

**San Onofre Decommissioning Community Engagement Panel
Special Meeting**

Tuesday, October 14, 2014, from 10:00 a.m. to 1:00 p.m. PDT in San Juan Capistrano, California
Meeting Minutes

I) Community Engagement Panel Member Attendance

- a) Present: Dr. David Victor (CEP Chairman/UCSD), Dan Stetson (CEP Secretary/Ocean Institute), Ted Quinn (American Nuclear Society), Valentine "Val" Macedo (Laborers' International Union of North America Local 89), City Council Member Jerome M. "Jerry" Kern (Oceanside), Gene Stone (Residents Organized for a Safe Environment), Dr. William Parker (University of California, Irvine), Larry Rannals (Camp Pendleton), Mayor Pro Tem Larry Kramer (San Juan Capistrano), Rich Haydon (California State Parks), Supervisor Pat Bates (Orange County)
- b) Absent: President John Alpay (Capistrano Unified School District Board of Trustees), Mayor Tim Brown (CEP Vice Chairman/San Clemente), Supervisor Bill Horn (San Diego County), Mayor Lisa Bartlett (Dana Point), Donna Boston (Orange County Sheriff's Department), Garry Brown (Orange County Coastkeeper), Jim Leach (South Orange County Economic Coalition)
- c) Guests: Dr. Michael McMahon (Sr. VP, AREVA TN), Dr. Kris Singh (President & CEO, Holtec)
- d) Southern California Edison Representatives: Tom Palmisano (VP and Chief Nuclear Officer), Chris Thompson (VP Decommissioning)

II) Convened by Chairman David Victor at 10:00 a.m.

- a) Today's meeting is to talk about the very important issue of the long term stewardship of San Onofre and in particular the spent fuel at that site
- b) The CEP is not unique in the US nuclear industry but is a very important part of the decommissioning process and I believe we are establishing some best practices for how to do this. This panel is not a decision making body but a conduit for information between the communities and the co-owners, particularly SCE. The CEP has been working for about nine months on a wide range of topics, such as spent fuel
- c) The SONGScommunity.com website has been overhauled to make it easier to get information from that site. You can sign up there for the next walking tour which is Saturday, October 18th. It also contains documents from prior meetings, videos, and will eventually include meeting transcripts. The website includes live streaming as well as functions that enable the public to send messages to the CEP, request SCE speakers for community events, etc.
- d) For today's meeting, we will first hear an update from Tom Palmisano on the dry cask storage issues at San Onofre site and then we're going to hear from the two manufacturers of canisters that might be used at the site

III) Tom Palmisano (VP and CNO of San Onofre) – Dry Cask Storage at San Onofre

- a) Decommissioning principles are safety, stewardship, and engagement and all three principles are at play in the decisions we are making on dry fuel storage
- b) Used Fuel Storage
 - i) Current number of fuel assemblies in pool = 2,668 (approximately 1,100 of them are High Burn-up Fuel)
 - Unit 2 SFP: 1,318 fuel assemblies (570 are High Burn-up)
 - Unit 3 SFP: 1,350 fuel assemblies (545 are High Burn-up)
 - ii) Existing ISFSI pad
 - Unit 1: 17 canisters
 - Unit 2: 17 canisters
 - Unit 3: 16 canisters
 - iii) ISFSI expansion pad

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- Unit 2: need 45 canisters
 - Unit 3: need 39 canisters
 - Units 2 & 3: need 12 canisters for Greater Than Class C (GTCC)
 - Note: number of canisters is approximate
- c) Dry Fuel Storage
- i) Current ISFSI facility
 - 50 loaded spent fuel canisters
 - 12 empty modules
 - Space for 26 more modules
 - The existing ISFSI storage facility must be increased to accommodate approximately 100 additional canisters, with modules
- d) Independent Spent Fuel Storage (ISFSI) – SCE Vendor Selection Process
- i) Before we permanently closed the plant and decided to enter the decommissioning process we already had an ISFSI with 50 loaded canisters and we had an ongoing contract in place with AREVA for the canister design as well as continued support for the needs through operation of the plant
 - Back in 2010 or 2012 when the plant was still operating, the plan was to continue to purchase canisters and load about 10 canisters roughly every 3 years (approximate schedule) through the remaining life of the plant. At the time the current license expired in the 2022 timeframe we were working on license renewal and were anticipating adding an additional 20 years, which would bring us to 2042, and at some point expanding the pad to support an operating period of 60 years
 - The situation changed when we decided to permanently retire the plant and start the decommissioning process and the decision was made to re-evaluate our needs and ultimately enter a bid process for the cask vendor
 - We had a plant staff of 1,500 people that were responsible for not only operating the plant but managing the fuel with periodic support from the vendor for cask loading campaigns, cask fabrication, etc.
 - That picture changed radically when we permanently closed the plant and were faced with a situation where in order to offload the fuel in a reasonable timeframe we would need an intense campaign over a one- to two-year period to load 100 canisters, roughly (not 10 canisters every 3 years) and were faced with an expansion of the pad in a relatively short term. At that time, the utility plant staffing was going from 1,500 to 450, to somewhere around 325 next year and will stay at a low level
 - The utility staff shifted to maintenance and monitoring mode of the plant in a decommissioning phase, maintenance and monitoring of the spent fuel storage installation and the spent fuel pools, but there was no longer a large staff to handle pad extension, the fabrication of 100+ canisters, and the loading of 100 canisters. Given that change in situation, SCE decided to go out to bid for a different service and a different plan than we needed during operations
 - The new plan needed to consider an early pad expansion, fabrication and delivery of 100 canisters, and a loading campaign done largely by vendors under our direction, so a different campaign than we had first envisioned
 - ii) ISFSI Vendor Qualification (based on both a short- and long-term period of support)

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- Products currently licensed by NRC for storage and transport in US
 - Strong presence in US (i.e., long term commitment)
 - Maintenance and surveillance capabilities with field support services
 - Products must be easily adaptable to SONGS design requirements
 - Capable of performing the full scope of work
 - (a) Engineering
 - (b) Procurement
 - (c) Fabrication
 - (d) Construction
 - (e) Fuel movement services
 - (f) Maintenance, surveillance and aging management program capability
 - Based on these criteria we narrowed it to three vendors that are currently licensed in the US and in previous meetings we've talked about those vendors
 - Ted Quinn asked if the licensing was a criterion
 - (a) Tom Palmisano explained it was embedded in the engineering and the current casks had to be licensed in the US and licensed for SONGS-specific criteria; SCE's specific licenses are SCE's responsibility
- iii) ISFSI Evaluation Process – Evaluation Criteria:
- NRC approved design
 - High seismic design: SONGS specific
 - Engineering capabilities
 - Fabrication capabilities
 - ISFSI construction experience
 - Fuel handling and cask loading experience
 - ISFSI maintenance and surveillance capabilities
 - Fuel handling equipment maintenance and repair
 - Project management experience
 - Schedule performance
 - All three vendors responded and we are now down to the final round with Holtec and AREVA
- iv) ISFSI Update – CASTOR Option – Based on input from CEP, SCE met with Siempelkamp to discuss option with the “CASTOR” product:
- No current US licensed products available for storage and transport
 - Weight would require substantial upgrades to spent fuel crane and handling equipment
 - Siempelkamp offers design services to develop a product and apply for US license, however, would increase offload campaign schedule substantially
 - US presence limited to one site

