

## Citizens' Oversight Projects (COPs)

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August 30, 2018

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Greetings:

The NRC announced a "Special Inspection" at San Onofre Nuclear Generating Station to review events surrounding the Aug 3, 2018, fuel-loading "near miss" incident. Through this letter we hope to provide guidance to this investigation by the NRC from our standpoint of providing public oversight, including a request for expanding the scope of your investigation. Please distribute this letter appropriately within the NRC so our concerns will be known by the inspection team.

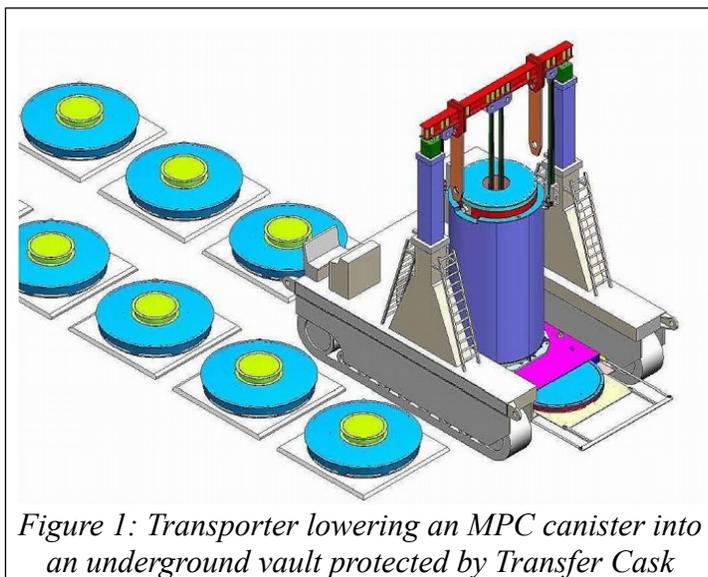
The issues we are concerned with are as follows:

**1. NEAR MISS INCIDENT:** Safety inspector and whistle-blower David Fritch spoke at the 9 Aug 2018 Community Engagement Panel (CEP) meeting in Oceanside. Fritch described a near-miss incident where a fully loaded spent nuclear fuel canister (multi-purpose canister, MPC) being lowered into the underground vault caught on the MPC Guide Ring, and was held by only 1/4 inch from falling 18 feet into the underground vault while the rigging was completely deployed, no longer supporting the canister.

Fritch, an OSHA inspector who has been working on the San Onofre site where spent fuel is being moved to the underground spent fuel storage installation only 100 ft from the water's edge, said that the workers thought they had lowered the canister into the underground vault, only to find out that it had become lodged on a guide ring.

Fritch's full remarks and the initial SCE response to them at the meeting can be viewed in the meeting video [1]. His comments are attached to this letter. See also media coverage [2].

The facts broached by the testimony of Fritch at the CEP meeting have been corroborated by Southern California Edison (SCE). The workers had moved a canister full of spent fuel assemblies inside a Holtec "HI-TRAC" transfer cask using a transporter that can both lift the canister and transfer cask and roll them over to



*Figure 1: Transporter lowering an MPC canister into an underground vault protected by Transfer Cask*

the underground vault where the canister is to be placed. Steel, lead, and water are the principal shielding materials in the HI-TRAC transfer cask so workers can work near the MPC without receiving an excess dose of radiation.

Once over the underground vault, the bottom of the transfer cask has a sliding door that can move out of the way so the MPC-37 canister can be lowered into the vault. (Figure 1).

The rigging holding the canister lowered all the way, and workers thought the canister had successfully been lowered into the vault. However, the bottom of the canister had become lodged on the top of the MPC Guide Ring, which exists about four feet from the top of the vault, and the MPC canister was only barely held by about 1/4 inch from falling about 18 feet into the vault. (Figure 2).

