DEPARTMENT OF HEALTH

STATE OF HAWAII

In the Matter of U.S. NAVY'S APPLICATION FOR A UST PERMIT FOR THE RED HILL BULK STORAGE FACILITY.	Docket No. 19-UST-EA-01 VOLUME II (Pages 214 - 453)

The above matter came on for hearing via Zoom Videoconferencing, commencing at 8:00 a.m., on Tuesday, February 2, 2021.

BEFORE:
LOUIS L. C. CHANG, ESQ., Hearing Officer

APPEARANCES:

For the U.S. Navy:
JONATHAN McKAY, ESQ.
MICHAEL LAW, ESQ.
KARRIN MINOTT, ESQ.
MARNIE RIDDLE, ESQ.

For the Board of Water Supply:
ELLA FOLEY GANNON, ESQ.
DAVID K. BROWN, ESQ.
Morgan Lewis & Bockius
300 Grand Avenue, 22nd Floor
Los Angeles, California 90071

JEFF A. LAU, ESQ.
Deputy Corporation Counsel
City and County of Honolulu
567 S. King Street
Honolulu, Hawaii 96813

APPEARANCES (Continued):

For the Sierra Club Hawaii Chapter:	DAVID KIMO FRANKEL, ESQ. 1638-A Mikihala Way Honolulu, Hawaii 96816
For Environmental Health Administration, Department of Health:	JAMES C. PAIGE, ESQ. Deputy Attorney General 425 Queen Street Honolulu, Hawaii 96813

Reported by: Donna N. Baba, CSR #103
Certified Shorthand Reporter

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P R O C E E D I N G S

HEARING OFFICER CHANG: Let's go on the record. Good morning/good afternoon everyone. May I have appearances for record, and please indicate the parties associated with you, your respective witnesses who may be present, and assistants.

MR. MCKAY: Yes. Good morning, sir. For the United States Navy, I'm Jon McKay with the Office of the General Counsel. I'm here with my colleagues, Mr. Mike Law, also with the General Counsel's Office; Ms. Marnie Riddle and Ms. Karrin Minott from the Naval Litigation Office; Mr. Frank Cioffi from ACOM as our expert consultant; and Mr. Curt Stanley, who's also with ACOM.

HEARING OFFICER CHANG: Very good. Thank you very much. And then for the Board of Water Supply?

MS. GANNON: Good morning Hearing Officer Chang. This is Ella Foley Gannon from Morgan Lewis & Bockius, and I'm here representing the Honolulu Board of Water Supply. With me this morning is my colleague, David Brown, also from Morgan Lewis & Bockius; and Jeff Lau from the City and County of Honolulu. And we also have Wogai Mohmand with Morgan Lewis with us. Erwin Kawata is here in behalf of the Board; and David Norfleet from DNV GL, one of our witnesses, as well as Nicole DeNovio from Golder.

HEARING OFFICER CHANG: Thank you. And for the Sierra Club.

MR. FRANKEL: Good morning, your Honor. David Frankel here for the Sierra Club.

HEARING OFFICER CHANG: And for the Environmental Health Office.

MR. PAIGE: Good morning, your Honor. Deputy Attorney General James Paige for EHA. I also have present client representatives Lene Ichinotsubo, Fenix Grange and Roxanne Kwan.

HEARING OFFICER CHANG: Thank you, everyone. Are there any administrative or procedural matters that need to be taken up now, or are we ready for the presentation of the next witness?

MR. MCKAY: The Navy just had one change in its order of witnesses. I didn't receive any objections. We're going be proceeding this morning with Mr. Chris Caputi, followed by Mr. Frank Kern, and then Mr. Rob Jamond. We're changing the order of Rob Jamond and Frank Kern.

HEARING OFFICER CHANG: Okay. Mr. Kern is joining us at this time as well.

MR. MCKAY: Okay.

HEARING OFFICER CHANG: So Mr. Caputi, may I ask you to take your oath at this time. The court

reporter will administer the oath.

Whereupon,

CHRIS CAPUTI,

called as a witness on behalf of the United States Navy, being first duly sworn by the court reporter, was examined and testified as follows:

MS. RIDDLE: I'll be directing Mr. Caputi's testimony. Chris Caputi is an engineer with Michael Baker International, which assisted the Navy in selecting tank and line tightness testing methods for use at Red Hill.

DIRECT EXAMINATION

BY MS. RIDDLE:

Q. Mr. Caputi, could you briefly summarize your testimony thus far?

A. Yeah. I was asked to provide some details to explain the selection and execution of the leak detection testing at Red Hill.

Q. Thank you. Are there any corrections you'd like to make to your testimony?

A. No, there are not.

MS. RIDDLE: All right, thank you. If BWS would like to cross-examine the witness?

HEARING OFFICER CHANG: Okay. For the Board?

MS. GANNON: Yes. This is Ella Foley Gannon,

and I'll be speaking with you this morning about your testimony. Thank you for joining us, we appreciate it.

CROSS-EXAMINATION

BY MS. GANNON:

Q. Can you explain to me basically what is a tank tightness test designed to do?

A. I guess in layman's terms it would be to determine if the tank is leaking at that point in time that the test is executed.

Q. And if there was a leak when the tank tightness test was run, would it still be able to pass that test?

A. Well, for all leak detection equipment there is what is known as the minimum detectable leak rate that is established for a test method or piece of equipment, so it is conceivable that the method limit, the leak that's actually occurring could happen below the minimal detectable leak rate.

Q. So simply because a tank passes a tank tightness test, it doesn't mean that it's necessarily not leaking; that's correct?

A. That is correct.

Q. So if a tank was -- so the rate that you use as your minimum detection is .5 gallons her hour; is that correct?

A. That is correct currently, yes.

Q. Though if a tank was leaking .4 gallons per hour, would you find that when you ran a tank tightness test?
A. No, we would not.
Q. And if you, so if you had that tank tightness test done and it was leaking .4 gallons per hour, and then you did a test again in six months and it was leaking .4 gallons per hour, would you find that leak?
A. No, we would not find that leak either.
Q. So how long would it take you to discover that a tank was leaking chronically .4 gallons per hour? When would you discover that?
A. Really, not until the leak would increase in size to be occurring at above the minimum detectable leak rate.
Q. So just so I can understand it, so if it was leaking .4 gallons per hour for a year undetected, how much fuel would be released?
A. .4 times 24 hours in a day, and so a couple hundred gallons, potentially.
Q. Thank you. And so going back to the purpose of the tank tightness test, you said it's really giving a kind of snapshot of the time when it's run, right? This is the condition of the tank when it's run. So it doesn't predict whether leaks are going to happen in the future, does it?

A. No, it does not.
Q. And it doesn't speak to if it does discover a leak, it doesn't speak to where the leak is occurring does it?
A. No, it does not.
Q. So it's simply, again, it's simply just a snapshot that says whether it its leaking above your detection rate or not when it's done?
A. Correct.
Q. Correct?
A. Yes.
Q. So do you also look at any trend analysis when you get your results from the tank tightness test?
A. I'm not sure exactly what you mean. Could you clarify that?
Q. I'll show you something, a graph that our expert did, David Norfleet from DNV GL, in his report. I'm not sure if you had an opportunity to review that as part of these proceedings, but it was the -- it's the Board of Water Supply -- again, it's the Norfleet testimony, and I'll share my screen so you could see what we're looking at. Can you see my screen now, or not yet?
A. Not up. Something's happening.
Q. Okay. I'm getting better at this as the days go by.

A. Okay, I can see it now.
Q. Okay. So what this was done to look at and to try to analyze from the little data we've had about the -- from tank tightness tests that were done in 2018, the first one was from Tank 10, do you see that?
A. Yes.
Q. And then we did an analysis from the readings from Tank 11 in 2018, and there's a difference in that, right, because the blue is the data results we had. Do you see the difference? Again, there's 10, and there's 11, right?
A. Mm-hmm, I see them.
Q. So what would explain that difference? What would explain that decline in the data for Tank 11?
A. Well, it certainly shows that it's losing mass over that time period, however, that doesn't necessarily mean that it's a leak escaping to the environment. It could potentially be just a bleed by of the isolation valves. When you go to do a tank test it's imperative that the tank be isolated and fuel not be allowed to move through the normal appurtenances of the tank, like the piping or people taking samples and things like that that routinely happen during normal operations.
You effectively seal it in and say we're going to test it now and try to account for any loss of mass, and

occasionally you do see reduction of mass as it bleeds through a valve that you're testing up against. But ultimately, especially with such a small scale on the mass measurement there on the side, that wouldn't indicate a leak detectable above the minimum detectable leak rate.

So I guess it would be clear to say that that line would have to be much more exaggerated in a decline for the test vendor to say it's losing enough mass over this time period to be determined to be leaking above the minimum detectable leak rate.

HEARING OFFICER CHANG: Ms. Gannon, can you have the witness explain how to read the chart?

MS. GANNON: Sure.

Q. (By Ms. Gannon) Mr. Caputi, can you explain what this chart shows?

A. Certainly. You can see that the mass number on the left-hand side of the graph indicates how much the fuel weighs, effectively, which they can then turn into feet of water, which is what they indicate there, how -- you know, the level of the tank. The access along the bottom really is just a time scale going from -- in, I believe that is hours.

So as you look at it, you say, all right, well, the mass at the beginning of the test was, you know,

right along that black line as you progress through time, the mass that is being measured with those little blue dots has effectively dropped slightly. But again, that could be through internal valve bleed by, all kinds of other probably factors that could influence that. But, again, with something like that, the minimum detectable leak rate of what the test method is set against, if that decline doesn't become much greater than what it is, the equipment can't say for a fact that it is leaking. It may be, but it's below the detection limit of that method.

So the test vendor, this is certainly what they're looking at. The data is collected, analyzed by their equipment, it produces this graph of what the mass is doing, and then they determine, well, it's not above -- the decline isn't above the minimum detectable leak rate, therefore, it passes the test.

HEARING OFFICER CHANG: Ms. Gannon, I'm sorry, I still don't completely understand how to read this chart. On left-hand scale, and when it talks about a mass, it gives a value, 170,086, 170,084, and then at the top it says feet H20. So what does the number represent?

A. I can try clarify that for you if you like.

Q. Please.

A. Okay. So it's actually 170.090 feet is what you're read -- the top number on the left-hand side of that graph. The next level down is then, what, two-thousandths of a foot lower, right? 170.088 and on down the graph. So that is actually the height of the fluid within the tank, and its converted to feet of water as opposed to using feet of jet fuel or whatever this product was, and that's just for a standard. So depending on what kind of product you're testing, they weigh different amounts, you know, per unit volume, and instead of dealing with that they convert all that to just a height of water, is kind of the standard to present.

HEARING OFFICER CHANG: So now the blue line, the dash line showing a decline, so at the end of that 125 timeframe, that's, I think you said those were hours between the bars?

THE WITNESS: Yes, I believe so.

HEARING OFFICER CHANG: So that would be about 10 days? So in 10 days what has happened?

THE WITNESS: It's the measure, the level that they've measured has gone from approximately 170.085 to not even 170.084, right, a slight decline of less than a thousandth of an inch.

HEARING OFFICER CHANG: All right, thank you.

Ms. Gannon, I apologize. Please proceed.

MS. GANNON: Thank you. I think that's helpful to explain that, and I apologize for not asking those detailed questions myself.

Q. (By Ms. Gannon) So again, but this is not -- you said you don't actually do trend analysis regularly when the tank tightness tests are being done?

A. Well, we don't. The test -- that is exactly what the test vendor is doing.

Q. And you described that there could be other reasons other than leaks, and some of those sounded like they could be anomalies in the equipment, or there could be some sort of small error that's made in some of these readings; is that right?

A. With any scientific measurement there is some level error in measurement, so maybe that has some part in how these numbers as they're established here.

Q. Okay, thank you. I'm going to take that down.

So turning back to then the data that actually the person who's running the test has done, did the DOH request that the Navy turn over that data in order to confirm the validity of this test?

A. Are you asking me if they asked me for that data?

Q. Well, on page 19 of your testimony you talk about the fact that the Navy's consultant and the DOH's

consultant had asked for it, and then you said that you didn't think it was necessary for it to be turned over. That's what I'm trying to get to. Do you remember that, or do you need me to pull up your testimony?

A. Yeah, no, no. I mean that's been a long-standing kind of, I don't want to call it a battle, but line of questioning is to what is presentable as far as the data that the test vendor has and is willing to exhibit.

The reasoning that we don't ask for the test data, which to us is all those individual little blue dots that are on their graph, is that we couldn't possibly do anything with that. I mean, yes, if they ultimately showed the analysis that's been done to show those little blue dots, that's actually having already skipped a step of what the raw data is. And, I mean, I guess there's a disconnect between -- the raw data that's collected by the test equipment is then analyzed, and the results are then populated on that graph that you saw. I don't know what anybody getting the individual raw data of the pressure readings could do to try to validate the numbers that populate that graph. You would need to know the analytical algorithm that the tester's using that ultimately makes that graph.

So if we got the raw data and I were to make a mathematical calculation, it would definitely not match

what they have because I don't know what their algorithm is. That's a proprietary, internal -- I mean I've often described this as kind of a black box situation, is that they -- we're paying them to do a tank tightness test. Their equipment has been validated by independent third-party testers to show that the results that you get when you use this method is acceptable, and it's really not an industry standard to then second guess the test vendor and asked them for their raw data so you can analyze it to try to compare what you came up with versus what they came up with.

They have a method that's been established, scrutinized, proven to get to a minimum detectable leak rate. We employ them to do such, and we don't scrutinize their raw data. And I really don't, as I've heard this question many times since we've been doing work there, I don't know what anybody would do with that raw data.

Q. So the third-party vendors, their equipment has been verified, but not their equipment every single time a tank tightness test is done twice a year on -- that's supposed to be done every tank, I don't know that it's been done on every tank -- but every time you're doing the test, the equipment isn't being verified by anybody else, right? There's no third party who's checking and

making sure that each time the tank tightness test is done the equipment is performing as it's supposed to?
A. No, that's really -- that validation, that's a different kind of validation. That would be, say, calibration as opposed to test method third-party evaluation.
Q. So, again, when we say that this has all gone through this phase, it's really just the methodology that has been approved by third parties, again, not the specific equipment on the day, and you haven't reviewed any of them. You're relying upon the vendor.
A. Correct.
Q. So have you reviewed the validation testing to confirm the accuracy of the vapor test?
A. Well, the third-party, the independent third-party validation of the test equipment and/or method in this case is then further scrutinized under what's known as the National Work Group for Leak Detection Evaluations, which is an organization that focuses on leak detection equipment and these third-party evaluations to make sure that the third-party evaluation was done in accordance with EPA protocols for valuating test methods. So we rely on that working group's listing, essentially, or validation of methods to select the methods that we use for any

testing.

That's kind of the industry approach, is that somebody has a test method that they've invented, they get somebody to independently verify it under what are EPA protocols, I mean a very specific set of things that this is how this needs to be done. That is then sent to this national working group, which is effectively a group of regulators, State regulators and people from EPA that look at it and say, yes, this test method was independently verified under the protocols established for UST leak detection equipment and we are noting that this was all done properly. Therefore, then they list it on their work group, and that allows people in the industry to then just go out and select a piece of equipment without having to do kind of what you're implying here.

I don't need to independently verify a piece of leak detection equipment if the industry standard is that somebody else has already done that and that's been validated by this working group.

Q. But again, when you're talking about the validation, it's for the methodology in general, but not specifically how the equipment is performing on that day, or when a tank tightness test is done; is that correct?

A. No, we don't do any evaluation to -- in a routine tightness test situation. Like we don't go and perform a tank tightness test and at the same time pull a leak to confirm that that equipment is measuring the same thing that we're taking out of the tank, which is how you would have to go about doing that.

Q. Okay. So you haven't done that and the Navy doesn't do that independently either, do they?

A. Not during a routine test, however, as part of the AOC, that was done for various test methods. They were -- again, it was kind of an extra step of validating that this test method actually does what it says it does. No, it's not done on an every-single-tank event. That's just not practical to every time you do a test validate the amount of work that would take to do that.

But instead, yeah, we rely on it was independently scrutinized, listed on the work group, we selected it, we've used it, and then under the AOC they said, well, we'd like to see this evaluation to see in Red Hill, you know, what the results would be, and so we utilize these multiple different methods against each other, pulled leak events to see how this equipment could measure those induced leaks, and serve the Mass Tech method, the one that you showed there and is the

most -- well, that we've only ever used at Red Hill was found to be even more capable than was originally thought under the original third-party listing.

Q. But then you had described that there's this ongoing battle our dispute with the Department of Health about the need to provide the underlying data. Did the Department of Health officially agree with you that they didn't need to see that, that they didn't need to be able to audit it? Have they agreed with that?

A. Well, I mean I would say that as under the AOC where we did this evaluation, from the very beginning both the EPA and, I guess, the DOH was asking -- you know, they infer we would like to see the data because we want to be able to try to do similar math to, I don't know, validate what the method was actually indicating?

We conferred with them and said, look, the way that this is normally done, you don't need to look at the data, you just need to look at the results of what gets done. So if I do a tank test and Mass Technology, for example, says that the tank was leaking at .4 gallons per hour, and the evaluator had pulled an -- induced a leak -- when I say leak, I'm talking about draining part of the tank into a bucket at a leak rate of .4 gallons per hour and collecting it, it's not like it's truly leaking -- but they're inducing a loss

of product from the tank at a rate, and that's the, kind of the target rate for the evaluation. And then these testers run their equipment and say, our answer for that test event was .4. Well, if the leak we induced was .4, then they nailed it. If it was .5, they were slightly off. If the leak was 5 gallons per hour, then they were way off.

So under the AOC we had multiple test methods, and that's exactly what we did, we analyzed the equipment at Red Hill, the different tank test methods in tanks at Red Hill, inducing leaks to see how well the results of these methods compare to the known leak, and when you do that, then you don't really -- it's not like I really care what the data that the tester is collecting says, all I care about is the results that come out at the end. So if you're telling me your answer is 1 gallon per hour and the leak rate that I established was 2 gallons per hour, well, I'm going to be concerned about your accuracy of that test method. And so was --

Q. I understand that that's the explanation you've given to the Department of Health and EPA. My question was, have they agreed with you that that's acceptable, and if so, can you point to me where in the record that could be found?

A. They haven't said that to me.
Q. Okay. And then when you have oversight over the vendors when they're doing the test, did you verify that the equipment that's being used for that test have been calibrated on that day and is performing as it's supposed to be?
A. You kind of drifted off there, but I think I understand your question as do we check calibration of the test equipment. Effectively the type of equipment that the Mass Tech system is doesn't require a calibration against a standard over -- for every test. We've discussed this with them, and basically the pressure transducer, which is the, kind of the working part of this whole system is in itself a standard and, therefore, they don't calibrate it against any other standard during this method.

Now, I would say that they put their system in a tank, and what they do is they put the system in, they lower it to the bottom, they would get it an expected level measurement of the tank, which they would compare to the tank-gauging system, and what the Navy would have said, hey, we're going to test Tank 10, it's at 200 feet, and when we put the test equipment in there, that's what we would expect to see.

Now, if it were anything different, then we would

immediately abort the test and begin to discuss, all right, what's wrong, is it a sensor, did you give us the wrong number, what's going on here. Is it -- you know, what is going on. So, I mean, I guess in that regards it is calibrated every time in that when we install the equipment we know what the tank gauging or the Navy gauging has told us to expect.

Q. And you verify that, you don't just rely on the vendor to verify that every time?

A. No, we would rely on the vendor to do that.

Q. So what kind of a QAQC do you do of the vendor's work?

A. Well, certainly we make sure that the minimum detectable leak rate is calculated based on the tank that's being done and that it's being used on. We would look at the graphs that you had provided earlier to get a general feel that there was no -- something really unexpected. I mean, I think my staff and myself would look at what you had shown earlier and say, yeah, that is going to equate to some kind of loss that's less than the minimum detectable leak rate, therefore, it's not something that we're going to say is a failing test. So we do validate that portion of the test.

Q. So you do do that type of trend analysis that I showed you that we had run?

A. In very general terms, yeah.
Q. And you do that for each time the tests are run?
A. Yes. For every report that we are provided from our test vendor, we provide QC to make sure everything we understand is what we expect.
Q. But you don't actually, again, verify that, yeah, the measurements are coming up what's really in the tank at that moment. You don't do that, you rely on the vendor for that; is that right?
A. That is correct.
Q. And when you talked about the verification again, it's you have this whole verified to .5 gallons per hour, right? That's as much as you've verified it to, or have you done it --
A. I'm sorry, can you repeat that question?
Q. So when you were talking about you verified that the equipment can run at a certain rate, and we talked about earlier that your is rate is .5 gallons per hour, so have you verified it for lower than .5 gallons per hour?
A. Yes. As part of the AOC that was required. There were leak rates selected and agreed to by the EPA and DOH as, hey, when we do this validation of this test equipment, what are the leak rates that you would like us to use, because we can induce a leak of really

whatever we want to. Off the top of my head I don't have that report in front of me. There definitely were some below .5 gallons per hour.

Q. And just talk about the .4 gallons per hour. When we talked earlier about that, if it was leaking for a year at that rate without being detected, it would be 30,504 gallons. Does that sound right? So that that would be something that could be leaking on a yearly basis without being detected by this test?

A. Yes, I guess that -- without a calculator, yeah.

Q. That's what it shows just quickly looking at the calculator here. So I think that -- I think I'm running that it correctly. But, so I just wanted to clarify the magnitude of that.

What's the longest tank tightness test that you've run at Red Hill?

A. I want to say seven days.

MS. GANNON: Okay. I think that is all I have for you. Thank you so much for walking through this with me.

HEARING OFFICER CHANG: Okay. Mr. Frankel for Sierra Club.

MR. FRANKEL: Thank you.

