Bart Ziegler: Should I record this, you guys? Yes or no?

Donna Gillmore: That's fine with me.

Bart Ziegler: Dave, do you mind or should we just turn it off?

Dave Lochbaum: That's fine with me. I'm okay.

Bart Ziegler: Just so if we -- you know, this is a confidential call. This will be limited to the people here. And, again, anyone who can't be heard or for some reason they can text me at 619 300 1097. I'm just so grateful. Thank you.

Dave Lochbaum: Sure. Further complicating the situation is the fact that plant owners are suing the Department of Energy or the Federal Government for Breach of Contract.

Donna Gillmore: Can other people put their phone on mute, because we're getting a lot of echo in the background.

Bart Ziegler: Oh, crap. It could be my phone. Let me work on that, please.

Dave Lochbaum: And because of those lawsuits, the way those are working out in the courts, the Department of Justice, which is defending the Department of Energy, will fight any owner who goes for low-density casks, casks that store smaller amounts of spent fuel, which will more likely fit into whatever repository the Department of Energy comes up with. Department of Justice wants owners to use the largest-capacity cask, because that's the cheapest option for storing it onsite. They fight any efforts by the owners to spend more money than what's the cheapest available. As a result, the cask vendors are competing for this market. So they come up with cask designs that store lots of fuel, the most that can be handled by the cranes and the infrastructure at the plant sites. And that's what we've been using for about 20 years now. That's not a good way to do it, but the Federal Government has basically put the vendors and the owners and the communities into that box because they've utterly failed to live up to their legal and moral obligations.

Donna Gillmore: Are you saying that Prairie Island is not going to get reimbursed for their thick-walled AREVA cask?

Dave Lochbaum: The Department of Justice will likely fight that because there's cheaper options out there, or they'll have to justify why they went that way. The other issue is -- again, I've said several times, to me the worst dry cask in the world is better than the best spent-fuel pool. The biggest risk to me from spent-fuel is when it's in the pool. Once it gets out of the pool, the safety and security is vastly improved. The thin-walled casks and thick-walled casks, to me, it's six of one, half-dozen of

the other. Neither one is perfectly safe. Neither one of them is perfectly evil. They both have their issues that make them slightly better or slightly worse. But I'd rather have it in either a thick cask or a thing cask then have it in a spent-fuel pool. If all factors were the same except for the thickness of the cask, I would hardly endorse thick-walled casks. If everything else were the same, they're much better than thin-walled casks. There's no doubt about that. But thick-walled casks can't code as much spent-fuel as thin-walled casks, so therefore you have to use more casks if you go with the thick-walled casks than if you go with the thin-walled casks. To me the biggest threat is if you drop a cask as it's being moved over the spent-fuel pool or around it, because that could cause the water to drain out of the spent-fuel pool. Once it's in the cask it's relatively benign. And the more casks that you use, the more likely you are to someday drop one. So I don't like things that cause you to buy more -- it's not the cost. I don't care about the cost, because I'm not paying for it. It's the fact that the risk goes up the more casks that you use. Once the stuff is in the cask, I agree with most folks except for the NRC that the cask should be protected against sabotage either with an earth berm or a building or something so that the bad guy can't have easy access to the cask sitting out there on a pad.

Don Mosier: This is Don Mosier; I joined the call late. But what about transporting the cask to an offsite storage location?

Bart Ziegler: Don, is that you? Don Mosier, MD/PhD from San Diego.

Dave Lochbaum: Yeah, there are some issues with casks, depending on primarily the heat loads inside the casks. Some of the casks that are being used today cannot be transported offsite. They'd have to be repackaged. That's because the overpack that's used to protect the canisters during transport acts like a blanket and the heat-load is too high for that blanket to prevent damage to the fuel inside. But that's somewhat related to the point I made earlier in that because the DOE hasn't defined what the canister's replacement in the repository is, nobody can provide something that gets it from the reactor to the repository in the same cask. DOE has been promising to do that for decades and has yet to do so.

Donna Gillmore: The issue came up in an email about some kind of embrittlement and cracking issue in the thick casks. I've been looking for something like that but I haven't been able to find anything. Do you have some information on that, Dave?

Dave Lochbaum: Yeah, that was that NRC two-day conference that they held back in -- I think it was November of 2015. I think you called into it. I happened to be in D.C. that week. I talked to Mark Lombard of the NRC staff and several other people who worked for Mark in those days about the thick-walled casks, because I knew the

NRC was studying them, just taking a look at them. And what several people told me was that because of the thickness of the cask, the heat-load is not uniform from the top to the bottom of the cask because the fuel assemblies inside aren't at a constant temperature from top to bottom.

Donna Gillmore: Are you talking about the ductal cast iron or are you talking about the carbon steel?

Dave Lochbaum: I'm talking about thick-walled casks, regardless of what they're made of.

Donna Gillmore: Okay, because I know in 2014 we had Siempelkamp there, who was the manufacturer. And I know that Mark and Al Santos (ph. sp.) that worked for him, they were talking about the temperature change, too low a temperature change would cause embrittlement. But I gave him the evidence that they obviously hadn't read the information carefully and that wasn't true. So they have some bad perceptions about the ductal cast iron cask. And there's plenty of documentation to counter that. If they still are saying that -- well, Mark's no longer in charge of that group. Do you know who they're dealing with now?

Dave Lochbaum: No, I don't know who took over his job.

Donna Gillmore: Okay, well, I know Al Santos is gone. He now works for EPRI, so he's not there. So I can talk to them and see which ones they're talking about. But this is news to me and it doesn't fit anything that I've found. Have you found any documents that talk about that?