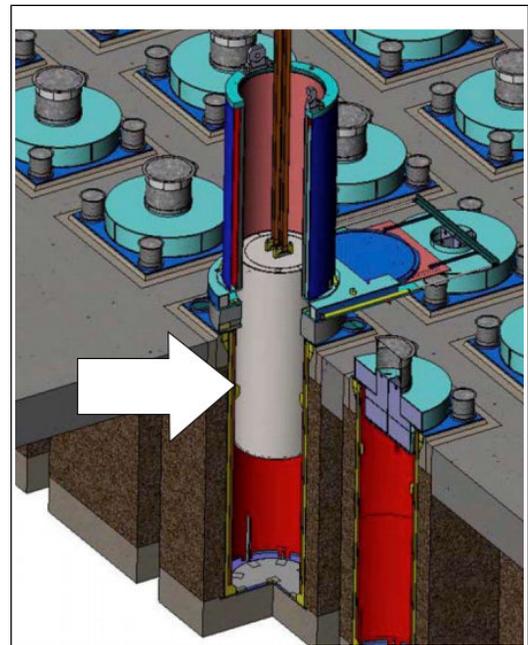
Apparently, the workers then took radiation readings and were concerned that the readings were too high. They discovered that the canister was teetering on the alignment ring. They pulled the canister up with the rigging and re-centered it, and then successfully lowered it into the vault. Fritch also said that this was at least the second time such an incident occurred.

Some have commented that there was no risk to the public in this near miss incident. We disagree. This event **could have been a major disaster**, and it is one that has not been adequately modeled nor is there any plan to deal with it.

The NRC reviewed a mathematical model of a drop test of a canister devised by Holtec [3] Also, Brookhaven National Labs published this more detailed model [4].

Although the model devised above included a drop of the canister inside the HI-STORM (above-ground) shell, this analysis was limited to a drop of **only 12 inches, not 18 feet**. The other aspects of that report concerned drops of the HI-TRAC transfer cask holding a canister. Those models considered larger drops of up to 100 feet. But in those modeled drops, they considered that the contained canister was a "rigid cylinder" and they did not consider the damage to the MPC itself. If you've heard of drop tests of "30 feet", these tests include the transportation cask or transfer cask. These casks provide structural support and/or impact limiters, and those tests do not consider damage to the contained canister either.

As a trained engineer, my thoughts are as follows. First, models can be wrong, as they have never been validated by any actual drops of fully loaded MPC-37 canisters to see what would happen. But intuition says that if the fully loaded, (~45 tons) 5/8" thick stainless steel canister had fallen the 18 feet, it would have suffered substantial damage, particularly at the bottom which takes the full weight of the rest of the cylinder. The containment of the canister may have been breached (most likely at the weld to the base plate), and it very likely would have become wedged in the bottom of the vault (because the sides of the cylinder may have bent in and out or bent to one side). The concrete would be damaged by the falling canister and the shock wave produced by the fall may damage other nearby canisters. The canister spreading to the sides would likely damage the air vents of the underground vault, perhaps crushing them



*Figure 2: Arrow shows location of alignment ring which was supporting the entire ~45 ton mass on about 1/4" from falling about 18 feet into the vault.*

and eliminating any circulating air. Then, the fuel may quickly overheat. If the fuel assemblies inside were also compromised, there is a risk that a critical reaction would have been sustained. It could have resulted in a meltdown or explosive scenario, contaminating the coastal area for many miles. It is unclear how anyone could then get the crumpled canister back out of the underground vault even if the canister containment boundary is not compromised.

These mistakes place the population of approximately 8.4 million residents around the facility at extreme risk of a major disaster, as well as likely radioactive contamination of the ocean and beach areas around the facility.

- > Camera systems are not utilized to allow workers to safely watch the canister at all times.
- > Of concern also was the fact that Edison did not disclose this near-miss at their own meeting.
- > It seems such events have happened at least one other time, also not disclosed.
- > Edison has no plan for what to do if a real disaster should unfold.

Fritch also listed a number of concerns regarding the dismal safety culture at the plant. He said they were under-trained, under-staffed, and did not communicate lessons learned to subsequent workers.