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CROSS-EXAMINATION

BY MR. FRANKEL:

Q. Mr. Caputi, you don't live on Oahu, do you?

A. No, sir. I live in Virginia Beach.

Q. Okay. I want to know, in 2016 was the tank tightness test done twice a year for every single tank at Red Hill?

A. I would say all the active ones, yes.

Q. But not the ones that are out of commission?

A. When they're out of commissions there's no fuel in them so you can't do a test for leak.

Q. Okay. So I guess that's -- right, right. So when I say out of commission I may be using that term improperly. The ones that are not with fuel in them, the ones that are undergoing repair, et cetera. So I don't know what the right term is, but should I say all the tanks with fuel in them had a tank tightness test twice in the year 2016?

A. That is the intent of the our scope of work traditionally. Without looking I would have to -- I would say yes, that's the intent is that we would test every tank with fuel in it twice a year. I really don't know, though, without --

Q. Okay, yeah, I'm not interested in intent, I want to know what was actually done. So, you know, there's a

reference in the ABS report that I'm not going to bring up because I don't know exactly where it is, but it mentions that one of the tanks, at least one of the tanks was not -- tank tightness test was not done, and so you don't know -- well, I guess it's Tank 17 apparently had not had a tank tightness test when the risk assessment, ABS risk assessment was done in, I think, 2017.

But so you can't testify whether the tank tightness test was done for all the tanks with fuel in them in 2016, correct? You don't know?

A. Yeah, I don't know.

Q. And you don't know if they were done in 2017 either?

A. I'm sorry, I don't -- I don't necessarily memorize every tank and when it was tested at Red Hill. We test a lot of tanks all over the world. I can't remember.

Q. Is there a better witness who would be better for me to ask that's testifying in this hearing than you on this?

A. I'm sure it would have to be somebody that could pull up one of the reports that we wrote, you know. So I mean in that regard I would be a good witness if I had that data right in front of me.

Q. Okay. So if the ABS report says that no tank tightness test was done in 2017, you have no reason to disagree with that as you testified today?
A. I can't attest to what they were able to figure out or not.
Q. Okay. Who is this third-party vendor you folks have been talking about?
A. It varies. In the industry there are few that prepare that kind of work more so than others. Ken Wilcox is one of the more -- one of the larger providers of such service. But, you know, I've seen Bechtel, I've seen other companies that experienced in this kind of work perform third-party evaluations of test equipment.
Q. Okay. I'm actually curious about Red Hill.
A. Okay.
Q. So you were talking about third-party vendors, so who are the third-party vendors you folks have dealt with at Red Hill?
A. Well, for -- I'm struggling with your question exactly. I would say this, that the equipment that we use, Mass Technology, for the tank testing at Red Hill, had the third-party evaluation for their equipment done in like 1994, and they're occasionally updated as their technology changes, and that was done by Ken Wilcox & Associates. When we performed the evaluation, which I

hesitate to call a -- and I'm talking about the evaluation, the AOC evaluation, Section 4 that we were involved with -- I hesitate to call that a true third-party evaluation of the kind that, say, a Mass Tech would use to get listed, but for that, the approach was similar. We utilized Ken Wilcox & Associates to perform the evaluation during the AOC for all the test evaluations that we performed.

Q. Okay. So this is really as clear as oil to me. Who's doing the tank tightness test? Is Michael Baker?

A. No, it's Mass Technology.

Q. So the ones twice a year, that's them that's doing the tests?

A. We pay them to perform the test, and then we validate what they did in regards of they went and they did the test, they provided us a report, and that we provide that to the Navy.

Q. And so they're the -- and it's always them?

A. At Red Hill it's always been them, yes.

Q. Since what year?

A. I believe the first one we did was in 2008.

Q. So these folks have done it each time, and they're the ones with the black box math?

A. Yes.

Q. Okay. And to be clear, you work with Michael

Baker, right?
A. Correct, yes.
Q. So let me bring up this document, which is -- well, we'll start there. Do you recognize this document?
A. Yes, that's one of our -- that's the market survey, yes.
Q. Is that something you worked on personally?
A. Yes, I did.
Q. And page 2 of the main body says: One thing has remained constant since these tanks were commissioned in 1943 and that is that the technology available to detect leaks in the tanks still lags behind the required level of measurement needed to protect the groundwater in the aquifer surrounding the tanks.

Did I read that correctly?
A. That's what it says.
Q. And that's something you worked on, this report?
A. Yes, sir.

MR. FRANKEL: No further questions.

HEARING OFFICER CHANG: Mr. Paige for EHA.

MR. PAIGE: No questions.

HEARING OFFICER CHANG: Any redirect?

MS. RIDDLE: Yes, we will have some redirect. We'd request a 15-minute break.

HEARING OFFICER CHANG: All right. Let's take a recess for 15 minutes. See you then.

MS. RIDDLE: Thank you.

(A recess was taken.)

HEARING OFFICER CHANG: So are we ready to resume?

MS. RIDDLE: Yes, we are.

REDIRECT EXAMINATION

BY MS. RIDDLE:

Q. I'd like to share my screen for a moment and bring your attention, Mr. Caputi, to page -- let's see, I'll read it out and then I'll share my screen. So the Bates No. is Navy 0010864, and this is page 6 of Exhibit N-64, and I will share that. Is that coming up for everybody?

HEARING OFFICER CHANG: Yes.

Q. Okay. So Mr. Caputi, could you look this over, and could you just go through in laymen's terms how these tests are performed, what is done at the tanks at Red Hill when these tests are conducted.

A. Sure. Just looking at this real quick. So, I guess, where to start. It's a team, effectively, as it says here in beginning, the Project Team's part. It's a Michael Baker representative, and tank tester, Mass Technology's fuel representatives show up at Red Hill,

right, and discuss with the operations people which tank is available to test in which order. We make it clear that it should be at, you know, a full height. And then we proceed to the tank that the Mass Technology vendor climbs to the top of the caging gallery over the top of the tank and lowers their test equipment into the bottom of the tank.

That unit is then connected to a computer take sits down at the bottom of the stairs and it collects pressure data over the length of the test. And so you go into this test determining, all right, what is the target MDLR, minimum detectable leak rate, that I need to achieve. So now that these are regulated and have a set minimum detectable leak rate, that's established, and then we determine which specific test method are we going to employ. So in this case we used 24-hour testing for five days to hit that minimum detectable leak rate.

And so really all they do is they lower the equipment in, the data is collected, they go back every day to check that the data is still being collected and it's uninterrupted. When the test is -- well, let me stop right there. I guess as the test ramps up, they are looking for any anomalies, and really the big one, as I think I've discussed before, was if a valve is not

completely tight when the test begins, we're able to see that the tank is losing mass, so we'll work with the operations folks, hey, can you reset the valves, can you reopen and close the valve to make sure that it's completely sealed, and then we'll look at the data again to make sure, all right, the tank is completely isolated.

Then we begin the test, we collect the data, as again I said that we go check every day, sometimes more than once a day. They download the data to date and they'll look at that to make sure -- just to see what's going on. They can determine or see a trend right away, that, oh, maybe the tank is losing mass and there's something wrong with the valve, or if we can determine it's not the valve, then really is there something going on.

And so every day that they collect data they take a, kind of a snapshot of the test so far to determine how it's performing, and does everything look like a tight tank. When it's all said and done, they collect all the data, transmit that back to their headquarters and it is -- analysis is performed and quality control is performed, and an initial result would be told to us if they -- if they ran the whole test and said, hey, you know what, we never saw a gross leak during all our

little individual spot checks, but this tank failed, they would call us for that. If the tank passes, they wouldn't bother calling us, they would just send us the report at the end saying based on all this data we collected over this time period it's not leaking above the minimum detectable leak rate.

We take the report, as I alluded to earlier we look at kind of their math, we look at their graph just to make sure that it looks like it's all what we'd expect, and then we write a report that goes on top of their report that gives kind of the regulatory background of why we're doing the testing, what the Navy's scope of work was to us, and kind of all those details, and then wrap up the report and send it to the client.

Q. Thank you. So as the test is being conducted, you look at the data to see if anything jumps out to the naked eye as a problem; is that correct?

A. That is correct.

Q. But you don't really have your own algorithm that would meet the regulatory requirement for establishing the rate of leaking that is occurring or anything like that, correct?

A. That is correct.

Q. Okay, thank you. So I'd like to turn to the

report that was appended to the supplemental testimony that you'd submitted in this case. Let me pull that up. So I'd like to go up to page 8, and do you see the paragraph at the top that starts with "Since 2015"?

A. Yes.

Q. Okay. And then I'd like you to just briefly review this top paragraph, these four equations here, and then just this couple sentences starting here with "This averaging."

A. Right.

Q. Can you just tell us what this section of your report means in layman's terms?

A. Yeah. This is an explanation of when you perform a Mass Technology test, the result that you get for that individual test is solely determined by the surface area of the tank that you're testing. So a tank of a certain size gives you a result for that test. However, that result might not -- and I'm talking about the minimum detectable leak rate, which is the number that you compare your measured results to -- so if need to get to a minimum detectable leak rate smaller than the one that you would do for a single test of that certain surface area, you need to do more testing, and the industry standard that's applied to this is averaging. I'm really not sure why they call it averaging because

you're not really averaging anything. What you're doing is taking the MDLR for one test, dividing that by the square root of the number of tests that you run.

So I always use this kind of example, is that if the square root of 4 is 2, so if you want to divide your minimum detectable leak rate in half, you've got to run four tests. So all of this is really an explanation of Mass Technology's method is based on doing, in this case particular, it's based on doing a 24-hour test. That gives you a minimum detectable leak rate, though, of .62 gallons per hour.

If you need to get more sensitive to that, then you need to run multiple tests to reduce that MDLR by this averaging, and again, that is dividing the MDLR of one test by the square root of the number of tests that you're going to run. So in this example, to go from the MDLR of the standard one test of .62, we did -- there was three days of data collection for the reporting, so the square root of 3 is 1.73, so point .62 divided by 1.73 is .63 gallons per hour. And that's industry standard's approach to how you do that.

Q. Okay. So the way the tests are conducted at Red Hill gives you an effective MDLR of .36 gallons per hour; is that correct?

A. That is correct.

Q. And this Mass Tech test method was verified by a third-party verifier, Ken Wilcox Associates, correct?
A. Correct.
Q. And it has been approved by the National Working Group on Leak Detection and Evaluation?
A. It has.
Q. Okay, thank. I'd like to turn to a letter that you've appended to this report. Let me scroll down. Are you familiar with this letter? It's from the U.S. EPA and the State of the Hawaii Department of Health.
A. Yes.
Q. I'd like to go to the second page of this letter. If you could just review the first sentence of that top paragraph starting with "The site specific."
A. Yes. Okay.
Q. And could you just tell us what the EPA and Department of Health are saying in this paragraph?
A. They are saying that from the results of the AOC evaluation of the test methods, that two of them were capable of meeting or exceeding the regulatory MDLR.
Q. Okay. And one of these technologies is the Mass Tech tank tightness testing method that's currently used at Red Hill; is that correct?
A. I guess to be more clear, it is the same method, and maybe -- this sometimes trips people up, the Mass

Technology has been evaluated to do 24-hour test, 48-hour test, 72-hour test. It's all the same equipment, it's just the different algorithms and the approach to get to the MDLR and their associated third parties.

For the testing that we currently are doing, we're utilizing 24-hour test, Mass Tech test. For the AOC, the test period was 48-hour test. So everything's the same except that there was a different time period.

Q. Okay, thank you. To your knowledge have any tanks at Red Hill ever failed a tank tightness test?

A. Not to my knowledge.

Q. Do you know when the Navy started conducting tank tightness tests twice a year?

A. I believe that was 2015 or 2016.

Q. Do you know when the Navy started testing the tanks once a year before then?

A. Oh, I'm sorry, your previous question was what now?

Q. Right. Before I asked you if you knew when the Navy started testing the tanks twice a year.

A. Twice a year. I'm sorry, yeah, twice a year that began in 2008. Then we switched with the change in the EPA's regulations of the update to 40 CFR 280, we began annually, and then semiannual -- I don't even know that

we ever accomplished an annual test. There was a very brief point in time where the regulations required an annual test, the new 40 CFR 280, but the Navy decided that they wanted to go to semiannual testing, and so I don't -- I think there was a brief time that we thought we were going to do annual testing, but it really strictly -- it went straight into doing semiannual testing, and that was either 2015 or 2016.

Q. Okay. And I just -- I had one more question. Do you know for certain whether Tank 17 at Red Hill was in service or out of service in the year 2017?

A. Oh, off the top of my head I couldn't tell you, no.

MS. RIDDLE: Okay, thank you. All right, I think we don't have any further redirect questions at this time.

HEARING OFFICER CHANG: Thank you.

Ms. Gannon?

RECROSS-EXAMINATION

BY MS. GANNON:

Q. That raised a couple clarifying points. So you were just testifying that you validate all of the information while the tests are being done. I understood based on our conversation that you were talking about the vendor validates that. Did I get that

wrong? Who does the validation while the test is happening?

A. Yeah, to be clear, it is the test vendor that is identifying these issues.

Q. Okay. So all those things that you were just discussing with Ms. Riddle are things that actually the vendor does, not you?

A. If you're talking about the initial tank setup and the beginning of the test, then yes, they do that. They bring that information to us and then we work as a team with the Navy to determine what's going on. Now, I'm not sure if you were really referencing the other things that we do check. You know, we provide QC of the report and all that later on.

Q. No, I was really focused on what happens during the testing itself, so thank you for that clarification.

And then you also had gone through with Ms. Riddle about that you used the .36 gallons per hour, but if the tank again, to be clear, the tank was leaking .4 gallons per hour, would that pass the tank tightness test?

A. Not that one, no. That would be a failure.

Q. So you say that every -- so every test you do you know that it's not leaking -- every test that you've relied upon you know that the tank is not leaking at .4?

A. The MDLR for those tests is .36. Now, we've only reported to .5 because that's the regulatory requirements, however, the test is actually utilizing an MDLR of .36. So, yes, if there was a .4 gallon-per-hour leak, that would be identified.

Q. Okay. But that's different than what we talked about earlier this morning. I'm just trying to make sure I understand, because we went through morning we were talking about if a tank was leaking at .4 gallons per hour you wouldn't note that, and now you say it's .36. So I just want to make sure that --

A. Yeah, I mean to be clear, and it is pretty confusing in that the MDLR that's established showing the math that we just went through is .36 gallons per hour. It's only reported as a passing test to .5 because that's the regulatory driver that we're going to. But to be clear, if it was leaking above .36, but below .5, that would be detected by this method and would be reported.

Q. But it would not be considered a pass?

A. That's correct, it would not be considered a pass.

Q. Okay. I did not get that earlier, so I appreciate that clarification. Are the tank tightness tests supposed to be run only on a full tank?

A. Operationally full. I mean if it's performed on a tank less than full, we are usually instructed to go back -- it's always a matter of operations. I mean these are very, as we've all seen, these are very deep tanks. When we get there they may only have a hundred feet of fuel in a given tank and they're not going to receive any anytime soon. What normally is done is we test it to that -- the current operating level, so if it's at a hundred feet we'll test it at a hundred feet. Then as soon as they do get more product, they fill it up and we come back and test it at full.

Q. Even if that's not at your six-month period, you would do that immediately to make sure that it could perform at the level that it's filled?

A. Yes, as soon as they reach out to us.

Q. I haven't seen that in the documentation in any evidence of that. Do you know where that would be provided?

A. I mean I think you have to look pretty closely at the dates of when things are tested in those large tables.

Q. Yeah. And you can't testify to that, based on your discussion with Mr. Frankel earlier, so we can't talk about that with you. Okay.

MS. GANNON: I don't think I have any further

questions. Thank you.

HEARING OFFICER CHANG: Does the Sierra Club have additional questions?

MR. FRANKEL: Sure.

RECROSS-EXAMINATION

BY MS. FRANKEL:

Q. Sure. I just wanted to follow up on what you were just asked about. You said that the .4 of a gallon leak would be reported, using the passive voice. To whom is that reported? Is that reported to the Navy? Is it reported to the Department of Health?

A. I as a contractor don't report anything to the Department of Health on behalf of the Navy. I would strictly tell -- I guess the chain would go, I would notify my direct client first, which is the NAVFAC Atlantic here at Norfolk, and then we would get on the line and discuss it with the leadership at Pearl Harbor, Red Hill, FLC Pearl Harbor. And what happens after that, I don't know.

Q. Okay. So you do not know if that -- if there's a leak of .4 gallons, I guess it's an hour is the unit we're talking about, right? You don't know if that is reported to the Department of Health. You don't know?

A. I'm not really clear on your question. Are you saying that -- well, first off, it's never happened so

we've never reported that to even the Navy clients. I guess I don't understand your question.

Q. Okay. Let's say the next tank test that's done it's revealed that it's .4, which is below the .5 regulatory threshold. Can you testify that that is going to be, will be reported to the Department of Health? Do you know?

A. I don't make those notifications, so I can't testify to that.

MR. FRANKEL: Okay, thank you. That's it.

HEARING OFFICER CHANG: Mr. Paige, for EHA?

MR. PAIGE: No questions.

HEARING OFFICER CHANG: Okay. I have a few follow-up questions, if I may.

EXAMINATION

BY HEARING OFFICER CHANG:

Q. Mr. Caputi, can you clarify the role that you take for this project. Your testimony has been primarily focused on confirming the acceptability, appropriateness of the testing procedures that were used, but was your role more than that?

A. You know, I guess in the big picture we are -- Michael Baker under this contract -- are responsible for leak detection testing worldwide at DOD locations. So we select appropriate leak detection equipment or

methods based on the situation. That's kind of the first step. Then we help schedule and kind of overcome any of the logistical challenges of getting the selected test vendor to a base and begin testing. But we are on site when they begin testing and help really just provide logistical support.

We then are involved with receiving the results. If everything goes properly and smoothly and there's no suspected leaks, we essentially just get a report that says, hey, these tanks were tested on this date, and we look at their results, we look at what method they use, was it the method that we expected and that we paid them to use. That method, was it employed under the procedures that it needs to be employed under, and to some kind of respect QC the results only in that, yes, they're saying their MDLR in this case, the tank is of certain size, the MDLR based on the, kind of the math that we looked at there, does that all add up. So we scrutinize the report in that behalf.

And then we also again provide a description of the regulatory reason why we're doing it, and this test was done in accordance with HAR, blah, blah, blah, specifically why it was done. And that's really it. You know, there are, obviously not in this case, times where things fail, and we would recommend further steps

to deal with that situation, finding leaks, et cetera, but we make recommendations and that's really it.

Q. Okay, thank you. With regard to your testimony to Ms. Riddle's question that there have been no failures of any of the tanks that were tested at the Red Hill Facility, over what period of time does your answer apply?

A. The first test that we undertook at Red Hill was in 2008, varying frequencies, and ever since that time there's never been one that has failed.

Q. Thank you. From the earlier questioning, because the tests have to set that MDLR and it can't be zero, the concern that there might be chronic leaks that are not detected through this methodology, I wanted to ask you for some clarification of that.

If there is a low level leak that is not detectable by the methodology that is being used, at some point is that going to be picked up by the fuel monitoring systems available?

A. There's that potential. You know, obviously we're only doing a test over a week, but if the facility were monitoring it using tank gauging for an extended period of time, they could potentially pick up a small chronic leak like that.

Q. So from the question asked by Ms. Gannon about

assuming a low level undetectable chronic leak could generate as much as 3,000-plus gallons over the course of a year, is there any other methodology by which the Navy is able to monitor and see that that is actually occurring?

A. You know, I think I understand that their tank gauging is capable of detecting a 16th-of-an-inch change in product level, if that tank were locked in and not used at all, at some point you would believe that they would lose that 16th -- they would detect that 16th-of-an-inch loss and identify that as what I believe they call it unscheduled fuel movement, and so they potentially could do that.

But if you're operating tanks, you know, putting fuel in or taking it out, that's going to create a challenge. But, yeah, conceivably if you're not moving fuel and you're watching just the ATG, I could see where you would eventually pick up a small leak like that.

Q. All right. Another question, the testing methodology that you have testified about, does that reflect a change over time? And I'm not talking about the frequency change, but the methodology.

A. I'm really not clear on your question. Are you asking if as the method is, has it changed since we started?

Q. Well, I understand the methodology that you've described is the one that was used from 2008 to the present. Is that methodology different from what was being done before that, do you know?
A. Yeah, before -- precision leak detection like we're employing didn't occur until the 1990s. Prior to that you had to use more rudimentary leak detection. Tank gauging, you know, it's not the level of sensitivity that we're capable of doing with today's technology.
Q. All right. In one series of questions you indicated, or at least I wrote notes that indicated that the Navy started doing the twice-a-year testing in 2008. Is that accurate?
A. Yes.
Q. Okay. But shortly after that you had -- I understood your answer that the Navy did annual testing briefly, and then semiannual testing in 2015 and '16, so I just want to clarify.
A. Yeah. When we initially started doing this there was a pilot test in 2008 just to make sure that we could employ Mass Technology testing. Then the -- at this point in time there was no regulatory requirement to do any testing. So the way forward at that point was we're going to do testing every other year. I believe that

was like 2008, 2009 is really when we started doing that.

And then when we became aware of the 2015 changes to the Federal UST regulations, obviously the thinking was, well, now these are regulated, we need to start doing annual testing, so we're going to do that. But then really they went above and beyond and started doing the testing twice a year. And I can't remember off the top of my head if it was 2015. I know that the change to the UST regulations was 2015. Whether we started in 2015 or if it was 2016, I really can't recall.

Q. All right, so perhaps I had written down the testimony wrong. So my note that the Navy started twice-a-year testing in 2008 is not accurate?

A. Yeah, no. Yeah, I misspoke there.

Q. Okay, thank you for clarifying that. Then when you use the reference of us, you know, we, gave data to us, I understand that to be to your company, Michael Baker?

A. Yes.

Q. And then, in turn, you would refer that information on to your client and the Navy?

A. Correct.

HEARING OFFICER CHANG: Okay. Thank you very much. Any follow-up questions from counsels?