IV) Chairman David Victor – Introduction of AREVA and Holtec Guests

- a) Our two special guests represent the only two companies that are viable, credible contenders for the contract to supply the canisters at San Onofre. The purpose of today's meeting is to focus on how these canisters will perform and how would we know in the community that the system is working properly. Gain an understanding of the monitoring, defense-in-depth systems that are going to be essential for the long term storage of this waste on site. All of us would

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prefer if the Department of Energy would take the fuel away, but the reality is that the fuel will remain on site for now so we want to know more about how these systems are going to perform. This meeting is to my knowledge unprecedented in the nuclear industry, in that these two vendors are in competition; however, the ground rules are that this is not a commercial meeting. I am enormously grateful that they both agreed to participate in this informative meeting on defense-in-depth

- i) Gene Stone stated his objection to the fact that CASTOR had not been invited to this meeting so that the public could be informed about the different criteria that can be met by different canisters
 - Chairman David Victor replied that a number of CEP members wanted to focus on the two viable products

V) Dr. Michael McMahon (Sr. VP, AREVA TN Americas) – AREVA’s SONGS-Specific Used Fuel Solution

- a) I would like to thank the CEP for asking me to come back and speak to the panel. The CEP’s work is important and there has been extensive workload to field questions and requests for information from the public. I believe it has driven a more open and robust process and I think everyone has benefitted, including the dry fuel storage vendors
- b) Topical outline:
 - i) Overview of cask/canister system design and implementation
 - ii) Defense-in-depth, maintenance and surveillance requirements
 - iii) Anticipated aging management plan
 - iv) Mitigation of degraded canister
- c) Overview of cask and storage system design and implementation (NUHOMS® Systems)
 - i) Dry Shielded Canister
 - The primary criticality control and storage container for the used fuel assemblies
 - Shell designed for extremely long lifetime
 - Ability to “can” assemblies in retrievable cans (NRC license submittal in progress)
 - ii) High Seismic Horizontal Storage Module
 - Passively removes heat from canister
 - Protects canister against external hazards
 - Protects canister from the environment
 - Provides heavy duty biological shielding
 - iii) Robust design is engineered for long-term storage
 - iv) Transfer Cask
 - Assures safe loading and transfer of the canister from the Spent Fuel Pool to the storage module
 - Provides biological shielding during transfer
 - Loaded canister is always in the transfer cask during handling
 - v) Transportation Cask
 - Transports fuel safely away from the site
 - In fabrication now; ready to deploy in 2016
 - Only cask licensed to transport canisters loaded with High Burn-up Fuel in the US
 - vi) NUHOMS® Systems are licensed today to transport SONGS fuel off-site
 - vii) Requires expansion of existing ISFSI pad

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- viii) Horizontal storage requires shallow excavation
- ix) Low schedule risk for meeting spent fuel pool offload dates
- x) Implements technology already in use at SONGS
- xi) Final appearance can be readily enhanced during final site grading
- xii) NUHOMS[®] implementation assures path of greatest certainty to early spent fuel pool off-load
- d) Defense-in-Depth
 - i) Defense-in-Depth – Layers of Protection
 - Key safety functions:
 - (a) Heat removal – ensure fuel/cladding stays intact and in stable temperature range
 - (b) Confinement – protect public health and safety by keeping radioactive material out of the biosphere
 - Defense-in-depth components:
 - (a) Fuel assemblies (pellets and cladding)
 - (b) Dry shielded canister
 - (c) Horizontal storage module
 - (d) Robust Learning Aging Management Program (LAMP)
 - (i) Inspection/monitoring
 - (ii) Mitigation/repair
 - (iii) Isolation/replacement
 - Protecting the fuel is our number one safety priority
 - ii) Defense-in-Depth – Fuel Assembly Integrity
 - Fuel pellets (UO₂)
 - (a) Hard ceramic matrix that locks in and immobilizes 99.9%+ of radioactive materials
 - (b) Keep temperature within stable limits to keep radioactive materials trapped inside the pellets
 - Fuel rod cladding (Zirconium metal alloy)
 - (a) Added layer of protection for the fuel pellets
 - (b) Contain radioactive gases generated in the fuel
 - (c) Keep temperature within stable limits to keep cladding intact
 - First line of defense to contain the radioactive inventory
 - iii) Defense-in-Depth – Heat Removal: Canister and Horizontal Storage Module (HSM) Design
 - Dry shielded canister
 - (a) Canister cools fuel passively through internal conduction to shell surface
 - (b) Helium leak would have minimal impact on heat removal capabilities
 - Horizontal storage module
 - (a) Passive cooling maintained even if lower vents blocked by flood/debris
 - (b) Expedient debris and mud removal from airflow paths
 - (c) Easily accessible for visual inspection of airflow paths
 - Above ground system provides robust heat removal capabilities
 - iv) Defense-in-Depth – Confinement
 - Canister Design
 - (a) Dry shielded canister
 - (i) Confinement barrier for radioactive gases escaping the fuel assemblies

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- (ii) Corrosion-resistant stainless steel shell designed for 100 years + lifetime with Learning Aging Management Program
 - (iii) Low helium back-fill pressure
 - (iv) Loaded canister is always in the transfer cask during handling
 - (v) Double welded lid safeguards confinement integrity
 - (b) Inspections during fabrication
 - (i) Every canister is tested under the most robust guidelines as dictated by Section III, Subsection NB of the ASME code and ANSI N 14.5
 - (ii) Mechanical testing for yield strength, ultimate strength and elongation of each component
 - (iii) Completed fabrication welds are 100% visually and 100% radiographically inspected
 - (c) Engineered and fabricated with highest level of standards
- v) Horizontal Storage Module Design
 - Horizontal storage module
 - (a) 4-foot thick, steel reinforced, concrete roof
 - (b) Dose reduced to levels indistinguishable from natural background radiation at ISFSI fence
 - Licensed to withstand all of SONGS site-specific external hazards
 - (a) Earthquake: 1.5g horizontal / 1.0g vertical acceleration specification makes NUHOMS the highest seismically qualified dry storage system in the world
 - (b) Tsunami/Flood: qualified for a flood height more than the SONGS site design basis flood height
 - (c) Tornado: can withstand impact of tornado accelerated objects
 - (d) Aircraft impact: no release of radioactive material in case of aircraft impact and above ground system not susceptible to jet fuel fires
 - Robust storage module engineered to perform through hazards
- e) Learning Aging Management Program (LAMP)
 - i) Three Pillars
 - Adaptive system
 - (a) Inspection/monitoring
 - (b) Mitigation/repair
 - (c) Isolation/replacement
 - Periodic inspections – data collection
 - (a) Initiated at license renewal; timed to occur well before degradation can progress
 - (b) Subsequent 5-year inspection intervals are spaced to detect any degradation mechanism
 - Potential additional inspection
 - (a) LAMP includes “toll gate” feature at five year intervals, which evaluates latest research and industry experience of dry storage aging mechanisms and inspection methods and results
 - (b) Correspondingly appropriate changes to LAMP will be implemented
 - LAMP is a further line of defense for long term storage
 - ii) Aging Management Plan: Inspection Capabilities
 - Inspections – capability for inspection of 100% of canister surface

