alternative sites based on multiple criteria. The highest-weighted criteria were as follows:

- Suitability of site for long-term storage
- Ease/duration of licensing & permitting
- Costs and potential for DOE reimbursement
- Exposure to known or potential geologic hazards
- Avoidance of natural or man-made events that could affect safety
- Site grade & foundation properties (e.g., bearing capacity, seismic response, etc.)
- Potential for environmental resource impacts (e.g., sensitive habitats)

The NIA site proposed in this application was ranked highest among the five on-site alternatives examined in SCE's analysis. In addition to having adequate space to accommodate the proposed ISFSI, the NIA possesses several key advantages: (1) It has been previously graded and developed (with an existing ISFSI), minimizing needed site preparation, and would not result in new impacts to land resources; (2) it lies in close proximity (within approx. 1200 feet) to the existing spent fuel pools along a stable, secure and proven haul path; (3) it is underlain by relatively stable San Mateo formation sandstone; (4) it could make use of existing security arrangements; and (5) as stated above, was available for use in the near term. Of particular importance for the Commission's analysis is the fact that the NIA has superior foundation conditions; each of the other four selected sites is partially or entirely underlain by poorly consolidated marine terrace deposits, which are considered to be more susceptible to erosion, slope failure, and seismic shaking than the San Mateo Formation. The Reservoir and South Yard sites in particular are located on top of high, erosion-prone bluffs and nearer to sensitive habitats and scenic areas. Thus, the NIA was judged by the Applicant to be the superior location of the 5 alternative sites examined within the SONGS licensed area.

Nonetheless, it cannot be ignored that the proposed ISFSI location within the NIA lies just over 100 feet from the shoreline, at some of the lowest grade elevations (approx. 14 to 20 feet MLLW) present at the SONGS site. As discussed in greater detail in the Geologic Hazards findings (Subsection D), the site could potentially be exposed to several coastal hazards depending on how long the facility were to remain in place. During its review of SCE's alternatives analysis and in view of the fact that the proposed project seeks authorization for temporary, interim storage, Commission staff noted that several areas currently occupied by Units 2 and 3 and related structures may share some of the advantages of the NIA (e.g., foundational stability sufficient to support two nuclear reactors) while also being both located farther inland (300 – 900 feet) and at a higher grade elevation (>30 feet MLLW) than the proposed ISFSI location. Though currently occupied by existing structures, these areas are expected to become available over the next 15 years as the decommissioning and dismantlement of Units 2 and 3 proceeds (SCE 2014b). SCE has expressed its willingness to reevaluate alternative locations as they become available, and, if warranted, relocate the spent fuel to a new ISFSI facility at a later date.

### *Design & Technological Alternatives*

In addition to considering alternative locations, SCE evaluated several possible ISFSI configuration alternatives within the NIA. According to SCE, the currently proposed configuration (**Exhibit 3**) was selected because it would maximize the distance between the facility and the shoreline and avoid the need to fill or modify the existing NIA drainage sump, while still providing adequate storage capacity (75 modules). Other configurations, while feasible, would lessen the distance between the facility and the shoreline and/or require more extensive site preparation and modifications to existing structures.

Similarly, SCE considered several different ISFSI storage systems and cask types. While it would be feasible to use one of the other ISFSI designs and storage casks which are currently licensed by the NRC and in use at other U.S. facilities – such as the Areva NUHOMS horizontal storage system currently employed at the existing SONGS ISFSI – SCE did not find any clear environmental or practical benefit to selecting an alternate system. SCE has indicated that, in comparison to other options, the proposed HI-STORM UMAX system offers significant advantages in terms of increased security, greater protection against coastal airborne salinity, reduced visual impacts, improved ventilation, ease of cask handling, and increased stability during a seismic event (Holtec 2014b; SCE 2015a).

Opponents of SCE's proposed ISFSI system have argued that the thin-walled stainless steel storage casks that would be used are at risk of degradation, especially stress corrosion cracking, over time, and are not suitable for long-term storage in a coastal environment. These critics additionally state that thick-walled cask varieties commonly used in Europe, such as the CASTOR series (manufactured by GNS, a German company), would be superior in terms of safety, aging management, and future transportability. However, these thick-walled casks are not generally licensed for use at U.S. sites by the NRC.<sup>3</sup>

### **Length of Development Authorization**

Though SCE seeks temporary development authorization until 2051, there is no assurance that SCE will be able to transfer the spent fuel to DOE custody and decommission the proposed facility as planned by 2051, complicating the analysis of the project's exposure to geologic hazards and its potential to adversely affect coastal resources. The uncertain duration of the ISFSI's presence at the proposed location also has implications for SCE's alternatives analysis, as summarized above. A number of the project alternatives were rejected by SCE not because they were necessarily inferior in terms of safety, geologic hazards or environmental effects, but because they would introduce delays (and additional costs) into SCE's plans for transferring the spent fuel from the pools to the ISFSI. However, under a scenario in which there is no near-term prospect for transporting the spent fuel off-site to a permanent federal repository, considerations related to expedience, scheduling, and cost must be weighed against other factors, including the long-term vulnerability of the site to coastal hazards.

Over the next several decades, new information is likely to emerge that will clarify the current uncertainties: Progress (or a lack thereof) on the development of a permanent federal repository and/or off-site interim storage facilities will influence SCE's schedule for spent fuel transfer, and

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<sup>3</sup> CASTOR models V/21 and X/33 are currently being used at the Surry Power Station in Virginia under a site-specific license (SCE 2015b).

the continued need for and expected lifespan of the ISFSI; the decommissioning of SONGS Units 2 and 3 will open up new on-site locations which may prove to be less vulnerable to geologic hazards over the long-term; new scientific observations and modeling (e.g., regional sea level rise, hazards risks) will help refine projections of the ISFSI site's vulnerability to coastal hazards; and new information, based on the actual experience at multiple nuclear power plants, will be available on the suitability of thin-walled casks for storage and transport beyond the NRC's initial 20-year license. Given the (albeit uncertain) transport of the spent fuel from these interim facilities to a more permanent repository, it is appropriate for the Commission to require a re-evaluation of the project and the available alternatives at a later date, but prior to the end of the 35-year project life proposed by SCE.

The Commission staff considered two potential CDP timeframes for the re-evaluation of the proposed project, including after seven years (at the time of the expiration of CDP #E-00-014 covering the existing ISFSI), and 20 years (after the anticipated completion of Units 2 and 3 decommissioning). As discussed above, staff also considered the implications of assuming that the ISFSI would remain at the proposed location in perpetuity. After seven years, in 2022, the proposed ISFSI is expected to be fully loaded, and all fuel removed from the existing pools. However, Units 2 and 3 would not have been decommissioned or deconstructed and the potential to relocate the ISFSI to other locations within the Part 50 licensed area would not yet be available. Further, there is a reasonable likelihood that the status of both the permanent federal repository and proposed private interim storage facilities would remain unresolved.

The Commission finds that in this case, a 20-year period of development authorization, with a requirement for the Applicant to propose a CDP Amendment to retain, remove or relocate the ISFSI at least six months prior to the end of this term, is justified by a number of considerations. First, by 2035, SONGS Units 2 and 3 will have been decommissioned, and additional on-site locations for the potential relocation of the ISFSI will be available for consideration. Second, 2035 occurs after the first planned shipments of SONGS spent fuel to the DOE, and at that point it will be apparent whether SCE's assumptions about the possibility and timing of the transport to DOE and the decommissioning of the ISFSI by 2051 are justified. It will also be apparent whether the current proposals for private interim storage facilities are viable alternatives. Third, 2035 is near enough in the future that it will precede the time at which the existing site will be threatened by coastal hazards, even accounting for the uncertainties associated with these hazards. Fourth, a 20-year period of authorization is closely aligned with the period for which the NRC has certified the safety and structural integrity of the proposed ISFSI system, providing assurance that the MPCs will still be transportable, and thus the ISFSI still removable, within that timeframe. Finally, it is expected that within 20 years, SCE will have developed the aging management strategies, and the tools and techniques needed for monitoring and inspection of the storage casks, which are necessary for ensuring the long-term transportability of the casks and eventual removal of the ISFSI from the site, which are not available at present.

Therefore, the Commission adopts **Special Condition 2**, which authorizes the project for a duration of twenty years from the date of approval (i.e., until October 6, 2035). At least six months prior to that date, SCE must apply for a new or amended CDP to retain, remove or relocate the ISFSI. Such application must be supported by, among other things, a re-evaluation of the available project alternatives.

**D. GEOLOGIC HAZARDS**

Coastal Act Section 30253 states, in relevant part:

*New development shall:*

- (1) Minimize risks to life and property in areas of high geologic, flood, and fire hazard.*
- (2) Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs ...*

The proposed ISFSI site is located within the SONGS North Industrial Area (NIA, formerly the site of SONGS Unit 1) on a heavily-modified coastal bluff, as close as 115 feet to the Pacific Ocean. The site is potentially subject to several geologic and coastal hazards, including seismic activity, slope failure, coastal flooding and tsunamis, and coastal erosion, each of which is evaluated below. During the staff review of the prior ISFSI project (CDP #E-00-014), the Commission's Staff Geologist conducted an extensive evaluation of geologic hazards at the SONGS site, drawing on the information available at the time (through early 2001). This section summarizes his conclusions (contained in the staff report to CDP #E-00-014) as a starting point, but also evaluates new information, data, and analysis tools related to geologic hazards that have emerged in the last fifteen years.

As described above in subsection B, the Commission is proscribed from applying Section 30253 – or any section of the Coastal Act – to issues related to nuclear and radiological safety. Nevertheless, the proposed development must minimize hazards and assure geologic stability and structural integrity in order to conform to the California Coastal Act. The analysis and findings that follow relate to the susceptibility of the proposed development to geologic hazards pursuant to the Coastal Act, but does not attempt to address the consequences of these hazards in terms of nuclear safety. Such consequences are under the jurisdiction of the federal NRC.

**Geologic Setting**

The SONGS site lies in the Peninsular Ranges geomorphic province of southern California. Bedrock at the proposed ISFSI is the San Mateo Formation, a dense, well-lithified sandstone of Pliocene to Pleistocene age, which is thought to extend to a depth of approximately 900 feet below grade at the site. In the natural state, this bedrock unit is overlain by a series of marine and non-marine terrace deposits, approximately 50 feet thick, of late Pleistocene age. During the construction of Unit 1, encompassing the current NIA, the terrace deposits and the upper 10 – 20 feet of the San Mateo Formation were removed, and the finished grade of the area is set well below the top of the coastal bluffs at an elevation of approximately 19 feet MLLW. The excavated material was placed on the beach in front of SONGS as sand nourishment, initially increasing the width of the beach, but much of the material has since been removed by longshore drift. A narrow beach still exists seaward of the NIA seawall.



## Seismic Hazards

Like most of coastal California, the SONGS site lies in an area subject to earthquakes. SONGS is approximately 8 km from the Newport-Inglewood-Rose Canyon fault system, 38 km from the Elsinore Fault, 73 km from the San Jacinto Fault, and 93 km from the San Andreas Fault, all of which are considered “active” (evidence of movement in the past 11,700 years) by the California Geological Survey (Jennings and Bryant 2010). Several relatively nearby offshore faults, including the Coronado Bank Fault Zone, the San Diego Trough Fault Zone, the Thirty-Mile Bank Fault, and the Oceanside Thrust also may have been active during Quaternary time. Several smaller faults exist in closer proximity to SONGS, but are considered to be inactive. The Cristianitos fault, a low-angle normal fault, lies south and east of the site, intersecting the seaciff approximately 1 mile south of SONGS. The Cristianitos fault separates two zones of distinct bedrock (San Mateo Formation to the north, Miocene Monterey Formation to the south), but is overlain by undisturbed terrace deposits, indicating that this fault has not been active in the last ~120,000 years (Shlemon, 1987), and probably not within the last 1.6 million years (Jennings and Bryant 2010). Four minor, inactive faults have also been mapped in the San Onofre Hills to the east of the site (USNRC 1981). In general, seismicity in the vicinity of SONGS has historically been relatively quiet compared to much of the rest of southern California, probably because of the relatively great distance from the San Andreas Fault, which accommodates most of the plate motion in the area, and the relatively low slip rates of the nearer faults (Peterson et al., 1996). A magnitude ( $M_L$ ) 5.4 earthquake, associated with an unusually large swarm of aftershocks, occurred near the offshore San Diego Trough Fault Zone in 1986, but no other moderate or large ( $M > 5.0$ ) earthquake has occurred within 50 km in historic time.<sup>4</sup>

Seismic hazards (excluding tsunami hazards) at the site include ground shaking, surface rupture, liquefaction, and slope instability. Each of these issues is addressed in these findings.

### *Ground Shaking*<sup>5</sup>

Geologists’ understanding of the ground shaking risk at SONGS has evolved along with ongoing research into the tectonic setting of the Southern California borderland. Studies undertaken at the time of the licensing of SONGS Units 2 and 3 identified an earthquake on the Newport-Inglewood-Rose Canyon fault system, centered on the portion of the fault nearest SONGS, to be the seismic event with the greatest potential for ground shaking at the SONGS site (NRC 1981). Based on the estimated magnitudes of the few historical earthquakes thought to have occurred on or near this fault system, and on an assessment of fault parameters (e.g., long-term rate of slip, etc.), the NRC adopted a magnitude ( $M_S$ ) 7.0 event, occurring 8 km from the SONGS site, as the “design basis earthquake”. Modeling of ground shaking associated with this

<sup>4</sup>  $M_L$  refers to locally-measured Richter scale magnitude. See **Appendix B** for a discussion of the various measures of earthquake magnitude and ground shaking used by geologists.