MS. GANNON: Not from the Board.

HEARING OFFICER CHANG: Okay. Hearing none, thank you very much, Mr. Caputi, appreciate all your information.

THE WITNESS: All right, thank you.

(Witness excused.)

HEARING OFFICER CHANG: Let's go off the record a moment.

(A recess was taken.)

HEARING OFFICER CHANG: Let's go back on the record. The Navy is calling Mr. Frank Kern. Mr. Kern, may I ask you to take your oath at this time.

Whereupon,

FRANK KERN,

called as a witness on behalf of the United States Navy, being first duly sworn by the court reporter, was examined and testified as follows:

HEARING OFFICER CHANG: Mr. McKay.

DIRECT EXAMINATION

BY MR. MCKAY:

Q. Good morning, Mr. Kern. Could you please explain to the Hearing Officer where you work?

A. Sure. I work for the Naval Facilities, in particular I work for Naval Facilities Engineering Command, and it's kind of a long name, so it's

Engineering and Expeditionary Warfare Center, and I'll abbreviate that the acronym EXWC. We're a NAVFAC Echelon 3 Command based in California, a command of approximately 1300 people. We're primarily involved in the areas of public works, environmental logisticians. We have an expeditionary arm. We're Navy laboratories, we have a research and development arm. And primarily we are naval facility -- we manage facilities for the DOD.

Q. What is the EXWC's involvement with the Red Hill Facility?

A. Well, the DLA, Defense Logistics Agency, they've got an inventory of storage tanks worldwide. They have centralized the management of the integrity of those storage tanks, and they have centralized it with our command. So within the capital improvements arm of EXWC, I work in a group called POL, Petroleum, Oil, Lubricants, and we manage the DLA centrally managed program, which is the -- we manage the integrity of those storage tanks for the DLA worldwide, and Red Hill is part of that program.

Q. And what is your specific role with regard to Red Hill?

A. So my role is as a design manager, so when we -- when I say we manage the integrity, what we do is we

manage the storage tank inspection and repair contracts, that kind of work. My role as the design manager essentially is to write the contracts to manage the design, manage the inspections, manage the repair recommendations. So I'm essentially the technical lead on the contracts at Red Hill; the Tank Inspection, Repair, Maintenance contracts at Red Hill.

Q. Do you have any involvement with the Administrative Order on Consent, or roles specific to that?

A. Yes. So we took on the AOC Section 2 several years ago, which was the Tank Inspection, Repair Maintenance section, and we essentially, we wrote a report, and then we subsequently followed that up with the decision document that was approved by the regulators. I believe what was in 2017. I was one of the coauthors of that report and the decision document.

Q. You've previously submitted testimony in this case. Do you have any changes or corrections to your testimony, the written testimony?

A. No, not right now.

MR. MCKAY: Sir, we offer Mr. Kern for cross-examination.

HEARING OFFICER CHANG: All right, thank you. For the Board of Water Supply?

CROSS-EXAMINATION

BY MR. BROWN:

Q. Good morning, Mr. Kern. My name is David Brown, I represent the Honolulu Board of Water Supply. Thank you for joining us. I have a few questions for you about your written testimony that you submitted.

I think I'd like to start with the recent press and interest concerning a contract that the Department of Defense recently signed with GTT. Are you aware of that contract? Are you familiar with it?

A. Yes. Yes, I am.

Q. Can you explain to me what work is covered by that contract?

A. Sure. It's a feasibility study. The study is -- the intent of the study is to determine whether an existing commercial membrane technology could be made suitable for use at Red Hill as an upgrade to the storage tanks.

Q. And when you say a feasibility study, what does that mean?

A. Well, it's just that, I mean we're trying to determine -- this technology is used in the liquified natural gas industry, it's used in the transportation, essentially it's used in ships, so the intent is to determine whether it's feasible to adapt that technology

to a land tank such as Red Hill.
Q. And so at this point would it be fair to say the Navy is looking into whether it can be done, and that there is no commitment to implement that technology at this time?
A. Well, when you say a commitment, I'm not going to get into the AOC Section 3 because that's not my purview, but the feasibility where study is involved in, like I said if it's determined that it's feasible, then the Navy, as signaled that we will -- we intend to move forward with some design work. But as far as commitments to anything else, I can't speak to that order.
Q. So just so that I'm clear, there is not a commitment at this time to implement that technology, it's just in the feasibility stage?
A. It's in the feasibility study stage, yes.
Q. Can you explain to me a little bit more about, what this technology is and how it works? We don't have anything in the record that I'm aware of that states exactly what is being done with respect to how this technology works.
A. Okay. And to be clear, you're talking about the feasibilities of the GTT North America feasibility study; is that right?

Q. Correct, yes, the work that GTT is performing.
A. Okay. Well, I mean the technology itself is probably best explained on the GTT webpage. But it is a stainless steel membrane, dual membrane with an interstitch. It's the same technology they use to store liquified natural gas on board transportation ships. They also use it on land tanks as well. But essentially it's a stainless steel membrane material.
Q. And how thick is that stainless steel membrane?
A. Well, you're talking about what they use on their ships?
Q. I would like to know how thick is the membrane that would be used at Red Hill.
A. Yeah, no, we haven't gotten into anything like that at all. We're still in the feasibility study. That would be -- if we were to determine something, that'd be a later stage. It would be during the design stage. Right now we're just trying to see if it's possible to adapt the technology.
Q. So you don't know whether it's possible?
A. No, I do not.
Q. Okay. And based on the design, or I guess the initial feasibility stage that we have now, would there be an interstitial space, so an area in between the inside barrier of the membrane and the outside barrier

that would be of sufficient width to visually inspect both the exterior of the inside barrier and the interior of the inside barrier?

A. Yeah, we haven't gotten anything like that at all. That's far down the future. We're trying to see if the technology can be adapted for use at Red Hill, so as far as any sort of design aspects, we haven't got to it. The goal of the feasibility study is to comply with the Hawaii Administrative Rule.

Q. And so based on the applications that are in place in the LNG industry, are you aware of whether or not that there is an interstitial space of sufficient width to visually inspect the exterior of the inside barrier and the interior of the outside barrier?

A. Yeah, I'm certainly not an expert at LNG storage but my understanding is no.

Q. No. So it would be reasonable then to conclude in all likelihood if this were to be applied, there wouldn't be a space like that, would there?

A. I'd be speculating. Like I said, we're in a feasibility stage. If the technology turns out not to be feasible at all, then that's the end of the study. If it does, we'll proceed into further development of the technology.

Q. And with respect to this technology, are you

aware whether it has been successfully employed in petroleum fuel storage context?

A. No, I am not aware of that, no.

Q. This is really pretty experimental, isn't it?

A. Yes, it is. Absolutely right, yes. They use it in storage of liquified natural gas. As far as using it in conventional petroleum products, no, I'm not aware of that.

Q. And how long is this feasibility study supposed to take?

A. We hope to have results by the early summer. I'm thinking by June. I'm hoping that we should have some sort of an idea whether or not we should proceed to a further stage.

Q. And do you have any idea how long it would take to design even a pilot for the Red Hill tanks, or a Red Hill tank?

A. I'm not going to speculate. I just don't know.

Q. Do you have any reason to believe as you sit here today that a tank would be able to be upgraded within the next five years?

A. Again, I'd be speculating. I'm sorry, I don't know the answer to that.

Q. Do you know whether secondary containment has been used for storage of petroleum products generally?

I'll ask the question a better way. Is secondary containment used in the storage of petroleum products in other context other than Red Hill?
A. Yes.
Q. And are those typically done with an interstitial space that can be monitored for the presence of leaks?
A. Yeah, I don't get involved in that much, but my understanding, the answer to your question is yes.
Q. So my understanding is that this technology, this experimental technology you called it, is not going to be applied within the period of the permits that the Navy is currently seeking for the Red Hill Facility; is that right?
A. Sir, I can't answer that question. I don't know the answer to that.
Q. But it wouldn't be within the next five years in all likelihood?
A. I think I already answered that question. I don't know the answer to that. Right now we're in feasibility stage so it's just speculative to say whether it not I can be deployed in five years.
Q. So the Navy's been examining the potential to apply secondary containment on the Red Hill tanks since as far back as at least 1988, but it has never been implemented at Red Hill, has it?

A. That's correct.
Q. And the Navy evaluated again different upgrade options for the Red Hill tanks in a 2017 report on tank upgrade alternatives; is that correct?
A. Yes.
Q. And the report recognized that secondary containment, which was Tank Upgrade Alternative Option 3A, can be constructed in the field at Red Hill using practicable construction means and methods, isn't that right?
A. Well, if you're asking me what the report says, that sounds correct. I'm not going to get into whether or not I concur with that report or whether that's the official Navy position. That's what the report says, I believe, yes.
Q. Is that a Navy report?
A. Yes, it is.
Q. So that's what the Navy said.
A. That's what the report says, yes.
Q. Correct. And the Navy hasn't implemented that solution at Red Hill, has it?
A. No.
Q. It hasn't committed to implementing that solution at Red Hill, has it?
A. No.

Q. Even though that solution is capable of being constructed in the field using practicable construction means and methods?
A. No, I don't agree with the premise. I think the reason the Navy went through the decision, the TUA decision process was to determine which of these alternatives were feasible and should be pursued, and the Navy made a decision based on those alternatives, and then the decision was that they did not pursue that alternative. I think the decision --
Q. I'm sorry, I didn't mean to interrupt. Go ahead.
A. I think that decision speaks for itself. I mean if it was a feasible thing to do, the Navy would have done it.
HEARING OFFICER CHANG: Mr. Brown, can you identify the exhibit that you're referring to?
MR. BROWN: I can pull that document up. It is Exhibit B-174.
HEARING OFFICER CHANG: Thank you.
MR. BROWN: Pardon me while I work through this technology.
Q. All right, can you see my screen?
A. Not yet.
Q. Okay, hopefully you can now.
A. Okay.

Q. So this is the Navy tank upgrade alternatives report, we're on page -- this is at page 132. This is looking at Alternative 3A, which is tank within a tank, talking about the testing and construction procedures. We are looking at page 148. So this is where it talks about the constructability, and we talk about Alternative 3A can be constructed in the field using practicable construction means and methods, standard industry standards for aboveground storage tanks. So that's Exhibit 174.

Okay. I think we can change over now. Mr. Kern, the Navy performs modified American --

MR. MCKAY: I'm sorry, Mr. Chang, I'm going to interrupt. Was there a question pending on that document? I wasn't sure if there was -- the document was pulled up, but is there a question pending?

MR. BROWN: Oh, no, the question that I had, I believe was Hearings Officer Chang had asked to show the document.

MR. MCKAY: Thank you.

Q. (By Mr. Brown) So Mr. Kern, the Navy performs modified American Petroleum Institute, or API 653 inspections on the Red Hill tanks; is that correct?

A. Yes.

Q. API 653 was written for aboveground storage

tanks; is that right?
A. Yes, that's true.
Q. So the Navy's modified them for use at Red Hill?
A. Yes. So we've had a modified standard that we use at Red Hill, that's correct.
Q. On an aboveground tank you can inspect both the inside and the outside of the tank walls, as well as inspect the roof; is that correct?
A. When you say the walls, are you talking about the tank bottom?
Q. The side walls.
A. The shell, okay. Can you repeat that question? I'm sorry, I lost track.
Q. But aboveground tank you can visually inspect both the inside and the outside of the tank wall, so sides of the tank, as well as the roof?
A. That's true.
Q. And how often under API 653 are the exterior side walls of an aboveground storage tank inspected?
A. Well, the operator inspects them routinely. We do inservice inspections normally every five years, and that would inspect the exterior of the shell of the storage tank.
Q. And that's more frequent than the inspections that are done for the Red Hill tanks; is that correct?

A. The inservice inspection frequency, yes, it's more frequent, yes.
Q. And can you visually inspect the back side of the Red Hill tanks?
A. Well, let's be clear, when you say back side, you're talking about the side of the metal that's exposed to the concrete; is that right?
Q. Correct.
A. So the answer to your question is yeah, we cannot inspect that, correct, visually.
Q. How important is a thorough API 653 inspection to preventing releases ensuring Red Hill tank integrity?
A. Well, I mean the standard speaks for itself. That's what we use as our standard of care to manage the storage tank integrity, so we do condition-based inspections so it's important to know the condition of the metal, and so it's important to us.
Q. I mean are operations reliant upon these API 653 inspections?
A. Well, no. I mean we operate -- they operate the facilities based upon a standard that we -- so if we clean and inspect and repair a storage tank, and then we have a certified inspector that certifies the tank is suitable for a period of time, let's say 10 years, 20 years, whatever it is, the operator relies on that.

Q. Right. So I just want to make sure I understand your answer. So it is important that -- the API 653 process is very important for purposes of operating these tanks safely and preventing releases?
A. Yes, it is.
Q. When did the modified API 653 inspections begin at Red Hill?
A. Mm, good question. I want to say right around 2006. I have to go back and look at which report that refers to, but I'm pretty sure it was around 2006.
Q. And how many tanks have undergone the tank inspection repair and maintenance process, including those 653 inspections you described in your testimony?
A. You'll have to clarify that. We changed our process after what happened with Tank 5, so after 2013 we changed the way we inspect tanks there.
Q. So since 2013, I just want to make sure I have this right, since 2013 the inspections have been different. They've been more robust?
A. Yes. We added additional steps, and that's correct, we added more fail safes into the system.
Q. And how many tanks have undergone those types of inspections?
A. Four.
Q. Four. So the majority of the tanks have not

undergone the inspection process that the Navy's currently employing which it believes is the proper standard to apply to these Red Hill tanks?

A. Yeah, we started in 2014, yes.

Q. And isn't it also true that there are Red Hill tanks that have never undergone an API 653 inspection?

A. When you say a 653 inspection, so some of the tanks were inspected back in the '90s, they used a 653. They don't use the same standard we do today, but they were -- they had a 653 inspector inspect the storage tanks, so I guess you need to be more clear about what you mean by that term.

Q. Well, I had just asked that, you know, when you started employing API 653 inspections, and I thought that your answer was in 2006.

A. No, no. That was -- no. I guess let me be more clear about that. That's when we started using the standard of care where they started screening the metal for the back-side indications of corrosion. Before that they were just doing spot checks on the metal with -- pursuant to 653 using ultrasonic technology.

Q. And when did the API 653 inspection begin?

A. Well, it was after the standard came into being, so I believe it would have been in the late '90s, early 2000s.

Q. Late '90s, early 2000s. So Tank 3 was last inspected in 1983. Does that sound right to you?
A. I'll have to take your word for that. I don't know the answer to that.
Q. If Tank 3 was last inspected in 1983, is it safe to say it has never undergone an API 653 inspection?
A. Yes.
Q. Tank 4 was last inspected in 1983. Do you agree with that?
A. Well, it's the same answer, I mean I haven't studied the schedule of those. But it was last inspected before the standard came about, then the answer is yes.
Q. So it would never have undergone an API 653 inspection?
A. That's correct.
Q. If Tank 9 was last inspected in 1995, it would never have undergone an API 653 inspection?
A. Same answer, yes.
Q. Same for Tank 11, last inspected in 1981?
A. Yes.
Q. And for Tank 12, last inspected in 1995?
A. Same answer, yes.
Q. So more than a quarter of the active Red Hill tanks have never undergone any formal API inspection?

A. Yes.
Q. You think that's consistent with the Navy's standard of care?
A. As I mentioned, we changed the standard of care as a result of what happened in 2014, so we essentially inspect the tanks quite a bit differently than we used to. The Navy's inspection standards certainly changed over the years as technology became available. In the early 1980s some of the screening technologies didn't exist. The technologies we use today, such as Phased array or LFET, those did not exist in those years, so it certainly evolved over the years.
Q. Right. Is that why detailed tank inspection data, including steel liner thickness data, doesn't exist for all the tanks at the facility, because they haven't been inspected?
A. Can you say that again? I could hear all the way.
Q. Sure. I think you had mentioned in your testimony that the detailed tank inspection data, including the steel liner thickness data, doesn't exist for all the tanks at the Red Hill Facility.
A. Yes, that's correct. That's correct because nobody's gone there to measure it with this modern technology, yes.

Q. And some have never even had a formal API inspection?
A. Yes, yes.
Q. The Navy's tank inspection and repair -- sorry, Tank Inspection, Repair, and Maintenance process is dependent upon, I believe what you call predictive repairs; is that right?
A. Well, it's not dependent upon it, it's a feature. I mean we use that in order to populate our contracts with something. But yes, that's built into our contracts, yes.
Q. Built in the contract. Have the repairs that have been undertaken on the Red Hill tanks become more extensive over time?
A. Yes, absolutely right. The last round of inspections were engaged in, currently engaged in have certainly resulted in more repairs than we've ever done before, that's true.
Q. Is that because the corrosion on the Red Hill tanks is getting worse over time?
A. No. The primary repairs is -- the majority of the repairs we're doing are weld repairs. We are essentially taking -- embarked on a program in an abundance of caution to upgrade some of the 1943 welds to modern standards, and that is the majority of the

volume of repairs that we're doing are weld repairs.
Q. So would it be safe to say or fair to say that these tanks that haven't been inspected are likely to need the same kind of extensive repairs?
A. It depends. I mean the welding that was done in the '40s is -- some of it meets current -- when I say meets current, it doesn't meet current codes and criteria, but some of those welds are actually very well performing. So we have taken on the, what do I say, the standard of upgrading a lot of those welds to make sure that there's no problem with them, and whether or not future tanks have those same conditions, they very well might, I don't know, we haven't gotten to those yet.
Q. But we don't know because we've never inspected those tanks, right, or we haven't in, what, 30, 40 years in some cases?
A. Well, that's correct. I mean we haven't gotten and done the level of detail that we're doing today, that's correct.
Q. Okay. Has the Navy had to replace entire plate sections on the Red Hill tanks before?
A. Well, I mean the plates vary in size. They've replaced some large pieces of plate, yes, that's true.
Q. Why would you have to replace an entire section of plate?

A. Well, there was a case, I know, and it's kind of anecdotal so I will just report what I've heard, but I believe it was Tank 16, there -- had an area that was -- there was a lot of backside corrosion and they cut it out to see what was going on and they found a piece of timber shoring that was behind that piece of metal that had sat saturated for decades and it resulted in a large area of corrosion. So in that case they replaced the whole -- a large section of metal.

Q. I would like to show Exhibit B-297. Can you see my screen, Mr. Kern?

A. Yes.

Q. So this is the tank 13 API 653 Out-of-Service Inspection and Suitability for Service Evaluation, Final Pre-repair Report dated, it looks like sometime in 2017, 2018; is that correct?

A. Yes.

Q. Can you read for me the section here under General Backside Corrosion?

HEARING OFFICER CHANG: What page are you on, please?

MR. BROWN: I'm sorry, I'm on page 23 of the, document, it's at BWS 031345.

A. I can read it, unfortunately on the right-hand side it's got the -- it's a little bit covered up. If

you could slide it to the left a little bit, that would be kind of helpful.

Q. Oh, is it not showing? On my screen it's full.

A. Maybe it's my view.

Q. Let me stop sharing and try to share another and see if that helps. So let me move this over and see if this helps you.

A. Yes, that's better. So which paragraph?

Q. The first paragraph under -- the first two paragraphs under "General Backside Corrosion."

A. Just says general backside corrosion is such that the area affected is much larger than a localized corrosion area and requires a repair that is larger in size. Within Tank 13 there are repairs that fall under this category and it is recommended to repair an area greater than 2 square feet in area for each location. Several of these repairs are full-size liner plate replacement repairs.

Q. And if you wouldn't mind, the next paragraph, and that should do it.

A. These repairs will be unlike any previous repairs done at the Red Hill Facility and will require extensive design and construction considerations. Repairs could include removal of existing shell plate and inserting new plate or welding patch plates to cover the affected

areas.
Q. Thank you, Mr. Kern. So we had talked about the need for more extensive repairs. Is this consistent, this Tank 13 report with the kinds of repairs that have been occurring more frequently and more recently at Red Hill?
A. It's not consistent with Tank 17. Tank 17 actually has fewer repairs than that.
Q. But some of the tanks are having these more extensive repairs?
A. Some have fewer, some have less, that's right. The reason they pointed out the size of those repairs is because the handling of materials becomes harder once you have a larger piece of material. It has to be rigged differently and we have to accordingly price it differently, so we ask them to distinguish the size of the repair in the report so that when we add those repairs into the contract we know how to do our estimating.
Q. Okay. Mr. Kern, are you familiar with the steel liner samples sometimes referred to as coupons that were removed from Tank 14 in 2018?
A. Yes.
Q. Another witness yesterday mentioned that you were actually present when those coupons were removed. Is

that accurate?
A. Yes, I was.
Q. Okay. I have a few questions for you about that, so let me get another document here. And while I pull that up, some basic questions. So can you explain to me how many coupons were removed from Tank 14?
A. There were 10.
Q. And how were those coupons selected?
A. So this work, the coupon selection work was done under AOC Section 5, and as part of Section 5 the regulators, which would include the Department of Health and the EPA, and the Navy, we got together, we brought the preliminary inspection information, the what we call the spreadsheet of indications, and we all sat in a room and decided which 10 locations we would pull coupons from them. So it was kind of a joint effort between the regulatory agencies and the Navy.
Q. Okay. And just because I've looked at some of this before, I want to make sure it's clear to the Hearings Officer and the parties. There were 10 coupon locations that were originally selected, as well as two alternates; is that correct?
A. Yes, that's right.
Q. And only 10 were actually removed, right?
A. Yes, that's correct.