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- Non-Destructive Examination (NDE) Tools
 - (a) Exam tools ready for field deployment in 2016, 7 years ahead of need for SONGS license renewal
 - (b) Current standard is enhanced visual inspection using high resolution video cameras; can use other techniques if needed
- Above-ground system allows for:
 - (a) Simple retrieval for inspection and shipment
 - (b) Accessibility in case of remediation (cleaning, repair)
- NUHOMS[®] System provides easy access for inspection
- iii) Aging Management Plan: Research and Licensing
 - The NRC issued the initial licenses for components for 20 years and will reissue them in up to 40-year increments with “toll gates”
 - (a) AREVA currently submitting license renewals at other sites
 - AREVA has 5 years of experience in research and development of LAMP
 - (a) SONGS NUHOMS system will have the benefit of standardized NUHOMS[®] System LAMP experience (17 sites, 381 DSCs and 3,000+ “canister years”)
 - Long term NRC High Burn-up Fuel (HBF) licensing coordinated with DOE/EPRI Research
 - (a) AREVA (TN-32) plays a central role in the Department of Energy’s HBF storage research and demonstration program
 - (b) AREVA plays critical role in study concerning licensing analysis
 - (c) AREVA’s global research and engineering resources augments DOE/EPRI Research
 - AREVA is at the forefront of High Burn-up Fuel research and LAMP development
- iv) Aging Management Plan: Long-Term Solutions
 - AREVA has a fully licensed solution for off-site transportation today
 - Since 1966, AREVA has transported more than 75,000 spent nuclear fuel assemblies worldwide, including 15,000 High Burn-up Fuel assemblies
 - (a) No release of radioactive material ever
 - (b) No damage to fuel during transport
 - AREVA has the most experience in transporting used fuel... including High Burn-up Fuel
- f) Mitigation of Degraded Canister
 - i) Canister Repair
 - Sufficient time exists for remediation action due to extremely slow progress of degradation mechanisms
 - If an indication is detected by LAMP on a canister it can be repaired by well-established nuclear industry best practices and techniques
 - Through-wall crack poses no threat to health and safety of the public
 - ii) Canister Replacement
 - Utilize pre-staged overpack module with canister sleeve to isolate a canister needing replacement
 - Overpack sleeve is sealed and monitored
 - Transportation cask is used to move canister off-site
 - iii) No impact to public health and safety
- g) Conclusion
 - i) Long-term public health and safety is assured through “defense-in-depth” protection:

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- Fuel rod in the assembly captures 99.9%+ of radioactive material by design
 - Canister is designed to remove heat and confine any radioactive gases
 - Storage module is designed to remove heat and protect canister from external hazards
 - Adaptive and conservative LAMP ensures long-term integrity of the system
 - (a) Inspection/monitoring
 - (b) Mitigation/repair
 - (c) Isolation/replacement
- ii) AREVA has more than 50 years of experience in safely managing used nuclear fuel
- iii) SONGS can rely on AREVA as a strong, long-term partner
- h) CEP Member Questions
- i) Chairman David Victor commented about the inspection tool that was going to be ready by 2016 and that won't be needed at SONGS until 2020, and asked if the canisters should be inspected earlier than that. Secondly, if a crack were discovered one strategy would be to put the canister in an over-pack and does that mean that these over-packs need to be pre-positioned on-site or in the western US?
- Dr. Michael McMahon responded that several systems have been inspected at the 20-year point, for example, Calvert Cliffs (on the Chesapeake Bay) just recently and AREVA used a borescope (a very thin camera) to do an inspection; the canisters looked almost pristine. Inspections have also been performed at other sites. Based on those inspections and the fact that there was no evidence of degradation, the 20-year timeline looks very conservative; the data shows that there is no benefit to inspecting early
 - Dr. Michael McMahon stated the over-packs should be pre-positioned on-site. The vision is to have an empty module or two on the site with the over-pack, for immediate transport
- ii) Hon. Jerry Kern commented that the coast is a pretty harsh environment and part of the AREVA system has aluminum in it, which degrades very quickly
- Dr. Michael McMahon stated that the aluminum is on the inside and is not exposed. The exposed surface is 316L stainless steel which is corrosion-resistant and used for this site because of the marine environment; 316L has a higher resistance to marine environment than the 304 stainless steel used in non-marine environments
 - Chairman David Victor asked what would be done if chlorides were found
 - (a) Dr. Michael McMahon stated chlorides were found at Calvert Cliffs but no evidence of corrosion; database of results is being built
- iii) Ted Quinn asked, 1) if the US was to set up an interim storage in the western US, is the pad design sufficient to allow transportation off-site and 2) do you still have some licensing to do on the transport cask
- Dr. Michael McMahon responded the transportation cask is in fabrication, but is licensed and should be field-deployable in 2016
 - (a) Ted Quinn asked what with all the logistics of moving equipment necessary to allow transport off-site, does that work with the design you're proposing
 - (i) Dr. Michael McMahon responded absolutely, that the way the canisters are transferred from the pool to the pad is very similar to the way it would be transported
 - (ii) Ted Quinn asked if both a NRC and DOE license are required for transportation

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1. Dr. Michael McMahon responded that both an NRC and a DOT (Department of Transportation) license are required and AREVA has both
- iv) Secretary Dan Stetson asked for confirmation that if there is a leak AREVA would box up the canister and ship it off-site
 - (a) Dr. Michael McMahon stated it would depend on the circumstances; if there was a crack that could not be repaired on-site, that's the mechanism you'd use. First you'd isolate the cask and allow time for the transportation equipment to get there, and then transfer it off-site. That would be a very rare instance, but it's recommended to have that capability just for conservatism
 - (i) Secretary Dan Stetson asked if that happened, where would the canister be shipped for repair
 1. Dr. Michael McMahon stated it could be shipped to any spent fuel pool
 - a. Secretary Dan Stetson asked if a pool was not available, is it something that could be constructed on-site in a fairly short period of time
 - i. Dr. Michael McMahon responded that in theory all you need is a pool and that he didn't foresee there being anything challenging about that
- v) Chairman David Victor mentioned that there had been some discussion on the CEP about hot cells and is it your opinion that the industry should be figuring it out so one is ready to go if it's needed, or is that a waste of money?
 - Dr. Michael McMahon stated that was a complex question. First of all it's a very rare event to use one. The pool would be your first line of defense. If we had an interim storage facility it would make sense to have a handling facility that was capable of dry handling. AREVA has a recycling facility in Normandy, France, that has a full hot cell capable of unloading casks. AREVA also have mobile hot cells which are used more for waste applications; the knowledge exists to have a mobile cell which would be able to transfer fuel
- vi) Gene Stone asked that if a pool is the first line of defense, why SCE doesn't keep a fuel pool on-hand. Also, who's responsible for having the transport cask on site: SCE or AREVA? Does the technology exist to actually repair the outside of your canister?
 - Dr. Michael McMahon responded that
 - (a) It is hard for him to envision an incident that you could not repair on-site and does not see the need to keep a pool on-site as there are other pools in the state that are available; this is more of a risk management decision and not a technology decision.
 - (b) SCE has the responsibility for the operation of the ISFSI, but AREVA has the equipment and would make it available if needed. Because you can isolate the cask, you don't need to have a transport cask sitting right outside the gate
 - (c) AREVA can repair canisters using currently existing technology and has performed repairs on stainless steel in nuclear applications for decades (weld overlays, etc.)
- vii) Hon. Larry Kramer asked what AREVA was doing to protect against galvanic corrosion within the module
 - Dr. Michael McMahon stated that the interior of the canister contains no liquids; we pull the liquids out and we put inert gas inside; we've had no experience with galvanic corrosion because there are no electrolytes to cause that type of degradation