<sup>5</sup> Seismic hazards are often discussed in terms of the strength or intensity of ground shaking rather than earthquake magnitude. Measures of ground-shaking account for the attenuation of seismic waves due to distance from a rupture and amplification or damping due to substrate types (e.g., soft sediments vs. hard rock) and thus provide a better estimate of the amount of damage that may occur at a given site. Ground shaking is often expressed as the *acceleration* experienced by an object during an earthquake. The *spectral acceleration* occurs at different oscillation frequencies, which can be plotted to form a ground shaking *response spectrum*. The *peak ground acceleration* (PGA) is a measure of is the maximum force (expressed as a % of the acceleration of gravity, g) experienced by a small mass located at the surface of the ground during an earthquake. PGA is often used in seismic design as a hazard index for short, stiff structures. **Appendix B** provides additional discussion of ground-shaking measurement.

event yielded response spectra with a peak ground acceleration (PGA) of 0.31 g. After comparison with empirical models, and in order to build in conservatism for inaccuracies in the model, the NRC approved the calculated spectra multiplied by a factor of about 2, resulting in a design basis PGA of 0.67 g.

The approach taken by the NRC during licensing review was deterministic in nature: A design basis earthquake was established, and that earthquake was used to calculate expected ground acceleration. In 1995, SCE and a team of consultants undertook a probabilistic study of seismic hazards at SONGS (SCE Geotech Group 1995). The results represent the annual frequency of exceedance of various ground motions at SONGS, shown as a family of seismic hazard curves and ground motion response spectra. Under this analysis, the “safe shutdown earthquake” (synonymous with the design basis earthquake discussed above), with a PGA of 0.67 g, had an annual probability of occurrence of 0.00014 (0.7% in 50 years), or a recurrence interval of 7,143 years.

In addition, a number of studies have provided evidence that, in addition to the strike-slip faulting recognized at the time of the SONGS licensing review, thrust faults exist in the area offshore of the SONGS site which might interact with the Newport-Inglewood-Rose Canyon fault system in a complex way during an earthquake (e.g., Rivero et al. 2000; Kuhn et al. 2000; Shlemon 2000; Rivero and Shaw 2011). Notably, the 1986 Oceanside earthquake ( $M_L$  5.4) was centered on one of these low-angle faults, and showed a thrust fault mechanism. Rivero et al. (2000) and Rivero and Shaw (2011) have hypothesized that blind thrust faults related to the Newport-Inglewood-Rose Canyon fault system may be capable of an earthquake ranging in magnitude from  $M_W$  7.1 to 7.6, larger than that of the design basis earthquake considered during SONGS licensing. However, other studies dispute the existence of blind thrust faults offshore of Orange and San Diego counties, and suggest that the observational data (seismic reflection profiling, earthquake clustering patterns, etc.) used by Rivero et al. to infer thrust faulting can be interpreted within a framework of step-overs and trend changes along known north-to-northwest oriented strike-slip fault systems (Ryan et al. 2012). New and reprocessed on- and offshore seismic reflection profiling data collected by SCE and Scripps Institute of Oceanography have been interpreted as supporting the step-over and trend change model (Malloney et al., *in press*), suggesting that the previously posited blind thrust faults do not exist. SCE has also sponsored a recent study of marine terrace uplift in coastal San Diego and southern Orange counties over the late Quaternary, which appears to have found no evidence of the deformation and differential uplift which could be expected to result from any recent activity on blind thrust faults in the vicinity of SONGS (SCE 2013).

In 2010, as an update to the older studies, SCE commissioned a new study (*Probabilistic Seismic Hazard Analysis Report*, GeoPentech, 2010) to assess the seismic hazard presented by both the previously-recognized strike-slip faulting and postulated offshore blind thrust faults (e.g., Oceanside and Thirty-Mile Bank thrust faults) near SONGS. Probabilistic peak ground accelerations and spectral accelerations for the SONGS site are shown below:

	<b>10% in 50 yr</b> (475-yr return period) (GeoPentech 2010)	<b>2% in 50 yr</b> (2475-yr return period) (GeoPentech 2010)
<b>PGA</b>	0.227 g	0.477 g
<b>0.2 sec SA</b>	0.530 g	1.111 g
<b>1.0 sec SA</b>	0.261 g	0.501 g

The GeoPentech analysis suggests that the inclusion of an offshore blind thrust fault earthquake source does not greatly increase the ground shaking hazard at the SONGS site, and that the PGA of 0.67 g assigned to the design basis earthquake at the time of Units 2 and 3 licensing remains conservative.

Independent evaluations of earthquake ground shaking hazards in the vicinity of SONGS are provided by the California Geological Survey (CGS) and U.S. Geological Survey (USGS). The CGS Earthquake Shaking Potential Map for California (Branum et al., 2008) portrays the San Onofre area as a region of relatively low ground shaking potential, with the Big Sur coast being the only other part of coastal California having a comparably low shaking potential according to this assessment. Comparable, quantitative assessments are provided by the USGS Seismic-Hazard Map for the Conterminous United States, 2014 (Peterson et al. 2015) and online analysis tools developed by both CGS and USGS. Probabilistic peak ground accelerations and spectral accelerations for the San Onofre area, assuming firm bedrock conditions, are shown below:

	<b>10% in 50 yr</b> (475-yr return period) (USGS) <sup>6</sup>	<b>10% in 50 yr</b> (475-yr return period) (CGS) <sup>7</sup>	<b>2% in 50 yr</b> (2475-yr return period) (USGS) <sup>3</sup>	<b>2% in 50 yr</b> (2475-yr return period) (CGS) <sup>4</sup>
<b>PGA</b>	0.20 – 0.25 g	0.245 g	0.40 – 0.50 g	0.505 g
<b>0.2 sec SA</b>	0.50 – 0.60 g	0.564 g	1.0 – 1.2 g	1.113 g
<b>1.0 sec SA</b>	0.15 – 0.20 g	0.200 g	0.30 – 0.40 g	0.377 g

These estimates of ground shaking potential at the SONGS site are quite similar to those from SCE's probabilistic study (GeoPentech 2010).

It is important to note that these assessments of ground shaking risk were based on the current understanding of the likelihood of earthquakes of varying intensities on nearby faults at the time they were released, and that as geologists' understanding of the network of faults underlying coastal California continues to evolve, estimates of ground-shaking risk at a specific site, such as SONGS, may change. A recent example of this iterative process is provided by the USGS *Uniform California Earthquake Rupture Forecast*, Version 3 (UCERF3) report (Field et al. 2014), which provided new estimates of the magnitude, location, and time-averaged frequency of potentially damaging earthquakes in California based on research since the previous report (UCERF2) in 2007. On a statewide basis, the estimated likelihood of a M 8.0 or greater earthquake in the next 30 years has increased from about 4.7% in UCERF2 to about 7.0% in UCERF3, in part due to new research highlighting the potential for multi-fault ruptures during a single event. The

<sup>6</sup> U. S. Geological Survey, Seismic Hazards Science Center, Custom Hazard Maps tool, <http://geohazards.usgs.gov/hazards/apps/cmmaps/>, and Peterson et al. (2015).

<sup>7</sup> California Geological Survey, Probabilistic Seismic Hazards Ground Motion Interpolator (2008), [http://www.quake.ca.gov/gmaps/PSHA/psha\\_interpolator.html](http://www.quake.ca.gov/gmaps/PSHA/psha_interpolator.html).

implications of the revised earthquake forecast for ground shaking hazards at SONGS are not clear, though it is notable that the 30-year likelihood of a large ( $>M$  6.7) earthquake on the offshore Newport-Inglewood-Rose Canyon fault system has been revised downward slightly since the 2007 forecast.

### ISFSI Seismic Design

The proposed ISFSI has been designed to withstand ground shaking of much greater magnitude than contemplated in either the Units 2 and 3 licensing review or the more recent probabilistic analyses summarized above. The “Most Severe Earthquake” (MSE) variant of the spent fuel storage system,<sup>8</sup> for which the NRC approved an amendment to HI-STORM UMAX Certificate of Compliance (CoC) on September 8, 2015, has been designed to withstand a net horizontal zero-period acceleration (ZPA) of 2.12 g and vertical ZPA of 1.0 g (for a very high-rigidity structure, such as the proposed ISFSI,  $ZPA \approx PGA$ ). **Exhibit 6** shows the horizontal (X+Y) and vertical seismic spectra for which the proposed project is designed, together with spectra corresponding to the seismic design for SONGS as a whole, derived from the design basis earthquake described above (Holtec 2015). The spectra labeled “SONGS” is derived from the NRC-approved “free-field” spectra and takes into account the interaction of the proposed structure with ground motions, which tends to amplify shaking. The design spectra for the ISFSI were generated following NRC Regulatory Guide 1.60, “Design response spectra for seismic design of nuclear power plants.” Comparison of the ISFSI design spectra with the calculated spectra corresponding to the SONGS design basis earthquake shows a large factor of safety. The ISFSI design spectra exceed that of the design basis earthquake at all frequencies. It is accordingly reasonable to conclude that even an earthquake larger and/or closer to the site than the SONGS design basis earthquake, will not produce ground shaking exceeding the design of the proposed project.

Accordingly, the Commission finds that the proposed project, as conditioned, assures stability and structural integrity relating to seismic hazards, consistent with section 30253 of the Coastal Act.

### *Surface Rupture*

No active faults were found at the SONGS site during geologic studies related to licensing and construction of Units 2 and 3 (Fugro 1977; Shlemon 1977, 1979). Though several sets of shears in the San Mateo Formation were uncovered during the excavation for Units 2 and 3, they did not offset the overlying terrace deposits, indicating that they had not been active for at least 120,000 years and do not represent recent faulting at the site. Hence, the risk of surface rupture at the SONGS site is very low.

The largest fault near the SONGS site is the Cristianitos fault, a low-angle normal fault passing less than one mile south of the site. Based on several observations, several studies have proposed recent right-lateral strike-slip movement on the onshore Cristianitos normal fault, as well as a re-activated extension of this fault offshore of northern San Diego County (Fisher and Mills 1991).

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<sup>8</sup> The MSE version of the HI-STORM UMAX incorporates three physical design changes to augment the structural integrity of the system: (a) Addition of a hold-down system to the closure lid to prevent its uplift during the seismic event; (b) Use of plain concrete (min. compressive strength 3000 psi) in the interstitial space between storage modules instead of soil fill; (c) Strengthening of the MPC guides to increase their load bearing capacity. (NRC 2015)

However, others have shown that the Cristianitos fault near San Onofre beach is overlain by undisturbed terrace deposits, indicating that there has been no movement on it for at least 120,000 years (e.g., Shlemon 1987). The Cristianitos fault is not considered an active fault by the California Geological Survey (Jennings and Bryant 2010).

Accordingly, the Commission finds that the proposed project, as conditioned, assures stability and structural integrity with respect to surface rupture, consistent with Section 30253 of the Coastal Act.

#### *Liquefaction*

Like all existing SONGS structures, the proposed ISFSI would be underlain by the dense, well-consolidated sands of the San Mateo Formation, which are considered to be at low risk of seismically-induced liquefaction. The overlying terrace deposits were removed during the construction of Units 1, 2 and 3. Although the water table is shallow at the site (approximately +5 feet MLLW) (SCE 2015b), cyclic triaxial tests, field density tests, and very high blow counts during standard penetrometer tests show that liquefaction should not occur during a design basis earthquake (PGA of 0.67 g) (SCE 1998; GEI 2015). Minimum factors-of-safety against liquefaction in the plant area have been calculated at 1.5 to 2.0 (SCE 1998). An independent assessment of liquefaction hazards in the area has identified the SONGS site as an area at low risk of liquefaction (CGS 2002).

A number of studies in northern San Diego County have identified stratigraphic features, including sand dikes, lenses, fissures and disturbed bedding, which have been interpreted as the results of liquefaction occurring in recent geologic history (e.g., Kuhn et al. 1996; Kuhn et al. 2000; Shlemon 2000; Kuhn 2005). For example, Kuhn (2005) noted that a number of these paleo-liquefaction features disturbed late Holocene Native American middens and burial sites within the past 1,000 to 3,000 years, and suggested that they “were likely caused by  $M \sim 7+$  tectonic events inferentially generated by the nearby offshore Newport-Inglewood-Rose Canyon fault system.”

Although these features are suggestive, the Commission does not consider them indicative of a serious liquefaction hazard at the proposed project site. Liquefaction in sandstones as dense as those encountered at the SONGS site have not previously been documented in even very large earthquakes; it is far more common for unconsolidated sands or artificial fills to fail by liquefaction. While it is possible that an earthquake much larger than the design basis earthquake might be capable of causing liquefaction of the San Mateo formation sands, no estimates have been provided by any of the cited studies as to the required ground shaking needed to induce such cyclic stresses. In light of the high factor of safety evident in the site-specific studies, and without credible data to the contrary, the Commission finds that the applicant has adequately addressed the liquefaction hazard at the site.

Accordingly, the Commission finds that the proposed project, as conditioned, assures stability and structural integrity with respect to liquefaction, consistent with Section 30253 of the Coastal Act.

### Slope Stability

The proposed ISFSI site is located approximately 55 feet southeast of a cut slope rising to 77 feet above the NIA grade, and approximately 300 feet southwest of a somewhat lower cut slope (**Exhibits 3, 9**). Both slopes are largely covered in gunnite. During studies for the SONGS Unit 1 ISFSI facility (CDP #E-00-001), SCE analyzed the stability of these slopes along four cross-sections during seismic shaking corresponding to the design basis earthquake (ground-shaking intensity of 0.67 g, described above), concluding that only minor sloughing of near slope surface material would occur and that minimum factors of safety ranged from 1.7 to greater than 3 (SCE 1995). An additional evaluation concluded that, if a massive failure on the nearer northwest slope were to occur, the maximum distance the soil would be likely to travel would be 120 feet from the toe of the bluff (Hadidi 2000). More recent re-analyses of slope stability and slope toe run-out at the site yielded factors of safety of about 1.5 and projected slope toe run-out distances between 91 feet and 107 feet (Pham 2007; Hinkle 2011; Ninyo and Moore 2015).