Dave Lochbaum: No, because I didn't look for any, because there are no thick-walled casks contemplated in the United States. Nobody's applied for one, so there's no --

Donna Gillmore: Yeah, well, they have them in Prairie Island. They bought some a few years ago. That's what they had before, and they bought some more. And, you know, the as you know the problem I have with the thin-walled ones is the NRC information that Darryl Done (ph. sp.) their corrosion engineer provided about them being susceptible to chloride-induced stress corrosion cracking as well as other things is just from the ocean environment. And Darryl Done had an example of operating experience. They haven't been using the same canisters. Most of them are in use less than 10 years; a few have been used 20 years. But because of the lack of operating experience with the thing canisters for spent-fuel, they looked at other things made out of the same type of stainless steel, similar manufacturing, welding and things. And they enlisted the Koeberg plant that's located in the same environment that's found in San Onofre, the moist salt air, frequent fog, onshore winds and surf. And the Koeberg had multiple cracks up to 0.61 inches deep, and it leaked. It was a tank. It didn't hold spent-fuel. And

then initially the NRC said that they thought it would take 30 years before the canisters would be cool enough, before the moisture would be able to stay on the canister long enough to kind of melt or dissolve the salt on the container. So they thought we had at least 30 years before there would be crack initiation. But then EPRI took the temperature of a number of canister exteriors around the country, including Diablo Canyon, and they found a canister at Diablo Canyon that had a low enough temperature in a two-year-old canyon for the moisture to stay on the canister. And they also found corrosive salts. We obviously don't know if any of them are cracking yet, because they have no way to look for cracks. So that is one of the major concerns that we have about the thin canisters.

Dave Lochbaum: I don't share that concern.

Donna Gillmore: On what basis are you thinking these are not going to crack?

Dave Lochbaum: I'm not saying they're not going to crack. What I'm saying is they have some inspection programs already and they're developing more extensive ones.

Donna Gillmore: They don't have any inspection programs to look for stress corrosion cracking on the outside of canisters. They're trying to get a robot that can see most of it, but they're not even close to having a technology to go with that, that can find them. And then Dr. Singh, president of Holtec, says even if you could find a crack, he said even a microscopic through-wall crack would release millions of curies of radiation -- radionuclides. And even if you could find a way to repair it, that will just introduce another area for cracking. And we have him on video at a meeting saying that. And he's the one that makes these canisters.

Dave Lochbaum: I'm aware of that. I don't find any truth to that, so that's why I have no concerns.

Donna Gillmore: But they can't inspect them. You can't repair something that you can't see.

Dave Lochbaum: They can inspect them.

Torgen Johnson: Can I interject something? I just have a question, Dave; this is Torgen. And my question is that when you have such a high consequence when there is an accident, because of the location of this fuel, this amount of fuel, if there's an overlooked or a misunderstood materials-issue that results in a failure in the cask to hold the radiation inside, and you have a release and you have no way of re-containing or repacking that canister, if you have no spent-fuel pools anymore to re-cask a damaged canister, when the consequence is potentially this high, don't you think that we should be using the tested system that's been in this kind of location, that's been proven over time with this many fuel assemblies, this close

to a salt environment, before the public has the confidence in this system to feel that we don't need to worry about it? My first response to this is any kind of ferrous metal this close to the ocean is questionable. The fact that it's containing this much radiation makes it even more questionable. The fact that it's been brought up that there's no way to inspect these canisters -- the promise of having a working inspection program for these canisters sometime in the future is not very comforting. But then the idea that we've I think only recently realized when you have these kinds of accidents with the fuel, that you're really in uncharted territory. The confidence that the industry has that this is all under control is not -- it's not enough of an assurance to a public that has so much at stake around the power plant. There aren't enough reassurances. There isn't enough data on this system to give anybody the confidence that this system is going to be any better than other engineering endeavors at that power plant that had failed, in which we were given the same kind of reassurances: that these systems won't fail. And they did. Where does your confidence come from, Dave, that this system is going to work?

Dave Lochbaum: Well, first of all I agree with your premise, that given the hazard we need to go with a tried and true system. But that system doesn't exist. The thick-walled casks aren't any more tried and true than the thin-walled casks. So if the lack of evidence or lack of data is a show-stopper, it should stop both, not pass one and prevent the other.

Donna Gillmore: Well, the thick-walled casks, though, they've been used over 40 years and they're able to inspect them. They've even opened one, at least one, in Japan. And they've been holding up with minimal degradation. We have no idea how many cracks these thin ones have, because they don't inspect for cracks because they can't. So we have more operating experience seeing how these other ones are holding up. And I agree with you that they should be protected from the environment in addition, which we're not doing in the US, which we should. And the Nuclear Waste Policy Act requires monitored retrievable fuel storage. These thin-walled canisters do not meet that requirement, but the thick ones do.

Dave Lochbaum: I disagree. If we had a thin-walled canister that had a problem, we could figure out how to do it. That's not an issue. We have enough hot cells and technology to deal with that. We don't need to have that deployed at ever site, because that would be too costly.

Donna Gillmore: Right, but there are no hot cells even to take the fuel out of one canister and put it in another. The one they had, the one I think that was at Oak Ridge, they even tore that one down. And the NRC regulations do not allow you to transport an even partially cracked canister. So to transport a partially cracked canister inside

a transport cap is not even a safe thing to do. Let alone, who knows what the thermal analysis is if you've got a leaking canister and what the radiation levels will be on the outside of that.

Dave Lochbaum: That's not true at all. We have thermal analyses that will allow us to do the canister intact. We can then provide the input into the models to model the crack that we've got. And we would know what the radiation level is likely to be and what the heat-transfer is likely to be.