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- (a) Hon. Larry Kramer asked if there are any external monitors on a continuous basis for temperature and so forth so we know what's happening inside
 - (i) Dr. Michael McMahon responded that the daily maintenance includes monitoring the temperature of the concrete as well as a visual inspection
- viii) Larry Rannals asked about mode of transportation based on the weight of the canisters (rail or public highway)
 - Dr. Michael McMahon responded that it would probably be easiest to transport by rail although there are large transporters that can distribute the weight; AREVA routinely uses rail or barge; public highway is technically possible with special equipment, but would be much more challenging

VI) Dr. Kris Singh (President & CEO, Holtec International) – HI-STORM UMAX: Holtec's Underground Dry Storage System (State-of-the-Art Solution for the Safety and Security of the People and Environment at SONGS)

- a) I am honored to present to you the technology which is eminently suitable for deployment in your neighborhood; it is a state-of-the-art solution for the safety and security of the people and environment at SONGS
- b) Topical Outline:
 - i) Overview of Holtec International and Holtec's HI-STORM UMAX System and Implementation (U stands for underground and MAX stands for maximum safety and security)
 - ii) Defense-in-Depth, Maintenance, and Surveillance Requirements – Performance Monitoring Program
 - iii) Anticipated Aging Management Plan – Canister Monitoring and On-Going Developments
 - iv) Mitigation of Degraded Canister – Damaged Canister Storage Plan
- c) Overview of Holtec International
 - i) Holtec is a US owned company with four operation centers in four states
 - Holtec has a large international footprint in used fuel management with 67 nuclear units, including Chernobyl
 - Holtec has the most transportable dry storage systems loaded worldwide
 - ii) Examples of Holtec's technology leadership in dry storage
 - Secured license for the first multi-purpose canisters in the US (1998)
 - Secured license of America's first dual-purpose cask, HI-STAR 100 (1998)
 - Pioneered the certification of "canning" for storing vulnerable or damaged fuel in welded canister; a large number have been successfully loaded around the world (including Illinois, Oregon, California, and Spain)
 - First to obtain the license to store High Burn-up Fuel (2001)
 - Licensed industry's first transport cask, HI-STAR 180 for High Burn-up and MOX Fuel (2009)
 - Holtec holds more patents on used fuel management technologies than all world suppliers combined
 - iii) Holtec has licensed a fleet of used fuel transport casks
 - Industry leader in obtaining transport cask licenses over the past 5 years
 - Certification effort for Holtec's universal transport cask (HI-STAR 190, proposed for SONGS) is underway; expected to receive NRC license in 2015
- d) Essential Features of Holtec's HI-STORM Dry Storage Systems

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- i) Canisters are stored vertically
 - Reduced rate of solute deposition on vertical surfaces
 - Vertically oriented fuel rods provide significant self-shielding
 - Entire shell surface can be conveniently inspected
- ii) Biological shielding uses structural steel with enclosed concrete to prevent spalling of concrete due to aging
 - Steel structure is more resistant to incident missiles or crashing airplanes
- e) Introduction to Holtec's HI-STORM UMAX Underground Dry Storage System (labelled diagram)
 - i) 24,000 lb. steel/concrete closure lid
 - ii) Reinforced concrete top pad
 - iii) Corrosion-resistant stainless steel spent fuel canister
 - iv) Solid concrete monolith
 - v) Corrosion-resistant stainless steel liner
 - vi) Reinforced concrete base mat
- f) Constituent components of the HI-STORM UMAX System for SONGS
 - i) Multi-Purpose Canister (MPC-37) – meets the most stringent ASME code
 - ii) HI-STORM UMAX – underground storage module designed for virtually zero dose, low profile, full protection from extreme environmental events
 - iii) HI-TRAC VW On-Site Transfer Cask – assures safe movement of the MPC during on-site loading and transfer operations from the spent fuel pool to the HI-STORM UMAX
 - iv) HI-STAR 190 Off-Site Transportation Cask – qualified to transport MPC-37 containing High Burn-up Fuel
- g) Holtec's HI-STORM UMAX Multi-Purpose Canister
 - i) Canister shell is made of 5/8-inch thick, high-quality, stainless steel type 316L, providing extreme corrosion resistance in marine environments
 - ii) Canister lid (9.5-inch thick) is strength welded to the shell, and further protected by a redundant closure ring to ensure long service life
 - iii) Canister is licensed for the storage of damaged fuel containers ("cans")
- h) Holtec's HI-STORM UMAX System Design and Implementation
 - i) Decommissioning benefits of vertical storage and MPC-37
 - MPC-37 stores 37 used fuel assemblies
 - (a) High storage capacity of MPC-37 requires fewer storage system and fewer off-site transports
 - (b) Enables expedited defueling of the spent fuel pools
 - (c) Enables prompt decommissioning of the site
 - High heat rejection capacity of MPC-37 (47 kW) ensure low fuel cladding temperature in service
 - Keeps fuel in the orientation (vertical) for which it is designed; no risk of creep-induced deformation in long-term storage
 - MPC-37 stands on solid ground
 - Installing the loaded canister in HI-STORM UMAX is a simple, low dose operation that relies only on gravity
 - Canister is vertically stored underground in a clean, dry cavity
 - Holtec's HI-STORM UMAX will have 73 dry storage cavities to defuel the spent fuel pools – compact footprint

