

The San Onofre Briefing: The Latest on SoCal's Shut Down Nuclear Power Plant

First Fridays

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Dr. Bart Ziegler: [00:01:27] Welcome to everyone joining this month's First Friday Series webinar. And this edition is very, very close to our heart. My name is Bart Ziegler and I'm the President of the Samuel Lawrence Foundation. Our foundation advances impactful programs at the intersection of science, arts, and education, looking for solutions to our planet's greatest challenges, from nuclear safety to climate change. And right at the forefront of our mission is working to keep Southern California safe from the public health hazards of nuclear waste. So that's why today we'll be looking at the very real threat posed by the decommissioned nuclear power plant at San Onofre. Before we get started, it is a privilege and my honor to welcome Congressman Mike Levin to offer opening remarks. Congressman.

Congressman Mike Levin: [00:02:20] Well, thank you so much for having me, Bart. It's great to be with you. And I'm grateful to the Samuel Lawrence Foundation for all you do. I also want to extend a very special thank you to my dear friends, Admiral Len Herring and Greg Jaczko, who co-chaired the Songs Task Force that I established shortly after taking office in 2019. They have just had such great advice and expertise, and I'm excited that you'll be hearing from them in a little bit. I'm really grateful for the opportunity to just briefly speak with you, and I'm so glad that Bart brought up the word solutions, because for me, it's all about solutions, about, you know, how we're going to safely handle the spent fuel at San Onofre and ultimately, what advocacy will be necessary to make that happen? I think, you know, there are 1600 tons of spent fuel at songs. The fuel sits just 100ft from the Pacific Ocean and an active fault line. And near Camp Pendleton, near a very important, uh, marine base, also near a very heavily populated areas in San Diego and Los Angeles and Orange County. And the current situation, the status quo is neither safe nor effective in the long term for our spent nuclear fuel. Since I entered Congress in 2019, I made it a top priority to find a permanent home for our waste at San Onofre.

Congressman Mike Levin: [00:03:50] As part of that work, I formed a bipartisan congressional spent Nuclear Fuel Solutions caucus, uh, that works together to address the challenges associated with commercial spent fuel stored at sites across the country. As I've said ad nauseam, the waste at San Onofre is the symptom of a greater problem. The problem is that we lack a cohesive, comprehensive strategy to deal with spent nuclear fuel across the entire United States. I also convened the Songs Task Force. I mentioned that Len and Greg are the co-chairs, and the Songs Task Force developed policy recommendations on the issues facing songs and our greater community. Since their report came out, I've been introducing federal legislation to address spent fuel in accordance with the report's recommendations. The report had something like 30 recommendations, of which eight had a direct federal nexus. And we've tried to tailor the legislation and our policy strategy at the federal level directly in line with the recommendations from the task force. One of those bills is called the Spent Nuclear Spent Nuclear [00:05:00] Fuel Prioritization Act. That bill would prioritize the removal of spent nuclear fuel with the areas of the highest seismic risk, the highest national security concerns, and the highest population density. We have over 9 million people living within 50 miles of San Onofre.

Congressman Mike Levin: [00:05:17] We know it's directly adjacent to Camp Pendleton, one of the most important bases in the United States for the readiness and preparation of our military. And we know that a California experiences seismic risks, and particularly right around that plant, there are both active and inactive faults. So the bill, our Spent Fuel Prioritization Act, would make San Onofre one of the highest priority sites in the nation for spent nuclear fuel removal. So a bipartisan bill led by, uh, Darrell Issa and myself. Additionally, I've introduced legislation to direct the Nuclear Regulatory Commission to create an Office of Public Engagement and Participation. It's so important to have stakeholder engagement. It's important the Nuclear Regulatory Commission isn't just a top down organization, but really empowers people to to be involved. I think top down thinking is a big problem, and it's how we got into this mess that we're in with spent nuclear fuel and top down thinking whether it's at the NRC or elsewhere is a big challenge. Uh, just this week I introduced something called the Hundred Year Canister Life Act. Current NRC regulations set the lifespan requirement of nuclear waste canisters at 40 years. 40 years. I don't believe that's enough. This bill would ensure canisters can safely store spent nuclear fuel for much longer, a hundred years. Until we find a longer terme solution.

Congressman Mike Levin: [00:06:48] It's critical that the best technology is used at San Onofre in order to keep our communities as safe as possible, and I'm going to be pushing very hard for this bill to become law. It's not going to happen overnight, but we've got to keep at it. The process to chart a path forward for for a safe solution for our spent nuclear fuel will be just that, a process. And a key part of that process is recognizing the situation that we're in today. With nuclear waste scattered at around 75 sites across the country. And how we got here and how it's not sustainable. We're in this situation because the federal government tried to establish a long term repository for the waste at Yucca mountain in Nevada without getting the permission or obtaining the consent of the state and all the affected localities and tribes. That was a recipe for failure. And it's why all the fuel is still sitting in San Onofre today. Our songs Task Force report, which I'm proud that the Samuel Lawrence Foundation was a critical partner in, acknowledged this by finding that, and I quote, consent based siting keyword consent with meaningful partnerships and open communication among federal, state, local, and tribal leaders is a critical step forward towards establishing a permanent repository.

Dr. Bart Ziegler: [00:08:06] The well that's oh I see oh, Congressman, I thought you were-- We're really limited with time.