Donna Gillmore: The one high burn-up transport cask that's available, that's the AREVA MP 197. And that has a chart in there of what the kilowatt level needs to get down to before it's approved to transport that on the rail or roads. And there's a chart that was prepared by one of the labs that shows, for example, when you take a canister with high-burn-up fuel and 37 fuel assemblies, which is what Holtec wants to do, it's going to take about 45 years of cooling before the radiation level will be low enough to transport that canister and that cask. And I have the tech specs for the transport cask and I've got the chart showing -- and the cooling time starts with the time it comes out of the reactor. And then the NRC has also done a thermal analysis of how long you could keep a canister inside a transfer cask, because I think it was Big Rock or one of those that had asked to destroy their pool. And the NRC did a thermal analysis and determined it was about a certain amount a month that it could stay in the transfer cask before it overheated. And they had to come up with some other solution after that. Fortunately they didn't have a canister fail, so that never came up. And I spoke with Mark Lombard and he said not one vendor has submitted an application not use a thick cask to deal with a leaking, failing canister. So there is no container approved for that purpose by the NRC.

Dave Lochbaum: Because there's no need for that purpose. No canister has failed. So nobody is going to design --

Donna Gillmore: This is what Holtec and the others are telling people. If they have a leaking canister, they're going to put it in some kind of an overpack container.

Dave Lochbaum: Yeah, because what would happen -- if a canister were to fail, for whatever reason, we would know what the failure point is, whether it's the weld at the top, whether it's a corrosion through the side of wherever. And we would design an overpack to deal with that problem. It doesn't take very long to manufacture that fix. So rather than have a standard overpack that may or may not apply to the problem that develops, the capability exists to figure out what the problem is and apply the proper solution. I have no -- I can't say "no"; absolutes are dangerous -

- but I have very little doubt that we'd be able to rise to that challenge. It's not that big a challenge.

Donna Gillmore: I don't have your confidence, because I haven't seen any information that would support that. And we've got these canisters that have been sitting here since 2003. We have no idea how many cracks they have; we have no idea how thick they are. And they want to destroy the pool. And they have nothing in place, nothing approved to deal with it. And it could be one or more of those canisters cracking. If it's anything like Koeberg, you know, that was less than 20 years for that crack. So I don't share your confidence. And if there was some documentation, that would help. But I don't see it anywhere. I just see the opposite.

Dave Lochbaum: Show me any canister anywhere in the United States that has failed. Just one.

Torgen Johnson: How long have these canisters been in use, Dave?

Dave Lochbaum: Since 1986.

Torgen Johnson: Okay, '86. And this is 2017.

Dave Lochbaum: Right.

Torgen Johnson: And how long will the fuel be in these canisters down at sea level at San Onofre.

Dave Lochbaum: Until the Federal Government lives up to its obligations.

Torgen Johnson: And in the meantime, they can't be transferred offsite and they can't be inspected properly. And soon there won't be fuel pools to do any kind of transfer into an overpack if there's a problem. And in the meantime we have several counties surrounding this facility. And at the same time we've got emergency planning efforts being scaled back and reduced to almost nothing now if there is an emergency. I don't see anything there to build any confidence in the public that's skeptical of all of this and its in-confidence.

Dave Lochbaum: Everybody's right to their opinion and their fear, but I don't see anything in any of that that causes me any problems at all.

Donna Gillmore: I don't deal in opinion; I deal in fact.

Torgen Johnson: Dave, we just had the power plant come apart, and the steam generators.

Dave Lochbaum: How many people were injured by that nuclear power plant coming apart? How many people lost their homes? How much land was contaminated? Not a single person. Did the system fail or did it work?

Torgen Johnson: Let's talk about an accident at San Onofre and what its consequence would be at surrounding areas, rather than talking about whether or not those steam generators had a maximum accident. What we know is that we can have accidents here with the fuel. If the fuel was safe, Dave, we wouldn't be talking about these canisters and these elaborate storage systems, if the fuel was safe.

Dave Lochbaum: I understand that very well.

Torgen Johnson: Right, so we're not talking about burying an inert, safe -- we're talking about a very dangerous material --

Dave Lochbaum: Absolutely.

Torgen Johnson: -- put into an untested system, and we're getting reassurances that are almost identical to the ones that we were getting. While the steam generators were coming apart and Edison was aware of it, we were going to NRC/Edison meetings in Orange County and getting reassurances from the NRC and Edison's public representatives that there was nothing going wrong at the power plant and that everything was fine. And yet they knew they had problems. So I just want to say, first of all, the public is distrustful of Edison's reassurances. And the public has access to information to be able to look at a complex system like a storage system and start to ask intelligent questions. And the public has enough questions about how sound the engineering is on this. And really what the public gets back are deflected answers when the questions are pointed and there's not an answer from Edison, that they don't have an engineering answer. Or they just get unsubstantiated reassurances that everything's going to be fine. The cost-analysis for these facilities, David, shouldn't be a cost-analysis that's internal to Edison. It should be a cost-analysis that includes the potential impact to surrounding communities when there is an accident. And when I hear the comments that "no, this isn't cost-effective" or "that would be too expensive," I think surrounding communities have a very different view of the cost-analysis of an accident.

Dave Lochbaum: I don't disagree with that. But even agreeing with that, I still think the proposal for San Onofre storing the fuel in the Holtec high-storm cask is safer in the long-run. I don't care about the cost. It's safer in the long-run than waiting for a thick-walled cask and keeping the fuel in the spent-fuel pool.