Q. So there were a couple of coupons that weren't removed?
A. Correct.
Q. But the numbering is not going to be consecutive when we go sort of look through these coupons, right?
A. That's right. There were 10, plus two alternates, that's correct. There were 12 that were identified, only 10 were removed.
Q. Okay. And these steel liner samples were examined on site immediately after removal and had certain characteristics recorded; is that correct?
A. When you say reported, I mean, yes, we sent them to a laboratory for analysis. Are you speaking about that or --
Q. No, sorry, and maybe I wasn't clear. I meant they had certain characteristics recorded. Like, for example, like there was a void space between the steel and the concrete, whether the coupon had wetness on the back side, whether there was corrosion, what color the corrosion was, certain indicators were noted after the coupons were removed; is that right?
A. Yes, that's correct.
Q. So let's -- I'd like to show you some of these coupons, so I'm going to share my screen again, and I tried to make the report a little smaller for you for

ease of view. Are you able to see the even entire document?

A. Yes. I can see the two photographs and the paragraph, yes.

HEARING OFFICER CHANG: And are you looking at Navy Exhibit 40?

MR. BROWN: This is Navy Exhibit 40 at page Navy 0009624 or PDF page 22.

Q. And this is the section of the Navy's Destructive Testing Results Report on coupon evaluation; is that correct, Mr. Kern?

A. Yes. That's what it looks like, yes.

Q. And these are photos of how the coupons were removed from Tank 14; is that correct?

A. Yes, it is.

Q. I want to scroll down through a couple of these coupons. So for each of these coupons there's a table in the Destructive Testing Results Report that shows what the on-site conditions were, it has some photos on it. I'd like to walk you through these various coupons since you were actually there, to confirm some of the information that was contained in these.

So can you identify what that document is showing us right here? This is Coupon No. 1; is that correct?

A. Yes. Yeah, that's essentially the field

observations for Coupon 1 for the, I believe that's for the concrete. I can't --

Q. Yes.

A. On-site visual, that's the concrete sample, yes.

Q. And the Navy indicated whether there was a void space between the concrete and the liner.

A. Yes.

Q. Correct?

A. Yes.

Q. And here there's an indication of a void space on the left side; is that correct?

A. Yes.

Q. And when you examined these coupons, who did the measurements of the void spaces?

A. I would assume that was done by Rob Jamond. I did not. I looked at each one of these. I didn't write these field notes, so I --

Q. But you were there with Mr. Jamond?

A. Yes. So, yes, we both participated, but I would assume that these -- either these notes were written by him or somebody working with him. There were a couple of teams working that day, and I didn't write these notes. But I'd certainly looked at the sites. But as far as who wrote those notes, I'm not quite sure.

Q. So would Mr. Jamond be a better person to ask

these questions, or should I ask them to you? Are you confident that Mr. Jamond is the one that wrote the notes?

A. I think he did, yes.

Q. Okay. Well, then let me go through these a little bit quickly then, and I apologize for having to go through them with you again. But let's walk through Coupon No. 1. There's an indication of a void space on Coupon No. 1, we went over that, that's correct, right?

A. Yes.

Q. And then the next page discusses the back side of the coupon, right? This is an image of the back side of the coupon?

A. Yes, it is.

Q. And it indicates various visual examination observations, including that Coupon No. 1 is wet on the back side; is that correct?

A. That's what it says, yes.

Q. Did you observe any of these indications, or is this something again that Mr. -- is it Jamond? I apologize, Jaymond or Jamond?

A. His name's Jamond. I was there that day and I looked at all these sites, and I actually looked at each coupon when they came out. You know, I see what is written down on the sheet where it says wet or dry, wet.

I did not -- I would not have characterized the surface as wet. I looked at all of them, I didn't see any wet surfaces.

Q. Okay. So we should ask Mr. Jamond because he's the one that actually wrote these indications down and did the examination of the coupons and determined whether they were wet or dry?

A. Yes.

Q. Okay. Do you have any reason to disagree with the indications that are in this Destructive Testing Report with respect to these coupons?

A. Well, you just showed me one right there. He characterized the locations as wet, the coupon as wet, and I observed the same coupon, I would not -- I certainly didn't put my hand on the coupon, on the face of the coupon, but I looked at it closely and I would not have characterize it as wet. In fact, I thought every single one of them was dry.

Q. Did you perform any testing on these coupons yourself?

A. No, I just did visual.

Q. You just did visual. So this is just based on your visual observation?

A. Yes.

Q. Okay. We'll reserve these for Mr. Jamond.

So Mr. Kern, we spoke a little bit earlier about predictive repairs the Navy performs on the Red Hill tanks. Would you agree that for predictive repairs to be accurate they have to be based on reasonable assumption? You're predicting what's going to happen, you're not looking and seeing how, you know -- you're not able to measure how thick these steel liners are at the time you decide to repair it, you just have to go with what your predictions, correct?

A. No, no. No, that's -- unfortunately you're mischaracterizing what the predictive repairs are for. The reason we do those is in order that we can award a construction contract that has an adequate amount of work into it that our contracting officer will allow.

If we award an empty contract that has no repairs in it, and later on we have to add enormous amounts of repairs, it turns into a Navy process violation and so, we call predict, we put repairs in there that we think will need to be done, but every one of those repairs has to be validated or trued up.

We do this commonly on all of our storage tank inspections, not just at Red Hill, but worldwide. It's a little bit of a painful process, but it's an artifact of our contracting mechanism. The federal acquisitions regulation, we cannot -- the contracting officers will

not allow us to award a contract that does not have an adequate amount of work into compared to what we need to add into it later.

Q. I see. So when you refer to predictive repairs, you're not talking about predicting the type of defects in the tanks, you're talking about predicting how much work you're going to need to do.

A. It's categories, that's right. I know I'm going to need a certain number of patch plates and a certain number of weld repairs. I don't know what that number might be, so let me just take a stab at it. I populate the contract with those repairs, the contractor bids on it, which goes through a competitive process, and then later on during the inspection phase we true that up, or we validate those repairs to see if in fact they're needed, or more are needed or fewer are needed. And that's the way we do our contracts.

Q. Okay. So switching then to another topic in your written testimony, the Navy performs it's repairs based on an assumed corrosion rate; is that correct?

A. No. You need to know that -- the answer is no. We perform repairs based on the conditions. We inspect based on an assumed corrosion rate.

Q. So when you say we inspect based on assumed corrosion rate, what does that mean?

A. Well, we have to establish a threshold for the inspector, for the nondestructive examiners to optimize their equipment flow. We have to establish something. We can't just tell them to go in there and find every indication. If the metal has lost, you know, 1 or 2 mils -- a mil, thousandths of inch -- that's not terribly significant to us, so we have to kind of establish some ground rules, and the way we do that is to establish a threshold for what we think the corrosion rates are, and then as part of the inspection process we validate and see how close that corrosion rate was.

Q. So for, and I want to make sure I understand this correctly, so for the Red Hill tanks you were inspecting -- you don't make repair decisions based on an assumed corrosion rate?

A. No. We make them based on the conditions.

Q. But you can't know the conditions on the back side of the steel liner before you make the repairs, can you?

A. I'm not following you. Can you repeat that question?

Q. Oh, yeah. No, no, I just want to make sure I understand this correctly. I thought we talked about earlier it's not possible to inspect the back side -- visually inspect the back side of the steel liner; is

that correct?
A. That's correct.
Q. So the process is we have API 653. API 653 says you need to have, is it .1-inch of a tank wall left between the next inspection cycle to makes sure that it doesn't corrode through; is that correct?
A. Sort of. The .1 or the hundred mils of metal thickness, that's the minimum remaining thickness at the end of the next inspection interval.
Q. Right.
A. So that's correct, that's our target.
Q. That's the target. And then you, in order to make sure that you don't miss that inspection target, you add on a -- and you can correct me if I'm wrong -- .6 to ensure that the corrosion that could occur in that inspection cycle doesn't happen.
Well, how about this, let me make it easier. Can you explain to me where the -- what .16 comes from?
A. Sure. What we've done, we make an assumption, and the assumption is done before the inspection takes place. And the assumption is that the storage tank will corrode to that 100 mils of minimum thickness by the next interval, right, so you figure out that rate, we normally use a factor of safety to account for some variability, and the factor of safety varies but you'll

see it's right around 2, 1.92, and then we establish that as the rate, and using that rate, the 160 mils falls out of that. That would be the threshold for repair done today to ensure that at the end of 20 years you wouldn't have any metal that's less than a hundred mils of thickness.

Q. So there is an assumed corrosion rate built into that .16 figure; is that correct?

A. Yes, there is.

Q. And the Navy's assumed corrosion rate is 3 mils per year; is that right?

A. No, that's the one that's been modified. The rate is lower than that. That's with a factor of safety. With the factor of safety it works out right around 3 mils per year, yes.

Q. 3 mils per year, yeah. And so I just want to make sure I understand this. So the assumption then is that these tanks could be corroding as much as 3 mils per year?

A. The assumption is, like I said, we don't base the repairs on that assumption, we base the inspection on that assumption. But the intent is to establish what the nondestructive examiners are supposed to look for. So they look for indications of metal loss that are greater than 50 mills, and if it's 90 mils or greater of

metal loss, then they repair that location.
Q. Maybe I can make this a little bit easier. Is the Navy relying upon a 3 mils per year corrosion rate for operation of the Red Hill tanks?
A. No, because the corrosion rate -- we did the repairs regardless of what the rate might be. So we use the rate to establish the inspection threshold, right? We repair based on the conditions that are found. So regardless of what the rate is, if it's -- we're going to repair the storage tank to be suitable for the next inspection interval. So the actual rate that we're using as our assumption is less than 3 mils per year, but like I said, we use a factor of safety in there to account for variability in the inspection and that's where the 3 mils comes from.
Q. Okay. Let me refer to your testimony because I just don't think I understand and it may be more helpful for everyone to take a look at. I'll share my screen.
Okay. Mr. Kern, can you see my screen?
A. Not yet.
Q. Oh, sorry. How about now?
A. Yes.
Q. So I'm just going to read this testimony. "Because the detailed thickness data from previous inspections do not yet exist for all tanks at the Red

Hill Facility, the Navy's process requires some assumptions. One of the assumptions is that the metal was in fact the nominal thickness when it was installed -- .25 inches for most components of the Red Hill tank liners and .5 inches for the bottom plates of each tank. Another assumption is that corrosion taking place has occurred at a constant rate since the tanks were constructed. Currently that rate assumption is approximately .003 inches, or 3 mils per year."

Is that accurate?

A. Yes.

Q. So the Navy is assuming that corrosion is taking place at Red Hill at approximately 3 mils per year.

A. The rate assumption is built into our inspection, and that's correct. The actual rates -- so it's an assumption. The actual rates that are followed up on the inspections actually demonstrate that the rates of corrosion are less than 3 mils per year, but we use a conservative approach in order to make sure that we repair these tanks appropriately, so 3 mils per year is our assumption. The last four inspections we've done, in fact I think only one area exceeded that. All the rest of them were well below 3 mils per year.

Q. So Mr. Kern, if you assume a 3 mils per year corrosion rate at Red Hill, since the inception of the

facility, which is 1943, how long would it take for one of the tanks to corrode through wall?

A. You want me to get my calculator and calculate that? I mean I can do that.

Q. If we do the math and we do 3 mils per year --

A. All right, 75 years.

Q. It would be -- basically all we need to do is take 250 and divide by 3, right? Is that about 83.3 years?

A. Yes.

Q. And assuming for the moment that the corrosion started on day one, when would that corrosion make it through the wall of the tank?

A. See the difference that -- this is an assumption. We all know that corrosion doesn't take place at a linear rate. The assumptions are in place in order for that we can provide a basis for an inspection, and the basis for the repairs is, of course, the conditions.

So the importance of the assumption is that it gives us a place to start. It's not necessarily that we think that they're corroding at a certain rate, it's just we have to give something to the inspectors so they can do their job.

Q. I certainly understand the need to be practical. But if you use the calculated rate that the Navy is

using, we just talked about it, there wouldn't be a through-wall defect at Red Hill until 2026, isn't that correct?

A. The disconnect that I've got is that the actual rates are lower.

Q. So if the actual rates are lower, how do you explain the fact that tanks have already corroded through wall?

A. Well, I mean what I'm talking about is on the last four inspections our tank inspectors have reported rates that are substantially less than 3 mils per year. If you want to talk about outlier data, then we can. Outlier data, like I mentioned earlier, if there's a defect behind the plate, that'd certainly cause an accelerated rate of corrosion, there's no doubt about it. If you have a product side corrosion, if you had a pit, a holiday in your paint, that's going to corrode at an accelerated rate.

What we're talking about is the overall inspections that were done. We take the worst case, the highest rate of corrosion on each plate, we divide the tank up into regions, we report those regions, we report those rates. The overwhelming majority the last four inspections the rates hover between 1 to 2 mils per year. That's the actual, that's not the assumed rate.

That's an actual rate.

Q. Mr. Kern, we're dealing with the safety of our irreplaceable groundwater aquifer. Don't we have to assume the worst case rate, at least the worst case rate we know has occurred at Red Hill?

A. When you say worst case rate, you have to define that for me.

Q. Sure. So we know that these tanks have corroded through wall. We know that these tanks have through-wall holes going back to at least 1998. I'm not a mathematician, but if I do the math, that's at least 4.5 mils per year. Why aren't you using 4.5 as your corrosion rate to be protective of the environment?

A. Well, and my point is that there's always going to be data outliers. If you have 2 acres of steel, you're always going to have some outliers in that steel. So I would -- there's no doubt that a lot of these outliers were fleshed out early in the life of the facility, and so you are correct, the higher corrosion rate areas certainly manifested themself at that time.

The approach that we're using today is to assess the corrosion for what it is, assess the actual conditions, and then repair the tanks accordingly. We renewed the steel to be good for another service interval. But as far as using outlier data, that's not

consistent with what industry does. There's a different mechanism between a holiday in the paint or a product side corrosion as there is on a back-side corrosion or general corrosion versus pitting. They're different mechanisms.

So we do not use outlier data to establish the rate for repairing the entirety of the tank. The last four inspections we've done have required replacement -- or repairs, let's say repairs, the patch plate type repairs of between 1 and 2 percent of the area of one of these tanks. So if I have an area 1 or 2 percent requires repair, and that's at half this 3-mil rate, it makes no sense to try to repair the entirety of the tank, assuming the rate is 4 or 5 or some other rate, it makes no sense because the data don't bear it out.

Q. Mr. Kern, isn't it true that it's those outlier rates that caused the leaks?

A. Are you talking about Tank 5?

Q. I'm talking about any tank, if it has an outlier, an increasing corrosion rate something greater than 3 mils per year, if it has 10 mils per year, is it more likely to cause a leak than one that has 3 mils per year?

A. Sure, of course.

Q. So shouldn't your inspection, repair, maintenance

threshold use a more conservative assumed corrosion rate to prevent releases for the operational life of these tanks?

A. Yeah, see, there's a disconnect. We're repairing the conditions that are found. We assume the rate as far as for inspection purposes. It makes no difference what the rate is, we just, when we do the repair, if the metal needs to be repaired, we repair it.

Q. Mr. Kern, is the Navy underestimating its corrosion rates in operation of these tanks?

A. No.

Q. I'd like to show another exhibit.

HEARING OFFICER CHANG: Please identify the exhibit.

MR. BROWN: It's going to be Exhibit N-44.

HEARING OFFICER CHANG: Thank you.

MR. BROWN: The Department of Health and U.S. EPA's response to the Corrosion and Metal Fatigue Practice Report. Can everyone see my screen?

THE WITNESS: Yes, I can see it.

MR. BROWN: And this is a March 16 document from the U.S. EPA and Department of Health. I'd like to direct the witness to PDF page 7, which is Navy 0010372.

Q. Under number 4, can you just read me the first sentence of this statement from the EPA and Department

of Health?

A. "The Regulatory Agencies believe the Navy is underestimating corrosion rates for Tank 14 and should reassess corrosion rates as used in calculating repair thresholds under TIRM."

MR. BROWN: I don't have any further questions at this time.

HEARING OFFICER CHANG: Thank you.

MR. FRANKEL: Can we take a four-minute break?

HEARING OFFICER CHANG: Sure.

MR. FRANKEL: Thank you.

(A recess was taken.)

HEARING OFFICER CHANG: I think we are ready to proceed, so Mr. Frankel?

CROSS-EXAMINATION

BY MR. FRANKEL:

Q. Okay. Mr. Kern, you don't live on Oahu, do you?

A. No, I do not.

Q. I noticed you're drinking bottled water?

A. Yes.

Q. Do you understand that many Oahu residents enjoy drinking water from their tap?

A. Yes, I do. Absolutely.

Q. Okay. Let's talk about the original design and construction of the Red Hill fuel tanks. They were

designed by eminent professionals in the field of hydraulic structures, right?

A. Yes, that's right.

Q. And the technical expertise of these engineers was some of the finest in the U.S.; is that right?

A. Yes. Yes, that's right.

Q. That's from our testimony. And the reinforced concrete and steel line were carefully designed and constructed. That's your testimony, right?

A. Yes.

Q. And the steel liner plates were carefully fitted, correct?

A. Yes. Yes, they were.

Q. And the concrete was carefully prepared. That's your testimony?

A. Yes.

Q. And tested, correct?

A. Yes.

Q. And great effort was undertaken by the designers. That's your testimony?

A. Yes. Yes, they did.

Q. And yet within a few years of construction these tanks leaked, isn't that right?

A. Well, that's not in my testimony, but that's my understanding, yes, that's true.

Q. That 1949 Bechtel report documented these leaks, correct?
A. Yeah, if I'm understanding correctly, they had a leak in one of the telltale pipes, yes.
Q. And these tanks were designed by eminent experts, correct?
A. Yes, they were.
Q. Okay. Now, you testified that concrete can experience cracking over time, correct?
A. Yes, that's correct.
Q. Has the concrete at Red Hill experienced cracking?
A. Well, I know that we studied, we went looking for it a couple years ago with the -- we hired a concrete consultant and we spent a good amount of time looking for these cracks. We weren't able to find any deteriorated concrete or cracks. I'm not going to say there aren't any cracks because we all know that concrete cracks, but we haven't found any.
Q. Okay. In 2014, fuel from Tank 5 leaked, correct?
A. That's right.
Q. And traveled through 20 feet of concrete, staining the wall beneath Tank 5, correct?
A. Well, I mean I'm aware of the stain on the wall in Tank 5. I'm not going to try to testify that I know

every detail of what that material was, but there was definitely material on the wall of that stained lower tunnel in Tank 5, there's no doubt about it.

Q. Well, that concrete plug from the bottom of the tank to there is 20 feet, isn't it?

A. No. The lower tunnel is above the top or the bottom -- it's above the bottom of the concrete plug, so it's less; less in heighth than that.

Q. So if we'd heard testimony from the deputy director of the facility describing that amount of concrete there as being 20 feet, you're saying he was wrong?

A. Well, I mean it depends on how you want to measure it. You're talking about in vertical height, are you measuring it from the perimeter of the tank, you measuring from the center of the tank? There is a very large concrete plug underneath the bottom of each storage tank, that is true. The heighth of that lower tunnel, the lower access tunnel, the vertical heighth between that and the bottom of the tank is approximately 8 or 10 feet.

Q. Okay. That's different than the testimony we heard the other day, but okay. Did that fuel travel through cracks in the concrete, or we don't know?

A. It certainly could have, yes.

Q. Okay. I want to ask you about the Department of Health and EPA's conclusion that during construction the concrete shrank during hardening, causing the concrete to pull away from the tank walls. Do you know what I'm referring to?
A. No. Can you point me to it?
Q. Well, your testimony --
A. Are you saying it's a document? Or I'm not sure what you're talking about.
Q. It is a document. In your testimony you dismissed the Department of Health conclusion because they relied on the 1946 report, "Builders for Battle." Does that sound more familiar now?
A. Yeah, yeah. It's a book. "Builders for Battle" is a book.
Q. Okay. So going back, so you recall that the Department of Health and EPA talked about the concrete shrinking during hardening which caused the concrete to pull away from the tank walls. You recall that?
A. I recall the quote being placed, yes. I recall that quote, yes.
Q. And you dismiss this conclusion because you claim that that 1946 book, "Builders for Battle" is known to be inaccurate. That's your testimony, right?
A. Sure. The book contains an error in that regard.

It's obvious that there's an error. The concrete was -- the shrink -- the joint at the concrete was not between the steel and the concrete, the shrinkage occurred between the gunite and the concrete.

Q. And you know this because you've seen it? You saw the shrinkage?

A. No, I did not. That's what the design shows.

Q. Okay. Do you know what -- what is the DLA?

A. It's the Defense Logistics Agency.

Q. And just to be clear, you're -- I'm having difficulty with the military bureaucracy, but where you work, you're not part of DLA; is that right?

A. No. No, I work for Naval Facilities. DLA is a separate agency.

Q. Are you familiar with a DLA recommendation in 2008, 2009 calling for relocation of the fuel or downsizing to two significantly improved tanks?

A. No, I'm not familiar with that.

Q. All right. Let's talk about corrosion. Backside corrosion has taken place, right?

A. Yes, it has.

Q. And two through holes were found in Tank 2, correct. You testified to that.

A. Okay, yes.

Q. Where were they found?

A. I'm sorry, I don't have that report. Tank 2 was done a long time ago. I'd have to review that report to go back and look.
Q. Do you know if they were found below the fill height?
A. They might have been, I don't know. I'd have to -- Tank 2 was done a long time ago, so I'd have to review that report to kind of be sure, but it's possible, yes.
Q. Okay. Six through holes were found in Tank 16, you testified, right?
A. I was -- you're responding to Norfleet testimony, that's right. There was a table that showed the number of holes in these prior inspections, and so that's accurate, yes.
Q. And two of them were below the maximum fill height, correct?
A. I don't want to miss testimony here. Whatever I put in my written testimony I stand by, but I don't remember that exact number sitting here today, I'm sorry.
Q. Okay. If I go to your supplemental testimony, you say -- I suppose you're criticizing the Norfleet report. You say another example is a listing of six through holes for Tank 16. That does not make a

distinction that four of the six, or 67 percent of the count are located above the maximum fill height. That suggests, of course, that two of them are below the maximum fill height, right?