Congressman Mike Levin: [00:08:13] Okay, I'm almost done. I promise you the report went on to recommend, and I quote, Congress should consider federal legislation that considers a framework to achieve consent for future storage and disposal sites and, quote, Congress should work towards a consent based final disposal site. So with these recommendations in mind, I fought to fund the Department of Energy's Consent based siting program. So far, I've delivered \$93 million for that program. With that funding, Doe has established consortia across the country made up of universities and nonprofits that are engaging with communities about consent. As we speak. This is the most promising solution so far for the spent fuel at San Onofre, and it is driven by communities themselves. And it's based on the task force report goes hand in hand with the other work being discussed today. The alternative is the top-down process that got into the mess we're in. It's unfair to communities, especially those that have been historically under-resourced and disadvantaged. So I'm grateful for your partnership, Bart, and ensuring we come up with the safest, most responsible solutions possible. I'm proud of the steps we've taken so far. I look forward to continuing to work with you to move the

spent fuel away from the beach at San Onofre. I thank you for your efforts on this critical issue, and for giving me the opportunity to run a minute or two long and to speak with you at this very important event. Thank you, Bart. Thank you everyone.

Dr. Bart Ziegler: [00:09:38] Thank you very much, Congressman, for taking your time. We truly appreciate your time. And now I'd like to introduce our moderator today. Uh, Samuel Lawrence Foundation Senior Advisor Kathryn Brinton, who's an ACLU Know-Your-Rights Ambassador and advocate for human rights, children at risk, and environmental justice. Kathryn, [00:10:00] I'll give you the microphone. Thank you.

Kathryn Brinton: [00:10:03] Thanks, Bart, and so happy to be here. Welcome to everyone joining us today. Those watching on zoom, please use the Q&A or chat box to submit your questions. If you're watching live on YouTube or LinkedIn, send an email to Admin@SamuelLawrenceFoundation.org. Let's begin with some essential background on the San Onofre Nuclear Generating Station. Primarily owned and operated by Southern California Edison. SONS commenced operations in 1968 and was decommissioned in 2013. Almost a half century of spent fuel generated by the plant, 3.6 million pounds of high level radioactive waste remains on site about 60 miles south of LA. SONS straddles San Diego and Orange counties, and is surrounded to the east by Camp Pendleton. It's on a stretch of gorgeous, biodiverse Pacific coastline. This is a very unlikely place for a nuclear waste dump. It's also a dangerous one. San Onofre's lethal waste is stored in thin metal canisters placed in a wet, salty environment. These canisters were engineered not for long term storage in any location, let alone a marine environment 100ft from a rising ocean. Experts tell us that these canisters, which are at or near their expiration dates, have been scratched and gouged, increasing their vulnerability to corrosion and cracking. Rising sea levels and the heavy surf of storms exacerbate the problem. Moreover, there are other risk factors specific to San Onofre location, including its close proximity to major transportation corridors and population centers, inordinate heat from nearby wildfires, earthquakes, and resulting tsunamis. The Samuel Lawrence Foundation in San Clemente Green are two organizations of many that believe the method of storing toxic waste at San Onofre is woefully inadequate.

Kathryn Brinton: [00:12:20] It poses an environmental risk, and it poses health risks. However, that's not a perspective shared by Southern California Edison. Um, it's important for us to state that, and it's incumbent on us to invite them and any other

agencies to a follow up webinar. And Bart gives us his word. We will do our best to make this happen. As Congressman Levin reminds us, public discourse is not only fair and healthy, it's dialogue. We need to find solutions. So let's warmly welcome our panelists, who so generously agreed to share their time and wisdom with us. We're very honored to introduce Rear Admiral Len Hering, Senior, Retired U.S. Naval Officer. Dr. Gregory Jaczko, Former Chair of the US Nuclear Regulatory Commission. Cindy Folkers, Radiation and Health Hazard Specialist with Beyond Nuclear. And Gary Headrick, Founder and President of San Clemente Green. Our first question is for Admiral Hering. Admiral, it is an honor to have you join us. And we thank you for your tremendous service as a naval officer. Thank you for joining us. As a naval officer, you led important conservation efforts and continue to do so. When we met, you were executive director of "I Love A Clean San Diego." A Navy man after our own hearts! So I have to ask, Admiral, how did 3.6 million pounds of such toxic waste get stranded next to Pendleton on our beach? Trestles is nearby, the famous surfing spot that the Beach Boys sang about.

Rear Admiral Len Hering: [00:14:14] Great question. Um, but I think that, uh, Congressman Levin actually, uh, covered the reasons why. And I think that the reason is, is that the that nationally we have failed to do the right things, um, to make absolutely certain that the waste generated by these nuclear power plants is taken care of properly. Um, it's stuck at Pendleton because there is no repository, long time repository for the waste across the entire country. So until we find a solution, um, that waste will have to sit there. Um, and unfortunately, we're now dealing with, um, what I believe is inadequate storage requirements that are that now face songs [00:15:00] in the local environment.

Kathryn Brinton: [00:15:02] So you were in charge of safety and security in the Navy? And you believe that that the waste is not being stored safely? Can you elaborate a little bit for us?

Rear Admiral Len Hering: [00:15:14] Sure. And I encourage everyone who's listening to get a copy of our report. Um, and read it thoroughly and understand what it is that we found, um, during that time frame. Um, everything that we identified in that report brings question and concern, um, to those of us who, on a regular basis, manage and sustain a system where we evaluate risk and address that risk so that we can minimize that

risk. Um, in the case of SONGS and the things that we found out. Um, I don't believe it was done properly. And I still believe to this date, if you look at the issues that many have brought up and asked for consideration have yet to be addressed properly. And unfortunately, when they are addressed or they are found to be a issue or risk, they're waived, um, they're waived through the regulatory commission or they're waived through a process that allows the operator to continue to operate as they have been in the past. And for me, that's the most concerning part. A regulation is not something that individuals should be allowed to just waive and proceed. Um, a regulation in the Navy for instance. If you needed a waiver, that waiver was for a short period of time until such time as you were able to comply with the regulation. And I would say it's exactly the same thing with the FAA. Unfortunately, that's not the same case that we've seen with the NRC. And these operators are operating with a significant number of waivers. And it puts things at risk.