Torgen Johnson: Well, I think that we have two lousy choices is what we have. We have an untested dry-cask system down at sea level, or we have the spent-fuel pool which is a terribly dangerous configuration for the fuel.

Dave Lochbaum: Yeah, it's not a choice between right and wrong; it's a choice between wrong and "wronger," I think is what we're faced with.

Torgen Johnson: Well, I think what the public is concerned about here right now is that the cost-analysis that Edison is using to choose a thinner-walled cask in a system that's not been proven in this location and this configuration with that many fuel assemblies, and without an in-place tested monitoring system, an inspection system, that the public has the right to doubt the safety of the system and to challenge the decisions that are being made that don't just risk the power plant and surrounding facility but potentially risks areas far outside of the power plant. And that's what the public is really ware of, these reassurances, Dave. The public is wary about the location. We all know because we all live coastally here. I build coastal homes right on the bluffs. The bluffs are unstable, and the salt environment penetrates every aspect of a home, even into the walls of the home. So the salt environment, ferrous metal containment, 37 fuel assemblies in these systems at sea level -- there are more doubts and more questions than there are reassurances and empirical data showing us that these systems have worked with onshore conditions like at San Onofre.

Don Mosier: This is Don Mosier. I just wanted to mention that the latest study shows the Newport-Inglewood Fault is much more extensive than we thought last year. And so the earthquake risk at San Onofre is three to four times higher than the NRC has allowed in their projection. And also the plant is on the busiest civil aviation pathway in the United States. So it's a very vulnerable site for potential terrorist attacks. And if anything, it would make sense to harden the storage site against attack and also to help protect the canisters from the marine environment. And that's inexpensive compared to everything else Southern California has and is doing.

Donna Gillmore: Don, there's one more point to what you said. You know, there's evidence that these thin canisters could have even partial cracks right now. There is no seismic evaluation for other than perfectly intact canisters. When I talked to Mark Lombard at the NRC I go, "What's the seismic rating for canisters that have cracks in it?" And he's avoid for two years answering, because they don't know, because they don't check. They only do seismic evaluations assuming everything's in perfect condition. So that's another important point.

Dave Lochbaum: That is true. They only assume pristine conditions when they do those analyses, and obviously things are pristine only when they come out of the shrink wrap. They degrade from that point on.

Donna Gillmore: Yeah, and Holtec has given us a big 10 years on the concrete understructure portion. And then the 25 canister-warranty is void if they fail, because of the concrete understructure.

Bart Ziegler: That was Don Mosier. He's remodeling this roof. Hello?

Dave Lochbaum: Yeah.

Torgen Johnson: You know, Dave, one of the things that's a concern here, too: the canisters and the fuel being where they are, close to the Newport-Inglewood/Rose Canyon fault line, are subjected to shaking and rocking. And the earthquakes -- our experience here in Southern California, like with the Northridge earthquake that we had back in the '90s -- when you're close enough to the source of an earthquake, you get a P-wave that comes through the ground. And there were stories of people lying in their beds in Northridge when the P-wave hit their building and passed underneath their building while they were sleeping in bed. The person in their bed and the bed hit the ceiling, came back down to the ground, and then the building came back down on top of them. So it's not just a side-to-side shaking, but there's a vertical jostling. If you've got a cracked container full of 37 heavy fuel assemblies -- I don't know if these have ever been tested. And if they were cracked or they were damaged or compromised in any way, what does that mean to the integrity of the containment, when you have something like an earthquake and a jostling of these fuel assemblies in these containers that have never been tested for this type of thing? That's where you could also get failure.

Dave Lochbaum: Sure. That's a good point and I think dovetails on what Donna said earlier and you said earlier. You have a good point, that the community needs to trust that whatever is done protects them, provides adequate protection. If the company is coming in and saying these things are good for x-number of years, what's the assurance backing that up, whether it's monitoring or whatever? I think I would agree that there's work to be done there, whether it's a monitoring thing, a periodic inspection, or both so that if something does go wrong you get as much lead-time as possible. I guess a little disagreement is whether you need to have a spent-fuel pool still onsite. I think more broadly if your monitoring and inspecting regimes detect a problem, what are you going to do? And "hope for a miracle" can't be the answer. It's going to be something tangible. So I think in that regard I think the community deserves that rather than just a blanket assurance.

Torgen Johnson: Well, I think the community, when you define what it is, too, as far as economically, the impacts, we have multibillion-dollar high-tech and biotech

industries operating off of the 78 corridor just to the south of Camp Pendleton. Probably about I'd say 15 miles from San Onofre you have a whole industrial high-tech corridor. It's the economic engine down here in San Diego County. None of these people are aware of the risk of an accident with these canisters. But I think that the cost-analysis has to be commensurate with the potential economic impact to these areas around the power plant, not to mention all the people living in the area that now don't have the emergency planning program that the jurisdictional planning committee had put in place when the facility had operating reactors. They've scaled back on security, they've scaled back on emergency-planning. And yet the fuel is still there and the pools are still heavily loaded today, with all the scaling back of the safety programs and so forth. And these are all done because of cost reasons, not for public safety reasons but for internal cost reasons at Edison. Scaling back on these things, those are more reasons why the public is dubious about Edison's concern for the communities surrounding the power plant. They're willing to take these actions now that really build a sense of distrust in the public as far as Edison's willingness to do everything possible. Safety is not Edison's first priority --

Dave Lochbaum: Right.