## **2. CHANGED COMPONENTS:**

Secondly, we learned at the March 2018 CEP meeting that Holtec had modified the MPC canister system by changing the design of the ends of the "shim" blocks, which are open to encourage circulation of the helium inside the canister. The design was changed from a more robust end with cut-outs to a flat cut design with stand-off pins. SCE reported that they discovered some loose pins in the bottom of a canister.



Holtec apparently changed the design without informing their customers or the NRC.

We note that the two issues combined would have caused even worse problems. That is, if the pin design is used, coupled with the near miss drop, then these pins would surely bend or break off and the canister would more quickly overheat due to lack of internal cooling circulation of the helium.

Given this newly acknowledged accident scenario, we request that the NRC expand the scope of their inquiry to include the defective canisters already installed in the ISFSI. As these are defective designs, Holtec should pay for the removal of the four defective canisters and to swap out the assemblies into a canister that meets specifications.

**3. NO ACCIDENT SCENARIO PLANS:** Coupled with these two issues is the lack of any plans for what to do if such an event were to occur. The response by SCE representative Tom Palmisano to the question regarding what they would do had the canister actually fallen the 18 feet (see [1]) was that they would take readings, make reports, and then figure out what to do. We find this lack of pre-laid plans

appalling. We have also learned that moving a compromised canister back to the spent fuel pool is problematic, as reflooding a very hot canister is a tricky and dangerous proposition that may result in cracking the cladding due to the sudden temperature changes. However, it has been a standard assumption in the nuclear industry that a pool would be available at the dry storage site and used to stabilize a failed or compromised canister. [5]

It is important to note that the Holtec spent fuel dry storage systems uses components that are used at various stages in the process and each component provides only part of the functionality of the overall system. The MPC itself provides only containment and does not provide shielding nor sufficient structural robustness for transportation or storage. Shielding is provided during transfer of the MPC to the ISFSI through the use of the Transfer Cask (HI-TRAC) which surrounds the MPC. This is transported to the U-MAX underground ISFSI after the spent fuel assemblies are inserted in the MPC and it is welded shut. It is at this stage of handling the MPC canister, lowering it into the underground vault, that we find the canister has no additional protection from the fall. Also, when the canisters are to be moved to their ultimate destination and each is removed from the ISFSI and loaded back into the Transfer Cask, we again have the risk that it might fall into the vault. Then finally, when the MPC is removed from the Transfer Cask and moved into the Transportation Cask (Holtec HI-STAR 190), we have a similar highly risky period when the MPC is not yet protected by the transportation Cask. These transitions include manipulations of the MPC alone, and mean that risk factors will be higher. All these transitions should be included in the review process which should occur at this juncture. We notice also that these critical transitions are not adequately covered by NRC human factors documents. [6]

**Citizens Oversight has petitioned the NRC to improve the rules surrounding the storage of spent nuclear fuel accepted by the NRC for processing. The Docket Number for the Petition: PRM-72-8. The two related documents are available as ADAMS Accession number for the Petition (NRC Rule Changes): ML18022B210; the attachment (HELMS Proposal) ML18022B213.** One of the key suggestions to satisfy the HELMS criteria is to upgrade the canisters with a secondary outer shell so as to meet the 1,000 year design life criteria. We submit that this may be an essential tool to deal with a compromised canister that is leaking to the environment. Therefore, we request that the information related to this incident be provided to those NRC analysts working on the rule-making petition mentioned above.

Citizens Oversight calls on the NRC to include the following in a formal investigation into the situation, including the following:

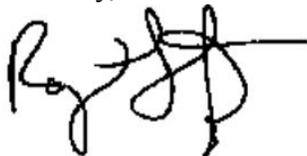
1. **STOP:** Make a full-stop on any further movement of spent fuel to the underground facility until a full analysis, report, and corrective actions are defined and taken.
2. **INVESTIGATE:** The Nuclear Regulatory Commission (NRC) must investigate this incident to determine:
  1. how these mistakes occurred.
  2. a list of similar incidents which also occurred, as mentioned by Fritch.
  3. why the NRC was unaware of this incident, and why such incidents are not reported and why a special inspection and investigation is required to know about such near-miss incidents.
  4. a list of similar accidents that may occur during the sensitive transitions of the MPC from one enclosure to another, for example during the removal of the canister from the vault and then lowering it into the upright transportation cask.
  5. whether scraping damage to canisters will compromise their corrosion immunity.