Kathryn Brinton: [00:17:07] You mentioned the FAA. Um, this is another example of the regulators reporting to the industry that they're supposed to be regulating, instead of vice versa.

Rear Admiral Len Hering: [00:17:19] Yeah. And I will tell you again, read the report. The report clearly shows how industry is telling the NRC how they want things done. Um, and when a regulation is found to be an obstruction, they file for a waiver and they receive one. Um, and I would tell you that, you know, the perfect example that we would see is the, the incident that just occurred with Boeing. And, you know, we find out that Boeing operators made the failure, but in fact, the regulators, um, grounded the aircraft until the investigation was totally complete and the situation rectified. Um, there was no waiver provided. There was no issuance. There may be fines yet. Yet and still in this situation, we find that that it's happening all the time. Um, and the, the, the number of waivers that are being provided by the Navy to the operators is incredibly, I'm going to say not, um, minor, but significant. There is there are phenomenal numbers of waivers that are being authorized. Um, and not just until the regulation is secured, but to bypass the regulation.

Kathryn Brinton: [00:18:42] Um, I'd like to bring your attention to a 2019 report. At that time, our Department of Energy commissioned a gap analysis, and the findings assigned a number one top priority to data gathering on stress corrosion cracking due to

atmospheric corrosion of welded canisters. So here's a report the feds paid for. They published it. Um, the number one priority was even, um, out there for everybody to read in red font. And they've had five years. I'm wondering if anything's been done on this.

Rear Admiral Len Hering: [00:19:20] To the best of our knowledge, you know, um, and even though they will tell you that they've used devices that have allowed them to inspect the scene, what we have determined is that they are not OSHA, um, approved processes. So we're not we're not exactly of not shown. I'm sorry. Skip there. Um, but the the regulatory process that allows for, um, standards to be secured in industry is not being applied in the devices that they use to make the inspection are not compliant with those requirements.

Kathryn Brinton: [00:20:01] And [00:20:00] you think this is that at the industry's request?

Rear Admiral Len Hering: [00:20:05] No, I don't think anything else has been done.

Kathryn Brinton: [00:20:08] Okay.

Rear Admiral Len Hering: [00:20:08] And they they've admitted it in public, but we've heard nothing more.

Kathryn Brinton: [00:20:15] We'll be hearing soon from Cindy Folkers, who will brief us on the hazards of radiation exposure. But, Admiral, approximately 70,000 Marines and other individuals live and work at Camp Pendleton. And some of these Marines have young children. And from the waste containers, there's an elementary school that's less than three miles away as the crow flies. Um, does the Navy share our concerns? I mean, does does Brigadier General Woodworth have this on his radar? Do you know?

Rear Admiral Len Hering: [00:20:52] Well, I won't speak for the General. I've not spoken to him about this particular issue. But I do know that, um, the secretariat, the Navy Secretariat does have this on their radar. Um, it is an issue that the federal agencies deal with. Um, if, as you know, this particular piece of land was done through, um, congressional, the Navy--just so that you understand, the Navy does not own the property, the Department of the Navy does, which is the civilian side of the organization.

They are the ones who are responsible. Those they are the ones who are complying with the congressional mandate, and they are the ones who, when time comes, um, will have to deal with how, if and how, they proceed with this issue. Um, are they concerned? Yeah, I think there's a lot of people there who are concerned and understand the significance of it. Are they going to be the persons who step out and vocalize? Um, unfortunately, I don't believe that's the case.

Kathryn Brinton: [00:22:02] Is there anything hopeful here, would you say, Admiral?

Rear Admiral Len Hering: [00:22:06] Well, I think that, you know, one, these types of conversations are helpful. Um, the report is and some of the things that Congressman Levin have pointed out, are all directed in the right place. Um, we need to figure out what to do. We need to understand. We need to have a better conversation. Um, we need to have a more open conversation with the NRC, so that the questions and concerns of those individuals who are in the immediate vicinity, um, are either satisfied or the solutions provided and the situation rectified. Um, but I would say that you know, if we just sit back and let them do what they want to do, we're going to regret it. I know that there's a lot of people who say that, you know, some of it is telltale, but in the world of nuclear, the risk factor that we use in the Navy is if there was a risk at all, any percentage whatsoever, you did everything that you possibly could to abate it or you stopped it. And that is not the case. Under the current conditions, um, they will tell you that the risk is minimal or it's not, or it is or whatever SONGS is located in a very difficult location. Um, it was known in the early 1900s as Earthquake Bay. We know that there are many faults. We've seen the effects of sea level rise, and the information that have been provided, is, in fact, for most individuals who have asked the questions, insignificant or in or not sufficient, um, to really answer the questions and make people comfortable that they know what they're doing or that they have the conditions or the information or the materials ready to respond, should there be an incident, and what they have provided is, from my perspective, um, less than satisfactory on a large scale.

Kathryn Brinton: [00:24:30] Thank you, Admiral. We truly appreciate your time and for sharing your thoughts and your experience with us. Um, we'd like to move on now. Thank you to Dr. Jaczko. Doctor, you're a theoretical particle physicist, a Princeton lecturer, a world renowned expert on energy policy and politics. You're also Former Chair of the US Nuclear Regulatory Commission. Your insights are highly valued. And

thank you once again [00:25:00] for joining us. Um, I wanted to mention also, and I don't know, do we have, um, an image of this Paul? This is a book you wrote -- *Confessions of a Rogue Nuclear Regulator*. "Which, according to the book jacket, is an account of how the nuclear industry maintains its market position by, quote, "hoodwinking Congress and co-opting the regulators." This was written by a politician, by the way. So, Dr. Jaczko, can you speak to the scope of the nuclear power industry in dollar terms?