Torgen Johnson: -- and we sense that now. And we're looking at these fuel-storage configurations, and we're realizing as we ask questions that safety is not the primary concern. I think their concern is economic, obviously. But also I think there's a lot of reliance on information that when somebody like Donna keeps pursuing those assumptions that the storage facilities are based on -- keeps pursuing those assumptions down to the core -- she finds that there's a lot of cross-referencing of reassurances and confidence that this thing is going to work. And when she actually asks, "Where's the root data that substantiates this confidence?" it doesn't exist. And you know, Dave, if you look at that recent implosion of Theranos, you had the best minds and the best business leaders in the world investing hundreds of millions of dollars in a technology that didn't exist -- billions -- that didn't exist. And in a way, it's almost a mirror of that kind of false confidence that exists in the nuclear industry.

Dave Lochbaum: No, there's a lot too that. I mean, I think one of the problems that the NRC falls into -- and I lean, if not falling in that category, too -- is that there's an assumption that spent-fuel will be taken away in the near future from San Onofre and elsewhere. And therefore the assurances that that canister or that system, more broadly, that you're using is an interim system. It's an interim system, so it doesn't get the same care and attention that the plant did. And as you alluded to earlier, even that more rigorous attention didn't work in the replacement steam generator case. So if the NRC had to assume, you know, they've done the study

saying that it could stay there forever. They released that study in October of '14. But that was just a paper study. I mean, they really don't think it's going to be there more than two decades. I think the study that SEC prepared assumes that DOE will start accepting the fuel in 2035 or something like that, which is probably optimistic.

Torgen Johnson: Yeah.

Dave Lochbaum: Even Edison's own expert witness -- I was part of that decommissioning proceeding where they made that statement and had that plan -- even their own Edison-expert was asked if that was a likely date, and he said no. So it's all smoke and mirrors. But to go to what you were saying, Dave, about the assumption that these are going to be relatively short-term temporary storage, yes, that was the case. However, in 2014 when the NRC said, "Well, these will probably last 100 years and then we'll have to replace the container" -- and I've been following that 100-year statement through all kinds of documents. I have found absolutely no technical basis that those thin-canisters would last 100 years. And I would assume the Department of Justice was probably basing it on information they were given by the NRC. The NRC has no data to support that, and they have a lot of data that shows probabilities of short-term failure, not even 100 years. So I think that's the case in terms of the justice department. If the justice department knew we were buying containers that could crack as soon as they were cool enough and then those cracks could go all the way through in 16 years -- and they know now that the waste may have to sit there indefinitely. 100 years, whatever. You want higher requirements for monitored, retrievable storage. I mean, you can't retrieve the fuel out of these thin canisters without destroying the container. And you can't inspect them. You can't inspect the outside, let alone the inside. There's no inspection of the baskets. Japan has abolished the use of aluminum alloy baskets because they said they're not going to last 60 years. I'm still waiting for an answer from the NRC about "what are we going to do?" We use a lot of aluminum baskets. And they still have evaded answering that question. And if any of those cracks happen to be near those fume supports that hold the basket to the container, you could have the basket inside failing. So that's another issue I don't usually bring up a lot because it's hard for people to comprehend even some of this stuff. So I tend not to bring that up, but --

Dave Lochbaum: As far as that 100-year assumption, where it came from, my recollection is it that it came from the original certifications the NRC issued for Surry back in '86 and thereafter. The initial assumption was it was licensed or certified for 20 years. It was a provision for up to for extensions for a total of 100 years. But I think it's that circular logic or circular assurance train that once that became -- there might

not be much science behind that. But I think that became the standard or the number that has been used.

Donna Gillmore: Yeah, and I think that was a thick-walled cask. Surry was using thick-walled casks at the time, right?

Dave Lochbaum: Right, that's correct.

Donna Gillmore: So with a thick-walled cask, that seems more reasonable.

Dave Lochbaum: I think the reality that the NRC doesn't really believe these things will be there very long, and DOE, is leading people into unfortunate decisions from both the safety and the cost standpoint. I think DOJ is driving people to use the cheapest solution available, which also has some safety implications. So the Federal Government needs to look more broadly, more realistically: that these things are going to be there for a while, longer than their assumptions.

Torgen Johnson: Mm-hmm.

Dave Lochbaum: And I think if they did that, if they were more realistic, they would come up with better casks. The other thing, to give credit to Donna -- I think, Donna, mainly through your efforts the NRC is developing those inspection programs or back-fitting the inspection programs for dry storage. They might have gotten there anyway, but I think the pressure or the spotlight or whatever that you put on them is getting them there quicker. Perhaps they should have been there already, but --

Donna Gillmore: Well, based on my research, it's not even feasible to come up with even an adequate way to do it. The best way to check for cracks in stainless steel is to put a fluid dye on the inside. And that's how they inspect them before they're loaded. Any other technique has its limitations. And they're way far away from that. And the current robot they designed can't even check the bottom; the robot can't even get there. So it's really just, as far as I'm concerned, a PR effort to stall the fact that they don't have a good solution.

Torgen Johnson: Dave, do you think that the Federal Government will live up to its obligation to take all the waste; and if so, when?

Dave Lochbaum: I have more confidence now than five years ago, but it's not anywhere close to 100 percent. The reason I have more confidence is that more and more people are becoming disenchanted with the status quo. It's not really helping the communities, not helping the plant owners, it's not helping the government who keeps losing these lawsuits. So there's more and more people wanting to do things differently. I think that's why you're seeing the talk about two central or

consolidated interim storage sites. The Blue River Commission a few years ago recommended that as a step because the repository is not going to be available anytime soon. But in terms of the repository itself, which is supposedly the final disposal of this stuff, I don't think we're any closer to getting to that point, because the House and the Senate, which have to somehow agree and come up with the money to fund whatever path we take, they're not on the same page. They're not even in the same book at the moment on how to solve this problem. And coming up with the money to pay for whatever that path is, is currently a problem that needs to be solved.