The design of the ISFSI is such that the storage modules will be built partially below grade and encased in a concrete and fill berm, with only the tops of the modules (the steel and concrete closure lids) exposed at the top of the ISFSI Pad, at an elevation of approximately 32 feet MLLW (about 12.5 feet above the NIA grade (**Exhibit 3**). Although portions of the ISFSI would be within the potential run-out zone during a large slope failure, but due to the design of the facility, would not be vulnerable to damage. The portion of the ISFSI nearest the northwest slope, the “the “Approach Slab”, though only 54 feet from the bluff toe, is a flat expanse of concrete at the top of the ISFSI berm that could be covered by soil during a slope failure without affecting the structural integrity of the facility. The closure lids of the nearest row of storage modules would be 98 feet from the bluff toe (**Exhibit 3**), and thus within the larger of the projected run-out zones (107 ft; Ninyo and Moore 2015). However, the Ninyo and Moore (2015) analysis did not account for the relief of the ISFSI berm, which rises to a height of approximately 12.5 above the NIA grade, with a 45 degree slope at its margins. A more recent analysis provided by SCE, which accounts for the presence of the ISFSI berm, indicates that the maximum soil run-out could advance up the ISFSI berm to point approximately 70 feet from the bluff toe, well short of the nearest storage modules (Pham 2015).

In summary, the relatively high factors of safety calculated for the cut slopes adjacent to the project site suggest that the slopes are likely to remain stable during a large earthquake. Moreover, in the event that a major slope failure does occur, soil run-out would not reach the fuel storage modules or otherwise compromise the stability and structural integrity of the proposed ISFSI.

Previous studies have identified several coalescing large active landslides affecting the coastal bluffs south of SONGS (e.g., Kuhn 2000, Kuhn and McArthur 2000). These slides are seated within the Monterey Formation, which is known to contain weak layers making it vulnerable to landsliding. In contrast, the project site, and the SONGS as a whole, is underlain by well-consolidated San Mateo Formation sandstone to a depth of at least 900 feet, and there is very little risk that a landslide similar to those occurring to the south could involve the SONGS site itself. Information provided by SCE to the Commission during the review of the previous ISFSI

project (CDP #E-00-014) demonstrated that the SONGS site has experienced very little settlement or differential vertical movement since it was constructed, ruling out the existence of a slow-moving, deep-seated landslide beneath the site.

Based on this information, the Commission finds that the proposed project, as conditioned, assures stability and structural integrity with respect to the stability of the slopes adjacent to and underlying the proposed project, consistent with Section 30253 of the Coastal Act.

### **Bearing Capacity**

The proposed ISFSI facility is a massive structure (approximately 584,000 cubic feet in volume), consisting of a concrete foundation pad, a concrete and fill subgrade, a concrete surface pad, and 75 steel and concrete fuel storage modules, each receiving a stainless steel MPC (containing the spent fuel assemblies) and weighing approximately 190,000 pounds. When fully loaded, the UMAX system would weigh approximately 87 million pounds. For perspective, this figure can be compared with the weight of the terrace deposits and upper portions of the San Mateo Formation formerly overlying the site. Since these deposits were approximately 70 feet thick, with a unit weight of approximately 102 – 117 pounds per cubic foot, the deposits formerly overlying the 25,000 square foot area of the UMAX system would have weighed approximately 179 to 205 million pounds. Thus, even after the construction of the project, the weight applied to the San Mateo Formation would be less than 50% of the weight of the overlying rock prior to the development of SONGS.

More relevant to the question of the ability of the site materials to support the ISFSI is a calculation of the bearing capacity of the San Mateo Formation relative to general or local shear failure. SCE has provided a technical analysis showing the static ultimate bearing capacity for the proposed ISFSI (SCE 2015g). When calculating the allowable static bearing capacity, a standard safety-factor equal to 3 is built into the capacity value for a static loading combination.

The calculated allowable static bearing capacity for substrates underlying the ISFSI (San Mateo Formation plus overlying sand/gravel fill layer) is approximately 43,500 pounds per square foot. When considering the calculated weight of the ISFSI and the effective area, the foundation will only be loaded to approximately 3,900 pounds per square foot (additional factor of safety > 11). SCE also provided a dynamic analysis of the proposed ISFSI demonstrating the capacity of the pad design under seismic loading. This analysis uses 1.5 g horizontal and 1.0 g vertical ground acceleration in order to demonstrate the adequacy of the foundation and to show that the concrete pads will not fail during an earthquake with the specified ground accelerations. When calculating the allowable seismic loading combination bearing capacity, a standard safety-factor equal to 2 is built into the capacity value for a seismic loading combination. The calculated seismic allowable bearing capacity is shown to be approximately 65,150 pounds per square foot while the seismic bearing pressure as a result of the ISFSI is shown to be 12,800 pounds per square foot (additional factor of safety > 5). In both the static and dynamic cases, a sufficient factor of safety exists to conclude that the ISFSI will not exceed the bearing capacity of the site, and that the concrete pad will not fail during an earthquake with the specified ground accelerations.



Accordingly, the Commission finds that the proposed project, as conditioned, assures stability and structural integrity, with respect to materials at the site have sufficient bearing capacity, consistent with section 30253 of the Coastal Act.

## Coastal Hazards

### *Tsunamis*

Several previous studies have estimated the potential run-up and inundation that would occur on the SONGS site during a tsunami event. The Safety Evaluation Report prepared by the NRC at the time of licensing hearing of Units 2 and 3 examined both local- and distant-sourced tsunamis (NRC 1981). SCE's model of the local-source tsunami (resulting from a 7.5 earthquake occurring along the Newport-Inglewood-Rose Canyon fault system, 8 km offshore, with vertical ground motion of 7.1 feet) projected a wave height of 7.6 feet. Superimposing this tsunami on a 7-foot high tide (the 10% exceedance Spring high tide for the site) and a one-foot storm surge, resulted in a maximum "still" water level of 15.6 feet MLLW. In its review, the NRC generally agreed with this model, arriving at a maximum still water level of 15.83 feet MLLW. In these calculations, the presence of the seawall was ignored. In its application to the Commission for the 2001 ISFSI (CDP #E-00-014), SCE provided additional modeling addressing the wave runup that could be expected if tsunami struck the site in conjunction with both high tide and storm surge (SCE Geotech Group 1995). Under these conditions, and discounting the presence of the Unit 1 seawall, it was projected that maximum wave runup would reach an elevation of 18.8 feet MLLW. Notably, these analyses considered only tsunamis generated by earthquakes, but did not address the potential for tsunamis generated by submarine landslides, which are known to have occurred along the Southern California coast in the past (Legg and Kamerling 2003).

More recently, a new site-specific analysis was conducted as part of SCE's 2013 *Calculations for a Probable Maximum Tsunami* report (Kirby 2013), which considered both local- and distant-sourced events as well as local tsunamis generated by submarine landslides. Models of far field tsunami sources associated with large subduction-zone earthquakes (M 9.0 – 9.5) from around the Pacific Rim (e.g., Aleutians, Kuril Islands, Japan Islands, Chile) yielded tsunami wave run-up elevations ranging from 8.5 to 22 feet MLLW, with the largest tsunamis produced by earthquakes in the eastern Aleutian Islands.<sup>9</sup> Models of locally-sourced tsunamis, including those resulting from a M 7.5 earthquake along a theorized offshore blind thrust fault and from submarine landslides offshore of San Diego County, yielded maximum run-up elevations ranging from 10 to 21.5 feet MLLW. A recent, independent evaluation of potential tsunami inundation at the SONGS site is provided by the *Tsunami Inundation Map for Emergency Planning* (San Onofre Bluff quadrangle), prepared by the State of California in 2009. The purpose of this series of maps was to identify a "credible upper bound" of potential inundation at any location along the coast, based on a combination of potential tsunami source events, including both local and far field sources. At SONGS, the map shows the entire NIA area to be within the potential tsunami inundation zone and suggests a credible upper bound to potential inundation of 20 to 23 feet MLLW.

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<sup>9</sup> For comparison, actual tsunami run-up heights observed along the Southern California coast following large historical earthquakes on the Pacific Rim, including the M9.5 1960 Chilean earthquake, M9.2 1964 Alaskan earthquake, and M8.8 2010 Chilean earthquake, ranged from 4.9 to 12.5 feet above MLLW. (California Geologic Survey, *Historic Tsunamis in California*, [http://www.conservation.ca.gov/cgs/geologic\\_hazards/Tsunami/Pages/About\\_Tsunamis.aspx#historic](http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/Pages/About_Tsunamis.aspx#historic))

Given that the grade elevation within the NIA is approximately 19-20 feet above MLLW, it is possible that the base of the ISFSI structure could be inundated or subject to wave runup during a large tsunami event at some point during the life of the project. In the near term, the top of the ISFSI pad, at +32 feet MLLW, would likely remain above the inundation elevation under the scenarios discussed above. However, the entire structure could be subject to wave run-up in the most extreme scenario, if a large tsunami were to coincide with both high tide and major winter storm and high wave conditions (see below). Rising sea level will further exacerbate this situation (e.g., see **Exhibit 7**).

Information provided by SCE indicates that temporary inundation has been factored into the design of the ISFSI and its components, including the MPCs, such that overtopping of the facility by a large tsunami would not adversely affect its stability and structural integrity. Specifically, the storage module components, including the Cavity Enclosure Container (CEC), Closure Lids, and MPC, have been designed to withstand water submergence to a depth of 125 feet and missile impacts exceeding those that could be expected from tsunami-carried debris (Holtec 2014a, b). Additionally, the weld-sealed MPCs have been designed to prevent water intrusion in the event that flood water entered the ventilation space between the MPC and CEC.

In summary, the Commission concludes that although the project could be subject to tsunami flooding within the next 35 years, particularly if projected levels of sea level rise occur, the proposed ISFSI has been designed to resist temporary inundation, wave run-up and water contact. Therefore, the proposed development, as conditioned, will minimize flooding hazards consistent with Section 30235 of the Coastal Act.

#### *Coastal Flooding & Sea Level Rise*

With a grade elevation of approximately 19-20 feet MLLW, and a top elevation of 32 feet MLLW, the proposed ISFSI would not, at present, be vulnerable to inundation under normal high tide (MHHW  $\approx$  +5.8 feet MLLW) and/or storm conditions. As a part of its CDP application, SCE prepared an analysis of future flood conditions over the life of the development (SCE 2015a, d), using the sea level rise projections (National Research Council 2012) recommended in the Commission's 2015 Sea-level Rise Policy Guidance (CCC 2015). The analysis examined changes in water level and wave run-up conditions resulting from several sea level rise scenarios at different points in the future. SCE used an additive approach to examining changes in runup, assuming that the future high still water level would be the current mean high tide plus some amount of sea level rise, and that the future runup would be the current runup plus future sea level rise plus some forcing and surge. The analysis indicates that sea level can be expected to rise 0.3 to 1.8 feet by 2047 (30-year time horizon), depending on which scenario is used. Under the high sea level rise scenario, and assuming an additional foot of sea level height associated with wind and storm surge and/or oceanographic forcing (such as due to an El Niño event), SCE estimated that the still-water level at mean high tide could reach 7.6 feet MLLW and wave runup could reach 24.8 feet MLLW.

For several reasons, Commission staff believes that SCE's analysis underestimates the potential for future flooding at the project site. First, short-term fluctuations in water level (assumed by SCE to amount to +1 foot) may include both surge and the underlying effects of oceanographic forcing. Temporary increases in sea level associated with storm surge in Southern California

may reach +1 foot, while short-term sea level increases in sea level associated with the large 1982-83 El Nino event ranged from 0.4 to 1 foot (Flick 1998; CCC 2015). Thus, a more conservative estimate of the contribution to sea level from short-term phenomena would be approximately +2 feet. Second, SCE examined flooding only under mean tidal conditions of 5.8 feet MLLW. High tides equal or exceed 7.0 feet MLLW about 10% of the time and high tide levels equal or exceed 7.2 feet about 1.5% of the time, based on the distribution of five years of tide data<sup>10</sup>. Using these higher tide levels, present-day extreme high still water level could reach 9.2 to 9.3 feet MLLW (SONGS 2&3 FSAR), and current wave runup could exceed 24 feet MLLW. Using the same additive method that SCE used to modify runup for future sea level rise, wave runup in 2047, with 1.8 feet of sea level rise, could exceed 26 feet MLLW. However, run up does not change linearly with changes in water level, so these estimates of how run-up will change with changes in water levels likely underestimate potential run-up.

In summary, it appears possible that, in the absence of expanded or enlarged shoreline protection, the ISFSI site could be subject to occasional coastal flooding. However, as discussed above in relation to tsunami hazards, the proposed ISFSI has been designed to resist temporary inundation, wave run-up and water contact. Therefore, the proposed development, as conditioned, will minimize flooding hazards consistent with Section 30235 of the Coastal Act.