Dr. Gregory Jaczko: [00:25:39] Well, yeah, it's an extremely large industry, tens of billions of dollars if not larger, depending on how you want to define it, but more importantly, you know, it involves some of the most powerful power companies in the country. And they're companies that have tremendous influence, not just at the federal level, but also at the state level, where in many ways they they exercise almost unfettered power over state regulators and state legislatures and governors.

Kathryn Brinton: [00:26:09] So solutions to this problem sounds like they're going to have to come from the top down.

Dr. Gregory Jaczko: [00:26:14] Well, yeah, I think, unfortunately, I don't think the top is interested in solving some of these problems. I think, as Congressman Levin said, part of the challenge is the need to really mobilize communities and get communities engaged and dealing with spent fuel issues, which is, I think, why this particular briefing is so important and the work that the Samuel Lawrence Foundation has done and others, Len and others and Gary, all the people that are here on this webinar are committed, I think, to working in the community to address these questions and these issues, because I think as it is right now, the industry has very little incentive to make decisions that are in the best interests of the communities and they don't have the political infrastructure pushing back on them in really in a strong way.

Kathryn Brinton: [00:27:01] Do you care to comment at all on the NRC, the agency you once chaired?

Dr. Gregory Jaczko: [00:27:08] Yeah, sure. I mean, I'd love to talk about it. I think unfortunately, right now I'm very concerned because the agency, while it has its faults, I believe that there are a lot of very good people at the agency who work to to make good decisions. But what I've found through my experience is that the top of the agency, uh,

is really dominated by a perspective that views the agency's job as perpetuating the industry. Uh, I don't necessarily think the answer should be that the agency's job is to "end" the industry, but I think its job is to focus on public health and safety. And I think not only has the leadership of the Commission, namely the five presidentially appointed or currently four presidentially appointed commissioners, really been focused on this idea of the agency's job is to help the industry. Um, right now Congress is looking at legislation that would codify that even more aggressively than than I think the agency is currently acting. So it is, unfortunately, I think, a very dangerous time, um, for for the agency and for the pressure that exists and is exerted on the agency to not be an impediment to nuclear power, even if that is in the best interest of safety.

Kathryn Brinton: [00:28:25] I'd like to talk about the canisters a bit, if we could. Are these canisters routinely inspected? Is there a way of monitoring their emissions?

Dr. Gregory Jaczko: [00:28:38] So the canisters are inspected periodically. I think it's the best way to say that. Uh, there is passive monitoring around the sites to identify and monitor radiation, but they are essentially closed, sealed, uh, structures. So you really cannot inspect inside the canisters. Uh, and there are there are ways to do inspections on the outside of the canisters. Uh, so you can glean some information, but it's really, in many ways, intended to be a passive system that's expected to work well until things fail. Uh, so there's it's difficult to have early identification of problems and really aggressive inspections because of the nature of the canisters.

Kathryn Brinton: [00:29:29] Do other countries do a better job at this than we do?

Dr. Gregory Jaczko: [00:29:34] You know, there are other countries that approach it different. You know, I don't know that you can say they're better or worse in some regards, but, certainly there are countries that that have different types of storage configurations and different types of storage systems of facility. Actually, I visited in Switzerland. Uh, there they have a consolidated area where they put a lot of their, uh, storage, uh, their dry casks, their spent [00:30:00] fuel storage in a in a consolidated facility. Um, that facility has the ability to inspect and potentially repackage canisters if necessary. That's currently not a system that we have in this country. So in that sense, it's certainly a better approach. Um, the overall canisters are they are larger, thicker

canisters than the canisters, for instance, that are at San Onofre. Uh, so in that sense, I think it has some advantages.

Kathryn Brinton: [00:30:30] I guess part of the problem is that these canisters were intended to be temporary storage. Correct? So maybe, you know, the under engineering was a result of that.

Dr. Gregory Jaczko: [00:30:41] Yeah. I mean, the whole design philosophy behind these canisters is that they were there essentially to be a temporary storage until the fuel would be moved to a permanent repository, but that is now an open-ended time frame. So these temporary canisters are now essentially permanent canisters for all intents and purposes, but they're only licensed for a finite period of time, 40 years. And it's largely expected that almost all parts of the country where there are canisters, the canisters will have to last longer than 40 years. So there's just a lot of hand-waving about both from the agency and from the industry, about how you address that question. I think many people assume that you'll, through analysis or through actual use of the candidates, be able to establish that they can last longer than 40 years. But at some point, whatever that time frame is that they will eventually no longer be able to meet their safety requirements and their safety standards, and something will have to be done to repackage and remove the fuel and put it in new canisters. Which is why I think Congressman Levin's 100 year licensing, uh, for canisters is such an important piece of legislation because it really tackles that issue head on. And while 100 years may not even be sufficient in some cases, at least it's more realistic about the time frame that these canisters are likely to have to perform their function.

Kathryn Brinton: [00:32:09] I want to thank you so much, Dr. Jaczko, for being with us today. You thank you for--yeah, we thank you so much for coming forward and speaking to us. Okay.

Kathryn Brinton: [00:32:23] Miss Folkers, you're a Radiation and Health Hazard Specialist at the nonprofit Beyond Nuclear, which advocates for a world free from nuclear energy and nuclear weapons. As an expert in health hazards, what can you tell us about the threats posed by radiation and nuclear waste?