6. engineering modeling of accident scenarios including a free drop of at least 18 feet (and probably more to account for full rigging failure) including modeling of canister internal structures and allowed design changes (such as the aforementioned bolt changes).
  7. further modeling of the ISFSI structure, including the steel vault liner and concrete, to determine if such a drop would compromise part of or the entire ISFSI facility, knowing that the high-high tide line is only inches below the bottom of the ISFSI structure. During construction, whistle-blowers informed us that SCE had to pump down the ground water in the excavation for the bottom slab structure.
  8. what would be done if everything went wrong, i.e. the canister is dropped in the vault, it gets stuck in the bottom, the containment is breached, and a critical reaction commences. How would the canister be stabilized? To remove it, would the concrete slab need to be cut apart? Unlike the horizontal NUHOMS design, this ISFSI is not modular and there is no means to take it apart to allow access to a canister that has been dropped.
3. **DISCLOSE:** SCE should disclose all prior similar events, including the one referenced by Mr. Fritch, and any other "mistakes" made by their staff during the spent fuel loading operation. The NRC must insure that all issues are being addressed appropriately.
  4. **RESPOND:** SCE should provide a response to the claims that they are under-staffed, under-trained, and have a poor safety culture, including steps to be taken to become safety oriented.
  5. **PLAN:** Akin to Item 2.8 above, SCE & NRC should explain the steps they would take to deal with the problem, assuming the worst, as described above. It is unacceptable to hear yet again from Tom Palmisano of SCE that they would "evaluate the situation and decide what to do at the time." Since similar accident scenarios could occur when the canisters are eventually removed from the ISFSI vaults and transferred to the Transportation Casks for transportation out of the facility, how will a dropped canister be stabilized if the spent fuel pools are demolished? If a spent fuel pool is necessary in such a scenario, then NRC should not allow the pools to be demolished prior to removal of all of the spent fuel from the site.
  6. **REDESIGN:** Holtec should change their design of the spent fuel system so that:
    1. It is impossible for a canister get stuck in the lowering process
    2. Observability is improved during that process so there can be no confusion as to the state of the canister at all times. We suggest the canister lowering process should be live-streamed so the public can witness the operation.
    3. All other transitions, when the canister is moved from one containment to another, are critical and must be addressed with specific plans.
    4. Movement of spent fuel should not continue until these now known accident conditions are fully addressed and accounted for in the FSAR and CoC.
  7. **REMOVE DEFECTIVE CANISTERS:** SCE and Holtec should remove the four defective canisters that use the bolt design and replace the canister with one which meets all specifications. This is particularly important now with acknowledgment of this and similar accident scenarios that include drops of at least 18 feet.
  8. **ROBUST, COMPREHENSIVE AND TRANSPARENT MONITORING** -- The fact that this near disaster was not disclosed to the public is related to the culture of secrecy and poor transparency. We see this also in the lack of robust and transparent monitoring. It is all but

impossible to find and decode the official reports of radioactive monitoring and the public has had to look to third party resources to set up their own monitoring. This does not assuage fear and doubt which otherwise will surface. The NRC should review monitoring and reporting procedures to insure that they are robust, comprehensive, transparent, and easy to interpret.

Nuclear Regulatory Commission, please completely fulfill your responsibilities and include the full scope of this failure in your review.

Sincerely,



Ray Lutz, Engineer  
Citizens' Oversight Projects (COPs)  
619-820-5321

Joined and endorsed by:

Dr. Tom English, Former Advisor on high-level nuclear waste disposal to President Carter's Office of Science and Technology Policy, Sweden's Ministry of Industry, NASA, and California Energy Resources Conservation and Development Commission.