A. Yes, that's correct.

Q. And when they're below the maximum fill height, a through hole allows fuel to leak out of the tank, correct?

A. That's correct, that's the passage.

Q. A through hole is in nonmilitary, non-engineering terms, is a hole, right?

A. No. You have to be careful with that term because the way the word hole was used in a lot of these reports, it refers to a hole in a piece of metal, but it does not necessarily mean that metal was on the tank liner. It could have been a backer strip, it could have been a cover channel. There are numerous appurtenances within Red Hill that could have a hole in them, but not result in a loss of integrity.

Q. But a through hole goes all the way through the barrel as it were?

A. No. Like I just said, a through hole in a piece of metal, the way the term was used, it wasn't carefully defined in those days, so you have to actually look at the condition if there's a photograph or if there's some

documents, you don't know. But there's very clear -- there are pictures of through holes in what I call a backer strip, and a through hole in a backer strip is not loss of tank integrity. In other words, the tank is still tight, the backer strip has the hole in it.

Q. Because something's behind the backer strip?

A. The liner of the metal -- the liner of the tank, yes.

Q. So how many through holes have been found in the liner at Red Hill?

A. I don't know the answer to that, sir.

Q. Is it more than five?

A. I don't know. There's a lot of old reports. I had certainly -- I just haven't had the time. I don't sit down and read all these old reports. I know they're out there. I've looked at them on occasion, but I have not memorized them.

Q. I'm not asking for memorization of exactly how many. Is there any witness in this hearing that the Navy's calling that would have a better idea of how many through holes have been found in the liner?

A. I'd have to defer to counsel on that. I'm not in charge of the witnesses, so my testimony is that I've looked at those old reports, I'm certainly aware of the findings of them, but I can't speak to the number of

them of where they occurred and when they occurred.
Q. On Thursday last week the hearings officer and the attorneys got a chance to look inside Tank 13. Tank 13 is currently under going repair, right?
A. Yes, it is.
Q. It was inspected last year?
A. That's right.
Q. And prior to that it had been inspected 25 years ago, right?
A. Once again, I got to go back and look, but I'm assuming that's correct, it sounds right.
Q. Well, let's just, just so that I'm not making stuff up, let's look at what we have here, let's bring up a document.
HEARING OFFICER CHANG: Exhibit reference, please.
MR. FRANKEL: B-6.
HEARING OFFICER CHANG: Thank you.
Q. (By Mr. Frankel) you see that?
A. Yes.
Q. And you recognize this as being the report we've talked about quite a bit, the TIRM report?
A. Yes, that's correct.
Q. Okay. So we go down here, this report has a table that describes when tanks were last inspected, and

this table on page 19-8 shows that the last time Tank 13 was inspected prior to the current one was back in 1995; is that right?

A. Yes.

Q. And you have no reason to disagree with that, right?

A. No, I do not.

Q. Okay. So the most recent inspection revealed that mandatory repairs were required, correct?

A. Yes, that's correct.

Q. These repairs were necessary to preserve or restore the structural and hydraulic integrity of the tank, right?

A. Right.

Q. And backside corrosion was found within Tank 13, right?

A. Yes.

Q. And, in fact, 10 percent of the repairs due to backside corrosion were in the barrel area of the tank; is that right?

A. Are you quoting from my testimony or from the report itself?

Q. The report itself. Would you like me to bring that report up?

A. Sure.

Q. Okay. This is Exhibit N-81. Okay, you see this is Tank 13 service inspection report. I believe the Board of Water Supply has a different exhibit number, same exhibit that we talked about earlier. This one's a little -- this copy's a little clearer and includes color. So if we go down to page 9 of this report, do you see where it says "Approximately 10 percent of repair recommendations are defects caused by backside corrosion," referring to the barrel area? You see that?
A. That's right, yes.
Q. Okay. So here's a tank that had not been inspected for 25 years, and mandatory repairs were found to be needed because of the amount of degradation and defects that were in the tank, right?
A. That's correct, they found mandatory repairs, you're right.
Q. So let's talk about the inspection repair and maintenance schedule, and as you talked about with Mr. Brown, the Navy applies principles found in API Standard 653, right?
A. Yes.
Q. And that standard provides for requirements for the frequency of inspection for aboveground fuel tanks, right?
A. That's correct.

Q. And as Mr. Brown went over with you, that standard requires inspection of the exterior of the tanks?
A. Yeah, inservice inspections, that's right.
Q. But you can't inspect the exterior of the Red Hill tanks, right?
A. That's correct.
Q. And yet you're doing the inspections less frequently than the inspections that are typically done for aboveground tanks?
A. Well, the inservice inspections are visual inspections, they're not quantitative, so -- you know, inspector walks around and has a look at the tank, that's what we're talking about.
Q. And so that can't take place, and yet, nevertheless, you were doing inspections less frequently than do you -- well, you're doing them less frequently than for an aboveground storage tank.
A. Well, they're different types of inspections. The interval for the out-of-service inspections is different than the inservice inspections, so they're two different things.
Q. So what is the interval for inservice -- or let's just, to be easier and clearer, the more thorough inspection takes place how frequently for an aboveground

tank?
A. Well, it depends. I mean are you talking about pre-API.
Q. Mm-hmm.
A. Okay. So API allows the discretion to the owner. It's based upon the corrosion rates and it's based upon the recommendation of the certified API inspector. It can be anywhere from 10 years to probably all the way up to around 30 years. It depends on the recommendation of the inspector and the conditions.
Q. Okay, but there has to be a recommendation from an inspector, right?
A. Yes.
Q. And if there hasn't been an inspection, there's no recommendation, and therefore, one would have to have that thorough inspection every 10 years, right? You don't have the recommendation, then you got to inspect it every 10 years.
A. Well, the Navy applies -- you're talking about the Navy criteria or you're talking about the API?
Q. API.
A. So the API says that you can vary the inspection interval depending on the conditions and the recommendations of the inspector. I don't know that API tells you what to do if you don't have an inspection or

recommendation.
Q. All right. In 2007, the Navy established inspection objectives, right?
A. 2007?
Q. Mm-hmm.
A. You'll have to -- I'm not sure what you're referring to, sir.
Q. Okay. Let's go back to Exhibit B-6. So this is part of the TIRM report that we have referred to, page 19-3. Do you see where it says, "In 2007, Navy/DLA initiated the CIR tank program with the objective of inspecting every tank every ten years." You see that?
A. Yes. Yes, I see that.
Q. Okay. And the Navy failed to meet that objective, didn't it?
A. No. This initiative we're talking about, it was worldwide, so that was the DLA, they realized at that the point that they did not have a managed program to manage the integrity of their storage tanks worldwide, so they established -- they initiated a program and they established an objective. It was not -- this is not unique to Red Hill.
Q. Okay. But at Red Hill the Navy failed to meet the 2007 objective of inspecting every tank once every 10 years, correct?

A. Well, if you're asking if we've inspected all the tanks in the last 10 years, that's true.
Q. Okay. So that objective was not met. And so in 2016 the Navy changed its objective, right?
A. Yeah. I guess pragmatism came into play there. I mean the -- I wasn't involved in that decision, sir. But certainly the DLA manages a very large inventory of storage tanks, they must have realized that they had to use a more pragmatic approach.
Q. So pragmatism triumphed protecting the environment, we understand that concept. So the new inspection schedule, according to this TIRM document, is every ten years, unless the corrosion rate is such that it can be inspected later, i.e. 20 years, only though as recommended by an API Std 653 inspector, right?
A. Yeah, but see, what you're missing in that is the repairs. You see the interval, the next service interval is not only a function of the corrosion rate, it's a function of how many repairs that you do. So if you repair enough adequate areas, and as you can easily have checked -- I'm sorry, achieve a 20-year interval, that's what this is saying and that's what the DLA is doing today.
Q. It says 20-year interval, it doesn't say 22-year interval or 40-year interval, does it?

A. That's correct, it says 20 years.
Q. And, in fact, as you went over with Mr. Brown, there has been no API Std 653 inspection of Tanks 3, 4, 9, 11 and 12, right?
A. That's right.
Q. And Tank 7, 8 and 10 were last inspected more than 22 years ago, right?
A. That was asked and answered.
Q. And the answer is?
A. Yes.
Q. And they are filled with fuel, correct?
A. The tanks are in service today, that's right.
MR. FRANKEL: No further questions.
HEARING OFFICER CHANG: Thank you. Mr. Paige, any questions?
MR. PAIGE: No questions.
HEARING OFFICER CHANG: Okay. Redirect?
MR. MCKAY: Yes, sir. If we can take a break?
HEARING OFFICER CHANG: All right. How much time would you like?
MR. MCKAY: I would ask for 30 minutes, but I'm wondering would it be easier to break for lunch and then come back in an hour, or is that --
HEARING OFFICER CHANG: That's fine. We're open to that. Is that okay with everyone?

MR. MCKAY: Early lunch and regroup so we can combine the break with -- okay to come back at 12:30?

HEARING OFFICER CHANG: We shall resume at 12:30. Is that all right with everyone? Okay, we are in recess till 12:30.

MR. MCKAY: Thank you.

(Whereupon, at 11:22 a.m. a luncheon recess was taken.)

AFTERNOON SESSION

(February 2, 2021, 12:30 p.m., the hearing was resumed.)

HEARING OFFICER CHANG: Let's go back on the record. Mr. McKay, you wanted to do some redirect?

MR. MCKAY: Yes, sir.

REDIRECT EXAMINATION

BY MR. MCKAY:

Q. Mr. Kern, I'm going to be referring to our support staff to pull up some documents, so when I say Razan, I'm asking her to pull up a document to share her screen to make it easier on me, just so you know where I'm going. But could we pull it Exhibit B-6, and it will be at page 19-8 of the PDF.

MR. FRANKEL: It's 230.

MR. MCKAY: Thank you, Kimo.

Q. Mr. Kern, what is a Unified Facility Criteria?

A. Unified Facility Criteria, we call them UFC in DOD acronyms. The UFC are Navy criteria, they are the Navy standards that we use, they cover a variety of areas, but primarily, obviously in facility management. They're not optional, as DOD employees we are required to use them. But they essentially set the standards for a lot of activities in inspection, maintenance, repair, rehabilitation, renovation for a variety of DOD

facilities.
Q. And is that the criteria that sets the inspection cycle for tanks that Mr. Brown had asked you about on direct?
A. Well, one of the UFCs talks about it, so it defers to API 653. It sets an interval of 10 years, and then it says or unless recommended otherwise by a certified inspector.
Q. And is that a State regulatory requirement, or is it a requirement that DOD imposes on itself through the UFC?
A. No, it's purely DOD. As Defense Department we are -- as Defense Department employees we're required to follow it, but it's not a regulatory requirement, it's a DOD instruction.
MR. MCKAY: I'm going to ask to have Exhibit N-56, at Navy ID ending with the Bates number 10464. If you can scroll down to the bottom section, please.
Q. Mr. Kern, can you read Section (c) of that document, please?
A. Sure. It says, "Airport hydrant fuel distribution systems and UST systems with field-constructed tanks: Not later than twenty years after the effective date of these rules, tanks and piping installed before the effective date of these

rules must be provided with secondary containment that meets the requirements of Section 11-280.1-24 or must utilize a design which the director determines is protective of human health and --"

MR. MCKAY: Could you scroll to the next page, Razan, so we could finish that?

A. "-- and the environment, except for:" You want me to read the rest of it?

Q. No.

A. The exceptions?

Q. On the bottom there, can you see the bottom under subsection (3) where it says, Effective 7/15/18, or the date 7/15/18?

A. Yeah, yes. I see it, yes.

Q. Are you familiar with this regulation?

A. This is the Hawaii Administrative Rule.

Q. So the secondary containment piece that Mr. Brown was asking you about with this feasibility study, is it your understanding that this effort would be to provide the secondary containment by 2038 to comply with this rule?

A. Yeah, this is the rule that we are -- the goal of the feasibility study or any efforts to come out of that, the goal is to comply with the Hawaii Administrative Rule. We certainly haven't gotten into

the time frame discussion, but the intent is to comply with this part of the Hawaii Administrative Rule, that's correct.

Q. So the goal would be to have the secondary containment in place by 2038?

A. Yes.

Q. And Red Hill storage tanks are field-constructed tanks, aren't they?

A. Yes, they are.

Q. And they're underground storage tanks?

A. Yes, underground.

Q. So Mr. Brown asked you whether you -- he drew a comparison between inspecting the exterior of aboveground storage tanks and asked whether that was capable here at Red Hill. Are underground storage tanks generally conducive to outside inspections the way he described for aboveground storage tanks?

A. No. You're not going to be able to accomplish the same goal. Aboveground storage tanks, the inservice inspection the intent is to walk around and observe the exterior of the tank, which of course you can't do on a UST.

Q. The API 653's been discussed quite a bit. Can you tell why the Navy uses the aboveground storage inspection 653 for its underground storage tanks?

A. Well, I mean the API doesn't publish a standard for inspection, repair, maintenance of underground storage tanks, so we adapt the one that is the closest to it, which is 653. 653 does address an area that is of primary interest to Red Hill, which is the tank bottom, right, so we apply the portions of the standard that are aimed at a tank bottom inspection, the portion of the tank that you cannot inspect visually, the exterior, the back side. We adopt those for use all across at Red Hill, I mean, so entirety of a Red Hill tank in the parlance of the standard is a tank bottom.

Q. So you're adopting the standard to inspect the tank, the back side of the tank that's unable to be inspected of aboveground storage tank is similar to that of the entirety of the tank at Red Hill?

A. Yeah, yeah. The conditions are the same, and the 653 divides up the way you inspect an aboveground tank, so when we say modify, quite a bit what we're talking about here is we ignore the parts about inspecting the aboveground portion and the roof of an ordinary AST, and we apply the tank bottom, the requirements on the tank bottom. We apply those for the entirety of a Red Hill because it's the closest applicable standard that we're aware of.

Q. In your testimony you described -- your original

testimony you described the nondestructive testing techniques. Are those the same techniques applied for the aboveground storage tank's tank bottom, the LFET and PAUT?

A. Yeah, they're common in the industry, that's right. We use those on ASTs. There's other technologies out there, but this technology's essentially the same. They're using some sort of an electromagnetic method to assess whether there's metal loss. It's very simple, it's the same type of technologies.

Q. Do bottoms of aboveground storage tanks suffer from corrosion? Do they have corrosion issues?

A. Yes, very common.

Q. So you're inspecting the bottom of an aboveground storage thank for the same reasons you're inspecting the bottom or even the sides of the Red Hill storage tanks?

A. It's the same thing, the intent is to try to locate metal loss and then apply repairs to the areas that need to be repaired.

Q. In your original testimony -- if we could bring up Mr. Kern's testimony at page 29. Twenty-nine of the document.

Right there where it says approximately how much of the tank usually requires repairs, you indicated it

was 1 to 2 percent of repair was for corrosion. What are the other 98 to 99 percent of the repairs for?

A. Well, you're talking about two different things. We're saying 1 to 2 percent of the tank liner requires repair, 98 to 99 percent doesn't require repair at all.

But when we're talking about the repairs as a whole, the majority of the repairs that we're doing there at Red Hill are related to weld repairs. We're doing a lot of weld repairs, and that kind of dwarfs the amount of corrosion repairs in the storage tanks. But the 1 to 2 percent, that's just the area of the tank liner we're talking about there. 98 percent of the tank liner does not need repair due to corrosion.

Q. So when you mentioned repairing welds, why are we repairing the welds? Are they a source of release as well, or --

A. Well, they could be, and that's why we're getting into it. The issues with welds that we found at Red Hill is -- the primary one, I suppose, would be porosity. So if an inspector looks at a weld, an existing weld made in 1943, then he sees porosity in that weld, he sees, you know, small little bubbles of when the metal solidified it left little evidence of bubbles, those are unacceptable conditions in our modern standards, depending on the size of them. But the

problem is, is that porosity may or may not result in a loss of integrity, and the only way to find out whether it is, you can certainly test it, but from a weld repair standpoint you'd have to grind on it. You have to grind to see if the porosity sits on the surface of the weld, or whether the porosity extends all the way through the weld.

So from a practical matter, it makes a lot of sense if we're going to start grinding on the welds, it makes a lot of sense just to go ahead and grind the areas of porosity out and reweld them, rather than -- like I said, it's rather painstaking, you have to grind a slight amount, you have to perform a nondestructive examination to see if the porosity's gone, and if it's not, you have to grind some more.

So it's much simpler from a contractual point of view just to grind the welds out and put new ones in at the areas those exist. But whether those all result in tank integrity, it's -- very few do, and we put a vacuum box in some to see, but it's very rare that that's the case.

Primarily this porosity sits on the surface of the weld, so we consider it best practice, that way we can use a modern standard for the repair. Once they do a repair weld, we're no longer looking at a 1943 weld,

we're looking at a 2020 weld, so we could apply a modern standard to it. And all our welders are familiar with the modern standard, so it kind of makes the process much simpler, although it is clear that it makes the quantity -- there's a lot of quantities, there's a lot of these welds, and so it certainly skews the numbers. But as far as the tank integrity standpoint, these welds are not an issue for tank integrity.

Q. Can we move to page 27 of your testimony. Mr. Brown was asking you about the corrosion rate, and he discussed with you how the Navy gets to its, I think what you described as a repair rate.

Can you first explain what is the purpose of the minimum thickness level at the end of service interval?

A. Well, that's in the standard, it's in the API standard. So the intent of that is that the -- the API standard is certainly our standard of care at Red Hill. We never allow corrosion to failure. The intent is to corrode to a minimum thickness. And so the hundred mils of remaining metal at the end of the service interval is that remaining thickness.

And so we're following the standard, and it actuality makes -- it makes good sense to do that. But that's -- the hundred mils of remaining metal in the standards refer to as remaining metal thickness.

Q. You also indicated in your original testimony -- or I'm sorry, when you were cross-examined by Mr. Brown you also mentioned a 1.5 mils per year corrosion rate. Does that come from the API 653 as kind of a standard corrosion rate?

A. No. No, no. The 1.5, that's the -- you're talking about the assumed rate, is that what you're getting at?

Q. Yes, sir. Yeah, the assumed rate.

A. No, the assumed rate, that's an engineering assumption, right. So the inspectors and the engineers that we've hired to do these inspections came up with this idea to assume a rate, use a factor of safety to increase the rate to account for variability, inspect the tank based upon that assumed rate, and then once inspection is done, they validate the actual condition to determine whether or not that rate was conservative or not. And then, of course, make repairs based upon the actual rates that are being found.

So it's a little bit of -- the assumed rate is a little bit of a misnomer. We're assuming the rate in order to make an inspection, but we're repairing it based on the actual rates, and the actual rates are quite a bit less than that assumed rate, the 3-mil per year assumed rate.

Q. So you're assigning the 3 mils per year on top of the minimum thickness of 100 mils to get to the 160 number that Mr. Brown was asking you about?
A. Yes. So they're using the -- that's where the -- that's correct, that's where the 160 comes from, yes. It's using the assumed rate, of course.
Q. So when you identify that rate for repair, you assume that anything below .160 requires a repair?
A. That's right. We repair anything that has metal, remaining metal less than 160.
Q. So the LFET is intended to identify any area on the tank, not just the bottom, to identify all areas where its metal thinness, the metal is thinner than .160?
A. Well, actually we screen a little bit higher than that, but we screen at 200, but we set the repair threshold at 160. So we don't want to screen at the threshold itself for repair, so we screen at a higher number, and then we follow that up with another technology, we use Phased Array Ultrasonics that actually resizes the loss of metal, it's more of a quantifiable technology than LFET is, and then we use that 160 mil minimum thickness as the threshold for those repairs, that's right.
Q. And the repair process is to place then another

quarter inch of steel plate over the areas with minimum thickness for repair?

A. Yes, that's the repair methodology we use consistent with API, consistent with industry, that's correct. We apply a patch material over top of the metal that has lost thickness, and so that is a full thickness of metal of quarter inch is what we use.

Q. So the safety factor, in your original testimony you indicated that the safety factor was doubled for the Navy. Can you explain where that doubling occurs? What is the original number that the Navy is doubling? Is that 1.5 and we double it to the 3 mils?

A. Yeah, it's approximately, that's correct. It's approximate. We've tried to keep that right around 2, factor of safety of 2. I think it's actually slightly less 1.9 or so. But yes, it's a doubling of that rate. We do that in the calculation itself, and that results in our assumed rate of 3 mils per year.

Q. So that assumed rate is really an assumption that all the corrosion you've identified are thinning in the material that requires repair really occurred in half -- if we're talking about corrosion earlier, occurred in half the time that it may have.

A. Well, there's lot of ways to look at it, but yeah, that could be one way to look at it, that's right.

Q. I'm going to ask Razan, can you pull up document N-77 at Bates No. 11910; ending, I'm sorry.

Mr. Kern, this is referred to as Chapter 9 of Exhibit N-77. Do you recognize this document?

A. Yes. That's the TIRM procedures report.

Q. What's the subject of this chapter?

A. Yeah, Chapter 9 was put into the report as a request of the regulators. They wanted the Navy to report the results of Tank 5. They wanted to know what had happened to Tank 5, what took place, what were the -- what was the underlying cause, and they wanted us to do -- we had already told them that in meetings, but they wanted it in the report, so that's what this is.

This lays out kind of the forensics of what took place when Willbros Government Services repaired Tank 5, and then when, of course, when they filled it full of fuel in 2013, 2014, and it contained defects. So this is essentially the, kind of the after action report on what had happened.