Cindy Folkers: [00:32:42] So thank you so much for inviting me today. Um, I would take a step back to answer your question, and I thank you for that. Um, to look at sort of broad strokes, what exposure to radiation actually means. So radiation can interact with our bodies either from a source outside of our bodies, or if we inhale or ingest radionuclides into our system, we can be irradiated from within. It causes radiation disproportionately greater and sometimes unpredictable harm to females, children and pregnancies specifically. We've got data that show around nuclear facilities increases in childhood leukemias from deposition, light deposition from Chernobyl, impaired neurological neural development among children, which leads to behavioral problems and underperformance in school from work that Mary Olsen has, um, elucidated and basically dug out of the research. We see that children are about seven times more susceptible to radiation damage than the adult male that our current radiation exposure standards are based on. So this graphic is a select list. It's not all radiation radionuclides of concern, but it's a select list. And where they go in the pregnant body. So different isotopes and kinds of radiation are released at different points in the nuclear power cycle. So uranium mining will release a different set of isotopes, mostly compared to decommissioning a nuclear reactor, which will release a different set yet again from maybe what's in waste canisters. And then, of course, catastrophic releases from meltdowns will release, um, another sort of panoply of isotopes and some isotopes cross over. But some of the isotopes are sort of novel, uh, depending on which part of the cycle they're released from. So if we look at San Onofre waste in the canisters, it's my understanding that the canisters are passively cooled and air cooled, one of the isotopes of concern that I would raise as a flag.

Cindy Folkers: [00:34:47] And I don't know if this is happening or not, but I think somebody needs to check. Air cooled casks can be creating carbon 14 in the air around the casks. A carbon 14 [00:35:00] is significant because of course, it's radioactive carbon, carbon being a basic building block of the human body. It collects in fetal tissue or it can be two times the amount that it can collect in maternal tissue. So there's a higher concentration, which makes sense because of a fetus is building a human body. And so I don't know if they're monitoring around the canisters for carbon 14 formation, but I think that that's something that they need to look at. And that's before the canisters would be breached. If you're looking at, some sort of a meltdown or a criticality event that may breach the canisters releasing radioisotopes from these canisters, then I would add to those strontium 90, cesium 137 and Krypton 85, Krypton 85. Being fat-loving and

healthy, females of all ages contain more fat than healthy males. Um, so that would mean that they would potentially, in their bodies, be taking in more Krypton 85. Strontium 90 goes to bone more so in women than in men. In the ovaries of women, it collects more substantially from 0 year to 20 years. And then cesium 137, which is an isotope of concern as well, that mimics potassium in our bodies and can cause heart trouble in children. So all of these isotopes that I just mentioned have one thing in common, and they collect in, harm more, or hang around longer in females, children, or developing pregnancies.

Kathryn Brinton: [00:36:36] Are these isotopes, are they airborne? Are they ingested through what we eat and drink?

Cindy Folkers: [00:36:42] So yes and yes. And it depends. Sometimes after you have a catastrophe like Fukushima, it will settle on the ground. It might end up in tea farms, for instance, or in the fish locally. Some of these isotopes can be very hard to detect in foodstuffs. And you could ingest them that way. Children playing in soil that's contaminated could inhale radionuclides that way. They can be they're released to air and water. And so we're not only where you are not only dealing with what may happen with the canisters, but we're also looking at a history of San Onofre releasing, say, carbon 14 (which it did), tritium, (which it did). These are all radionuclides that have very long, hazardous lives. I don't go by half-life because half-life isn't necessarily what we need to look at when we're looking at the biological impact. We need to look at hazardous life. How long is it going to be hazardous for biological entities in the environment? And so when you look at hazardous lives of tritium, you know, you're dealing with 120 years to 240 years depending.

Cindy Folkers: [00:37:57] So you are not only dealing with what may happen from the canisters, you are still having a legacy of exposures from what happened from the releases before San Onofre shut down in 2013 permanently. Then there's the decommissioning, where they will open it up and release a whole bunch of radionuclides from the core. And if you weren't measuring that, then you don't really know what the radiological profile is. So you can inhale or ingest it depends on weather patterns, which way the wind blows, which way the water flows. If your food is grown in contaminated soil, then you have to worry about that. Are you ingesting or inhaling it? Are you ingesting it? If the wind blows and carries the radionuclides toward you or your

home, you have to worry about, are you breathing it in and is it settling on the ground? And are you growing your own vegetables? There are a lot of complicated questions, but the fact is, we can't begin to answer any of those unless there's decent monitoring.

Kathryn Brinton: [00:39:04] I want to thank you so much, Miss Folkers, for being with us today. We felt just very fortunate that you were willing to talk with us, and we really appreciate your expertise.

Cindy Folkers: [00:39:16] Thank you so much for having me.

Kathryn Brinton: [00:39:20] Okay. Mr. Headrick, you and your wife, Laurie, founded San Clemente Green, which led the grassroots effort to shut down SONGS. You work tirelessly still, to promote a sustainable future for our region, including serving on Representative Levin's Congressional Task Force on Nuclear Waste. So you've been at this a long time? Since 2007. What concerns you most about the stored nuclear waste at San Onofre?

Gary Headrick: [00:39:49] Well, I think we've seen today that there's a race against time. Basically, nuclear waste was never planned to be stored at San Onofre, [00:40:00] and the Department of Energy took on that responsibility, but has been unable to fulfill that promise since 1986. So in order for the plant to continue producing electricity, highly radioactive fuel assemblies had to be offloaded from the reactors and replaced with new ones. Since temporary storage was the presumption, Edison selected cheaper thin metal canisters that were far less robust than the thick casks being used in most other countries that had nuclear power. It was discovered that the permanent repository being built at Yucca Mountain had a fatal flaw. Water was penetrating the site deep below the desert, making it unsuitable for storing nuclear waste for many thousands of years. Now it requires a new plan to solve the long-time storage issues, but time is running out for the thin canisters that were only intended for containing the waste for up to 20 years. Under the circumstances, we are now being told that they're probably good for 60 to 100 years. Pretty convenient. There are basically only two questions that we're concerned about. How long will the thin canisters last, and what are we going to do when they fail? Since there is no viable plan now other than trying to entice less fortunate communities to accept these ticking time bombs, a new and reliable plan must

be top priority. We're currently exploring what legislative powers of the state of California can apply to develop a more acceptable and realistic plan.