Donna Gillmore: I don't think anybody here would want to bet their community that our federal elected officials are going to do anything right for us. We need to hedge our bets and get the safest technology, because these things could be here 100 years. We don't know. And would it be right to give another community canisters that we already know can crack and fail and can't adequately be monitored on the inside or the outside? That would not be a good moral, ethical thing to do.

Torgen Johnson: I think the community here understands that, Dave, that at least these canisters could be here much longer than their planned 20 years, and that if that is the case then it's mandatory that the safest long-term cask storage configuration be used, irrespective of the cost, because of the potential high consequence to the surrounding communities -- that the economic analysis that's driving Edison to go towards the quickest and least-expensive configuration is doing a huge disservice for everybody in the surrounding area that's looking at this with doubt. You know, the community here is fairly well-informed. We also know, Dave, that these canisters have been loaded with damaged fuel assemblies, even though Edison's given us reassurances that they're not, because there's people at the power plant that know this information and share that.

Donna Gillmore: They're in the statistics. We have the inventory of what's in there, and they've identified damaged fuel. What we've been hearing is there's more damaged fuel that they've been owning up to. I think that's the difference now.

Torgen Johnson: And what does that mean, when you've got damaged fuel assemblies and you do get a through-crack and you do get a leak?

Dave Lochbaum: The fuel rod is one barrier between the radioactive inside or the particles and gases getting out. So if it's cracked already, then that's inventory is already in the canister, waiting for a breach of the canister to go out. So, you know, you're waiting on the canister to fail before that stuff gets out.

Donna Gillmore: Yeah, and that'll go right out the air vents in the concrete overpack if it has air vents in it for cooling.

Dave Lochbaum: I want to circle back to a point that Donna made earlier about the aluminum being used in US canisters. I think the internals that bother me a little bit as much or more than that is the degradation of the neutron absorbers that they're using in the canisters to guard against criticality. There's an NRC staffer whose different professional opinion package was recently placed in Adams, and that's been a problem with spent-fuel pool protection against criticality. It seems to be it's been a problem on the dry-cask side, but they claim to have addressed it. And that NRC staffer recently pointed out that that assurance was perhaps as thin as the canisters.

Donna Gillmore: I would love to have that ML number; that would be great. That's just another reason to buy thick-walled casks that have bolted lids, so you could actually inspect for things like that and then deal with it, because we're just working in the dark once they weld these things shut. And regarding cost, I did a cost-benefit analysis for the Public Utility Commission and made a cost-based case that the thin canisters were going to end up costing us more. And I can share that with anybody that's interested, based on the facts of the shorter lifetime.

Dave Lochbaum: Is that posted in San Onofre Safety?

Donna Gillmore: Yeah, but it'd probably be hard to find. I can get it.

Dave Lochbaum: If you'll send that to me, I'd appreciate that. I also wanted to circle back to a point that was made about the risk to the communities. I understand that. What I don't understand is that when the reactor is operating, it's so hazardous that the owner needs federal liability protection against an accident under Price-Anderson. The spent-fuel is so hazardous the repository must isolate it from the public and the environment for 10,000 years. But when it sets in spent-fuel pools and dry casks, it's not protected by Price-Anderson and it's not protected by 10,000-year isolation. Why is something so hazardous on the two endpoints so benign in the middle there? And I just don't understand that.

Donna Gillmore: I managed to get the documents from the NRC that they based the assumption that nothing could go wrong, at least in the dry storage. And I did a paper on that, pointing out the assumptions in those documents are bad assumptions. And I made that case to both the DOE and to the NRC and the ACIS. And Mark Lombard actually acknowledged it in last year's annual waste conference and said they were, quote-unquote, "working on it," whatever that means. Not too many people probably knew what he was talking about there. So anyway, I can share that with you too.

Torgen Johnson: I'd like to share something with Dave, too. Dave, there was a point in prior to the shut-down of San Onofre where Edison was giving reassurances that their

seismic experts were convinced that there was no significant seismic risk at San Onofre. And they happened to call a meeting with the Southern California Association of Geologists in Carlsbad. I believe it was 2013. But Edison gave a presentation about their steam generator issues and asked for feedback from the community of geologists. A lot of them are academics that were asked for their opinions. And at first, after Edison made the presentation there was silence in the room because nobody really wanted to speak up. I think there was a certain reliance on Edison for work and grant-funding for research and so forth. But as soon as the discussion started and a few pointed questions were asked, the room erupted into debate and discussion. And Edison's representatives were there listening, and I was listening, and there was absolutely no consensus that supported Edison's public announcements that the seismic situation at San Onofre was in any way safe. There was a range of opinions, and there were comments that were made that I wish had made it onto the evening news that night, coming from the geologists. But it's these reassurances that the public hears all the time that when you dig a little deeper you realize that they're really hollow.

Dave Lochbaum: That's a good point, I mean, because if you'd asked the companies or the regulator in Japan on March 10th of 2011 if their plants were protected against tsunami and earthquakes, I'm sure you'd have gotten 100-percent "yeah, that's nothing to worry about." So I understand that the assurances and trust don't match up all the time.

Donna Gillmore: Well, if they were based on facts that would be nice. But they don't care to let that get in their way.

Torgen Johnson: I think Edison was concerned about the answers that they got at that meeting with the geologists and --

Dave Lochbaum: Stopped calling meetings like that, I assume.