Q. How many tanks was Willbros under contract to inspect?

A. That's a good question. I believe it was -- I'd have to go back and look. I know for sure they were under contract for three, but there might have been another one they never started. Anyway, they were under

I believe under contract for three or four.
Q. And how many did they actually finish in repairs?
A. Inspections?
Q. Inspections, yes.
A. Yeah, they finished inspection on Tank 5, and they never finished inspection on any of the others.
Q. So any other tanks in service don't have any inspections or repairs that are relied upon by the Willbros company?
A. No. We descoped the contract. So, yeah, after finding out what had happened on Tank 5, we descoped the work from Willbros, and they no longer did any work for us. And any work they had done, we contracted somebody else to redo the entirety of that work. So there's no work in place today that's relying upon Willbros.
MR. MCKAY: I'm going to ask Razan to pull up Navy Exhibit N-083, and take us to Navy at 0015081.
Q. Do you recognize this document?
A. Yeah. This is the inspection report for Tank 5, the reinspection that took place after Willbros was no longer involved.
Q. And who did the reinspection?
A. A company called Enterprise Engineering.
Q. And what did they determine about the thinning of the work that Willbros did, or the thinning of the

material that Willbros caused?
A. So when the Navy discovered what had happened on Tank 5, Willbros decided -- I mean the Navy entered into a warranty arrangement with Willbros where they essentially warranted their work, and they reworked -- there were the tanks, so they went back to the storage tank and they removed the patch plates that had been there and they replaced them all. And in the doing of that, the Willbros company, the workers, they probably got pretty aggressive with the grinder. When you remove a patch you have to grind the metal smooth so you can reattach a patch plate to it. So the workers got carried away with the grinder and they ground too much metal off. And when Enterprise Engineering went back in to reinspect the storage tank they found metal loss at these locations, and everybody was surprised by that. So we went and kind of had a look at what had been done, and it became obvious that the employees, the Willbros employees had overground the metal. They removed metal with a grinder and then placed a patch plate on that. And it's unfortunate, because once the metal is gone, it's gone, so we were stuck repairing some of these locations with even a larger patch plate to account for the metal that had been removed by Willbros.
Q. So in the second, it looks like the -- I'm sorry,

the third full sentence of the last paragraph where it says, "However, it should be noted that most of the lower thicknesses in these areas were a result of grinding by a previous contractor under a separate contract, and not directly related to backside corrosion." They're referring to Willbros' warranty work after the tank failed?

A. Yes.

MR. MCKAY: Razan, can you pull up Mr. Kern's supplemental testimony at page 16.

Q. Mr. Kern, you've reviewed the report that Dr. Norfleet published?

A. Yes.

Q. And you responded to his discussion of the corrosion rate. Can you explain for the Hearing Officer what your analysis was of how Dr. Norfleet incorporated the Willbros grinding issues into this table?

A. Well, yeah, it's a misunderstanding. When you're calculating corrosion rates you do not use metal loss that's not due to corrosion. There's a lot of ways -- there's other ways you can lose metal in a storage tank, you can have a gouge, or as we saw with Willbros, you could grind on it. Since that's not due to corrosion, of course, that is absent from the corrosion rate calculation, you wouldn't use that as part of that when

you're calculating a corrosion rate.

So you would stick to using corrosion as a corrosion rate calculation, and you would address metal loss done by grinding or done by a gouge, you would address that a different way because that metal loss is not going to grow, it's not going to increase in depth, it's not going to get any worse, whereas corrosion could. So it's those non-corrosion-based metal loss should not be included in the dataset.

Q. To be clear, though, you do fix the overground areas of the tank. You fix all areas where you locate anything below the repair threshold?

A. Yeah, the repairs are the same, that's correct. You just don't incorporate those numbers into a corrosion rate calculation because the numbers aren't based on corrosion.

Q. You indicated that you were present when the Navy conducted its nondestructive testing of the 10 coupons when Mr. Brown was asking you about that test. Can you describe where were you when the coupons were actually taken out?

A. You mean where was I standing?

Q. Yeah. Were you in proximity to the actual coupon and the wall, the concrete, as they removed the coupons?

A. No. No, no. When they -- so that the -- they're

using the suspended scaffold, may only hold two people, so I stood on the catwalk, they brought the coupons, after they removed a coupon they brought it over to the catwalk, and then we took it into the upper tunnel and documented it with photographs, et cetera.

At the end of that phase, at the end of the removing of those coupons, I went and I rode the suspended scaffold system myself, of course, I went to each location and observed the conditions there. So I observed the coupons when they were brought to the catwalk, and I observed all the cut locations at the conclusion of the removal.

MR. MCKAY: Razan, can you pull up document N-40, please, at page 22. Actually you can stop there.

Q. So you were actually in the catwalk as this photo depicts, or I'm sorry, in this, however you described it, the window-washing equipment is what it looks like to me, but next to the actual wall where the coupon was removed, you were able to get up to that level of the tank.

A. Oh, yeah. I went to each one of those, yeah.

Q. And what did you observe?

A. Well, I mean the concrete, what we're looking for is deteriorated concrete. That was one of the intents of this, is obviously pull the metal coupons, examine

the metal. But one of the secondary benefits of doing this type of investigation is you get to see the concrete personally and see whether it's cracked, or see whether it's spalled, or see whether it's -- any evidence that there's corrosion in the rebar, see whether it's wet, see whether there's any unusual conditions back there. So I looked at them all.

I didn't observe any that were wet. They certainly all appeared to be in good condition. In fact, a couple of them were in such condition that I thought they were almost fantastic. The metal plates were so well adhered on a few of these that they had quite a bit of difficulty getting the metal plates off on some of these, and in fact you can see in the photograph the guy is prying on it. They had to pry on it and actually hit a few of these with a sledge hammer to break them loose from the concrete.

MR. MCKAY: Razan, can you pull up N-27, please, the field notes.

Q. While she's pulling that up, so you didn't observe any running water or flowing water behind the coupon or on the concrete?

A. No, not at all.

Q. Who took the actual field notes? Or I believe you said Mr. Jamond may have. Was he up taking these

notes while the coupons were being removed?
A. No, I -- well, I shouldn't -- he was involved in the taking of the notes. Whether he did at that time or did it later, I don't remember. Honestly, I don't remember. I don't remember him taking notes in the basket system, but he might have. I don't want to testify to that, I'm not sure.
Q. We're going to scroll a little bit here to get to a few pages further down, my apologies. The condition of the concrete was noted in these field notes. Can you describe the condition of the concrete that you found?
A. Well, like I said, it didn't have any cracks in it, I was looking for cracks. I was looking for any evidence that it was spalled or deteriorated, like it was flaky or it was granular coming off. I was looking for any evidence that there was water or moisture on it that's a significant finding.
Q. I apologize, I can't drive the screen, so I'm just going to ask Razan to scroll down a few more pages. I apologize.
Does this represent the area you were able to go touch and actually physically examine?
A. Definitely, yes.
Q. When you say it was in good shape, this is representative of what you were seeing?

A. Yes. This is concrete that's well-adhered, it's not cracked, it's not spalled, it's not disbonded, there's no evidence of any strain in it. It's certainly got discoloration on it, but as far as the concrete structure itself, I didn't see any evidence that the concrete itself was deteriorated.

Q. So when this says the general condition was excellent, sound concrete with discoloration, no cracks and delamination, you would agree with that statement, at least for this coupon?

A. Yes.

Q. Razan, can you please move to Exhibit B-7. You can scroll up so we can just see the image, please.

I believe you were asked about the stain under Tank 5 on your cross-examination. Do you recognize this photograph?

A. Yes. I recognize that area of Tank 5, yes.

Q. And where is that area, where are we looking at under Tank 5?

A. That's in the lower access tunnel. I call it the cross tunnel.

Q. And that's a fuel stain. The Navy has published that this was part of the staining from the Willbros incident in 2014?

A. That's my understanding, yes.

HEARING OFFICER CHANG: Mr. McKay, you may be aware there are tools that can be used to annotate or circle or identify specific areas on photos. I don't know if you want to do that, because the scene you're looking at, is it in the middle of the photo.

MR. MCKAY: Yeah. I'm going to try to annotate again, but I ask your patience because it locked my computer up last time, so my apologies. Hold on just one second.

Q. So this area where I've just marked with an arrow, can you see that?

A. Yes. I can see the arrow, yes.

Q. Is that the fuel stain roughly, this area of fuel stain, if you can see my cursor, below Tank 5?

A. Yeah. It's the dark-colored area in there. So we have an area that's just kind of a concrete, or grayish concrete color, then we have this dark stained area. That appears to me to be the fuel stain.

Q. Mr. Frankel, the Sierra Club's lawyer asked you where in relation this stain was. So the concrete plug underneath the tank. Do you have an idea of the elevation on the concrete plug that this stain appears?

A. Yeah, I've got an estimate of it. I mean the -- I know the product lines you can't see in this photo. The product lines are overhead. The product lines exit,

they run horizontal underneath the storage tank, and then they turn, and when they get to the center of it approximately they turn and they run vertical into the storage tank. That vertical portion of those product lines is approximately, I want to say 8 or 9 feet, and then obviously we sit below those product lines a few feet, so I would say between 10 to 12 feet below the lowest elevation of the storage tank, and that's in a vertical dimension.

Q. So what we're seeing here is the floor of the tunnel is not also the bottom of the concrete plug holding the tank?

A. No. The concrete plug goes below this. It goes further down.

MR. MCKAY: Razan, could you move to Exhibit N-90, please.

Q. Mr. Kern, you're familiar with how the facility was constructed?

A. Yes.

Q. I think you were asked on cross-examination about whether the concrete was designed to pull away, and I may be misstating the question you were asked, but the question I'm going to ask is, you testified that there was -- in the design, the concrete was meant to pull away from the outer layer of the gunite and the existing

earth. I think you had a more eloquent phrase for that. But when they constructed this -- and you can see where my cursor is right here, and I'll see if I can add another arrow -- can you explain to the Hearing Officer your understanding of where the concrete was supposed to pull away when they injected the grout?

A. Yes. So in the evolution of the construction, let's just start there, it's simpler, I think, they mined the cavity. Onto the mined surface -- the mined rock is called the country rock -- they sprayed gunite, which is a spray-applied concrete, and they sprayed it, just kind of smooth it out, and mostly to keep the rocks from falling on them, on the workers, but they sprayed gunite. At a later date, of course, they installed reinforcement and the liner of the -- the quarter-inch liner for the tank itself, and then they applied what they call red earth to the sprayed -- the gunite surface, and the intention, the purpose of the red earth was what they call a bond breaker, is to break the bond.

And then they provide -- they install or they placed the concrete itself. So the concrete was up against, on one side up against the steel liner, and on the other side it was up against that gunite, but specifically up against the red earth. And then the function of a bond breaker is that when the concrete

shrinks it essentially puts the stress on the material at that location, it's the weakest point, so it would break at that location, and that was the intent of the red earth is to break the bond between the concrete and the gunite, and when the concrete shrunk, it would shrink at that joint. And the design clearly shows that, they show the grout tubes into that cavity, so once the concrete shrunk it left a small cavity back there. Into that cavity was injected grout under pressure, and the drawings clearly show the details of that. It was a kind of a well-known detail.

Q. And was the pressure placed on the outside of the concrete? Was the intent to force the concrete to be in intimate contact with the steel?

A. Yes. The intent was to prestress that concrete to the approximate stress of the -- that a full load of fuel would place on it. So they pressurized the grout injection in order to strain or put a -- kind of move that concrete just slightly in order to accomplish that, to keep the concrete and the steel into intimate contact, and they did that with -- the way they did that was with a, obviously with pressure grouting, but they measured the amount of movement with string gauges. They measured how far it moved, so that was the intent.

Q. When was the nondestructive testing conducted?

I'm sorry, the destructive testing, I confused the two. The destructive testing and the coupon removal, what year was that?

A. Oh, shoot. 2019? I think, best of my recollection, 2019.

Q. I have just one last question for you, and it's really more of a -- to help some of the -- your name has come up in prior testimony and what you might be able to offer. Can you just tell us what is your current work being done under the Administrative Order on Consent? Are you currently working on any sections, or upgrades, or statements of work?

A. Yeah. We're involved in Section 5, the destructive testing, 5.4 we call it, which is the response to the regulators' letter regarding the destructive testing results. So we're involved in that.

And then Section 2, which is TIRM, will require an update, depending on what comes out of that Section 5.4. And under 5.4 we're going to do some investigations into a few areas of interest, and as a result of that, we do expect to update Section 2, which is the TIRM report. We'll provide an update to that.

The TIRM document and the Navy's standard of care, what we do for an inspect/repair at Red Hill is kind of always under a, I don't want to say continuous

improvement, but once we come up with a better idea or we have a lesson learned, or there a lesson to improvement, that we always do. And so Section 2 is under my purview as well.

Q. So the Navy and the regulators didn't necessarily agree on the information that the coupon results testing provided?

A. That's right.

Q. And how are the regulating agencies and the Navy using that data? How do you intend or anticipate them to use the data from the coupon study moving forward?

A. Well, we certainly learned things from the study, I mean regardless of the outcome, the Navy learned things about the nondestructive examination process. We're using that information today, we plan to use it in an update to the TIRM. We can address variability in a few ways, but that's one of the ways we're going to use it.

And then it also opened up a couple of other fields of study, I mean there was a lot of questions about the condition of the concrete, so we have commissioned a study about that, let's study that concrete a little closer and see if we can figure out a few things about the way it was made, the quality of it, the strength of it, the condition of it, and those will

all give us information about its durability. So that study has already been commissioned. It's actually started, we have started on that, so there's a few areas of attack.

We're also addressing the technology, right. There's a lot of talk about different technologies, and everybody has a better mousetrap for using for nondestructive examination. We're certainly looking at those. If somebody has a better idea, we're interested in it and we're looking at it, so those are all results of what took place under the Destructive Testing Report.

MR. MCKAY: Thank you, Mr. Kern. Sir, I don't have any further questions. Thank you.

HEARING OFFICER CHANG: Mr. Brown, recross?

MR. BROWN: Thank you, Hearings Officer Chang.

RECROSS-EXAMINATION

BY MR. BROWN:

Q. Mr. Kern, you had referenced a discussion with Mr. McKay about the secondary containment of the Red Hill fuel storage tanks and whether that was possible, and you had mentioned that it wasn't. So are the majority, the vast majority of underground storage tanks secondarily contained?

A. You're talking about the Navy's inventory or --

Q. No, just in general.

A. Sir, I couldn't venture a guess on that, that'd be speculation. I don't know.
Q. Well, if you just were to put in an underground storage tank tomorrow, would you need to secondarily contain it?
A. I believe so. You'd have to comply with the current regulations, yes.
Q. You also mentioned that that the aboveground storage tanks that the API 653 standard is modeled off of, the analogy was to the tank bottom of an aboveground storage tank; is that correct?
A. Yes, that's right.
Q. Is it possible to cathodically protect the tank bottom of an aboveground storage tank? Is it possible to secondarily contain the tank bottom of an aboveground storage tank?
A. Yes. Some cases, yes, it is.
Q. You also mentioned in your testimony in your discussion with Mr. McKay that 1 to 2 percent of the inside of the tank or the tank surface area is subject to repair because of corrosion; is that right?
A. That's our current results right now, yes.
Q. How many square feet would that be?
A. If it's approximately 80,000 -- there's approximately 80,000 square feet in one of these so, you

know, 8 to 16,000.
Q. Eight to 16,000?
A. I'm sorry, that's 10 percent. It would be 800 to 1600.
Q. 1600. And each of those areas could be subject to multiple failures, correct?
A. I don't understand, can you repeat that?
Q. Sure. If there happened to be a failure in one of those sections, the one-foot by one-foot section, it could have more than one failure, correct?
A. I'm still not -- when you say failure, you mean a failure of the repair plate?
Q. No, a failure of the -- like a defect that would go through the wall.
A. So, yes, it's common that we repair more than one defect with one repair plate, if that's what you're getting at, yes.
Q. Yes. You also mentioned that you never allow corrosion to failure, but that's not true, is it? Like there have been through-wall holes in these tanks before.
A. Well, when I'm talking about our standard of care, we do not plan for corrosion to failure. That's not part of our standard.
Q. So that's the intent, that's not necessarily what

has always occurred, correct?
A. That's our standard of care. Our standard of care is to not corrode to failure, that's correct.
Q. And then I have a couple of questions for you about your discussion with Mr. McKay about the assumed rate of corrosion. And I want to clarify that with you, I'd like to bring up your testimony real quick.
Do you see your testimony, Mr. Kern?
A. Yes.
Q. So this is talking about how corrosion rates are calculated at the Red Hill Facility, and you walked through this with Mr. McKay, and my understanding is that you stated that the assumed rate is used for repair purposes; is that correct?
A. I'm not following. The assumed rate is used for inspection purposes.
Q. So let's just go through your testimony. So in a modified approach of the Red Hill Facility, the inspector first generates an assumed rate by calculating the rate of corrosion that would result in a minimum acceptable thickness, which in parens is 0.100 inch, end parens, at the end of the next service interval. Is that correct?
A. Yes.
Q. And that service interval is 20 years?

A. Yes. That's what we're using, that's correct.
Q. Right. And we know, and we discussed this earlier, that the actual service interval has not historically been 20.
A. Yeah, there have been service intervals that have exceeded 20, that's right.
Q. And at least a quarter of the tanks have never even had an API inspection, correct?
A. Yes.
Q. Okay. I think, it goes on to say, and then there's a safety factor of nearly two, which ensures that the metal remaining will be thicker than the API minimum. And that minimum is again .1 inches, right?
A. Yes.
Q. This assumed rate is approximately .003 inches or 3 mils per year; is that correct?
A. Yes.
Q. So the actual rate that the Navy is assuming to create the interval by which it repairs its tanks is 1.5 mils per year?
A. So you're saying -- I'm just not following that question. Can you restate that?
Q. Sure. So it says, this assumed rate is approximately .003 inches or 3 mils per year. And what we had just read was that they're calculating a rate of

corrosion that would result in the minimum acceptable thickness at the end of the next service interval, which should be 20 years, even though it's not, but that assumed rate is approximately 3 mils per year based on a safety factor of 2.

So the actual rate is .015 inches or 15 -- sorry, 1.5 mils per year. I'll restate it. 0.015 inch or 1.5 mils per year.

A. Yeah, so this is -- what you're doing, you're stating what we do -- this is the approach that's used to inspect the storage tanks.

Q. Correct. And when you inspect those storage tanks, you will repair anything that is below the threshold of repair.

A. Yes.

Q. And metal measured during inspection that's thinner than that threshold is what's repaired?

A. That's correct.

Q. So you take this 3 mils per year and multiply it by your 20, that's your service interval, that's how you get the 1.6; is that correct?

A. Yes.

Q. Okay. So that is what is used to create the interval by which you inspect the tanks. So it's based on the assumption that you're going to do it every 20

years, correct?
A. Yes, we're using 20 years as the interval, that's correct.
Q. And that's not what's happened, correct?
A. That's correct.
Q. Many tanks have not been inspected within 20 years; is that correct?
A. That is correct.
Q. And the rate that you're using, the actual rate which you're saying you're doubling by a safety factor is 1.5; is that correct?
A. You're talking about the assumed rate, we are assuming a rate.
Q. Correct.
A. Right, yes.
Q. And the actual rate that we know that can exist at Red Hill is at least 4.5; is that correct?
A. That's not what the reports that I have in front of me -- I mean the inspectors that we have hired have reported the rates, and we produce those reports as part of, personally it's part of my testimony, and they report the rates that are in them. That's what's being reported. They're not at 4.5, no. I didn't see a single rate that was near that high.
Q. No, I'm not asking if your inspectors reported a

rate that high. What I'm asking is, is it a corrosion rate, the worse case corrosion rate to calculate based on what's actuality happened at the Red Hill Facility, 4.5, based on the through-wall holes that have been documented in 1998?

A. No. You're comparing apples and oranges. The corrosion rates that are being reported today are between 1 and 2 mils per year. That's the actual rate. That's the loss of metal in there. The assumed rate is a rate we use in order to set off the inspections in order to establish a threshold for the inspectors to do their job.

Q. Okay. So if you had a through-wall hole in 1998 in one of your tanks, what would the actual corrosion rate be?

A. It depends. The point is, it depends.

Q. If it started at the inception of the facility, right away, which is actually the most beneficial to the Navy, right?

A. It depends. Are you talking about product side corrosion or are you talking about backside corrosion?

Q. Backside corrosion.

A. And are you talking about one indication? Are you talking about the -- when you talk about a rate, we break the rates up into various regions in the tank, and

we certainly report them per plate, right? It's in the reports that we sent you. And so there are none that are showing 4.5 mils per year.

Q. I didn't ask what your report showed, what I asked is -- and maybe I'm not being clear enough -- if you have a corrosion defect that happened in 1998 at one of the tanks, that means there's been 55 years since it's taken to corrode if you assume, and we don't even know that's the case, that the corrosion started in 1943. Does that sound right to you?

A. No. We're getting into a hypothetical here. I'm sorry, but I wasn't there in 1998 to inspect these, so unless we can talk about the exact conditions, then it is hypothetical. We can talk about hypothetical rates, that's fine, but in order to ascribe that to what we're doing today, I think it's comparing apples and oranges. The inspections we're doing today have a provenance, and the inspection in 1998 does not.

Q. My last question for you, Mr. Kern, is about a document that you discussed with Mr. McKay at Navy Exhibit 40. Do you see my screen, Mr. Kern?

A. Yes.

Q. This is the Destructive Testing Results Report that you discussed with Mr. McKay?

A. Yes, it is.

Q. And who prepared this report? What division of NAVFAC?
A. It was prepared by our organization by several of the engineers.
Q. Were you involved in the preparation of this report?
A. Yes.
Q. Did you review the report before it was completed?
A. I reviewed the report, but I don't know if I saw the final draft. But I certainly reviewed the report, yes.
Q. Did you have opportunity to comment on the report?
A. Yes.
Q. And the report was submitted to a regulatory agency?
A. Yes.
Q. Is the Navy in the habit of submitting inaccurate reports to regulatory agencies?
A. No.

MR. BROWN: I have nothing further.

HEARING OFFICER CHANG: All right. Mr. Frankel?