Kathryn Brinton: [00:41:30] Well, we're here in Southern California. No surprise, there's multiple fault lines around San Onofre. Um, on the screen. Paul, can we get an image of that map? There's a map of the coastline where the plant is located. And, um, as was said, I believe, by Admiral Hering, it's called Earthquake Bay. The stretch of coastline in which SONGS is nestled-the waters beyond that was called earthquake Bay. So there's a reason for that. And let me read to you what Kate Brown, Professor of Science and Technology at MIT, wrote for the LA Times. "The SONGS facility sits on an erosion prone bluff two feet above the mean high tide. Seismic activity often occurs, and four tsunamis hit the region between 1812 and 1930. Geologists say the potential for another tsunami is elevated in the area, which has 8.4 million people living within a 50-mile radius." So really, one can't help but think of Fukushima. Um, and my understanding is Japan ignored the geological evidence. So if a tsunami hit SONGS, um, what type of catastrophe would we would we encounter?

Gary Headrick: [00:42:54] Well, certainly the long overdue "big one" is something that we've been warned about for many decades now. When it does, the devastating effect will far exceed that of the ongoing Fukushima disaster, simply because of San Onofre's proximity to a very dense population. So much other infrastructure would also be destroyed that nuclear waste at San Onofre could only be protected by addressing this issue before the big one hits. We need to move the canisters to higher ground, switch from thin canisters to thick casks, and build a robust aboveground storage facility like they had at Fukushima. Those casks survived unscathed. We don't need to reinvent the wheel. Other countries like Japan and Switzerland have set the example. We just need to do it before it's too late. A much less noticeable threat I think is gaining more attention now that the King Tides and extreme weather conditions from climate change are becoming more apparent. With sea level rise comes groundwater level rise, which currently fluctuates near the bottom of the canisters. Capillary wicking action of moisture allows water to flow through the soil in all directions, including upwards. And by looking at the conditions of the tsunami wall, you can see the effect the ocean has had on metal and concrete. The tsunami wall. San Onofre has not aged well, and she is no longer able to count it as part of their defense in depth. If water eventually penetrates the canister, it's game over. Our goal is to get the California Coastal Commission to

reevaluate sea level rise now, instead of waiting till 2035, as stated, as a condition of the permit they approved.

Kathryn Brinton: [00:44:40] As a community organizer, what would you have us do to tackle this problem?

Gary Headrick: [00:44:46] Well, you know, I'd like to bring up the importance of whistleblowers who set the example for all of us to be brave enough to speak out when the wrongdoing is present. Three people in particular deserve our deepest gratitude. [00:45:00] One was the manager at songs who lost his job after complaining to his supervisors that his people feared retaliation from managers for reporting safety concerns. A little bit ironic, I'd say. Another alerted us to the fact that more testing needed to be done before starting up the new steam generators, which failed two years later and closed the plant permanently. During decommissioning, a canister was hanging by a quarter of an inch over an 18-foot drop into the concrete silo below. We would not have even known about it if the worker had not spoken up and made SCE accountable for their reckless behavior. In the absence of true regulation occurring on many fronts: If we see something, we all must say something, even when our livelihoods might depend on it. I'd also recommend that you sign our two petitions at SanClementeGreen.org. Become more familiar with the state of issues at San Onofre by watching the award-winning documentary S.O.S -- The San Onofre Syndrome: Nuclear Power's Legacy. It was a great 12-year synopsis on all the dialogue and actions between the scenes, which until now have been largely out of the public eye.

Kathryn Brinton: [00:46:12] You know, you also have on your website a link to a very compelling, very short video of an engineer at San Onofre who speaks to the corrosion risk. So if you don't want to sit through an entire documentary, I would invite you to watch that short little video. It's about ten minutes long.

Gary Headrick: [00:46:34] So important to stay informed. And like we've heard, it's so important that people, ordinary people like me, get involved and take a stand because we have a long way to go.

Kathryn Brinton: [00:46:47] Well, thank you for talking about moving the waste out of there. We've also heard, um, uh, our panelists talk about the importance of monitoring

the waste. Um, I think what Samuel Lawrence Foundation plans on doing is, um, launching a monitor and move campaign, um, as a way of building public awareness of this issue. Um, thank you so much, Mr. Hedrick, for all you do and for joining us today.

Gary Hedrick: [00:47:11] You're very welcome. And thank you.

Kathryn Brinton: [00:47:14] Bart, do we have--

Dr. Bart Ziegler: [00:47:16] Gary, you'll stay on? This is great. I just. It's amazing what you have courageously followed and persisted. Um. There's the first question is--well, well Len's here. Len, how do other militaries store and move their nuclear material? And what's the holdup? Why is this such a sloppy job by our local utility?

Rear Admiral Len Hering: [00:47:47] Well, I think a lot of it has to do with the regulatory process. Um, the military moves its materials completely different, um, and turns it over to the Department of Energy so that it's handled in a totally different fashion. I think what we're seeing here is that, um, the regulatory commission, um, or the utility, the utility involved, um, that basically hires an independent in this case, in most cases, a company called Holtec, to manage and store, a completely different process than the way the military does their handling.

Kathryn Brinton: [00:48:33] Admiral Hering, um, uh, at SONGS, we have high level nuclear waste that that differs from the nuclear waste you would have in the Navy?

Rear Admiral Len Hering: [00:48:44] Can you say that one more time?