Torgen Johnson: Well, they stopped making these statements about the relative safety. And in the meantime, since that meeting there's been discovery that the Newport-Inglewood/Rose Canyon fault line is much larger and much deeper than previously thought, and capable of much larger earthquakes. So this fuel is in an area where there's already -- I've got research that shows that there's tsunami evidence deposits far inland in the coastal estuaries near the power plant. So there's a history of periodic tsunamis that have come through this area that were very large. And that fuel is stored down at sea level behind a very flimsy sea wall. The storage facility is down near sea level. It isn't on top of the bluff. It's not 80-feet above sea level. It's down behind a wall. It's a seawall. It's not a

tsunami wall. It's like a very lightweight seawall that has not been maintained well.

Donna Gillmore: Torgen, Edison admitted to the coastal commission that they haven't been maintaining that seawall. So they're not taking any credit for it, but they're sure don't mention it in their little diagrams.

Dave Lochbaum: Yeah, I saw a diagram posted on a website. To tell you the truth, this call has -- I can see that there are issues with dry storage that we as a country aren't fully developing. I think your community and other communities deserve better. And this call changed my mind. I obviously didn't have that opinion coming into the call, but I think I've heard some very good points raised that I can't make go away. So, to me, I think it's difficult to come up with a system that's good for an indefinite period of time. And since we can't get a reasonable assurance that it will be "x" years, I think the approach is to have a monitoring system so you can see how the casks are doing. And if a problem is developed, again, you don't bank on a miracle to come in and save the day. You have something that seems like a successful solution to that problem. Whether it's spent-fuel pools or something else, I think that's up to the individual situation. But I think just assuming that the stuff will be good forever is asking too much.

Donna Gillmore: Yeah, I'm hoping to maybe buy us 100 years. I'm not that Pollyanna, you know. That might even be optimistic. But the thick-walled casks already have multiple redundancies, already have the monitoring of the pressure between the lids and seals so you know if there's a seal that needs to be replaced. You can inspect the inside. To me, if you're getting radiation leaks, then that's too late. The idea is to catch it beforehand. They're already designed so if you needed to take the fuel out and put it in another container or needed to inspect, they're designed to do that. So they're designed to be maintainable. The thin casks were designed with the optimism that we only need these to work for 20 years and then we'll have another solution.

Dave Lochbaum: Right.

Donna Gillmore: So we don't need to reinvent the wheel. Now, there are some different models of thick casks, and each country even specifies its own requirements with its casks. We had Siempelkamp that manufactures the CASTOR casks, and they also manufacture their own version. They had a thick-walled cask that could hold up to 33 fuel assemblies. And the ones that held less, you had a difference between a five-year and a 10-year cooling period before you could put them in the casks. And then in terms of the geological repository, that was not designed for high burn-up fuel, even if it would work. So we are way away from any permanent

solution. So I think it's not just saying "thick-walled casks." That's just an easy term that I actually invented as a talking point, and it seems to have caught on. But it represents more than that. It represents redundancies, inspectability monitoring, design that could be replaced, maintained. It really stands for a lot of other things. And there's variations in thick casks. And some are better than others.

Dave Lochbaum: That's a good point, because if you look at the safety philosophy that's applied when the reactor is operating, it's defense in depth. You don't rely on any one thing. And the canisters, the thin-walled canisters basically reduced defense in depth to the minimum. It's not one thing, because it's the fuel-cladding. But definitely the thick-walled casks or the double casks are more reflective of the defense in depth philosophy that's applied during reactor operation that somehow gets abandoned when --

Donna Gillmore: Now, the cladding used to be considered a defense in depth for the thin canisters. But then when they discovered, because of the damaged fuel and the high-burner fuel and all that, that they couldn't count on that, the solution was to take the damaged fuel and put them in damaged fuel cans before they put them in the basket. However, I didn't know that until maybe a year ago, that those damaged fuel cans, they aren't even sealed on the end. They have, like, a mesh on the end. So they're not even totally sealed. So you basically just have the thin canister as your only defense. And no that we know they can crack and that crack can probably even happen sooner because of the salt environment -- and I also told Mark Lombard, "You know moisture is the evil of materials." I told Mark Lombard, "You know, electrical contractor told me that ground is sogging wet all the time." And he got this shocked look on his face. I was sitting right next to him. He got this shocked look on his face. And then he gained his composure and he said, "Well, that's their problem to figure out." So when we have regulators that aren't doing their job and maybe only got their job because they go along to get along, then it's up to us to be the ones that speak, even for the NRC staff that really can't speak up without losing their jobs.

Dave Lochbaum: It's an interesting point about the corrosion on the outside, because the inside is -- you go to great lengths to remove moisture, the vacuum drying and whatnot and backfilling with the inert gas, to retard corrosion and degradation. But the outside, which is exposed to salt air, works fine and lasts forever. It's an interesting metallurgy issue there. Apparently NRC thinks it's only potentially corrosive on the inside, even though it's the same metal on both sides.