#### *Coastal Erosion & Bluff Retreat*

In their natural state, coastal bluffs at the SONGS are composed of highly-erodible terrace deposits underlain by the more resistant San Mateo Formation sandstone. During the construction of Unit 1 in the 1960s, the bluff was essentially removed. Over 70 vertical feet of terrace deposits and upper layers of the San Mateo Formation were removed, and the plant foundations were set in San Mateo Formation bedrock. The result of the excavation is that the new “bluff face” and upper edge is situated landward of the NIA. At this time SCE also installed a shoreline protection system, consisting of a rock revetment and a concrete encased, steel sheet-pile seawall rising to an elevation of approximately 28 feet MLLW, in front of Unit 1 at the time of construction. As a result, there has been little or no measurable shoreline retreat at the project site over the past 50 years.

The natural rate of bluff retreat in the San Onofre area is somewhat difficult to assess, due both to its episodic nature and to the varying mechanisms of retreat along the coast. Active bluff retreat is occurring south of the project site at San Onofre State Beach, where the bluffs consist of Monterey Formation bedrock overlain by terrace deposits and where runoff has been artificially concentrated in drainage channels associated with Interstate 5. Substantial subaerial erosion of the terrace deposits and Monterey formation has occurred in this area, taking the form of headward erosion of gullies, slumping of the bluff faces, and deep-seated landslides. However, as discussed above, these landslides are seated in the Monterey Formation (known to be susceptible to sliding) south of the Cristianitos Fault, and have not occurred in the dense San Mateo Formation sandstones underlying the SONGS site. The mechanisms of seacliff retreat in the San Mateo Formation at the SONGS site are less clear, but the shape of the seacliff suggests

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<sup>10</sup> Based on distribution of Table 2.4-11: Distribution of Spring High Tides at San Diego During Five Years, from the *San Onofre 2&3 Final Safety Analysis Report (FSAR) Section 2.4*, (Revision 24), adjusted by the amplitude ration of 0.92.

dominantly marine processes, such as undercutting, block collapse, and slumping of poorly consolidated upper bluff terrace materials. Distinct gullying of the terrace deposits is also evident in the unaltered seacliffs to the north and south of the SONGS seawall (**Exhibit 2**).

Studies undertaken by the U.S. Army Corps of Engineers in the 1950s concluded that no measureable retreat of the bluff line occurred near the SONGS site between 1889 and 1954 (USACE 1960). More recently, the U.S. Geological Survey has evaluated coastal bluffs to the north and south of SONGS, and estimated that long-term bluff retreat rates range from 6 -20 inches per year at the base of unprotected slopes within the San Mateo Formation (Hapke and Reed 2007; Hapke et al. 2007). Due to the presence of shoreline protection at the project site, no site-specific estimates of bluff retreat rates are available, but it is likely that the USGS upper estimate of 20 inches per year provides a conservative basis for evaluating the project's vulnerability to undercutting by coastal erosion in the absence of shoreline protection.

At its nearest, the proposed ISFSI pad would be located approximately 100 feet from the seawall adjoining the NIA (**Exhibit 3**), which, based on shoreline cross-sections provided by SCE, is assumed to correspond to the toe of the remnant bluff underlying the project site. The nearest UMAX storage module would be approximately 125 feet from the seawall. Discounting the presence of the existing shoreline armoring, a maximum average bluff retreat rate of 20 inches per year over the proposed 35-year life of the project would equate to a total bluff retreat of 29 feet, or about one-third of the distance between the existing seawall and the proposed ISFSI facility. Even recognizing that shoreline erosion processes are highly episodic, and that the actual magnitude of bluff retreat from year to year can deviate greatly from the long-term average, the proposed setback of approximately 100 feet would appear to be adequate to assure stability of the project site through the proposed project duration, without requiring new or expanded shoreline protection.

#### *NIA Seawall Adjoining Proposed Development*

Past bluff erosion at the project site has been greatly retarded over natural rates by the existing shoreline armoring in front of the NIA, consisting of a steel sheet pile and gunnite seawall, a concrete public access walkway and retaining wall, and a rock revetment (**Exhibit X**).

The NIA seawall was built in 1966 to protect SONGS Unit 1 from tsunami hazards. The wall extends approximately 650 feet on the seaward side of the NIA between the northwestern bluff and the junction with the Units 2 and 3 seawall. The seawall is composed of  $\frac{3}{8}$ -inch thick steel sheet piling covered on both faces by a 2½-inch layer of gunnite secured by wire mesh. The sheet piling is embedded to a depth of approximately 22 feet below the NIA grade (to an elevation of approx. -10 feet MLLW), and extends to a height of approximately 28 feet MLLW. The toe of the seawall was initially protected by a 12-foot wide rock revetment (1-4 ton rocks), but in 1982 a 15-foot wide public access walkway and reinforced concrete retaining wall were built over the original revetment, and a new, 20-foot wide revetment was placed at the base of the retaining wall to protect the walkway and seawall from undercutting.

Information provided by SCE indicates that the embedded portion of the seawall suffers from areas of localized corrosion, including several through-going holes, and that the structure has outlived its project design life (SCE 2015b). In 1986, when the corrosion was first discovered, SCE installed a corrosion monitoring system to ensure that the seawall sheet piling was

structurally adequate, but this monitoring was discontinued in 2007 with the final decommissioning of Unit 1. SCE has acknowledged that as of 1996, the seawall is “no longer credited in the design for tsunami protection of the site.” (SCE 2015b). In contrast, SCE has indicated that the condition of the rock revetment has not changed since its emplacement, and argues that the seawall is protected from scour by the revetment (extending down to +3 feet MLLW) and retaining wall (extending to +7 feet MLLW).

The uncertain level of degradation to the seawall sheet piling, together with its relatively shallow depth of emplacement, lack of foundation elements, and the lack of an engineered key to the rock revetment, suggests that maintenance and repairs may be necessary for the continued function of the shoreline protection structures, and that they cannot be counted upon to prevent erosion and flooding at the site in future decades.

### **Reasonably Foreseeable Long-term Hazards**

As discussed previously, there remains a significant degree of doubt as to when, or if, a permanent, off-site repository for the SONGS spent nuclear fuel will become available. It is similarly uncertain whether an off-site interim storage facility will be developed which could eventually accept SONGS spent fuel after the proposed project term of 2051. The proposed life of the ISFSI project is based on the assumption that the DOE will begin accepting spent fuel, on a nation-wide basis, beginning in 2024, with the first transport of SONGS 2 and 3 fuel beginning in 2030 (SCE 2014a, 2014b). If the DOE is unable to fulfill this commitment, or if the shipment of spent fuel to an off-site location is otherwise delayed, storage in the proposed ISFSI could be required beyond 2049, and the ISFSI would not be decommissioned and removed by 2051, as proposed. In the worst case, no federal repository or other storage alternative would be developed, and the proposed ISFSI would remain on the SONGS site in perpetuity.

In this scenario, or any other in which the ISFSI remained in its proposed location for many decades, there would come a time when the facility would be exposed to geologic hazards, and when the proposed project configuration and design could no longer assure stability and structural integrity without requiring shoreline protection, and would thus no longer fulfill the requirements of Coastal Act Section 30253.

For purposes of illustration, it is useful to consider potential future coastal hazards in relation to the project after 100 years, in the early 22<sup>nd</sup> century. SCE’s flood risk analysis suggests that after 100 years, in the year 2117, sea level could have risen between 1.8 and 7 feet; at future mean higher high tide, the still water elevation could be up to 12.8 feet above modern MLLW, approaching the lowest elevations within the NIA (about 13 ft MLLW in the drainage sump area and near the seawall). Factoring in additional water height attributable to storm surge, oceanographic forcing, and wave run-up could result in flooding to elevations above 30 feet MLLW. The combined results of high tide, storm surge, and a large tsunami would be expected to flood the entire NIA area, as illustrated in **Exhibit 7**.<sup>11</sup> If, as expected, sea level continues to rise in response to global warming, higher water levels would expose the project site to ever

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<sup>11</sup> **Exhibit 7** illustrates a scenario of complete flooding within the NIA in the year 2100, based on the water level contributions sea level rise (National Research Council 2012 high scenario), mean higher high tide conditions, 1 foot of storm surge and/or oceanographic forcing, and an additional tsunami wave run-up of 22 feet. A maximum flood scenario would factor in storm waves in addition to the tsunami and a larger term for surge and oceanographic forcing.

more frequent flooding, and eventually permanent inundation.<sup>12</sup> Even if the proposed ISFSI could be shown to be designed to withstand frequent flooding, inundation and exposure to ocean waves, a location within the surf zone would place major practical constraints on SCE's ability to load and unload fuel-filled MPCs, monitor and maintain the ISFSI components, and eventually decommission and remove the facility without adverse impacts to marine resources.

Similarly, in the absence of shoreline protection, the natural processes of coastal erosion and bluff retreat would eventually undermine the proposed project site and compromise the stability and structural integrity of the ISFSI. A crude calculation using a maximum estimated bluff retreat rate of 0.8 feet/year (Hapke et al. 2007, for unprotected slopes in San Mateo Formation bedrock) indicates that erosion could begin to undermine the ISFSI structure by approximately 2130. However, several factors, including the fact that the upper layers of the subsurface within the NIA consist of fill, which may be more easily eroded than native bedrock, that the rate of erosion would be expected to increase with rising sea level, and the inherently unpredictable and episodic nature of bluff retreat, could put the ISFSI at risk much sooner.

The Commission cannot conclude that the proposed ISFSI location would assure stability and structural integrity and minimize risks to life and property from coastal hazards, and shoreline erosion in particular, without requiring new or expanded shoreline protection. Thus, in order to find the project consistent with the policies of Coastal Act Section 30253(a) and (b), it must be able to assure the following:

- (1) Shoreline protection devices would not be extended, nor new devices constructed;
- (2) The ISFSI would no longer be present when the project site became threatened by long-term coastal hazards.

Given that there is presently no certainty that the spent fuel to be stored in the ISFSI will have been removed to a federal repository (or other off-site facility) by 2051 or any other specific future date, assurance of (2) above would need to be supported by three additional assurances:

- (a) The fuel could be transferred to a new, on-site ISFSI at lower risk from long-term geologic hazards than the proposed NIA facility; or
- (b) Based on the best evidence available at the time, the proposed ISFSI location within the NIA would not be threatened by geologic hazards within the timeframe of a revised/updated schedule for off-site transfer of the fuel; and
- (c) The MPCs stored within the ISFSI fuel modules would remain in a physical condition adequate to allow safe off-site transport (i.e., to a DOE facility) or on-site relocation (i.e., to a new ISFSI), and thus allow the proposed ISFSI to be removed.

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<sup>12</sup> For example, one recent modeling study projected between 7 – 17 feet of sea level rise (base year 2000) by the year 2300 under a moderate greenhouse gas emissions scenario (Schaeffer et al. 2012); another, examining a high emissions ("business-as-usual") scenario, projected between 7.4 and 38 feet of sea level rise by the year 2500 (Jevrejeva et al. 2012). The broad ranges in these projections reflect the high degree of uncertainty inherent to long-term modeling, but nonetheless demonstrate the potential for extreme sea level rise within the next several centuries.

*No New or Extended Shoreline Protection*

The existing shoreline protection system (rock revetment, sheet-pile seawall) seaward of the NIA was installed in 1966 to protect Unit 1, and was later expanded (to include the public access walkway and retaining wall) and effectively joined with the newer structures protection Units 2 and 3. During this time, the SONGS shoreline protective devices have adversely affected shoreline sand supply and contributed to the erosion of the beach by (a) directly encroaching on beach area; and (b) retarding the natural retreat of the bluff, which both prevents new beach area from being created and eliminates the delivery of sand to the beach and local littoral cell through bluff erosion.

In the absence of a permanent federal repository for spent nuclear fuel, or the development of some other federal, state or private off-site interim storage facility, the SONGS spent fuel could remain in the proposed ISFSI for many years beyond the intended date of removal. The long-term potential therefore exists that the proposed ISFSI site could be undermined by shoreline retreat and/or subjected to flooding as a result of sea level rise, storm waves or a tsunami event and the proposed new development could potentially require an expanded or replaced shoreline protective device.

Coastal Act section 30253 prohibits the approval of new development if hazards would affect the proposed development and necessitate construction of a new, expanded or replaced shoreline protective device to protect it. Because this policy requires that new development avoid the need for a new, expanded or replaced shoreline protective device, the Commission finds that the proposed development is consistent with the Coastal Act only if it is conditioned to provide that such shoreline protection will not be constructed. Therefore, in order to find the proposed development consistent with Section 30253 of the Coastal Act, the Commission imposes **Special Condition 3**. This condition requires that SCE agree to not extend, enlarge or replace the existing shoreline protective devices, or to construct new shoreline protection, for purposes of protecting the proposed ISFSI facility and ancillary structures (e.g., security building, fencing, etc.) from future coastal hazards.

*Future On-site Alternatives and Managed Retreat*

As discussed in a previous section, the decommissioning of SONGS Units 2 and 3 is planned to occur over the next 15 – 20 years, and would result in the removal of most major structures currently occupying the site. Thus, beginning in the early 2030s, there will be a number of additional locations within the area covered by the SONGS Part 50 site license where an ISFSI could conceivably be built, which were not available at the time SCE initially conducted its alternatives analysis. A number of these locations are at higher elevations (+30 – 80 feet MLLW) and greater distances from the shoreline (up to 900 feet) than the proposed ISFSI site in the NIA, and may prove to be safe from coastal hazards over a longer period of time. If the proposed ISFSI must remain on-site beyond 2051 for a long or indefinite period of time, it may prove necessary to relocate the ISFSI to another site better able to minimize hazards and assure the stability of the facility over the long-term.