More Information:

[1] Video of the CEP meeting with Fritch's comments and response by SCE, as well as other references on this issue: <http://www.copswiki.org/Common/M1870>

[2] San Diego Union Tribune Article: <http://www.sandiegouniontribune.com/business/energy-green/sd-fisongs-whistleblower-20180810-story.html>

[3] Preliminary Safety Evaluation Report, Docket No. 72-1040, HI-STORM UMAX Canister Storage System, Holtec International, Inc., Certificate of Compliance No. 1040" which can be accessed from the NRC ADAMS document repository: <https://www.nrc.gov/docs/ML1412/ML14122A441.pdf>

[4] Impact Analysis Of Spent Fuel Dry Casks Under Accident Scenarios, Brookhaven National Labs (2003) <https://www.bnl.gov/isd/documents/25144.pdf>

[5] Macfarlane, Allison "Interim Storage of Spent Fuel in the United States", Annu. Rev. Energy Environ. 2001. 26:201-35, "The waste handling building will need at least one pool in the event of failed casks, failed spent-fuel assemblies, or earthquake damage." <http://web.mit.edu/stgs/pdfs/annurev.energy.pdf>

[6] Sandia National Labs & NRC, "Preliminary, Qualitative Human Reliability Analysis for Spent Fuel Handling", NUREG/CR-7017, <https://www.nrc.gov/docs/ML1105/ML110590883.pdf> Sec. 7.2 "Dropping a Cask"

## TRANSCRIPT OF DAVID FRITCH STATEMENT AT 9 AUG 2018 CEP MEETING

Thank you, my name is David Fritch. I'm a worker on the ISFSI project. I work in the spent fuel project – F-R-I-T-C-H. I do industrial safety, so OSHA stuff, not nuclear stuff, but I'm out there.

And uh, I may not have a job tomorrow for what I'm about to say, but that's fine. Because I made a promise to my daughter that if no one else talked about what happened on Friday, that I would.

About 12:30, August 3rd we were downloading, and the canister didn't download, but the rigging came all the way down. There were gross errors on the part of two individuals. There were gross errors on the part of two, two individuals, the operator, and the rigger, that are inexplicable.

So what we have is is a canister that could have fallen 18 feet. That's a bad day. That happened. And you haven't heard about it. And that's not right.

My friend here is right, public safety should be first. And I've been around nuclear for many years. It's not. Behind that gate, it's not.

Here's a few things that I've observed in the three months I've been here. SCWE, um, the Safety Conscious Work Environment, where people are constantly given encouragement to raise concerns. It's not repeatedly or even, I've never even received SCWE training since I've been on site. That's not standard for a nuclear site.

Operational experience is not shared. That problem had occurred before, but it wasn't shared with the crew that was working.

We're undermanned. We don't have the the proper personnel to get things done safely.

And certainly undertrained. Many of the experienced supervisors, what we call CLS's, Cask Load Supervisors, once they understand the project and how everything works, are often sent away, and we get new ones that don't understand as well as even the craft, basic construction craft. And a lot of them who haven't been around nuclear before are performing these tasks - not technicians, not highly trained, not thorough briefs.

This is an engineering problem. What happened is, inside of that cask there's a guide ring about four feet down. And it's to guide that canister down correctly to be centered in the system. Well, it actually caught that. And from what I understand, it was hanging by about a quarter inch.

So, obviously, the point is clear. As people said, Edison is not forthright about what's going on. I'm sure they'll tell you that they were going to bring this out once it was analyzed, et cetera, et cetera. I'm sure they're preparing what they would answer if it comes out.

I came here tonight to see if this event would be shared with the community. And I was, I was disappointed to see that it was not.

And I want to thank the community of San Clemente. It's a beautiful, wonderful community with amazing people. You've been great to me. My family's here with me for the month.

Unless Edison and Holtec commit to defining success on this project as safety, and I'm not, I'm not talking about any of the concerns voiced today, I'm just talking about downloading – getting the fuel out of the building safely.

Are we going to address what would have happened to that canister if it would have fallen? Even if the shell wasn't penetrated, now will, will they take it in a repository site?

The question is, will, will Edison and Holtec commit to defining success primarily in terms of nuclear safety. And there will there be transparency, commitment to safety, and the financial commitment to make sure that it's done successfully. Thank you.