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RECROSS-EXAMINATION

BY MR. FRANKEL:

Q. Following up on that same document, and you know, I'm not an engineer, I don't understand any of this stuff, you were asked earlier about discoloration of the concrete behind those coupons. In that report you just talked about had a photo of that concrete. I can bring it up again if you want.

What causes that discoloration of the concrete?

A. I think in that case it was the corrosion product itself, the material that is deposited on the back of the metal when corrosion takes place.

Q. Okay. And what was that UFC thing, what does that stand for?

A. Is the Unified Facilities Criteria.

Q. And that's standards the Unified Facilities Criteria adopts for tank inspections, and that is intended to be protective of the environment, right?

A. Yes, it is.

Q. Okay. Switching gears, Mr. McKay asked you about secondary containment that the Department of Health's rules require be implemented by 2038. Is your testimony today that the Navy is committed to having secondary containment of it's tanks installed by 2038?

A. No, that's well above my paygrade, sir.

Q. Okay, thank you. Let's look at Exhibit N-10, Navy's Exhibit 10. That's not it, 110. Can't read my own handwriting. Okay, let's bring this up. Actually, why don't I go to the first page of this document, see if this looks familiar to you. We got it in the supplemental production. Have you ever seen this document before?

A. I have, but it -- yes, I have before. I'm not familiar with it, but I know I've seen it.

Q. Do you know what year it's from? The Navy's document doesn't really say anywhere when it was effective.

A. If I could see more of it I might make a guess, but I don't know offhand.

Q. Yeah, I don't know if there's anything more to show you, but let's --

A. Oh, oh, Thomas Kitchen. Okay, well, that certainly dates it. That goes back a few years. I'm aware of Mr. Kitchen's work, it's not recent, but I would say maybe 20 years ago.

Q. Okay. Maybe before the turn of the century? Twenty years ago.

A. Yeah, well, that's right. I don't think about it as being a new century, but yes.

Q. So on page 19 of this -- PDF page 19, it's 16802

of the Bates stamp, it refers to leak, blister, rust through from back side; a weld patch over leak; leak hole; weld patch over leak.

So just to sort of follow up on what Mr. Brown was asking you about, if this document suggests that there was a leak that went through the back side, what would the corrosion rate need to be for this hole to have been created, assuming an even corrosion rate that started when the tank, Tank 6 was built approximately 1943?

A. Yeah, I mean once again, I mean it's the same answer. I don't know the conditions here. I can read what's on the piece of paper, but I wasn't there when Mr. Kitchen did his inspection, and I certainly can't qualify the words that Mr. Kitchen used. Honestly, I would have to speculate on what the conditions were that gave rise to those repairs.

Q. Well, the Navy prides itself, as do you, in taking a conservative approach. So let's take a conservative approach, and what I mean by conservative, I'm not talking about Donald Trump and all that stuff, I'm talking about conservative to conserving the resource.

So if we're going to take a conservative approach and assume that Mr. Kitchen wrote these words in the way

that I understand them and many other people understand them, that there's a leak that went through from the back side, and this document was created approximately in the year 2000, what would the corrosion rate have to be to get the metal -- a hole right through the plate?

A. Yeah, again, I'm not going to testify to what Mr. Kitchen wrote or didn't write. The words speak for themselves.

Q. So you're not wanting to take a conservative approach to estimate the corrosion rate for Tank 6?

A. As I said, I don't know the conditions that gave rise to these words or the repair that he's referencing. There's a lot of conditions in a storage tank, and sometimes words are used in manners in which we don't expect them to be used, and I already testified about the use of the word through hole. That word doesn't always mean what you think it means, so you'd have to know the context in order to make a judgment about what the validity or the invalidity, or in this case a rate might apply here. I'm hesitant to do so because I know none of that information.

Q. And you're not willing to take a conservative approach to interpreting these words?

A. Like I said, I wasn't there when Mr. Kitchen did this.

Q. Okay. Let's look at another document now, it's going be N-20, I believe. Let's see here. This is the Corrosion Metal Fatigues Report. Okay. Are you able to see this part of the corrosion report that was submitted as a part of the AOC process?

A. Yes.

Q. And this is page 14 of Exhibit N-20, and this talks about the discovery for the first time of external corrosion on steel plates. The discovery happened in 1998, and there was a wormhole that extended completely through the steel plate.

Are those words clear enough for you?

A. Yes.

Q. So can you tell me what the corrosion rate would have to have been, assuming that the corrosion rate is even, assuming that it started when the tanks began, and that a wormhole extended completely through steel plate, what would the corrosion rate be?

A. A wormhole is not a corrosion-related defect. It's a manufacturing defect.

Q. Well, that's scary. How many of these manufacturing defect wormholes are there throughout the Red Hill Facility?

A. Well, unless it breaks the surface, it's irrelevant. We certainly would find those with LFET.

LFET is capable of locating a wormhole or a lamination. They're common defects in plate steel, they're known to exist. Unless they break the surface they're not an integrity threat, but the point being it's not a corrosion-related defect.

Q. What do you mean break the surface? It says a wormhole that extended completely through the steel plate. What other surface are you talking about?

A. If a wormhole or a lamination can exist that do not break the surface of the metal, that is a condition that is a, like I said, a manufacturing defect, it took place at the time the plate was rolled. It is a condition that we try to find and certainly would try to repair, but wouldn't result in the loss of integrity.

Q. So you're telling me the word, when it says completely through the steel plate, it didn't go completely through the steel plate?

A. No. What I'm saying is there's more than one type of wormhole or lamination. You asked what it was, I explained it.

Q. Well, I'm reading this text from your report. It says a wormhole that extended completely through the steel plate. Are you saying it didn't go completely through the steel plate?

A. I'm saying it wasn't due to corrosion.

Q. Okay. And so even though this paragraph begins talking about external corrosion, this paragraph is about corrosion, isn't it? The previous sentence says, "The blistered coating was removed which revealed a pinhole on the surface of the shell plate." This is not -- this wormhole is not created from corrosion?
A. I think you'll notice the word wormhole is placed in quotes, and I think part of the reason the author of this report did that is because the word wasn't well-defined, and it goes right back to my statement a few minutes ago that when you have an older report with an unknown provenance, there's quite often you do not know how precise or accurate, or even the definition of some of these terms, terms like leak, hole, wormhole, so you have to guess. And my assumption here is that the author of this report put quotes around the word wormhole because he wasn't sure what the author intended.
Q. So you weren't one of the authors of this report in 2016?
A. No. I know the author of that and -- but I was not.
Q. Okay. And again, you're not willing to take a conservative approach in terms of estimating risks, assuming that the word, when a hole goes completely

through the steel plate, that that doesn't mean exactly what it says?

A. Well, I think it's important if you're going to ascribe a rate of metal loss you use a detect that actually is losing metal at a rate and not a manufacturing defect.

Q. Okay. So do you recognizing that any of the through holes found at Red Hill are caused by corrosion?

A. Sure, absolutely.

Q. When was the first through hole caused by corrosion found?

A. I'm sorry, sir, I don't know the answer to that. I'd have to go back and review all the old reports to try to figure that out.

Q. And you talked with Mr. Brown about outliers. Are these through holes caused by corrosion outliers?

A. They could be examples of that, that's exactly right. I think I mentioned an example of where there was a piece of timber, shoring timber that inadvertently got left behind the metal plate that got saturated with water, became a source of an outlier condition, and became the source of an accelerated rate that wasn't representative of other areas around it. That's an example of an outlier. Those have been known to exist, yes.

Q. And if one were to take a conservative approach to protecting our water, which we depend on, doesn't it make sense in calculating the corrosion rate to look at these outliers?
A. We repair everything regardless of that. So it's not like we don't repair it. But it makes no sense to base a uniform corrosion rate on an outlier data.
Q. In terms of doing inspections, not repairs, but inspections, wouldn't it make sense to look at how quickly these tanks are corroding in outlier places because you don't know where all the outliers are?
A. Well, at 77 years in, most of the outliers have made themselves known by now.
MR. FRANKEL: Oh, that's comforting. I have no other questions.
HEARING OFFICER CHANG: Okay. Mr. Paige, any questions?
MR. PAIGE: Nothing further.
HEARING OFFICER CHANG: Mr. Frankel, can you leave that exhibit up on that page for a moment, please?
MR. FRANKEL: Yes.

EXAMINATION

BY HEARING OFFICER CHANG:
Q. Mr. Kern, I just wanted to touch on this since we were just talking about it. In the paragraph that's

highlighted, and at the last highlight there is a further sentence that talks about the wood, and you were testifying about a condition, and I'm wondering if this is the same situation that you were referring to?

A. It might be. Unfortunately, the story about the wood is a little bit apocryphal. I don't know which tank -- it might be the same one, I just can't say for sure.

Q. Okay. I want to go big picture a little bit before we get into details. Do we have a situation here where newly adopted regulations made effective in 2018 are now being applied to the Navy? Is that a correct statement to far?

A. You're talking about the UST regulations, sir?

Q. The HAR regulations, yes.

A. Yes, that's correct.

Q. That prior to 2018, the Navy was not subject to complying with that set of regulations?

A. Yes. My understanding, yes.

Q. Does that mean that the Navy was then subject only to the then existing federal regulations on USTs?

A. Yeah, that gets too deep into the topic of regula -- I'm not a regulatory expert. I can't answer that with any certainty, sir.

Q. Okay. Again, big picture, from the testimony I'm

beginning to get an understanding that were those UST tanks to be constructed today, they would be required to have secondary containment.

A. To comply with the Hawaii Administrative Rule, yes, sir.

Q. And because the USTs as installed at Red Hill don't have what is considered secondary containment, they are a grandfathered condition that may or may not be acceptable. Would that be an accurate understanding?

A. Well, I think the Hawaii Administrative Rule points out -- I mean they point out the exception for field constructed USTs greater than, I think it was 50,000 gallons, I think they have that written into there, and I think they talk about the year 2038, that's my understanding.

Q. So by 2038 they are required to have secondary containment?

A. That's what my understanding of what the Administrative Rule says, yes.

Q. And by secondary containment, that presumes that the method of secondary containment is going to be an approved method?

A. Well, the Administrative Rule says -- they define the TIRM, and they say that there's a barrier, primary barrier, a secondary barrier, and a testable

interstitch, so I would assume that that's the intent. I mean that's what we have read in the Hawaii Administrative Rule.

Q. Okay. The other kind of big picture I wanted to ask you about is you were asked some questions about the role that you played with regard to working on aspects of the AOC, and you identify two of them, I think it's Section 2 and Section 5 or something like that, I think.

A. Yes.

Q. Can we put a timeline to the work there as to, is the work in each of those sections completed, and if not, can we have a timeline as to when they are going to be completed?

A. So Section 2 is complete, it was approved -- the decision report was approved by regulators in 2017. But saying that, the intent of Section 5, which was the corrosion and metal fatigue, the intent of that was information that was gained out of destructive testing would be used to, in the Section 2, in other words, you would loop back into Section 2 and make up stage 2, depending on that, so currently Section 2 is complete pending updates.

Then Section 5, we're in the position of -- we actually put together a schedule recently. There's a bunch of areas that we need to address, I don't remember

how many. I say a bunch, maybe half a dozen, they're going to take different amounts of time. Some of them are easy, some of them are hard.

A couple of things require some actual, you know, unique research. The concrete testing is a good example, right, we're going to do destructive testing on the concrete at Red Hill, and subject it to a number of laboratory tests in order to try to get a good understanding of the quality of that concrete, and that the quality will give us an inference as to the durability of it. So that testing will probably take place, we hope to have that lab results back by the middle of this year, maybe by early summer, and then get the report back a couple months later from the -- we hired an industry expert for that.

So they have different timelines is what I'm getting at. Some of them are near term and some of them are quite a bit -- a longer term, but we have produced a schedule for that as part of AOC Section 5.4.

HEARING OFFICER CHANG: Okay. At this point may I have a brief discussion with counsels. In my mind I'm thinking it would be good to have clarity as to each of the sections of the AOC and what the timetable is as to the scope of the concern of that section, if it's been accomplished, if it's done, so noted, if it's not

yet completed. Do we have any understanding as to the timetable for further progress and completion of the effort that needs to be addressed in that item of the AOC.

So I just -- it's a query, I want counsels to ponder that, and then we can talk about that at some point, okay?

Q. Other questions, Mr. Kern, I'm going to show you that drawing of the construction of the plans, N-90. Let me put it up on the screen for us. Mr. Kern, are you able to see the Exhibit N-90?

A. Yes. Yes, I can.

Q. You were talking about the design intent and the installation. This drawing is not completely accurate in the sense that it does not depict the grout, so there's a layer of -- I'm sorry, it does not depict the gunite. So there's a layer of gunite that's between the construction and the rock facing.

A. Yes.

Q. My understanding is that the gunite completely encases the concrete that surrounds the tank, so it goes all around the barrel, as well as underneath the tank. And I presume above the tank; is that correct? Is that your understanding?

A. Now, the upper dome was constructed differently.

I don't think -- no, I do not believe they gunited in that upper dome area, because the construction method was different. They used what they call a stope, an inclined tunnel, essentially, and they mined out that -- on that drawing, they mined out what you would see is the gray area, while the rest of the storage tank was still full of rock. So I don't believe they sprayed that with gunite, I think they used timbers up there to shore it, and then they filled it full of concrete. I think that is a different condition because the upper dome was built first.

Q. Okay. So then the gunite probably begins at a barrel, surrounds the barrel of the tank?

A. Yes, yes.

Q. And goes under the tank?

A. Yes. They use the gunite in order to consolidate the rock to the point where it was -- well, it was two things, one, it gave them a nice smooth surface, but two, it prevented rocks from falling on their heads.

Q. All right. I'm pondering a puzzle relating to that 2014 fuel release. If, as the records indicate, 27,000 gallons of fuel was released, and from the investigation it -- we at least appear to understand that the release was caused by the defective welding work and the unpatched hole that was left so that the

fuel was able to get through the defective weld and through the hole left in a plate.

The puzzle is where did the fuel go, because it's supposed to be so tight. Your description of the construction and the installation of the pressure grouting was to push the concrete like up against the barrel, the tank barrel, right?

A. Yes. They essentially compressed it slightly, yes.

Q. So then by design there should be very little space between the concrete and the metal barrel. And the testimony so far indicates that while you might have gaps, you might have some spacing there between the concrete and the steel, but it just doesn't seem to me to be a lot of space for 27,000 gallons of fuel to go anywhere. So I'm trying to get an understanding of where did that fuel go.

And I'm sure, I'm certain that was also the question the media was trying to find out in various efforts. But if we know that the fuel is in that area and it's going to be obstructed to a degree by the concrete, to a degree by the gunite, to a degree by the grout, where could the fuel have gone?

A. Well, that's a great question, and this is something that in 2014, we were faced with that question

right in front of us, what happened to this fuel. So one of the things we did in order -- an attempt to do that, I mean we embarked upon an effort to -- and actually Willbros did, we forced Willbros to do it, they went around -- as bad as this sounds, we had to drill further holes in the tank. We went around and drilled holes in Tank 5 looking for that fuel, and we called it free product recovery.

What was interesting about that effort was we didn't find any. And, in fact, I determined how many holes there were, I want to say a dozen, I don't remember anymore, but it was right around a dozen. When you first drill a hole in a storage tank like this you had to be very careful about if there is a gap back there, if it contains explosive vapors. So the first thing you do is, of course, is you sample that air to determine whether there's any explosive vapors back there. And what's interesting in those holes that we placed, is they didn't find -- they found one trace, we call a sniff, one trace sniff of an explosive vapor back there, and none in the others. So, but they didn't find any liquid, that's for sure. We looked, we didn't find any. We didn't even find vapors where we thought we would.

So the question remains, I mean I know this is

speculative, but some people believe the fuel -- some of it definitely, as constrained as it was, could have flown back into the tank when it was defueled. That's certainly possible, we don't know. But it is speculation. We certainly would expect the concrete to absorb a good amount of it, I mean concrete's a porous material. Jet fuel is rather readily absorbed into concrete. But the short answer is we don't know, and but we did look. We certainly made an effort to try to find that, and we did not find any.

Q. And there's been a bunch of testimony about that stain that we saw the picture of, and the implication is that that stain is a fuel stain, but you in your testimony explained that the coloring is not from the fuel, but you believe the coloring of that stain is from the corrosion product. Did I understand you correctly?

A. Now, sir, are we talking about in the lower access tunnel, or behind one of the coupons?

Q. No, the dark-colored area in the stain, that we were looking at the picture of the lower access tunnel area connecting to the tank and, you know, they placed an arrow toward -- Mr. McKay placed an arrow pointing toward that darkened area on the concrete.

A. Yeah. Mr. Chang, let me be clear. I think, and if I misspoke, I apologize, my intent, the stain

material that was corrosion part, that was a deposit on the concrete behind one of our -- one or more of the coupons that were removed.

The stain in the lower access tunnel, no, I do not believe that was due to corrosion product. That's not the case. It certainly had the appearance of fuel, and I saw it as well. You know, I'm not a chemist, I don't know whether it was fuel, but I believe what I was told, it appears to have the appearance of fuel. So I just want to be clear on my testimony on that, the stain in the lower tunnel appeared to me to be fuel. How it got there, what the tortured path it had to take to get there, I do not know.

Q. Okay, thank you. That does clarify, and I had a different understanding, so thank you.

One more question on this picture of the tank before we leave it. There's a word on the right that identifies the grout material. If I'm reading it correctly, it points to that sliver, I'm going to call it a silver-colored sliver on the side of the barrel. Do you see that?

A. Yes, I do.

Q. That silver sliver appears only to go to the expansion joint at the top, and then down to the point where it says barrel to lower dome junction.

Is that your understanding that the grout was only installed along the vertical portion of the tank barrel?

A. No. I think this drawing is probably diagramatic in nature. No. It certainly was installed in the cylindrical portion, there's no doubt about that. In the lower dome area they installed grout, they did not use -- the intent was different down there. They did not try to prestress the concrete with the grout down there, they installed an enormous concrete plug in the lower dome.

What they used the grout in the lower dome area for was consolidation. So they put the grout tubes into the country rock and they injected the grout into the basalt itself in order to fill in the fractured -- basalt is a highly fractured material, and in order to fill that area with a dense material. So that would be a slightly different purpose. Same material, slightly different purpose that was done in the lower dome. That was done as well in the upper dome in the barrel as well.

But that's a different use. The grout -- the arrow that's shown on that sketch, my understanding what it appears to me they're trying to infer there, that's the prestressed grout, the grout that's mentioned in the

"Builders for Battle" book, the prestressed grouting that was intended to slightly compress the tank in order to counter-effect -- counteract the effects of the weight of the product.

Q. So that would only be on the sides of the barrel then?

A. Yes. That's the region -- that's correct. That's the region that they did prestressed grouting on was the cylindrical portion. The other areas of grouting were done for consolidation purposes.

Q. Okay. Thank you for clarifying that as well. As for the other kind of grouting for consolidation purposes, where is that? Where was that installed?

A. Yeah, it's not shown on this drawing, but what they did was they went all around the hemisphere. So they would have went around the hemisphere at the top and around -- essentially what they did was they installed these pipes at the same time, and so the pipes went all the way back into the rock.

On the grout tubes that are contained within the gunite, those were well -- they fastened them to that because they had to put a little -- they had to put a, kind of a diverter in there to ensure that the grout could come out of there and wouldn't get plugged up.

The grout into the country rock, into the basalt

was different, they just installed those tubes into the rock itself, and then I'm sure they found, you know, the appropriate locations for the cracks, and then they grouted the -- they grouted under pressure. It was not with the intent to prestress any material, they just grouted to refusal on most of those.

Q. I thought the pressure-injected grout was to fill any interstitial space that may exist between the metal and the concrete.

A. Well, the way the grout tubes were placed, the intent was to fill any space that existed between the concrete and the gunite. And that's why they show it as a sliver on this, it probably ended up being a sliver. But they placed it in horizonal bands, so they placed it at a pressure in a horizonal band, and then they -- once they achieved the stress that they wanted or the pressure they wanted, they abandoned those grout tubes and moved up to the next set of grout tubes, and they moved up the cylindrical area doing that. So they kept the grout face live all the way up the barrel so that they -- when they grouted these they grouted nonstop, so they were 24-hour operations.

Q. Would it be fair to say then we should not expect the grout to serve as a barrier for release of material?

A. Yeah, it's less dense than the concrete, that's

for sure. It's dense material, but its intent was to prestress that concrete. That's what it was made for.

Q. Yeah, but it doesn't envelope the tank at all, it's just primarily on the sides it appears?

A. Well, when you say the sides, I mean it goes all the way around the circumference, right? They put these grout tubes all the way around in a radial fashion all the way around at each height.

Q. I understand, but I am talking about the bottom, it doesn't go --

A. The bottom, that's correct.

Q. Okay, thank you. All right, it's much clearer to me now. Appreciate that.

You made a statement that corrosion does not occur in a lineal fashion. That is something you believe, right?

A. Yes, that's correct.

Q. So can we have agreement that corrosion occurs on an irregular basis, it's not going to be a uniform rate year to year to year, or condition to condition, or spot to spot?

A. Yeah, that's accurate. I mean it's unfortunate, but it's true, corrosion is not uniform across a storage tanker. That's why we've broken it down into regions to try to ascribe a little move granularity to it.

But, yes, it does not occur at a linear rate, it does not occur at the same rate each place you go, and of course, as we see in some places there is no corrosion occurring. So it's more of a phenomenon than a rate, but we -- engineers, we kind of use things to make decisions by, and make judgments, and make, you know, kind of designs by, and so we have to ascribe a rate to it in order to do that.

Q. It's also going to be dependent upon what is contributing to causing the corrosion?

A. Yes, that's right. I mean quite often what happens on storage tank bottoms is that a corrosion will initiate early in the life of the metal, and then when the corrosion product develops, it actually, it kind of, I use the word smother, it actually kind of slows down the rate because there's less chance for oxygen to get to that reaction and it actually slows itself down that way. That's really common in storage tank bottom corrosion. But it's completely subjective, it depends on where you're at and what the conditions are.