In order to guard against the possibility that the proposed ISFSI would remain in place beyond 2051 and become exposed to geologic hazards in the future, staff recommends that the Commission adopt **Special Condition 2**, which authorizes the proposed development for a



period of twenty years from the date of approval (i.e., until October 6, 2035). Special Condition 2 also requires that, at least six months prior to the end of this term, SCE apply for a CDP Amendment to retain, remove or relocate the proposed ISFSI facility. The CDP Amendment application shall be supported by (a) an evaluation of current and future coastal hazards based on the best available information; (b) an alternatives analysis examining the merits and feasibility of both off-site and on-site alternatives, including potential locations within areas made available by the decommissioning of SONGS Units 2 and 3; and (c) a plan for managed retreat, if retention of the ISFSI facility beyond 2051 is contemplated and coastal hazards may affect the site within the timeframe of the amended project.

#### *Cask Transportability and Removal of the ISFSI*

Ultimately, SCE's ability to avoid long term coastal hazards and the need for shoreline protection, and thus assure consistency with Coastal Act Section 30253, depends on its ability to eventually remove the ISFSI from the proposed site. In turn, the removal of the ISFSI depends on the fuel storage casks (MPCs) remaining in a condition adequate to allow safe removal from the storage modules and transfer to a new location. This is true regardless of the timing and circumstances of the ISFSI removal, whether in 2051, with the fuel being transferred to a permanent repository, in 2035, in conjunction with relocation to a new on-site ISFSI, or at some future date as a part of a plan of managed retreat to avoid coastal hazards.

The storage cask that would be used in the proposed ISFSI, the Holtec model MPC-37, is constructed from corrosion-resistant stainless steel, with a design life of 60 years (Holtec 2014a, b). With implementation of a monitoring and maintenance program, as well as an Aging Management Plan to be developed as a condition of license renewal for the HI-STORM UMAX system beyond the initial 20-yr term, SCE expects the service life of the ISFSI and casks to be at least 100 years (SCE 2015b). SCE does not anticipate that major repairs to the ISFSI or components would be needed within either the 60-year design life or 100-year service life of the system, but has stated that corrective actions and contingency plans will be developed in the future as a part of the Aging Management Plan (*see* Subsection A, above).

While the designs of the ISFSI and fuel storage casks appear to be robust, there are several uncertainties. The first is that the stainless steel MPCs will be in continual contact with moist, salt-laden marine air, and as a result could, over time, experience a type of degradation known as stress corrosion cracking. The initiation and growth of stress corrosion cracking in stainless steel fuel storage casks are not fully understood and remain a topic of active research, but these processes are likely to be accelerated in a coastal environment such as at SONGS (e.g., EPRI 2014). Commission staff is not aware of any documented instances of stress corrosion cracking in fuel storage casks at other nuclear power plants. However, the NRC has collected evidence of stress corrosion cracking in other welded stainless steel components at several coastal nuclear power plants (NRC 2014). The components in question had been in service for 16 to 33 years (average 25 years), and estimated crack growth rates ranged from 0.11 to 0.91 mm/yr. Elsewhere, the NRC has estimated that at least 30 years would be required for the initiation of stress corrosion cracking in steel fuel storage casks.

Additional long-term uncertainties remain due to lack of completion of SCE's proposed MPC monitoring and maintenance program. Based on information provided to staff, SCE would implement the following measures: (a) the monitoring of environmental conditions, such as temperature and humidity, that could influence the risk of corrosion and degradation of the stainless steel MPCs; (b) visual observation, surface measurements, and other inspection techniques to provide information on the physical condition of the MPCs; and (c) use of an empty cask ("coupon") as a surrogate for filled casks to allow for more thorough inspection and evaluation (SCE 2015f). However, SCE has also indicated that the "non-destructive examination techniques" and "remote surface inspection tools" that would be used to inspect the storage casks have not yet been developed or tested for effectiveness, and it is unclear when they would be available for use at SONGS. It must also be noted that the only existing requirements for the development of a monitoring and inspection program are associated with the Aging Management Plan required for *renewal* of the 20-year NRC license for the ISFSI system. Though SCE has indicated that it would seek to begin the monitoring and inspection of the ISFSI components well before the end of the initial license, it is possible that no detailed inspection of the casks would occur within the first 20 years of their emplacement.

As a part of its licensing processes, the NRC has reviewed the design of the HI-STORM UMAX (version MSE) system and the supporting documentation and analyses supplied by Holtec, the manufacturer (e.g., Holtec FSAR, CoC amendment application). In the Preliminary Safety Evaluation Report (SER) supporting the September X, 2015, final approval of an amendment to the UMAX system's Certificate of Compliance, the NRC determined the following:

*F3.3 The applicant has met the specific requirements of 10 CFR 72.236(g) and (h) as they apply to the structural design for spent fuel storage cask approval. The cask system structural design acceptably provides for*

- *Storage of the spent fuel for **a certified term of 20 years.***

*F3.4 The applicant has met the requirements of 10 CFR 72.236 with regard to the inclusion of the following provisions in the structural design:*

- *Adequate structural protection against environmental conditions and natural phenomena.*

...

- *Structural design that is compatible with retrievability of spent nuclear fuel (SNF).*

*The staff concludes that the structural properties of the structures, systems and components of the CoC No. 1040, Amendment No. 1 are in compliance with 10 CFR Part 72, and that the applicable design and acceptance criteria have been satisfied. **The evaluation of the structural properties provides reasonable assurance that the HI-STORM UMAX Canister Storage System Amendment No. 1 will allow safe storage of SNF for a licensed (certified) life of 20 years.** This findings is reached on the basis of a review that considered the regulation itself, appropriate regulatory guides, applicable codes and standards, and accepted engineering practices. [Emphasis added]*

As described previously, the Commission is preempted from imposing regulatory requirements concerning radiation hazards and safety. However, in order to find the project consistent with the geologic hazards policies of the Coastal Act and in recognition that the project itself proposes interim temporary storage for eventual transport to a federal or other off-site repository, the Commission must have reasonable assurance that the SONGS spent fuel will continue to be transportable, and the ISFSI itself removable, as long as the facility occupies its proposed location. The 20-year NRC licensing and certification of the structural adequacy of the proposed ISFSI system provides such assurance within this limited timeframe, and is roughly consistent with the limited available evidence on when stress corrosion cracking may begin to affect certain stainless steel components in marine environments. Thus, in order to minimize the possibility that the proposed ISFSI would become unremovable, and thus subject to long-term geologic hazards necessitating the use of shoreline protection devices, Commission staff recommends that the Commission adopt **Special Condition 2**, which authorizes the proposed development for a period of twenty years from the date of approval (i.e., until October 6, 2035), and requires that SCE apply for a CDP Amendment to retain, remove or relocate the ISFSI facility prior to the end of this term. Among other things, Special Condition 2 requires that the CDP Amendment application be supported by evidence that the fuel storage casks will remain in a physical condition sufficient to allow off-site transport, and a description of a maintenance and inspection program designed to ensure that the casks remain transportable for the full life of the amended project.

*Assumption of Risk & Restriction on Development*

Although the proposed project has been evaluated, designed and conditioned in a manner to minimize the risk of geologic hazards, the underlying uncertainties of any geotechnical evaluation and the fact that the risks associated with inherently hazardous oceanfront property can never be completely eliminated support a finding that no guarantees can be made regarding the safety of the proposed development with respect to coastal hazards. Geologic hazards are episodic, and areas that may seem stable now may not be so in the future. Accordingly, the Commission is adopting **Special Condition 4**, which requires the landowners to assume the risks of extraordinary erosion and geologic hazards of the property and waive any claim of liability on the part of the Commission. Given that the applicants have chosen to implement the project despite these risks, the applicants must assume the risks. In this way, the applicants are notified that the Commission is not liable for damage as a result of approving the permit for development. The condition also requires the applicants to indemnify the Commission in the event that third parties bring an action against the Commission as a result of the failure of the development to withstand hazards.

The Commission further finds that Section 30610(b) of the Coastal Act exempts certain additions to existing structures from coastal development permit requirements. Depending on its nature, extent, and location, such an addition or accessory structure at this location could contribute to geologic hazards at the site. Accordingly, Section 30610(b) requires the Commission to specify by regulation those classes of development which involve a risk of adverse environmental effects and require that a permit be obtained for such improvements. Pursuant to Section 30610(b) of the Coastal Act, the Commission adopted Section 13253 of Title 14 of the California Code of Regulations (CCR). Section 13253(b)(6) specifically authorizes the Commission to require a permit for additions to existing structures that could involve a risk of adverse environmental

effect by indicating in the development permit issued for the original structure that any future improvements would require a development permit. Since certain additions or improvements to the approved structure could involve a risk of creating geologic hazards at the site, pursuant to Section 13253 (b)(6) of Title 14 of the CCR, the Commission attaches **Special Condition 5**, which requires that all future development on the subject parcel that might otherwise be exempt from coastal permit requirements requires an amendment or coastal development permit. This condition will allow future development to be reviewed by the Commission to ensure that future improvements will not be sited or designed in a manner that would result in a geologic hazard.

## **Conclusion**

Based on the proposed project design and construction, and with the special conditions described above, the Commission finds that the proposed project, as conditioned, is consistent with Coastal Act Section 30253(a) and (b).

## **E. MARINE RESOURCES & WATER QUALITY**

Section 30230 of the Coastal Act states:

*Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.*

Section 30231 of the Coastal Act states:

*The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.*

Section 30232 of the Coastal Act states:

*Protection against the spillage of crude oil, gas, petroleum products or hazardous substances shall be provided in relation to any development or transportation of such materials. Effective containment and cleanup facilities and procedures shall be provided for accidental spills that do occur.*

The ISFSI would be built approximately 100 feet from the shoreline and would involve construction, excavation and grading activities within the NIA, a previously graded, paved and developed area of the SONGS site. The SONGS site is currently subject to NPDES permits issued by the San Diego Regional Water Quality Control Board (RWQCB); the NIA area is governed by the Unit 2 NPDES permit. The permit includes conditions related to allowable

volumes and types of non-radiological discharges from the various facilities on the site and other measures meant to prevent adverse impacts to coastal waters. To the extent that it could lead to new discharges, construction of the ISFSI would be subject to additional review and possible permitting by the RWQCB for conformity to requirements for construction stormwater discharges.

### **Construction-related Discharges**

Normal operation of the proposed ISFSI would not result in the discharge of pollutants to coastal waters or otherwise affect marine resources. However, grading and ground disturbance during construction could mobilize sediments which, if washed into the ocean, could adversely affect coastal water quality and marine organisms. Similarly, accidental leaks or spills from construction vehicles and heavy equipment could introduce pollutants into coastal waters.

The proposed construction and grading activities during the installation of the ISFSI would comply with existing water quality, storm water management, and spill prevention plans and their associated best management practices (BMPs). Because these activities – excavation, pouring of concrete, earth movement, use of heavy equipment, etc. – are similar to activities already occurring at SONGS, the existing plans and BMPs provide appropriate controls to avoid and minimize potential water quality impacts. The facility's Storm Water Management Plan (SWMP) includes procedures regard dust control, sediment management and debris cleanup that apply to the types of equipment to be used and activities to be conducted during construction, and use of these procedures will minimize storm water runoff and prevent soil and sediment from entering the ocean. The approximately 14,800 cubic yards of soil that would be excavated from within the NIA would be repurposed as fill material within the ISFSI berm.

The risk of spills of oil or fuel from construction equipment would be minimized by implementation of the existing SONGS Spill Prevention, Control and Countermeasures (SPCC) Plan, which describes the procedures and equipment availability needed to prevent and control spills of hazardous materials on site. SCE will stage all project-related construction machinery and heavy equipment in paved, developed areas inside the SONGS perimeter where the necessary spill prevention controls are already in place, and will refuel vehicles within already authorized areas.

### **Potential for Reasonably Foreseeable Impacts**

As discussed in greater detail in previous sections, there remain a number of significant uncertainties related to SCE's ability to decommission and remove the ISFSI facility by 2051, as proposed. In the absence of a permanent federal repository for spent nuclear fuel, or the development of some other federal, state or private off-site interim storage facility, the SONGS spent fuel could remain in the proposed ISFSI for many years beyond the intended date of removal. There is therefore the potential that the proposed ISFSI site will be undermined by shoreline retreat and/or subjected to flooding as a result of sea level rise, storm waves or a tsunami event. Despite the facility's robust design, these geologic forces would eventually result in a loss of stability and structural integrity, and cause the discharge of debris into the coastal ocean to the detriment of water quality and marine organisms.

In order to avoid this outcome, the Commission imposes **Special Condition 2**, which authorizes the approved project for twenty years from the date of approval (i.e., until October 6, 2035), and requires SCE, before this date, to submit an application for a CDP amendment to retain, remove or relocate the ISFSI. This application shall be supported by (a) an evaluation of current and future coastal hazards based on the best available information; (b) an analysis examining the merits and feasibility of off-site and on-site alternatives, including potential locations within areas made available by the decommissioning of SONGS Units 2 and 3; (c) a plan for managed retreat, if retention of the ISFSI facility beyond 2051 is contemplated and coastal hazards may affect the site within the timeframe of the amended project; and (d) evidence that the fuel storage casks will remain in a physical condition sufficient to allow off-site transport, and a description of a maintenance and inspection program designed to ensure that the casks remain transportable for the full life of the amended project.

These requirements will afford the Commission the opportunity to re-evaluate the likelihood of SCE's proposed timeline for the removal of the ISFSI before the site is vulnerable to coastal hazards and when potential relocation areas on and off-site are made available, including by the decommissioning of SONGS Units 2 and 3, and if necessary impose conditions necessary to mitigate and avoid adverse impacts to marine resources.

These requirements will afford the Commission the opportunity to re-evaluate the likelihood of SCE's proposed timeline for the removal of the ISFSI at a date closer to 2051, to reassess the vulnerability of the site to coastal hazards under future conditions, and if necessary impose conditions necessary to mitigate those hazards and avoid adverse impacts to marine resources.