Kathryn Brinton: [00:48:46] The high-level nuclear waste that is currently being stored at SONGS, does that does that differ in intensity than the waste the Navy would store?

Rear Admiral Len Hering: [00:48:57] Um, well, the Navy again, the Department of Energy stores for the Navy, its materials. Um, is it the same? Um, it is roughly the same from the nuclear reactors, from when they repower those nuclear reactors. But the other material we're talking about is from nuclear weapons, and that's handled in a totally different fashion. So, um, it is different from what the energy industry utilizes? And

really, the best person to answer how that's done, of course, would be our former, uh, regulator. Um, he knows all about those processes.

Kathryn Brinton: [00:49:44] Thank you.

Dr. Bart Ziegler: [00:49:46] Greg had to leave, so we're now four, five people.

Kathryn Brinton: [00:49:52] Do we have any participant questions? Bart? Have any of them come in through the chat?

Dr. Bart Ziegler: [00:49:58] Yeah. Here's one, here's one. [00:50:00] When are the Holtec canisters at San Onofre expected to be leaking? With their 25-year warranty, that is, before a severe earthquake or tsunami. Who wants to take that one on?

Gary Headrick: [00:50:15] Yeah, I have some thoughts on that, Bart. Great. You know, I think the, um, the whole system, the. Sorry. I'm fading away here. The canisters. I'm sorry I got distracted. Can you give me that question again?

Dr. Bart Ziegler: [00:50:40] Canisters at San Onofre expected to be leaking. That's before the earthquake. The tsunami. And, you know, I'm reminded by by, uh, someone, some really knowledgeable person told me once that it's either going to be criticality if there's an earthquake, tsunami, terrorist attack, and there could be any sort of number of, of problems that cause something just horrific for the 9 million people surrounding within 50 miles of the nuclear storage site and the waste site. Or it can just become an ecological disaster in in a thousand years or 10,000 years where the waste becomes into the soil, into the sand, into the sea and becomes part of the ecosystem of Southern California. So the question is, um, how long are the Holtec canisters expected [to last] before...?

Gary Headrick: [00:51:37] And that's that is the key question. How long will they last and what will we do when they fail? And the idea that they will last 20 years is a presumption. We don't know. It's all experimental. We don't know if the last 40 years or, you know, 60, there's no way to unweld the canisters right now to see what the condition of the fuel is inside. So I would rather ask the question, not how long will they last, but how soon could they fail?

Rear Admiral Len Hering: [00:52:09] Bart, if I can. Uh, that's really the question, the largest question that everyone who's involved here continues to ask. And it is, um, the whole issue on a thin-walled canister. And how many or what was what has happened to those thin-walled canisters in the process of movement? Um, are any of them scratched? Um, did they receive a scratch? How deep is that scratch? Um, because the corrosion of that thin-walled canister is totally dependent on the environment that it's subjected to. And if there is a significant scratch, um, on any one of those canisters, um, the viability of them retaining their integrity is lessened by whatever, uh, corrosion matter a corrosion example occurs. So again, it isn't it isn't how, it's when. And that's where the risk factor really comes in. When they say, "well, the risk is minimal..." The risk is not minimal because it cannot be measured. And if it cannot be measured, then you have to assume that it can occur.

Gary Headrick: [00:53:23] And I think we have some photos of the actual scratching and corrosion, don't we?

Rear Admiral Len Hering: [00:53:29] Yes, we do. And we have we have evidence that shows that, again, they've attempted to show that those scratches are minimal. But the reality is based upon the physicists and the scientists who have, um, come to the aid of, uh, you know, we who are trying to figure out how to get there from here, um, say that those tests are not relevant and they do not, um, and cannot. And the industry itself has admitted that it does not know how to offload one of those canisters, but they would figure it out if it ever occurred.

Dr. Bart Ziegler: [00:54:08] Right. Admiral, may I ask you a question? You wrote a seminal paper called Nuclear Waste Problems. Paper with, uh, let me see with Dr. [Tom] English and Dr. [Subrata] Chakraborty. How many of those, how many of those canisters of the 77 canisters that are now buried in the beach--how many of those are scratched or gouged?

Rear Admiral Len Hering: [00:54:32] They don't know. And that's the that's the whole point. Um, there is no there is no perfected inspection, um, criteria. Because in order to fully inspect the canister, they would have to again be lifted out or some device, um, manufactured that would allow you to do that and nobody knows how to do it. So we

don't know how many. And as you've already [00:55:00] heard, um, in the loading process, um, there is a very large risk that those canisters were scratched as they slid down into their storage silo, completely different from what might have been designed had the NRC actually seen a working, uh, variant of the, the process. Which they did not.

Dr. Bart Ziegler: [00:55:27] Gary, do you want to answer? You want to talk to that?

Gary Headrick: [00:55:30] Well, I think a picture is worth a thousand words, as they say. And we have pictures of a scratch going the full length of the canister. There's a patch, maybe 4 to 5in wide of obvious corrosion. And I'm sorry we can't share that with the audience, but I think it's so important for people to realize that when they do these inspections with the little robotic camera, they don't always show us the worst. And these two images were from, uh, 2019, I believe, and they're provided by Edison. And it's alarming. So that's all I can say.

Dr. Bart Ziegler: [00:56:13] Oh, wow. Um, you know, I just saw a whole bunch more questions from the audience. Uh, could. So. So, um, Kathryn, should I read some of these questions?

Kathryn Brinton: [00:56:25] Um, one more. Bart, we're at 12:27.

Dr. Bart Ziegler: [00:56:30] Maybe two more? What's the process for moving the nuclear waste from these thin canisters to the to thick canisters. What's the what's the process of moving the waste from one canister to another?