Torgen Johnson: You know, Dave, when we had a conference here in 2013 just the week that Edison decided to shut San Onofre down, we invited the former prime minister

of Japan to San Diego to speak publicly at the county government center in San Diego. And he was not asked to speak about anything other than his experience in Japan dealing with that disaster. But what he told us was that when you have a severe accident with fuel, his concern was the fuel. His biggest concern was the spent-fuel pools. And what he had said to us, which we hadn't heard before from anybody, was that they were already making contingency plans to evacuate out 160 miles. And he said that was going to be a permanent evacuation. And he said that at the conference. And I think that caught Edison's attention and caught everybody else's attention, because we'd always been told that a 10-mile emergency planning zone was sufficient and that 50 miles was really unsubstantiated. And the truth slipped out that the Japanese knew as nuclear experts when assessing worst-case scenarios that the impact was so much larger than what the public was being told here about San Onofre and the safety of San Onofre, that we were told by the interjurisdictional planning committee here that 10 miles was more than enough and really only about two miles out, if there was an accident at San Onofre, would be sufficient for public safety. Hearing a prime minister tell us that with all his experts, US and Japanese experts, that they were making contingency plans to evacuate the metropolitan Tokyo area out as far as the total metropolitan Tokyo area -- something like 50 million people -- I think that was sort of the veil pulled back on the truth about accidents with fuel. And he told us many times, "My concern was the fuel." He said, "All our experts were concerned about losing the ability to cool the fuel." And I think that's what we're looking at here now. We're dealing with the fuel and we're dealing with spent-fuel pools that are still very densely packed. And we're looking at safety, security, emergency planning being cut back at the facility; and we're looking at dry-cask storage containment that it's the quickest, most expedient way to put it in the ground and get it out of sight and out of mind. But the public's understanding that this stuff is probably going to be left here and that we've got to deal with it, either now and do the right thing and use the best containment systems and monitoring systems and re-casking systems that are available, or we stop what's being done right now because we know it's being put into a configuration where we can't monitor, re-cask, or transfer this fuel out of here. We need the best system possible for the interim system, realizing that it's probably going to become our permanent storage here.

Donna Gillmore: Well, my goal had been to have Southern California set the standard for model dry storage. I mean, we have power and influence here, money. If it can be done anywhere, it can be done here, to raise the bar. That was my hope. But we all have to be on the same page and educated to the same level before that can happen. And it's still probably a 50-50.

Dave Lochbaum: I can't disagree with that. And Tom Polomocino (ph. sp.), when he visited us in our offices in D.C., that was his stated goal. He wanted to set the standard for decommissioning for the country. A good standard, not one to avoid.

Donna Gillmore: The only reason they want the fuel -- I figured out why they picked what they did. One reason: they were looking for the quickest way to get it out of the pool because it cost them a lot of money to keep the pool. They can get rid of a bunch of workers. It's a big cost item. And Holtec gave them the promise between the three vendors that they could do it the quickest, that they could take 37 fuel assemblies and get approval from the NRC for even hotter canisters. But Edison is refusing to tell the public that because they're putting 37 fuel assemblies in there, that fucker's gonna be too hot for 45 years before they can transport it. You know, so it's just a game they're playing just for money. That's why they do everything.

Bart Ziegler: Dave, you know, there's some amazing people on the phone: Steve Kent, Don Mosier, Roger Johnson's (ph. sp.) former professor from Amherst. There's some just amazing people who are -- and Ace Hoffman is about as technically adept as possible. And rather than, you know -- number one, I just can't express the gratitude for your time and your decades of service. If there's a way we can help you without burying you with emails, we are absolutely there. All of us are volunteers and are so grateful to support you. Let us know how we can, if you have any ideas. We were trying to put the East Coast and the West Coast together in this conversation you kindly agreed to have. And, you know, it is a pretty serious thing out here. I don't know if I should share this but, Donna, if you don't mind may I tell him about your plans to move?

Donna Gillmore: Oh, yeah, I didn't want that to get in the newspaper or anything. But I've done the math, and the risk that in three years we could have through-wall cracks at San Onofre -- and they have no plans to deal with those Chernobyl cans at all -- is too big a risk for me. Most of my wealth is in my home. So I'm going to sell my home and get out of here as soon as I recover from my back surgery and get the house sold.

Bart Ziegler: Oh, yeah, Donna, thank you very much for even being on the phone given your recovery and your pain.

Dave Lochbaum: Well, I think in terms of the answer to the question, what I need, I think my next step is I want to go look at this Prairie Island plan in more detail. I skimmed it when it went through but I need to go back and look at it. If that's a model that provides better assurance -- not complete assurance, but better assurance -- then that's something we could endorse as a better way of dealing with this issue. I

think the other thing I want to go back and -- I made a presentation back when Gregory Jaczko was the chairman of the NRC, so I think it was like 2008-2009 timeframe, pointing out the fact that we deal with spent-fuel in an almost haphazard way as compared to the repository or the reactor side. And I need to resurrect that, because that's the concern that you have for the community, is that that risk is not being properly managed and therefore the community is shouldering a heavier burden than it needs to otherwise. So, I agree with that. I think I need to resurrect that to get that back in. And then put the issue back on the Federal Government side, NRC, et cetera, into how do they provide that assurance. Pretending it's not going to happen is not going to be enough for the communities.

Bart Ziegler: Okay.

Donna Gillmore: Well, I can send you the report I did on the documents they've used for that assumption.

Dave Lochbaum: And I'll send you the DPO packages. There's also some -- there was a problem up at Millstone loading a dry cask. I don't know if you saw that problem where they failed some fuel rods in the process. And I'll get you that information as well.

Donna Gillmore: Oh, they always will prove exemptions for everything, don't they?

Dave Lochbaum: Well, it was an -- actually, as they were doing the vacuum drying, the delta-P, the differential pressure, failed some fuel rods. And they started getting high radiation levels in the vent stacks. So I'll get that to you. In the meantime, if anybody has any questions or wants the document I mentioned or anything like that, feel free to email me. I mean, depending on the volume I may not get to it immediately but I'll get to it as quick as I can.

Bart Ziegler: All right, okay. Thank you everyone. Thank you to the East Coast. And is it Marvin from Philadelphia? Thank you very much. Dave and everyone else, thank you.

Torgen Johnson: Thanks, all. Very enlightening.

Dave Lochbaum: Thank you, thank you.

[End of Recording]