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- ii) High Seismic Canister Storage in California
 - In California, Holtec deployed the first anchored above-ground dry storage system at Diablo Canyon and later deployed underground dry storage systems at Humboldt Bay
- iii) HI-STORM UMAX Excels in Dose Attenuation, Seismic Resistance, and Security
 - Extreme seismic resistance capability: exceeds SONGS specified earthquake criteria
 - HI-STORM UMAX underground storage cavities are encased in a concrete monolith
 - Dose: indistinguishable from background radiation at the boundary fence
 - Aesthetics and security: visually inconspicuous
- iv) HI-STORM UMAX Cavity is Invulnerable to Ground Water Ingress, Fire, Flood, and Tsunami
 - There is no path for ground water to intrude into the HI-STORM UMAX cavity
 - Flooding of any severity will not challenge HI-STORM UMAX's performance
 - Any fire in the HI-STORM UMAX cavity will self-extinguish
 - HI-STORM UMAX is designed to withstand beyond design basis tsunami impact
 - Provides convenient removal features for water, mud, and debris
- i) HI-STORM UMAX is Fortified to Withstand Beyond Design Basis Threats
 - i) HI-STORM UMAX was designed in the wake of 9/11
 - ii) The cylindrical surfaces of the stored canisters are inaccessible to any missile or projectile
 - iii) The only access to the MPC-37 is guarded by a 36-inch thick stainless steel and concrete lid
 - iv) Below the closure lid, the canister is protected by a 9.5-inch thick solid stainless steel lid
 - v) All design basis and beyond design basis threats cannot cause loss of confinement of the stored canister
- j) Defense-in-Depth, Maintenance, and Surveillance Requirements
 - i) Defense-in-Depth in Manufacturing
 - Integrated design and manufacturing under NRC, ASME, and ISO-approved Quality Assurance Program
 - ii) Defense-in-Depth by Design
 - Canister oriented vertically to minimize salt deposits from accumulating on the canister's shell surface
 - The warm surface of the canister discourages dissolved salts in the air from condensing
 - The vertical orientation allows for complete access to the shell surface for inspection
 - Vertical orientation ensures that there are no crevices on the canister shell where contaminants can collect and concentrate
 - iii) Defense-in-Depth During Canister Loading
 - The Forced Helium Dehydrator (FHD), invented and licensed by Holtec in 2002, provides additional protection to used fuel during drying by maintaining low fuel cladding temperatures
 - FHD is currently in use at 30 reactor units to protect used fuel from failure during canister drying operations
- k) Canister Integrity Monitoring Program
 - i) Defense-in-Depth, Maintenance, and Surveillance Requirements
 - Canister Integrity Monitoring Program – provides early detection of potential threats to confinement integrity
 - Prediction of Flaw Initiation – material “coupons” are placed in the HI-STORM UMAX to serve as a pre-cursor of potential canister degradation

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- (a) Coupons bound the worst-case conditions of canister temperature, stress, and air flow conditions
- Periodic surface sampling for the presence of contaminants
- Flaw and failure detection
 - (a) Surface visual examination
 - (i) Full-length, 360 degree visual canister and HI-STORM UMAX visual examination
 - (ii) Lighting and cameras can focus on any part of the canister shell or vertical HI-STORM UMAX structure and measure the geometry of an indication
 - (b) Removal of the canister into the HI-TRAC Transfer Cask for an integrated helium leakage test
 - (i) Integrated helium leakage test is quick, easy, absolute, and will find microscopic flaws undetectable by other means
- Monitoring
 - (a) Periodic inspection of the canisters to monitor changes in any previously-found indications and identification of any new indications
 - (b) As shown at Hope Creek (picture shown), Holtec's Canister Integrity Monitoring Program detects and tracks indications long before they become a threat
 - (c) Holtec designed a Surface Sampling Inspection Tool that has been used to take samples from canisters stored in marine environments at Diablo Canyon and Hope Creek as part of the EPRI study
- Ongoing Advances in Aging Management Plan – Advanced Inspection Techniques Made Easy by the Vertically-Oriented Canister
 - (a) Precise volumetric measurement method for indications
 - (i) Current under development in conjunction with Rolls Royce and Electricity de France for use at Sizewell
 - (ii) Rotating sensors located in the Mating Device scan the entire canister shell surface
 - (b) Continuous lid temperature monitoring (being developed for Chernobyl)
 - (i) A sudden change in the temperature may indicate a deviation in canister conditions
- ii) Mitigation of Degraded Canister Using HI-TRAC VW (included in PowerPoint deck but not discussed)
 - SONGS will have two HI-TRAC VW Transfer Casks ready to serve as confinement provider to a damaged canister
 - Separate, stand-alone, oversized HI-STORM UMAX cavity will eliminate the need to maintain the spent fuel pool or hot cell
 - The loaded HI-TRAC VW will be stored vertically in the specially designed spare HI-STORM UMAX cavity
 - HI-TRAC VW will provide radionuclide confinement for an extended period
- iii) Alternative Method for Mitigation of Degraded Canister Using HI-STAR 190 is readily transportable off-site (included in deck but not discussed)
 - In the unlikely event of a threat of loss of confinement integrity is indicated, as an alternate approach:
 - (a) Canister is placed into the HI-STAR 190 Transportation Cask, located in the oversized HI-STORM UMAX cavity

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- (b) Lid is sealed and leak tested
 - (c) Cask provides radionuclide confinement
 - Casks are temporarily stored vertically in a HI-STORM UMAX cavity
 - The loaded HI-STAR 190 is readily transportable off-site
- l) Concluding Remarks
 - i) HI-STORM UMAX is designed to withstand severe environmental threats, such as flood, tsunami, fire, without threat to the system's confinement integrity
 - ii) HI-STORM UMAX is designed to provide a long, trouble-free service life
 - iii) HI-STORM UMAX's Canister Integrity Monitoring Program provides a comprehensive approach to prevention, detection, monitoring, and remediation
 - iv) HI-STORM UMAX provides ultimate safety and security for public health and safety
- m) CEP Member Questions
 - i) Chairman David Victor asked about the results from the EPRI monitoring program where some accumulation of salts were detected and if those numbers were worrisome
 - Dr. Kris Singh responded that the data was relatively limited because the canisters have been in use only a few years and the accumulation is very minor; we found the canisters to be shiny and no evidence of damage which would be demonstrated by pitting which would then lead to corrosion; doing surface examinations gives you plenty of time to identify future damage
 - (a) Chairman David Victor asked if you can remove accumulation, for example using a hose
 - (i) Dr. Kris Singh stated the main protector is heat; if the wall is warm then you won't have condensate that will deposit, concentrate, and become a nucleation site for attack. As the canisters get older Holtec is advising to close the inlet vent (in a small calculated amount), so the canister always stays warm. If you do that, Holtec expects that the rate of deposition will be significantly reduced and therefore will not get to the point where there would be damage to the canister wall
 - ii) Hon. Jerry Kern asked if Holtec had any history of water seepage in these canisters, at all
 - Dr. Kris Singh responded no
 - (a) Hon. Jerry Kern asked how deep the excavation will be
 - (i) Dr. Kris Singh responded 25 feet
 - 1. Hon. Jerry Kern asked what Coastal Commission permits will be required
 - a. Tom Palmisano responded that for the pad expansion, whichever design was chosen, SCE will follow all the appropriate permitting; that is being assessed right now and the Coastal Commission process will be followed as well as any other appropriate processes
 - iii) Secretary Dan Stetson asked about a recent Holtec press release that talked about a double-walled canister that Holtec is using in Ukraine that is safer; is technology advancing to adopt the double-walled system
 - Dr. Kris Singh responded that the double-walled canister provides different benefits; it basically protects the inner shell completely from adverse environments. You can also realize nearly the same benefit by using a higher corrosion resistant material, like 316L, and implement the measures that keep the pitting from initiating. In November Dr. Kris

