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 transfered 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

U.S. DEPARTMENT OF ENERGY
Nuclear Energy

Long-Term Performance Challenges

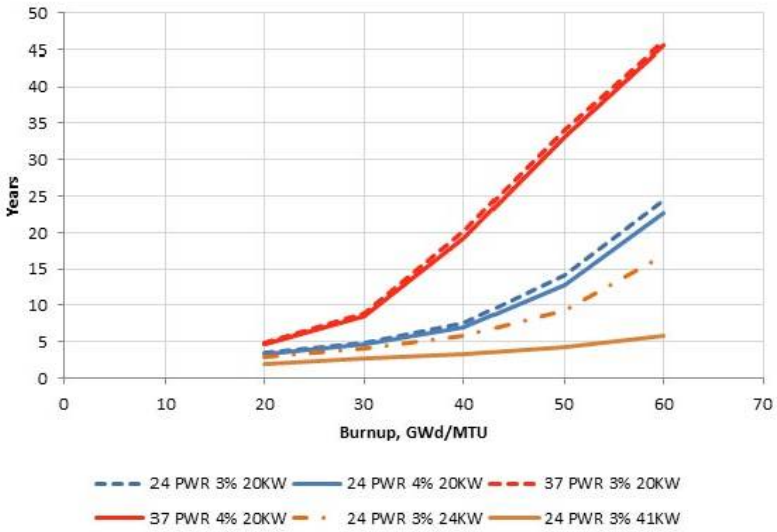
Thermal Load Management

- 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 ≤ 1.7 kW)

Other performance considerations

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

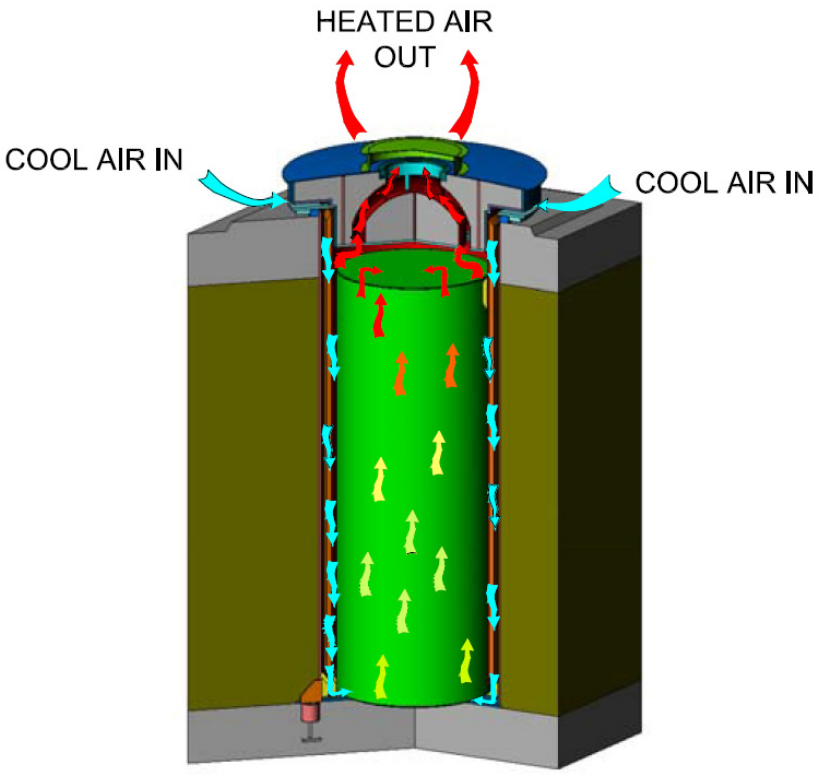
Estimated Cooling Time for PWR fuel to Reach Specified Thermal Power, as a Function of Canister Size and Burnup



Reasons to buy thick nuclear waste dry storage casks

Safety Features	Thin Canisters	Thick Casks
1. Thick walls	1/2" to 5/8"	up to 20"
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

Holtec HI-STORM UMAX Spent Fuel Thin Canister System



Germany thick casks in storage building

Fukushima TN-24 thick casks in storage building