### **Conclusion**

With the special conditions described above, the Commission finds that the proposed project is consistent with Coastal Act Sections 30230, 30231, and 30232.

### **F. COASTAL ACCESS AND RECREATION**

Section 30210 of the Coastal Act states:

*In carrying out the requirement of Section 4 of Article X of the California Constitution, maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent with public safety needs and the need to protect public rights, rights of private property owners, and natural resource areas from overuse.*

Section 30211 of the Coastal Act states:

*Development shall not interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation.*

Section 30220 of the Coastal Act states:

*Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses.*

Section 30212(a) of the Coastal Act states:

*Public access from the nearest public roadway to the shoreline and along the coast shall be provided in new development projects except where: (1) It is inconsistent with public safety, military security needs, or the protection of fragile coastal resources, (2) Adequate access exists nearby, or, (3) Agriculture would be adversely affected. Dedicated accessways shall not be required to be opened to public use until a public agency or private association agrees to accept responsibility for maintenance and liability of the accessway.*

Coastal Act policies generally require that developments such as the proposed ISFSI, located adjacent to the shoreline in an area with ongoing public use, not interfere with that use and provide access to the shoreline. The proposed ISFSI would be located within the existing SONGS restricted area, to which public access is prohibited under NRC security requirements. Thus, the project would not directly interfere with existing public access. Adequate public access and recreational opportunities are already available in close proximity to the SONGS site, including at public beaches to the north, south and directly in front of the plant, and along the existing pedestrian pathway below the SONGS seawall. However, the project could potentially result in a number of indirect adverse effects on coastal access and recreation through construction-related traffic and noise, and through impacts to shoreline sand supply should the retention and/or extension of the existing shoreline protective devices become necessary to protect the project from future coastal hazards.

### **Construction Traffic and Noise**

During project construction, trucks and workers travelling to and from the project site could increase traffic congestion along Old Pacific Coast Highway, a coastal access route inland of the plant. However, the expected traffic volumes are small, would be concentrated during off-peak hours, and would be limited to the approximately one-year period of construction. Construction would not occur during weekends and holidays. As a result, increased traffic associated with project construction would not significantly interfere with access to the coast along public roads.

Construction activities also will generate noise, which if loud enough could discourage public shoreline access and recreational activities and adversely affect other sensitive receptors (i.e., sensitive wildlife species). The closest sensitive receptors to the project site would be recreational users and wildlife on the shoreline (including the pedestrian walkway) immediately seaward of the NIA and the Unit 1 seawall, approximately 100 – 150 feet from the project site. Noise impact analyses conducted by SCE indicate that in the worst case, with multiple construction vehicles and heavy equipment operating simultaneously, the maximum noise level at 50 feet would reach 90 dBA ( $L_{max}$ ) (SCE 2015a). At the pedestrian walkway, factoring in the shielding provided by the seawall, the maximum noise levels are estimated to be 60 – 65 dBA,



which would not be significantly greater than ambient noise levels at this location. Other sensitive receptors (more distant recreational and habitat areas) would not be significantly affected by construction-related noise.

### **Public Beach Access and Recreation**

The existing shoreline protection system (rock revetment, access walkway and retaining wall, and sheet-pile seawall) at SONGS extends approximately 2000 feet between the bluffs northwest of the NIA to beyond the Units 2 and 3 K Buildings (**Exhibits 2, 8**). The segment of this structure seaward of the NIA was installed in 1966 to protect SONGS Unit 1, and was later effectively joined with the structures protecting Units 2 and 3. Landward of the mean high tide line, public access to the SONGS site is prohibited in conformance with NRC requirements, except for passage between sections of San Onofre State Beach north and south of SONGS along the designated public access walkway (*see* **Exhibit 8**).

The NIA shoreline protective devices have adversely affected the beach area and shoreline sand supply by (a) directly encroaching on beach area; and (b) retarding the natural retreat of the bluff, which both prevents new beach area from being created and eliminates the delivery of sand to the beach and local littoral cell through bluff erosion.<sup>13</sup> The direct and indirect loss of public beach below the mean high tide line as a result of these processes necessarily reduces public access and recreational opportunities. This loss of coastal access may occur on the beach area in front of the shoreline protective device or at beaches on either side, depending on local patterns of littoral sand transport. San Onofre lies near the boundary between two local littoral cells (Patsch and Griggs 2006), suggesting that under different conditions, sand may be transported either the north or the south of the SONGS site.

As discussed previously, there are a number of significant uncertainties related to SCE's ability to decommission and remove the ISFSI facility by 2051, as planned. In the absence of a permanent federal repository for spent nuclear fuel, or the development of some other federal, state or private off-site interim storage facility, the SONGS spent fuel could remain in the proposed ISFSI for many years beyond the intended date of removal. Under this scenario, the ISFSI will eventually become threatened by coastal hazards, such as erosion or coastal flooding. As stated above, Section 30253 of the Coastal Act prohibits the approval of new development if hazards would affect the proposed development and necessitate construction of a new or expanded shoreline protective device to protect it. Further, any enlargement or replacement of the existing NIA seawall undertaken in order to protect the proposed ISFSI from coastal hazards has the potential to prolong or increase the adverse effects of the NIA seawall on shoreline sand supply and beach access and recreation in the vicinity of San Onofre.

In order to avoid this outcome, the Commission attaches **Special Condition 2**, which authorizes the approved project for twenty years from the date of approval (i.e., until October 6, 2035), and requires SCE, before this date, to submit an application for CDP amendment to retain, remove or relocate the ISFSI, supported by (a) an evaluation of current and future coastal hazards based on the best available information; (b) an analysis examining the merits and feasibility of off-site and on-site alternatives, including potential locations within areas made available by the

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<sup>13</sup> This latter effect is likely to have been ameliorated by the placement on the beach of several hundred-thousand cubic yards of sand-sized material excavated from the bluff during plant construction.

decommissioning of SONGS Units 2 and 3; (c) a plan for managed retreat, if retention of the ISFSI facility beyond 2051 is contemplated and coastal hazards may affect the site within the timeframe of the amended project; and (d) evidence that the fuel storage casks will remain in a physical condition sufficient to allow off-site transport, and a description of a maintenance and inspection program designed to ensure that the casks remain transportable for the full life of the amended project. The Commission also adopts **Special Condition 3**, which requires that SCE agree to not extend, enlarge or replace the existing shoreline protective devices, or to construct new shoreline protection, for purposes of protecting the proposed ISFSI facility and ancillary structures (e.g., security building, fencing, etc.) from future coastal hazards.

With the implementation of the special conditions described above, the Commission finds that the proposed project is consistent with the public access and recreation policies of the Coastal Act.

#### **G. VISUAL RESOURCES**

Section 30251 of the Coastal Act states:

*The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural land forms, to be visually compatible with the character of surrounding areas, and, where feasible, to restore and enhance visual quality in visually degraded areas. New development in highly scenic areas such as those designated in the prepared by the Department of Parks and Recreation and by local government shall be subordinate to the character of its setting.*

The SONGS site is situated adjacent to the Pacific Ocean and in close proximity to several scenic areas, including San Onofre State Beach and Camp Pendleton, which were identified in the *California Coastline Preservation and Recreation Plan* (Baker1971). Existing structures at SONGS are partially visible from public roads (Interstate 5, Old Pacific Coast Highway) inland of the site, and from nearby beach and shoreline vantage points. However, the proposed location of the new ISFSI, within the NIA, is one of the least visible portions of the site. Due to the relatively low grade elevation of the NIA (+19 feet MLLW) and the partially below-ground configuration of the proposed ISFSI, the top of the ISFSI pad would rise to only +32 feet MLLW, and thus would be situated below the lines of sight of drivers on the public roads inland of the site. Views of the NIA from shoreline vantage points to the north (such as San Onofre State Beach) are blocked by the 96-foot high bluff immediately northwest of the NIA, while SONGS Units 2 and 3 structures obscure views of the site from the beaches and bluffs to the south. The existing NIA seawall, which rises 14 feet above the public access walkway seaward of SONGS, would block views of the ISFSI site from the walkway and the beach. To the extent that the proposed ISFSI would be visible from public vantage points, it would be visually compatible with the heavily developed, industrial character of the SONGS site. Existing and simulated post-project views of the site are provided in **Exhibit 9**.

Although a substantial amount of excavation (approx. 14,800 cubic yards) will be necessary in order to install the concrete foundation pad and the other subgrade portions of the ISFSI, the coastal bluff remnant on which the NIA is situated was heavily graded (more than 70 vertical feet of bluff material removed) during the construction of SONGS Unit 1, and the present project would not result in significant further alteration of natural landforms.

However, during the process of plant decommissioning it is anticipated that most, if not all, of the structures comprising SONGS will be dismantled and removed, leaving the ISFSI as one of the few remaining major structures on site (SCE 2014a). If the planned work proceeds according to SCE's plans, decommissioning and site restoration will be substantially complete by 2032. On a restored site, the proposed ISFSI will be much more obtrusive and visually incompatible. In the best case, if SCE's assumptions about the removal of the spent fuel to an off-site repository prove true, the adverse visual effects of the ISFSI would persist through 2051. In the event that no permanent repository becomes available, or if the off-site transport of fuel is otherwise delayed, the adverse visual effects of the ISFSI could persist for much longer. In order to minimize impacts to scenic resources, assure that the proposed development would be visually compatible with the character of the surrounding area and allow for the restoration and enhancement of visual quality in a visually degraded area to the maximum extent feasible, the Commission adopts **Special Condition 2**, which will authorize the project for a duration of twenty years from the date of approval (i.e., until October 6, 2035). At least six months prior to that date, SCE is required to submit an application for a new or amended CDP supported by an evaluation of the effects on visual resources of retaining the project, an analysis of available project alternatives and their implications for coastal visual resources, and proposed mitigation measures to minimize adverse impacts to coastal views.

As conditioned, the Commission finds that the proposed project is consistent with Section 30251 of the Coastal Act.

#### **H. ATTORNEYS' FEES AND COSTS**

Coastal Act section 30620(c)(1) authorizes the Commission to require applicants to reimburse the Commission for expenses incurred in processing CDP applications. *See also* 14 C.C.R. § 13055(e). Thus, the Commission is authorized to require reimbursement for expenses incurred in defending its action on the pending CDP application. Therefore, consistent with Section 30620(c), the Commission imposes **Special Condition 6**, requiring reimbursement of any costs and attorneys' fees the Commission incurs "in connection with the defense of any action brought by a party other than the Applicant/Permittee ... challenging the approval or issuance of this permit."

#### **I. CALIFORNIA ENVIRONMENTAL QUALITY ACT**

Section 13096 of the Commission's administrative regulations requires Commission approval of coastal development permit applications to be supported by a finding showing the application, as modified by any conditions of approval, to be consistent with any applicable requirements of the California Environmental Quality Act ("CEQA"). Section 21080.5(d)(2)(A) of CEQA prohibits approval of a proposed development if there are feasible alternatives or feasible mitigation measures available that would substantially lessen any significant impacts that the activity may have on the environment. The project as conditioned herein incorporates measures necessary to

avoid any significant environmental effects under the Coastal Act, and there are no less environmentally damaging feasible alternatives or mitigation measures. Therefore, the proposed project is consistent with CEQA.

The Coastal Commission's review and analysis of CDP applications has been certified by the Secretary of Resources as being the functional equivalent of environmental review under CEQA. As a responsible agency, the Commission conducted its analysis of the potential impacts of the proposed development that the Commission is authorized by the Coastal Act to review. The Commission has reviewed the relevant coastal resource issues associated with the proposed project and has identified appropriate and necessary conditions to assure protection of coastal resources consistent with the requirements of the Coastal Act. The staff report discusses the relevant coastal resource issues with the proposed development. All public comments received to date have been addressed in the staff report, including staff's oral presentation and the findings adopted by the Commission. The Commission incorporates its findings on Coastal Act consistency at this point as if set forth in full. As conditioned, there are no additional feasible alternatives or feasible mitigation measures available, beyond those required, which would substantially lessen any significant adverse environmental effect that approval of the proposed project, as modified, would have on the environment. Therefore, the Commission finds that the proposed project can be found to be consistent with the Coastal Act and CEQA Section 21080.5(d)(2)(A).

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## **Appendix B – Ground Shaking as a Measure of Earthquake Strength**

By Dr. Mark Johnsson, Coastal Commission Staff Geologist

Many different measures have been used over the years to assess earthquake magnitude. The familiar Richter, or local, magnitude ( $M_L$ ) is based on the ground shaking observed on a particular type of seismograph that is most sensitive to short period (0.8 second) seismic waves. These waves die out with distance, and so this measure is inappropriate when applied over long distances ( $> \sim 500$  km) to measure distant earthquakes. Moreover, for large earthquakes, the Richter magnitude “saturates,” and fails to accurately reflect differences between large earthquakes of different magnitudes. The surface wave magnitude ( $M_S$ ) was developed to measure shaking of long period (20 second) waves, and is more suited to larger earthquakes. This scale, like its counterpart the body wave magnitude ( $M_B$ ) also saturates in large earthquakes and, like the Richter magnitude, is based solely on ground shaking, not the amount of energy released by an earthquake. Currently, most seismologists prefer the moment magnitude ( $M_W$ ) for measuring large earthquakes. This measure is based on the strength of the rocks, the area of fault rupture, and the amount of slip during an earthquake, and is a better measure of the amount of energy released by an earthquake.