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- Singh will be giving a detailed dissertation to 50 of Holtec's customers to discuss a variety of measures that can be taken to keep corrosion from occurring
- iv) Ted Quinn asked if the system being proposed is already licensed and is it deployed anywhere else
 - Dr. Kris Singh responded that the NRC has gone through the rulemaking period and on November 24 it becomes effective. This system is being used at Callaway where we are building it, and at Humboldt Bay (an earlier version of it)
 - v) Gene Stone asked what the seismic rating is for this monolith
 - Dr. Kris Singh responded that the Coastal Commission's requirements are 1.5g in 2 horizontal directions, zero period acceleration, and the vertical acceleration is 1g. We made the seismic scenario more severe and put the same earthquake 25 feet below the surface and we found that the stresses are well below the limits (not even close). Capacity-wise we don't know the actual limit, but it is far greater than required
 - (a) Chairman David Victor commented that the CEP looked at seismic issues in the past and both of these designs are exceptionally robust against all of those scenarios
 - (i) Gene Stone asked if any of the European or Asian customers using Holtec systems are using a building to protect against weather conditions
 - 1. Dr. Kris Singh responded that Europeans historically put their casks inside buildings; they don't have huge sites as they do in the US and in Europe you can see apartment buildings right outside the fence of a nuclear facility, so to deal with people's sensibilities they put a structure around it. Most of these structures are not seismically qualified for California earthquakes; these structures are more of an optical protection than a safety protection

VII) Public Comment Period:

- a) A public comment period included written comments from members of the public. Chairman David Victor summarized the comments by topic and engaged the Panel in discussion.
- b) Chairman David Victor summarized questions pertaining to monitoring and sensors (in particular a question from Ray Lutz) and asked both vendors; what kind of monitoring or electronic sensors are being fitted to these canisters (temperature, gas leaks, etc.)?
 - i) Dr. Michael McMahon responded that temperature monitoring and radiation surveys are conducted; however, looking ahead, the types of instruments to be used are still under development. There's a lot of discussion about being able to monitor inside the casks, but one of the main benefits of having these welded casks are that you have a very tightly sealed environment. In order to put any kind of monitoring inside you would have to drill a hole; there's a trade-off between the tight integrity boundary and the information inside. That being said, you could look at thermocouples to monitor temperature on the metals themselves or perhaps acoustic sensors; long term monitoring is still under development
 - Chairman David Victor asked Dr. Kris Singh if he was in agreement that we should not be looking for monitors that would go through the wall of the cask because that would introduce additional failure points
 - (a) Dr. Kris Singh agreed that you should not breach the confinement integrity to monitor for breach of confinement integrity; in the Holtec system there is a direct way to see if you're getting any breach of the wall: helium circulates within the canister and makes the lid hot; a thermocouple is attached to the lid and you can

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- see the temperature; if you had loss of helium that temperature would drop;
measure the metal temperature, not the air temperature
- (b) Dr. Michael McMahon added that the difference in technology is that with AREVA's system there is less dependence upon the helium for heat transfer, so loss of helium wouldn't show as such an abrupt temperature change; different design features
- c) Chairman David Victor asked a question from Ray Lutz pertaining to a program to look at the degradation of High Burnup Fuel in vertical cask systems, and asked what is the status of research projects on degradation of High Burnup Fuel in horizontal cask systems
- i) Dr. Michael McMahon stated the EPRI DOE program is using an AREVA cask (TN-32 vertical cask which is designed to collect the material properties from the cladding over aging). Right now we have not envisioned a specific program just to look at horizontal versus vertical. The most important data is to look at the impacts of the aging due to the radiation effect and temperature changes. There may be a different profile over time in the horizontal or vertical but as long as we collect the data we'll be able to characterize the material in terms of radiation effluence and map very effectively the material properties with the vertical. No one's looked at the specific vertical versus horizontal aging program; it's an interesting idea to contemplate
- d) Chairman David Victor asked about monitoring of the site (two questions from Jennifer Massey); who will be on the site 24/7 collecting all this information
- i) Tom Palmisano responded that it is SCE's responsibility to maintain the fuel in the fuel pools and the dry cask storage system including periodic monitoring and will continue to be SCE's responsibility even after the plant is decommissioned and just the ISFSI remained. SCE will have a 24-hour presence on the site for inspection, monitoring, and response
- Dr. Michael McMahon added that during the actual loading campaign which will take weeks/months, the vendor crews would be on site, handling the fuel, handling the casks, and loading the system. Once that is complete it will shift to the utility
- (a) Tom Palmisano stated that during the loading campaign, SCE is ultimately responsible
- e) Chairman David Victor asked about the repairs and what technologies actually exist right now (a question from Donna Gilmore), and when can we expect the demonstration proof of technology in the future
- i) Dr. Kris Singh believes it is not practical to repair a canister if it were damaged; if in the most unlikely circumstance a canister had a through-wall crack, you wouldn't repair it, however, you could easily isolate the canister in a cask that keeps it cool and provides a next confinement boundary
- ii) Dr. Michael McMahon added that in the very rare event that you have a canister that needs to be repaired, the most likely event is that you'll inspect and find an indication, and to address an indication the technology used would be grinding the surface metal and do a weld-overlay repair, and a very innovative way is to use a peening-like ultrasound that compresses the crack on the surface and stops the crack growth; these repairs would be used for an early indication, not a through-wall; this is well-established technology that is currently used regularly at nuclear power plants
- Chairman David Victor asked for confirmation that AREVA is not waiting for regulatory approvals for a method for responding to a crack

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- (a) Dr. Michael McMahon confirmed the technology exists right now, and commented that perhaps the confusion is that if you found an issue you would develop a very specific repair plan based on the specifics of the geometry and location; for example Palo Verde had a bottom-mounted nozzle indication that needed repair and AREVA developed a repair plan, got it approved, and did the repairs
 - (i) Donna Gilmore commented that at the NRC technical meetings they're saying that there is no technology today to repair cracks in canisters even though you can repair materials it becomes problematic when it's full of radiation, so you don't have anything to use today to do that
 - 1. Dr. Michael McMahon responded that technically that is not a correct statement; the ability to repair metals in high radiation fields has been done for decades. Perhaps the NRC was saying that the specific ASME sections have not been precisely developed for it, but in terms of technical capability, absolutely it can be done, there is no technical barrier
 - 2. Chairman David Victor asked Dr. Kris Singh if he agreed with Dr. Michael McMahon's characterization; understanding that there are some issues with the ASME, and to provide an assessment
 - a. Dr. Kris Singh's personal opinion is that if a canister develops a microscopic crack it is a tall order to locate the crack, and if you try to repair it remotely, by welding, you create a rough surface which becomes a nucleation site for corrosion down the road. ASME Section III, Class 1, has very significant requirements on making repairs of Class 1 structures, like the canisters; so I don't advocate repairing the canisters
 - 3. Gene Stone asked if AREVA had done repairs on canisters with radioactivity inside of them
 - a. Dr. Michael McMahon responded no, there has not been a need to because there have been no canister cracks
 - (b) Chairman David Victor asked the vendors to discuss the confidence they have that the cracking and deposition is not going to happen at least in the next few decades
 - (i) Dr. Kris Singh stated that the location a crack would most likely begin are called heat-affected zones where welding occurs. In manufacturing we make sure that the sensitization does not occur; Dr. Michael McMahon was correct in that if you peen the surface you create compressive stresses on the surface that protects the canister from propagating. Holtec's belief is that a canister that is properly looked after, meaning that you do not allow the combination of low temperature, high humidity, salt deposition, and high tensile stress, you will not get damage to the canister
 - (ii) Dr. Michael McMahon agreed with Dr. Kris Singh in that as long as you control the material, the temperature, and the environment, stress corrosion cracking is a very controllable phenomenon
 - (iii) Ted Quinn commented that before we leave this subject that we're not leaving it with a discussion of stainless steel that is not able to be repaired. It is definitely able to be repaired; Palo Verde is repairing the nozzle in a much