Gary Headrick: [00:56:52] Moving the canister from one to another. Yeah, that's been done in Switzerland. And there's examples. We don't have to reinvent the wheel, but we need to operate in a environment that is no air, no water, but helium. And that will prevent a criticality event. When you pull the fuel assemblies out of the thin canisters and operate mechanically, robotically to place them into the thick casks that have bolts and instrumentation inside between two lids. That will give you advanced warning if there's a problem. So that's where we need to get quickly, and we need to do it with the most. You know, scientifically improved on top of whatever everyone else has designed. We need the best here. And it's a it's a process that will take time and the ultimate in

and, you know, credible processes that we're so far from that. And we have a long ways to go. But we can get there because we have to.

Kathryn Brinton: [00:58:03] We just had a question come in and it's for Miss Folkers.

Dr. Bart Ziegler: [00:58:07] Wait just a minute. Admiral. What?

Rear Admiral Len Hering: [00:58:11] What you just identified is a perfect example of what the study has found out is that they're not prepared to do any of this.

Dr. Bart Ziegler: [00:58:18] Who are not prepared?

Rear Admiral Len Hering: [00:58:20] The industry, NRC is not requiring any of this to be done prior to any of this happening. So they don't know. We can't--even if you found a place tomorrow to move the canisters, those canisters cannot be moved tomorrow to a consolidated facility because they're not approved by the Department of Transportation for movement, which means they would have to be uploaded and put into a different container. And none of this is prepared. None of this has been prepared.

Dr. Bart Ziegler: [00:58:51] We consolidated interim storage is really out of the question at this point. Um, but there's some other really important questions we won't be able to get to. Is there a legal route for public advocacy organizations to take force, compliance and oversight on the waste removal, or do we need a top down support like the Congressman mentioned? And the other thing is, how long is Edison responsible for their waste? At some point, the federal government and taxpayers assume all the liability? Or is that point already been reached? The decommissioning fund will run out of funds before the waste is correctly disposed of? Do we have time for one more question, Kathryn?

Kathryn Brinton: [00:59:26] I think I think I'd like to address a question to Miss Folkers. What are the effects of leaking radiation on thyroid health, thyroid, thyroid health? And from what distance are those effects felt?

Cindy Folkers: [00:59:42] Well, distance is difficult because it is as the wind blows. If, uh, iodine is released to the in air as a gas, it could travel where the wind goes. Uh,

thyroid is a big [01:00:00] deal because that's the one isotope that they can't claim doesn't have health impacts. Because it does. And it did after Chernobyl. And that's sort of what brought about all of the questioning of what isotope goes where and how it impacts your health. Thyroid cancers. Non-thyroid cancer diseases are also associated with impacts from radioactive iodine. And there are a number of different isotopes of radioactive iodine that lodge in your thyroid. So I don't know if that answers your question, but it can travel as far as the environment wants it to travel.

Kathryn Brinton: [01:00:45] Well, we've covered a very important topic today. Um, do any of our guests have any parting comments, any important question we neglected to ask?

Cindy Folkers: [01:00:57] I would like to actually say one thing, and I think it's really important that people understand this. Um, Senator Joe Manchin made a point of saying that the NRC focuses too much on safety, and he did this very recently, and it's a political article. And the problem with that is when he says they focus too much on safety. Really what he's saying is part of that is they focus too much on public and environmental health. And I think when we start talking about these technologies, like nuclear or any other technology, but specifically nuclear, we need to start focusing and centering environmental health and public health as the driving force for doing what we're doing with energy sources, whether it's addressing climate crisis or anything else. And until we do that, we are going to be spinning our wheels. So that is what I would like to say.

Kathryn Brinton: [01:01:46] Thank you so much.

Dr. Bart Ziegler: [01:01:49] Admiral, is there anything you'd like to add? As a closing.

Rear Admiral Len Hering: [01:01:54] Uh, no, I just I thank everybody for attending. I do hope that, uh, as I said in the beginning, the people read the report, um, so they understand the, the situation at hand and then get involved, um, make sure that individuals understand and, and know what they're facing. Um, it is not something that's going to solve itself without pressure. And that pressure needs to come from the local community and the local citizens, who expect something to be done, um, for their own safety's sake.

Dr. Bart Ziegler: [01:02:32] Well, Admiral, on behalf of everyone. Well, Kathryn will do all the last thank you's, but thank you so much for taking the time from Florida. And, um, Gary, it has just been just a pleasure. Thanks, Cindy.

Gary Headrick: [01:02:49] If, you know, I'd like to just reiterate that this is a race against time. We want to know how long these canisters will last and what are they going to do when they fail. And if the grassroots effort can benefit from anything, it's from looking at the SOS documentary that's 12 years of compressed actions that you can learn a lot from and really understand the situation much better.

Kathryn Brinton: [01:03:17] Bart, can we, um, can we link up the report that Admiral Hering is referring to on the SLF website?

Dr. Bart Ziegler: [01:03:25] Yeah, we'll put it on the home page and the landing page.

Kathryn Brinton: [01:03:29] Okay, good. Well, we are truly grateful, gentlemen, and Miss Folkers for your time. This really has been great. We want to thank San Clemente Green. We want to thank Beyond Nuclear. We want to thank all our participants and Brooklyn Story Lab, who helped us produce this program. Um, this webinar and its transcript will be posted to our website at SamuelLawrenceFoundation.org. Forward it to your friends and everybody who loves living here. Mark your calendars for our next First Friday series in March during Women's History Month. Um, and pray that we can get dialogue going on a follow up here. Get Southern California Edison to speak with us and maybe somebody from the NRC. We can get out of our echo chambers, learn something, and dialogue so that we move towards a solution, just as Congressman Levin so wisely said. So thank you, everybody, and goodbye.