An earthquake of a given magnitude will produce different levels of ground shaking at different locations, depending on the distance of the location from the earthquake hypocenter, the nature of the soil or rock between the location and the earthquake, and soil and rock conditions at the site. The level of shaking is expressed by a term called “intensity,” and is quantified by the Modified Mercalli Index, whereby intensities ranging from I (not felt) through XII (near total destruction) are assigned based on the level of damage sustained by structures. Better quantification of the level of shaking also is possible; and the standard measure is peak ground acceleration (PGA), usually expressed as a fraction of the acceleration due to gravity ( $9.81 \text{ m/s}^2$ , or 1.0 g). Peak ground acceleration is typically measured in horizontal and vertical directions. It can be expressed deterministically (“a given earthquake can be expected to produce a peak horizontal ground accelerations at the site of X g”), or probabilistically (“given the seismic environment at the site, there is a 10% chance that a peak ground acceleration of X g will be exceeded in 50 years”). The current trend is to express seismic risk in probabilistic terms. The State of California has defined ground accelerations with a 10% chance of exceedance in 50 years as corresponding to the “maximum probable earthquake” for the site. Ground shaking with a 10% chance of exceedance in 100 years is defined as the “maximum credible earthquake.” Peak ground accelerations depend not only on the intensity of the causative earthquake and the distance of the site from the hypocenter of the earthquake, but also on site characteristics. Most important is the depth and firmness of the soil and/or bedrock underlying the site. All of these parameters are evaluated in producing a seismic shaking hazard assessment of a site.

In evaluating the response of structures to ground shaking, the frequency (cycles per second) of that shaking is important—higher frequency shaking is more damaging to smaller, more rigid structures, whereas lower frequency shaking is more damaging to larger, or more flexible structures. The proposed ISFSI facility fits into the latter category. Different ground acceleration values apply to seismic waves with different frequencies. The inverse of the frequency of a seismic wave is its period. Thus, an earthquake with a peak ground acceleration of 0.7 g may have a peak “spectral acceleration” (SA) of 1.1 g for waves of 0.3 second period, but only 0.5 g for waves with periods of 1 second. A typical earthquake produces seismic waves with many different periods, and a plot of spectral accelerations for an earthquake shows the ground accelerations for waves of all periods. In addition, the duration of shaking appears to be important in determining the amount of damage caused by ground shaking. The duration of shaking correlates reasonably well with earthquake magnitude, but there are no currently accepted means of estimating the expected duration of ground shaking from a given earthquake.



FIGURE 1

SONGS ISFSI Expansion Project  
Regional Project Location

**Exhibit 1**  
**Application No. 9-15-0228**  
**Southern California Edison**  
**Project Vicinity**  
**Page 1 of 1**

L S A



0 1000 2000

FEET

SOURCE: Bing Maps

I:\HLT1401\G\Location.cdr (12/1/14)





FIGURE 3

**LEGEND**

- North Industrial Area
- Assessor Parcel
- 100ft Buffer of Parcel
- Adjacent Parcels

LSA



SOURCE: Google Earth (c. 2014); SANDAG (2014)  
E:\BLT\1401\GIS\Parcel.mxd (2/10/2015)





LSA



0 50 100  
FEET

SOURCE: Google Earth

I:\HLT1401\GIS\Site Boundaries.cdr (2/2/15)

# LEGEND

Project Site

SONGS Site

Potential Post-Decommissioning Alternative ISFSI Locations

FIGURE 2

Exhibit 2  
Appl. No. 9-15-0228  
SONGS Site &  
Alternative  
On-site Locations  
Page 2 of 2

SONGS ISFSI Expansion Project  
Site Boundaries









Existing View



Proposed Project View



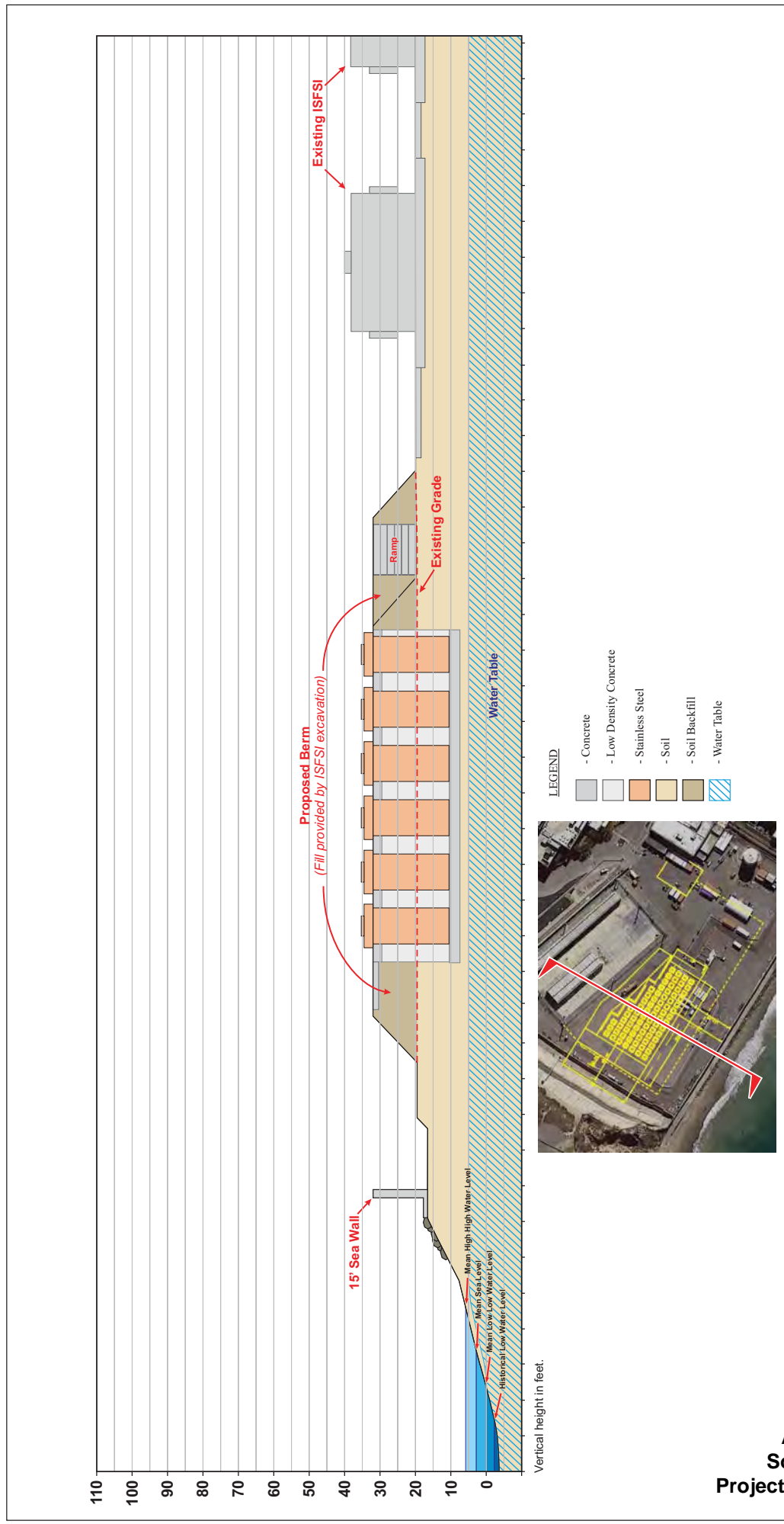


FIGURE A2

NOTE: Drawn to scale vertically NOT horizontally

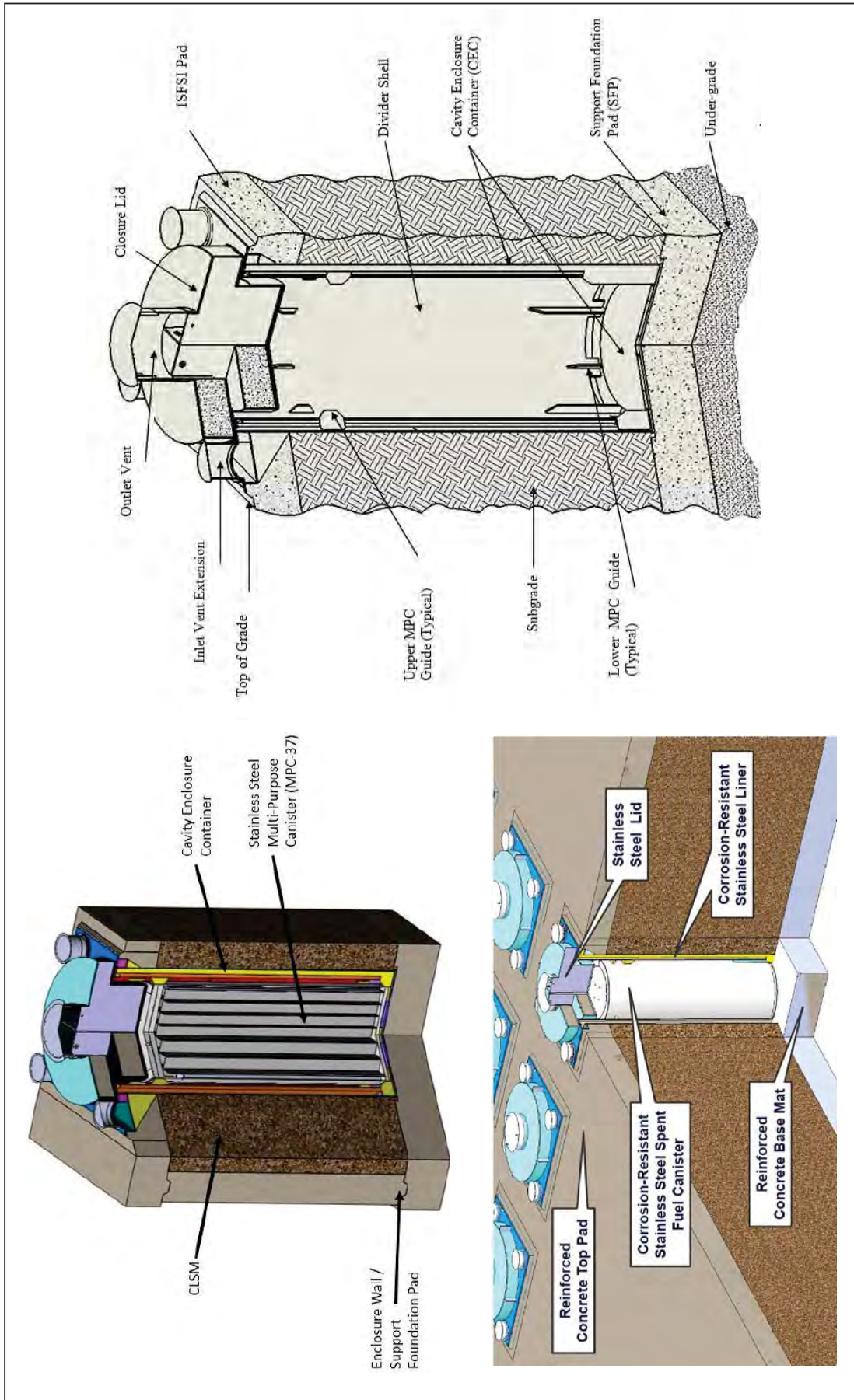
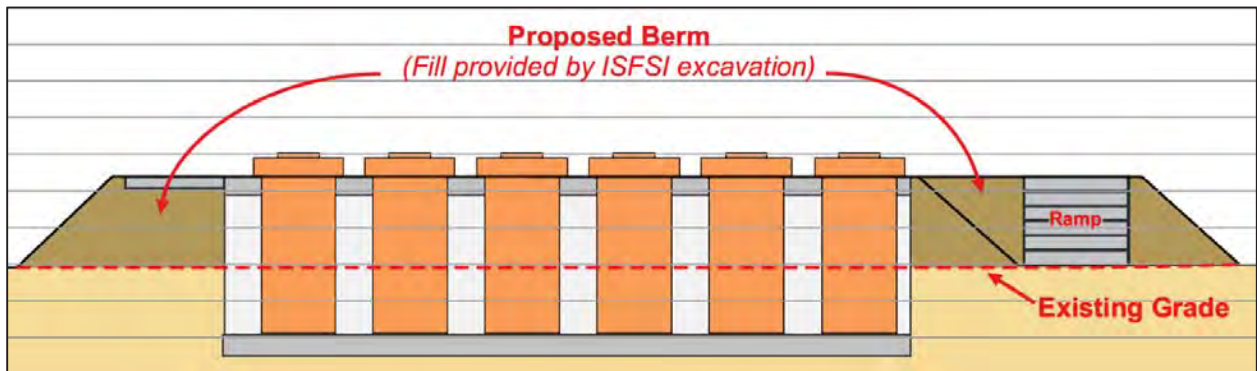
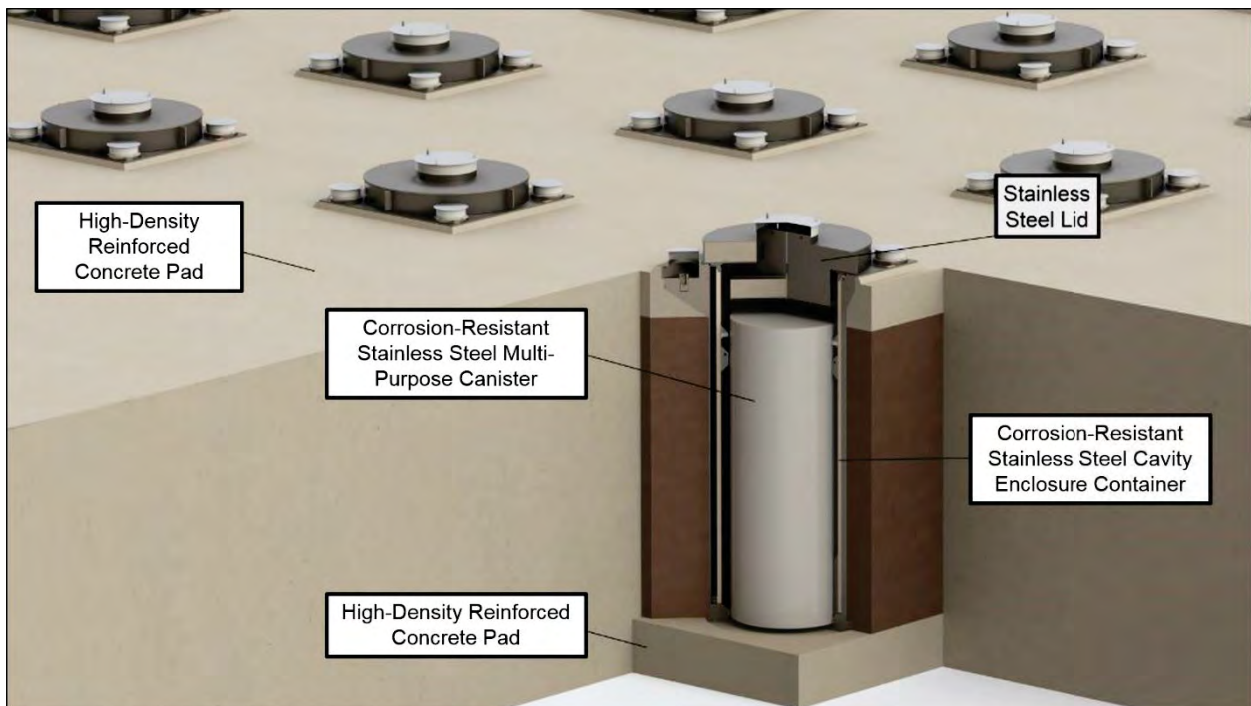


FIGURE 7

LSA



**Figure 1.** Cross section illustration of the concrete pads and storage modules. The space between the cylindrical storage modules is filled with a flowable grout material.