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higher pressure and temperature environment. I need to be sure that's clear
and that the public is not confused

- f) Chairman David Victor asked about the schedule for removing the last nuclear material from the site (question from Jennifer Massey) and the uncertainty around the DOE's plans
 - i) Tom Palmisano stated that the Department of Energy (DOE) has not really laid out a game plan that anyone has a lot of confidence in, so SCE is responsible for maintaining it on-site until there is a repository. For planning purposes, and planning purposes only, SCE assumes that the fuel is on-site until 2049 but that is an artificial date; some timeframe had to be used for the cost estimate, and that estimate is updated every year and as the DOE's plans become clearer, we'll have a better estimate. For now, the fuel will be on-site for a long time, unless something changes politically. SCE will have people on-site 24/7 until the fuel is removed unless the DOE does something differently, for example, if the DOE said they would take over responsibility for the fuel on-site, then the license would change, but at this point it is SCE's responsibility
- g) Chairman David Victor asked what SCE would do if the selected vendor went out of business (question from Marni Magda)
 - i) Tom Palmisano responded that the vendor evaluation includes risk the company portrays as part of the standard business analysis (short- and long-term confidence). The current plan is to have the fuel pools empty by mid-2019 or earlier, so an intense period over the next five years. The contract would include exit criteria which would allow SCE to take over and bring in another vendor. After 2019, when the pools are empty and all the fuel is in the dry fuel storage system, there is not a lot of ongoing daily or regular activity. There's periodic licensing, periodic help for the maintenance and surveillance program, the monitoring is done by SCE, and we become much less dependent on the vendor. In the unlikely occurrence that the vendor exits the business, we would take the equipment from them and hire a new vendor to fulfill the role
 - Marni Magda asked about the DOE starting to take fuel in 2024 but we don't get ours taken until 2049, and we could have the fuel staying 60 years, which is 2073; who is responsible for the licensing and where is the money
 - (a) Tom Palmisano stated that SCE is responsible for ensuring the money is there and as SCE is a rate-regulated utility we've concluded that we're fully funded for decommissioning including spent fuel management and we have to maintain that assurance or deal with the Public Utilities Commission in the future, so ensuring that the money is there is not the key issue, ensuring there's a competent vendor to support us seems to be the major concern. In the case the vendor exits the business SCE would have to ensure that the technology and the licenses are transferred to us or to another qualified company. That's been done over the years in the industry and we would know how to do that, but it is SCE's responsibility to do that
 - (b) Dr. Michael McMahon mentioned that this has happened in the past when small companies have been consolidated (e.g., NuTech) and AREVA was successful in acquiring the license in a very orderly process; this is a normal business cycle and has happened before without any disruption of service
 - (c) Ted Quinn commented that if the fuel remains on-site DOE lawsuits would provide funding

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- (d) Dr. Bill Parker posed a rhetorical question that if you're thinking about half a century or century, perhaps the concern would be about the future of SCE rather than particular cask vendors; if the utility structure changes in a fundamental way where would responsibility lie?
 - (i) Chairman David Victor responded that was an excellent point that they should keep in mind
- h) Chairman David Victor asked Dr. Michael McMahon about the licensed transport cask and if the license is to transport a damaged canister or will we find ourselves in a regulatory limbo
 - i) Dr. Michael McMahon stated the basis of the canister's design to protect public health and safety does not depend upon the canister as a confinement boundary; we are able to put the canister inside the heavy walled transportation cask and seal it shut, and the accident analysis doesn't take credit for the canister being intact; therefore the transportation cask can transport a damaged canister
 - Tom Palmisano clarified that the transport cask doesn't credit the canister
 - Donna Gilmore stated she has read the specification for the MP-197 transport cask and it requires it be an intact canister inside, so are you revising your MP-197 specifications
 - (a) Dr. Michael McMahon stated the NRC does provide for exceptions to be able to transport a damaged canister because the licensing basis doesn't take credit for the canister; an exception would be required
 - (b) Chairman David Victor commented that this must happen all the time and Dr. Michael McMahon confirmed that it does
- i) Chairman David Victor asked Dr. Kris Singh about the issue of consolidated interim storage (co-located facility) and how it would work with these two different designs; is there anything about the Holtec design that makes consolidated interim storage difficult
 - i) Dr. Kris Singh stated that the idea of consolidated interim storage is to reduce the number of locations fuel is stored. The push from suppliers has been to develop a universal transport cask so we can transport anybody's canister from their site to the interim storage facility and off-load the canisters into the interim storage cavity
 - ii) Dr. Michael McMahon commented that the centralized interim storage facility would not be a lot different than the ISFSI currently at San Onofre; there could be an AREVA section, a Holtec section, etc. You could even have a pool. It's pretty low tech. The advantage is that you could release the decommissioned nuclear sites for other uses. There are plants in the US that have been shut down for decades and the only thing left there is the used fuel so it would be very advantageous to have a place to centralize that and release the stranded sites
- j) Chairman David Victor received a couple of questions related to integrity against attack and how do we think about security of both of these designs against missile attack, RPGs, not just aircraft, and have you looked at integrity against missile attack and other things that the anti-terrorism communities are worried about?
 - i) Dr. Michael McMahon stated that AREVA does have to demonstrate protection against missile as a thrown object (see videos on website), such as metal telephone poles. In terms of the more advanced weapons, we're always looking to improve safety and security; these structures are incredibly robust, several feet thick of steel-reinforced concrete. These are simple systems: passive, no moving parts, low pressure, mostly solid material, and even if you get a breach the impact on public safety is very limited. AREVA is always upping the game to make sure they stay current