**Figure 2.** Illustration of a multi-purpose canister in a storage module supported by the concrete pad and surrounded by flowable grouting material.





LSA

LEGEND

 Structures to be Removed

FIGURE 9



0 75 150  
FEET

SOURCE: Google Earth

I:\HLT1401\G\Buildings Demolished.cdr (2/10/15)

*SONGS ISFSI Expansion Project*

Structures to be Removed

**Exhibit 5**  
**Application No. 9-15-0228**  
**NIA Structures to be Removed**  
Page 1 of 1



Figure 3: Comparison of 5% Damped UMAX MSE and SONGS DBE HOR Response Spectra

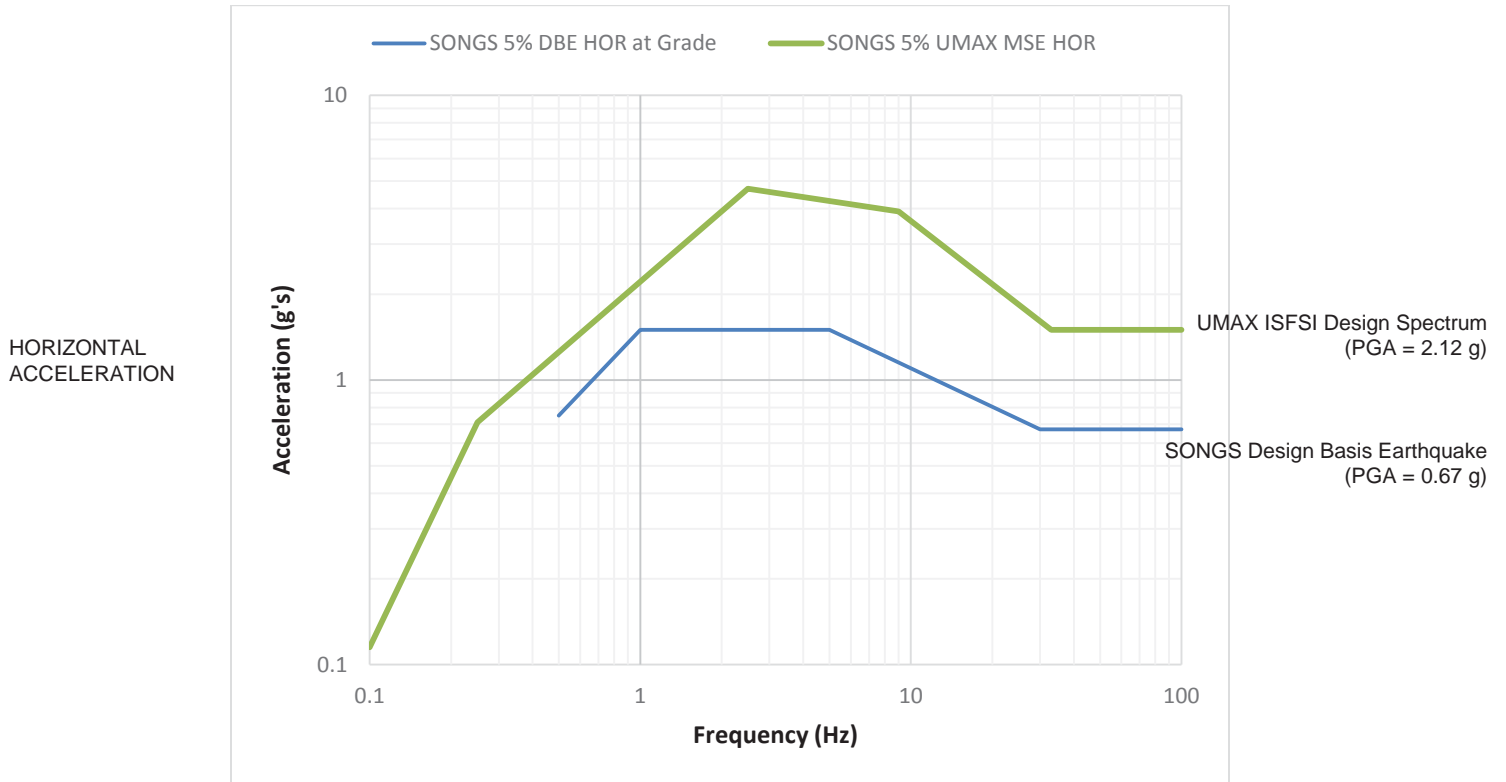
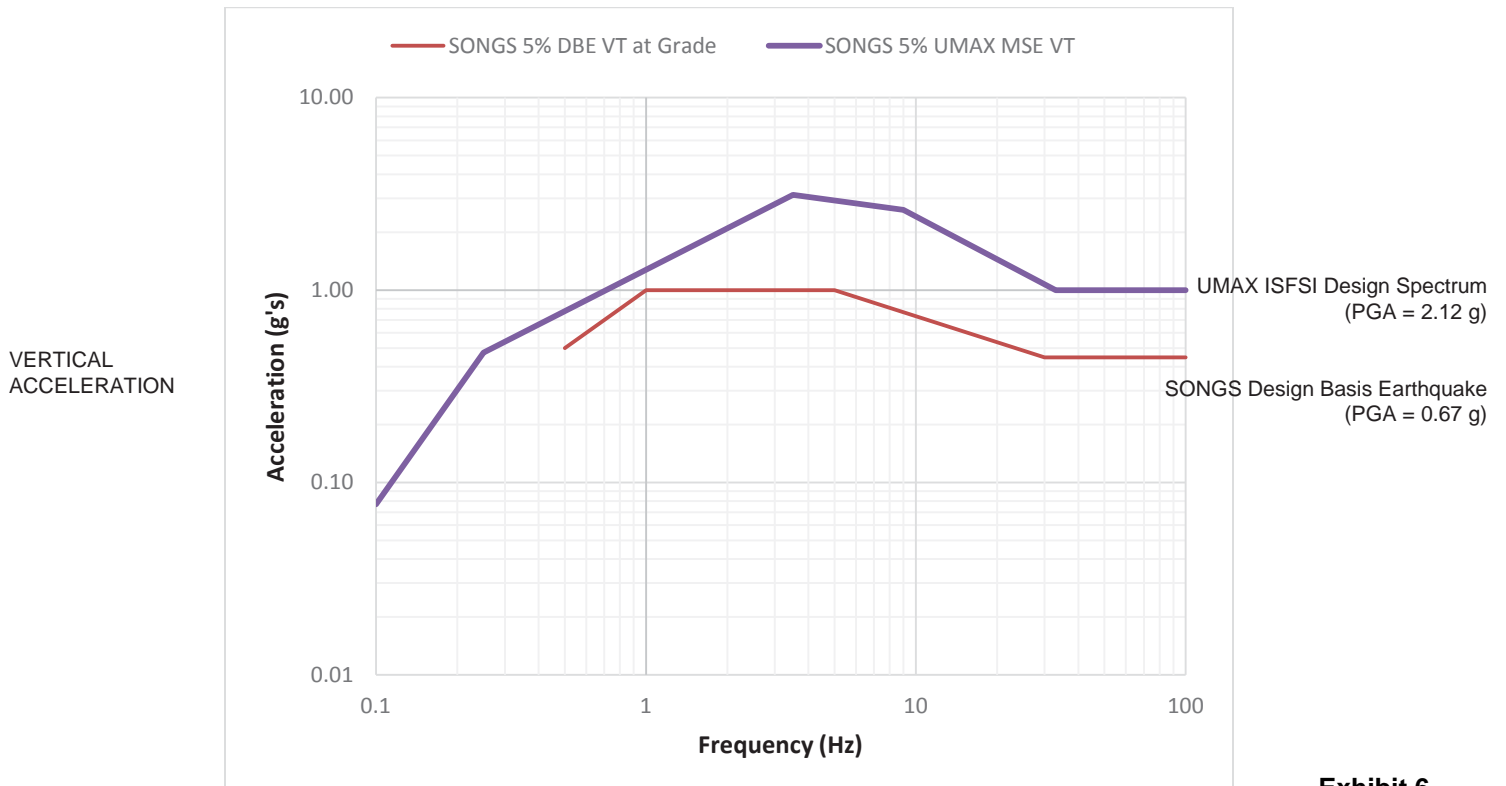


Figure 4: Comparison of 5% Damped UMAX MSE and SONGS DBE VT Response Spectra



Source: Holtec (2015)



FIGURE 11  
(Revised)

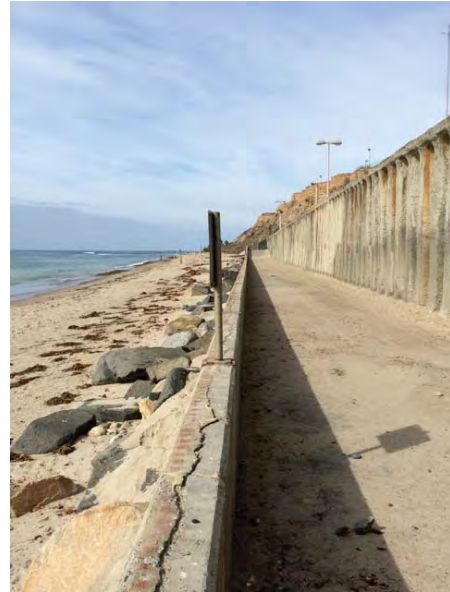
**Exhibit 7**  
**Application No. 9-15-0228**  
**Southern California Edison**  
**Flood Risk in Year 2117**  
**Page 1 of 1**

- LEGEND**
- Current MHHW Level (5.8' above MLLW level)
  - Future Sea Level Rise (SLR)/Future Water Elevation in 2100 (MHHW + SLR in 2100)
  - Future Flooding in 2100 (SLR/Future Water Elevation + Surge & Forcing + Wave Runup)
  - Coastal Bluff Erosion\* (0.7 feet/year) - Assumed year 2100

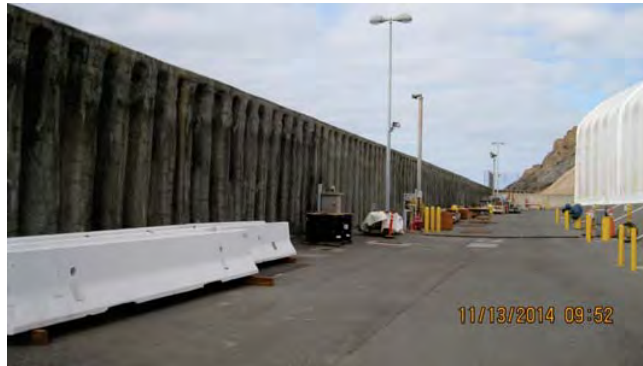


SOURCE: Bing Maps (c. 2014); UCSD (2015); Pacific Institute (2014) \* Using the 0.7 feet/year maximum provided by the California Coastal Commission and assuming that the rate is held true for 85 years  
E:\HLT1401\GIS\FloodRisk\_NoWall\_Lidar.mxd (5/4/2015)





Views of seawall from public access way on San Onofre State Beach looking inward towards the SONGS site.



View of seawall from SONGS site looking outwards towards San Onofre State Beach.

LSA

FIGURE 10

*SONGS ISFSI Expansion Project*  
Existing Seawall

SOURCE: LSA and <http://www.californiacoastline.org>  
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**Exhibit 8**  
**Application No. 9-15-0228**  
**Southern California Edison**  
**Views of Existing NIA Seawall**  
**Page 1 of 1**





Existing View



Proposed Project View

View from Beach Northwest of the NIA





**Existing View**



**Proposed Project View**

View from Parking Area Near Old Pacific Coast Highway  
(Looking Southeast toward NIA)





Existing View



Proposed Project View

View To Southwest Toward NIA From SONGS AWS Building





Existing View



Proposed Project View

View from NIA Toward Northwestern Bluff