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- ii) Dr. Kris Singh stated that the UMAX system was primarily designed for security. We started the program a few months after 9/11. If you look at the system, the only way for any missile or projectile to reach the system is from the top, where we've installed a 3-foot thick lid and below that a 9-inch thick stainless steel lid which will take enormous force; there would be buckling but no failure of the canister. This system is designed especially for security from terrorism
 - Chairman David Victor clarified with Dr. Michael McMahon that each of these systems has a different design and each addressed potential threats strategically
 - (a) Dr. Michael McMahon stated that the safeguards information asks what type of threat you need to look against and those evolve and change as do the designs as they go forward
- iii) Dr. Bill Parker commented that these questions do raise some serious issues. 20 to 30 years from now material penetrating weapons could very well be in the hands of terrorists and you could imagine 2-meters of concrete being breached with the appropriate technology. I think this is something in terms of long term protection that we need to think about
 - Ted Quinn added that similar to cyber security threat which is evaluated on a very frequent basis, the physical security is also evaluated on a very frequent basis and it isn't that many years away, it's looked at from an evolving perspective
 - (a) Dr. Michael McMahon added that these are very hardened pieces of infrastructure, by design, and there are much more vulnerable pieces out there
- iv) Secretary Dan Stetson asked for confirmation that each of the vendors is making the canisters themselves, but that it's actually a separate company that's building the concrete structure that they go in
 - Dr. Michael McMahon said the answer for AREVA is both yes and no. There are two methods for constructing the concrete structure: 1) on-site construction done by AREVA's own crews (e.g., Nine Mile Point, Cooper, and Beaver Valley) and 2) off-site construction done by a large pre-cast constructor on the Virginia eastern shore, that does construction and ships them out
 - Dr. Kris Singh stated Holtec is a soup-to-nuts company and they do everything from the beginning to the end
- k) Chairman David Victor commented on the Nuclear Regulatory Commission; there are a lot of meetings going on at the NRC and a lot of information and sometimes it's not clear what the NRC is doing and what it's role is. Gary Headrick feels that the NRC should be doing extensive research on these cask manufacturers and questioning what the manufacturers are claiming, and he doesn't understand what process the NRC is using, what questions they're asking, or if they're just taking the manufacturers word for it. Who is double checking to make sure that these manufacturers' claims are accurate
 - i) Chairman David Victor asked Dr. Kris Singh how claims you make about the design get verified by the NRC and what should the public be looking for as key steps in that process
 - Dr. Kris Singh responded that not one person does the design; about 60 people work on cask design and they all operate under the NRC's whistle-blower act; staff is encouraged to speak up if there is any deliberate or inadvertent error in the work; that is a criminal provision and there is criminal penalty associated with non-compliance. The documents Holtec submits to the NRC for review is subject to rigorous checking; they are given the computer codes and they actually run the calculations. In the case of complex

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calculations they engage NRC research to re-validate. Often there are heated discussions between Holtec and the NRC on calculations or models. It is not fair to accuse the NRC of not doing the work right. They have a substantial staff and substantial resources and we see that they do a very thorough review

- Dr. Michael McMahon asked if Gary Headrick could direct his question more specifically as to where he believed the NRC was not doing their job
 - (a) Donna Gilmore stated that she read the specifications and that there are things included in the vendors' slide presentations that don't match the specifications but there are too many to go over here; the NRC is supposed to be focused on extended storage now but they continue to approve canisters without having requirements in place; they are not looking long term
 - (b) Chairman David Victor stated we should put some of these questions back to the Chairman of the NRC and other folks and we'll have the opportunity to do this in the CEP. They view themselves as the front line of defense in making sure that whatever gets regulated for use is safe as opposed to necessarily driving the long term direction of the industry
 - (c) Dr. Michael McMahon commented that the NRC is not an advocate for the industry, it is not for or against nuclear power, and it is simply to ensure that we comply with the law, so when we make a submittal to them they are verifying that it is correct and accurate and complies with the law. The NRC shouldn't be taking a cheerleader stand or push to say we need to advance the cause of nuclear power; they must take a very neutral, Solomon-like approach. There are research institutes, such as EPRI that need to advance and look at that
 - (d) Hon. Jerry Kern commented that government takes research done by corporations, instead of doing their own research, and just review that research, sometimes inadequately
 - (e) Chairman David Victor asked that the public collect their central concerns about the NRC and share them with him, and he in turn will share them with the NRC Chairwoman and the senior staff and we'll find out their views about this. In this task force that we've done on long term management and aging of casks, I have been struck by the number of extremely important insights we've gained from the Department of Energy lab research projects, and the size of the nuclear research and development organization within the government is extraordinary
- l) Chairman David Victor will summarize a handful of comments and make them available as a public document. All the qualified vendors have been allowed to bid and some have not been examined further because they're not considered to be qualified, as was outlined in Tom Palmisano's presentation. Ace Hoffman commented that he doesn't believe the reasons given for eliminating CASTOR were very good and Chairman David Victor appreciates a variety of points of view, but that discussion took place earlier
- m) Chairman David Victor received a question on ASME from Donna Gilmore
 - i) Donna Gilmore stated neither company has ASME certification and the NRC actually allows exemptions to a number of standards, and the company in Germany actually has ASME certification. That's a standard quality check and I'm concerned that these two vendors have been given exemptions

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- Chairman David Victor asked Dr. Michael McMahon to help us understand the role of the American Society of Mechanical Engineers (ASME)
 - (a) Dr. Michael McMahon stated that they have standards for fabrication and can provide independent verification that standards are met (the N3 Stamp). That is one way, but not the only way, of assuring independent verification during fabrication to ensure that the quality standards are met. What the ASME will do is have independent inspectors sent to a fabrication shop and do independent verification checks. Both of our companies have developed other methods for ensuring that these canisters meet the highest standards of nuclear precision. The N3 Stamp is one way but not the only way
 - (b) Dr. Kris Singh stated that Holtec's plant has every ASME code stamp, Section III, Class 1, 2, 3, MC, every one of them. We also have ISO standards, ISO 9001, and we have all stamps. In our shop we manufacture to ASME, Section III, Class 1 routinely. The issue lies with the way canisters are made; the canister meets Section III, Class 1 95% of the way, but there's one major difference: the top lid gets welded at the site, not in the shop, so it cannot be certified as a pressure vessel under Section III, Class 1 in the shop. What the NRC has done is impose requirements on the testing that must be done on the canister, for example, that actually exceeds Section III, Class 1 requirements. We have the Holtec User Group with its own staff of inspectors that check every step. I can tell you that the amount of inspections that occur on the canister, are far more rigorous than the inspections that occur from ASME, Section III, Class 1 program

VIII) Closing Remarks by Chairman David Victor

- a) Chairman David Victor commented that what the CEP cares about, and what the people in the community should care about, is performance. Making sure the systems actually perform. We need to be careful that we don't get caught up in some bureaucratic procedure or set of rules. This is not the last word on these questions; these are the first words on these questions from the community. This community, as far as I can tell, has asked more questions about these issues than any other community, certainly in the United States, asked them intelligently and thoughtfully. People are concerned and want the best system in place and they want to know how it's going to age. As Dr. Bill Parker said, 50 years is an awfully long time and a lot of things are going to happen technologically, politically, and in terms of businesses over that period of time and we need a system that can adapt to those changes
- b) Thanks to our two special guests, along with the members of the CEP and Edison, because this was an extraordinary meeting. We had a tremendous amount of information presented, discussed, challenged, and rebutted; we're not going to agree on everything in the end but we've gained a lot more useful information today than we had 2 ½ hours ago and I especially want to thank our special guests

IX) Meeting adjourned at 12:40 p.m.

**San Onofre Decommissioning Community Engagement Panel
Special Meeting**

Tuesday, October 14, 2014, from 10:00 a.m. to 1:00 p.m. PDT in San Juan Capistrano, California
Meeting Minutes

ACTION ITEMS AND PROPOSED RESPONSE

	Action Item Description	Comments
	No actions identified	