Q. Then as the corrosion breaks down, making more space, the rate can increase?

A. Well, especially if conditions change. I mean we always have to be, you know, observant to that. But the corrosion itself, ascribing a rate to it, I know I've --

I know Mr. Jamond is a corrosion guy, he can probably explain this better than I can, but he always tells me don't look at corrosion as a rate, look at it as a process, it's a phenomenon that takes place, and whether it gets faster or slower, it's really hard to say. So using of the rates is something that engineers certainly do, not necessarily scientists.

Q. Switching topics in terms to the number of years between service interval terms, as an engineer you do not appear to be concerned that a 20-year interval is being utilized for these tanks; is that right?

A. No, no, because we can program the repairs to meet that interval. That's common across our inventory. We use 20 years on the majority of our storage tanks. There's a few that we do not. The 20 years is very common interval for what we -- the Clean, Inspect, Repair work that we do.

Q. Didn't you indicate that in some instances it could be more than 20 years? Thirty I think was the term?

A. Yeah, well, API allows it. We don't do it as a practice. API allows it if you have certain protective measures in place. They have kind of a sliding scale, and I think you can go all the way up to approximately 30 years between inspections. The Navy does not use

that practice.
Q. Okay. So up till now how many tanks have been recently repaired? We've had a lot of talk about Tank 5 because of its history, but have there been any other tanks been recently repaired?
A. We're in process right now, yes. We've got Tank 13, Tank 14, Tank 17, and Tank 18. Now, 13, 14 and 17 are actively in repair right now. Tank 18 is empty, is awaiting inspection, and then we will repair it as soon as that's done. It hasn't been inspected yet. I think they're still doing the preparatory work right now.
Q. So is 5 the only other tank that has been repaired?
A. With our TIRM process, yes.
Q. So the repair for the four that are in process, 13, 14, 17 and 18, that repair process will take roughly how many years?
A. It depends. I would say it's a good rule of thumb, it's approximately -- for the repairs themselves it's approximately a year. What unfortunately takes longer sometimes is our contract actions. But the repairs themselves, approximately a year. The inspection we usually -- I usually pencil in about six months for that. And then for preparatory and return-to-service activities I usually pencil another

six months in for that.
Q. So that looks like two years optimistic?
A. Yes.
Q. In terms of a schedule for repairing the remaining tanks, if you can do four in two or three years, can you do the remaining tanks in six to ten years?
A. Well, so the work is actually dependent upon our customer. So our customer is the Naval Supply, and you can see the logo on that graphic there, and they're the ones that provide them to us. So I work for NAVFAC, Naval Facilities. We do not decide which tanks are removed. I mean we give our recommendations, but they decide the mission, they have to meet the mission, they'll decide which tanks come out of service for this process. And so more is possible, but it's up to them to decide. They have to meet mission requirements, and that's something I'm not privy to.
Q. Okay. All right, but if there were no issue about availability of tanks for repair, they could all be repaired within that kind of a timeframe if they were available?
A. Yeah, I could say one thing, we've certainly learned enough information in the last six or seven years that we -- there was some talk earlier about

predictive repairs. The predictive repairs are a big benefit to our contracts, and we've got a decent handle on those, and that makes our contracts a lot more accurate than they have been in the past, and so I think we can gain some velocity because of this type of information. That is our goal, is because we have a pretty decent idea what it's going to take to fix one of these, and we don't have to try to change the contract later to add millions of dollars worth of work because we got it up front when it was competed.

HEARING OFFICER CHANG: All right. Thank you very much, Mr. Kern. Appreciate your assistance.

THE WITNESS: Thank you, Mr. Chang.

HEARING OFFICER CHANG: Any follow-up questions from counsels?

MR. BROWN: I don't have any.

HEARING OFFICER CHANG: Okay. Mr. Kern, I think you are done. Thank you.

THE WITNESS: Okay. Thank you everybody.

(Witness excused.)

HEARING OFFICER CHANG: Let's go off the record for a moment.

(A recess was taken.)

HEARING OFFICER CHANG: Why don't we go back on the record. Who will be handling the examination of

this next witness?

MR. MCKAY: I'll be handling Mr. Jamond.

HEARING OFFICER CHANG: All right. Mr. Jamond, may I ask you to take your oath at this time, and then the parties will start to ask you questions.

Whereupon,

ROB JAMOND,

called as a witness on behalf of the United States Navy, being first duly sworn by the court reporter, was examined and testified as follows:

DIRECT EXAMINATION

BY MR. MCKAY:

Q. Good afternoon, Mr. Jamond. What is your current position with the Navy?

A. I work for NAVFAC Engineering and Expeditionary Warfare Center. I'm the corrosion subject matter expert and a materials engineer.

Q. And what's your involvement with the Red Hill Facility?

A. I have been involved with the destructive testing and Section 5 of the AOC.

Q. You've submitted testimony and supplemental testimony in written form already in this hearing. Do you have any corrections or changes to that testimony?

A. No, I do not.

MR. MCKAY: Sir, we're going to offer Mr. Jamond up for his cross-examination.

HEARING OFFICER CHANG: All right. For the Board, who will be -- Mr. Brown?

MR. BROWN: Yes. Good afternoon, Hearings Officer Chang and Mr. Jamond. My name is David Brown, I'll be asking you a few questions today on behalf of the Honolulu Board of Water Supply.

CROSS-EXAMINATION

BY MR. BROWN:

Q. In your written testimony you speak at length about the corrosion afflicting the Red Hill tanks. What causes that corrosion?

A. Well, that's a bit of an open-ended question, especially since we haven't identified the specific mechanism that's causing the corrosion all over the tanks. I can only speak to the 10 coupons that were removed, and the corrosion that we found there could be due to the presence of moisture, some interstitial spaces that were identified. But the actual corrosion mechanisms are very hard to identify, and we haven't actually performed that, nor that it would not be possible from the 10 coupons we removed.

Q. Is the Navy performing any additional

investigations to identify the corrosion mechanisms that are afflicting the Red Hill tanks?

A. Yeah, under the Section 5.4 of the AOC there's the further studies to characterize the corrosion and attempt to identify some corrosion rates. These studies are yet to be performed, but that's in the works.

Q. And you agree that we need to understand the corrosion issue better, and as well as what rates are afflicting the Red Hill tanks?

A. Yeah, but the rates are going to be variable as Frank Kern elaborated on so, you know, identifying one corrosion rate at this point in time at one point in the tank will not necessarily give you a good indication of what's going everywhere, and that is why they use what had already been talked about using an average corrosion rate, a planning corrosion rate and those kind of tools.

Q. Are you aware of what the worst case corrosion rate has been at the Red Hill Facility?

A. No. My involvement has been strictly with the coupons. So I know the worst corrosion rate we found on the coupons, but beyond that, I have not been involved with the NDE or historically analyzing these tanks.

Q. How would you calculate the corrosion rate if you have a known through-wall defect, and you know when it occurred and you know when the tank went into service?

A. Well, I think what you're getting at is you could take an average, like divide the thickness loss by the time, and you get how many thousandths of an inch per year, but that would just give you an average, right?
Q. Right.
A. The rate is not linear, it's not constant, so I'd be hesitant to answer that as far as the corrosion rate. But as far as if you're talking about obtaining an average, you would just do what you're alluding to.
Q. Okay. And you are the subject matter expert on corrosion for the Navy; is that correct?
A. For Naval Facilities, NAVFAC Engineering Command.
Q. NAVFAC.
A. Yeah, there's other corrosion SMEs in other SYSCOMs. System Command, sorry.
Q. So if we had a corrosion defect occurring in 1998 that resulted in a through-wall hole, and we know that that tank went into service in 1943, and we were to assume, just for the sake of this discussion, that there was a constant corrosion rate, what would that -- or sorry, a constant rate of corrosion over time, what would the average corrosion rate per year be?
A. Well, to calculate it out, if you have 250 mils divided by the time the tank's been in service, then you can calculate the loss per year. But like I said that's

not really what's going on. What's going on, we don't know, like if it was corroding fast in the beginning and then tapered off, or there was some strange condition like Frank Kern had talked about, I don't know, but they're two different things. You have this average corrosion rate and you have what they call instantaneous corrosion rate date, which is what's happening when you measure.

Q. But if we just took the average and we use the time frame we talked about, 1943 to 1998 for the first through-wall hole, that would be about 4.5 mils per year; is that right?

A. Yeah, I didn't run the calculation, but it sounds really close, correct, yeah. I'm sure you did, so --

Q. And just to be clear, that is, you know, not necessarily the most conservative corrosion rate, right? Because that's under the assumption that the corrosion started when the facility went into operation, right, and we don't know when the corrosion on the Red Hill tank started, do we?

HEARING OFFICER CHANG: Mr. Jamond may be frozen. Let's go off the record.

(Off-the-record session.)

HEARING OFFICER CHANG: We're back on the record. Mr. Brown?

THE WITNESS: Can you repeat that question? I'm sorry.

MR. BROWN: Sure. No, I apologize. I understand everyone has these technology issues.

THE WITNESS: Yeah, challenges.

Q. (By Mr. Brown) So, yeah, I guess my question was, you know, the corrosion rate that we were just able to confirm at 4.5 mils per year, that was working under the assumption, right, that the corrosion began immediately once the facility or the tank went into operation, but we don't know when the corrosion at the Red Hill tank started, do we?

A. No, we don't. Unless there's testing that showed -- identified it early on, but that I don't know. But in lieu of any other data, no.

Q. And if the corrosion happened to start later, say ten years after operations began, that would actually mean that the corrosion rate was higher than what we had just discussed; is that correct?

A. Yeah, with the stated assumptions, that's correct.

Q. And it's also -- it would also be higher if the corrosion rate -- or sorry, if the corrosion -- let me back up.

So we also don't know necessarily when we find a

through-wall defect at Red Hill, when that defect made it all the way through the wall, do we?
A. I'm not sure. Yeah, I guess it would depend.
Q. So it's possible that a defect could go through wall at some point in time and it wouldn't be caught until the next time the tank was inspected; is that correct?
A. Yeah.
HEARING OFFICER CHANG: We lost Mr. Jamond again.
MR. MCKAY: Do we want to try to have him dial in?
HEARING OFFICER CHANG: We can try that. So lets go off record and let's fix this and come back on.
(Off-the-record session.)
HEARING OFFICER CHANG: Let's go back on the record. Mr. Brown?
Q. (By Mr. Brown) All right. Can you hear me okay, Mr. Jamond?
A. Yes.
Q. All right. So let me go back to my prior question just to make sure that I understood it right and that I got an answer. We were talking about an average rate for corrosion, how you would calculate that using known information from through-wall holes that

were documented in the inspection reports at the Red Hill Facility. And we had talked about how some of the information reported in the late '90s would indicate that there could be a corrosion rate, assuming the corrosion rate was average and started when the facility began operations at over 4 mils per year.

I then asked you if that would change if the corrosion started later, and I believe your answer was yes; is that correct?

A. That is correct.

Q. Okay. And then it's also true, isn't it, that if the corrosion resulted in a through-wall hole that was not identified until a future inspection, that if the hole actually occurred let's just say a few years or even a few months before that inspection, that the corrosion rate would actually be higher for the same reason; is that correct?

A. Yes, that's correct.

Q. So I think I'll stop with the math there, I appreciate you walking through that with me. What I'd also like to ask you about a little bit today is do steel tanks need to be in contact with the ground for corrosion to occur?

A. When you're meaning contact with the ground, you mean touching the soil or --

Q. Correct.
A. No, atmosphere corrosion can occur.
Q. And corrosion caused by moisture, as you've mentioned before?
A. Yeah, could be caused by humidity in the environment, in the air, and other factors.
Q. Oh, sorry, I didn't mean to interrupt you.
A. Oh, there could be other factors, but --
Q. So it's not the ground itself that's necessarily causing corrosion?
A. Can you rephrase that? I'm not exactly sure what you're asking.
Q. Sure. And I think you answered it. A steel tank doesn't need to be in contact with the ground or the soil to experience corrosion.
A. That is correct.
Q. Okay. Have you ever been to the Red Hill Facility?
A. Yes.
Q. Have you been in the upper access tunnel?
A. Yes.
Q. And the lower access tunnel?
A. No, I have not been in the lower access tunnel.
Q. When you were in the upper access tunnel, did you observe the water infiltrating the tunnel system?

A. No.
Q. Okay.
A. I just used the tunnel as access to the tank that we were testing.
Q. Okay. If there's water infiltrating the back side of the steel liners, could that cause corrosion?
A. They could be one component that could cause corrosion if other factors align.
Q. And what are those other factors?
A. Usually if the concrete had a breakdown in pH, you had a loss of passivity, or there's other things that could cause it, corrosive species migration.
Q. And when you say loss of passivity, what do you mean?
A. I didn't hear that.
Q. Oh, I'm sorry. I said when you just mentioned loss of passivity, what does that mean?
A. That means a breakdown in the passive layer on the steel that the concrete provides.
Q. And could that occur if there are voids in the inner face between where the concrete and the steel liner were?
A. It depends on the pH at those voids, if there's any moisture on the surface of the steel, if the pH goes below a certain level there could be corrosion.

Q. Okay. In your testimony you reference corrosion mitigation projects, including using carbon fiber wrap material to repair corrosion damaged fuel piping, and novel cold spray metal deposition technology to repair corrosion-damaged airfield components.

What is the purpose of those repair methods?

A. Regarding the carbon fiber or the cold spray?

Q. Let's just do each one. Sorry.

A. Okay. The carbon fiber was to provide integrity to these fuel pipelines in an emergency-type situation. As far as the cold spray, in our research effort it was not ever implemented into any tank or fuel pipelines. Was to provide corrosion protection by spraying on a sacrificial type of material, like magnesium, onto the surface of the steel, or zinc, similar to galvanizing, but to be able to spray it on.

Q. And would you consider those permanent or temporary repairs?

A. I think the carbon fiber was a temporary repair, that was the intent of the research project. And the cold spray, it's sort of like if you consider galvanizing temporary because it is depleted over time, but it's essentially a coating, a sacrificial coating you apply to mitigate corrosion.

Q. And are those intended to isolate the steel area

from the environment?
A. They're two separate projects, different end. But for the carbon fiber, wrap a pipe and repair it, it was not to isolate it so to speak, it was to provide structural integrity to the piping after you had a certain amount of metal loss so it could handle the working pressures or whatever pressures were designed.
I still want to point out, these are research efforts not implemented on Navy structures like on any sort of large scale. And for the cold spray, essentially we're providing corrosion control through the sacrificial coating by galvanizing, so it's not essentially isolating it, although it does have that effect. The key effect to stopping the corrosion was the sacrificial material providing a galvanizing type of corrosion mitigation.
Q. Okay. So you'd mentioned those were sort of experimental. Neither of those corrosion protection mechanisms are in place you had said for DOD equipment?
A. Yeah, they're just evaluations in the technology demonstration phases. It was funded by a research program dealing with corrosion.
Q. And neither of those could be applied at Red Hill, could they?
A. No, not feasibly, and certainly not to the back

side.
Q. Okay. Would you agree that two common forms of corrosion protection for steel assets are cathodic protection and coatings?
A. Yeah. The primary corrosion form is coatings, and then the cathodic protection when it's applicable is to essentially protect the coating and any holidays that are these. By holidays I mean holes in the coating.
Q. Okay. And the Navy does apply some kind of coating to the inside of the tanks; is that correct?
A. Yes.
Q. And where is that coating applied?
A. Well, there's -- you're referring to Red Hill specifically?
Q. Yes, at Red Hill.
A. I believe there was -- and then Frank Kern is probably more appropriate to answer the history of the coating that was applied, but there was a coating applied years ago, and now as part of their Clean, Inspect, Repair of the tanks they apply a Novolac epoxy coating to the barrel. Wait, I'm sorry, the lower dome. I really want to defer to Frank on this if I get the details wrong.
Q. I appreciate that, Mr. Jamond. I asked Mr. Kern quite a few questions that he was not able to answer and

deferred to you, so I'm going to ask them to you. So bear with me.

A. Okay, that's fine. But that one I'm not really sure, but that's my understanding.

Q. Okay. There isn't any form of coating applied to the back side of the Red Hill tank steel liner, is there?

A. No. No coating was identified on the coupons.

Q. And so there's no effective corrosion protection that applies to the entirety of the back side of the Red Hill's tank steel liner, is there?

A. The corrosion protection is afforded by the concrete in contact with the steel. That provides excellent corrosion protection.

Q. But wouldn't you agree that if the concrete steel bond is compromised and moisture is present, then corrosion is possible?

A. Yes, that is possible.

Q. And backside corrosion at the Red Hill tanks is not just possible, it is occurring, right?

A. We identified corrosion on some of the coupons that we cut out, and I believe the NDE program is there to repair corrosion-caused damage.

Q. And that corrosion-caused damage is repaired on all the Red Hill tanks, correct?

A. There is a Clear, Inspect, Repair cycle that they go through, and with the intent of repairing all of them, yeah, as needed.

Q. And I think we talked about this before, you are familiar with the steel liner samples, we talk to them sometimes, call them coupons that were removed from Tank 14?

A. Yes.

Q. And is your understanding that these steel liner samples were selected to exhibit a range of characteristics?

A. Yes, that is true.

Q. So the Navy selected coupons that its nondestructive evaluation methods indicate it could have isolated pitting; is that right?

A. Yeah. I would like to point out that we worked with the EPA and the DOH-Hawaii to agree on which coupon locations were selected, so it wasn't strictly the Navy's decision.

Q. Okay, understood. But there was a range of characteristics, including isolated pitting, general corrosion, pitting with general corrosion, and no corrosion; is that right?

A. Yeah, that's correct, and that's from NDE data that was provided.

Q. All right. I'd like to take a look at the Navy's Non-Destructive Examination, Destructive Testing Report real quick. Oh, you can still see the screen, correct?
A. Yeah, I can see right now. It just glitches out occasionally, so ...
Q. Can you see my screen, Mr. Jamond?
A. Yes, I can.
Q. And are you using a screen that the pictures are coming up on the right side, or can I open this all the way?
A. You can open it.
Q. It just makes it bigger.
A. Yeah, yeah.
Q. Are you familiar -- this is Navy Exhibit 40. Are you familiar with this report?
A. Yes.
Q. And what is this report?
A. This is the Destructive Testing Results Report.
Q. And this document was prepared by who?
A. NAVFAC EXWC where I work, and you see the authors there. I'm one of the authors, Miguel San Pedro, Frank Kern, Terri Regin.
Q. And who signed for this document? Or who was the responsible person?
A. Responsible person, can you elaborate?

Q. Yeah, there's a -- right here it says there's a name of a responsible person.
A. Oh, okay. Yeah, well, that's myself.
Q. Okay. You were one of the authors of this report, correct?
A. Yes.
Q. I presume you reviewed it before it was submitted?
A. Yes.
Q. If you had any concerns with any of the analysis or field notes that were taken with respect to this report, you had the opportunity to correct that?
A. Yeah, it's a collaborative effort, so -- but, yes, I am the responsible person.
Q. And you don't have any reason to believe that those descriptions are inaccurate, do you?
A. Well, I mean I overheard the previous testimony, I think I know what you're alluding to. Some of it's open to interpretation by the inspector, by the person taking the notes, so I did not identify anything that needed, you know, serious -- or caused any concern, no.
Q. And who took the notes?
A. Which notes for what?
Q. So the notes on -- the field sample notes that are included in this report, starting on page --

A. Yeah, there's sample notes for steel coupons and for the concrete. So for the concrete field notes, I took all of those notes. For the steel coupon, one of the coauthors, Miguel San Pedro, he was up -- not in the bucket, but up on the catwalk, did the analysis of the -- initial visual analysis of the steel coupons as they were delivered to him.

Q. And were all the authors of this report offered the opportunity to review it?

A. Yeah, I think it went through review cycles. I'm not sure who reviewed what when, and at what point, but we went through a lot of review.

Q. And if any of the authors had any concerns about what was in this report, they could have voiced those concerns, right?

A. Yeah, I mean some of it -- like I state, it was a collaborative effort, so some cases we had to compromise on, not on the data, but on some of the conclusions maybe or something, but nothing very significant, no.

Q. And you as the responsible person would have offered that opportunity and had those communications, correct?

A. Yeah. Everybody had a chance to make comments.

Q. And the Navy doesn't -- isn't in the practice of submitting reports to regulators that aren't complete

and accurate, are they?
A. Absolutely not.
Q. All right. I'm going to take a look at a couple of specific examples. I'm going to refer you to page Navy 0009633, which I will pull up on the screen, and this is a description of the Destructive Testing Evaluation of Coupon No. 3. You see that?
A. Yeah, I see it.
Q. And this is a cross section of Coupon 3; is that correct?
A. Yes.
Q. Can you describe to me what is happening in this coupon and what it's actually showing here?
A. Okay. The silver part of that is the cross section of the tank liner, and as you see the browner areas, those are corrosion product. And those lines designate thickness measurements with the numbers of thickness listed below.
Q. Okay. And I see some numbers of thickness, I see -- and if anyone needs me to zoom in, let me know -- but I see 5.5 millimeters; is that right?
A. Oh, I -- yeah, I think so. It's a little blurry on the screen, but, yeah.
Q. I can zoom in. Is that better?
A. Okay, yeah. That's much clearer, yeah.

Q. And, you know, I am very unfamiliar with the metric system, but how many inches or mils is 5.5 millimeters?
A. It's in the report, but you would take -- here, let me just pull it up.
Q. Is that more or less than 250 mils or .25 inches?
A. I'm just running the calculation because I can't --
Q. No, that's okay.
A. I'm sure you have it. We get about 216 mils.
Q. Around 216 mils.
A. 217.
Q. So the full operational thickness of the steel liner would extend above this 5.5 were it in the condition that it was when it was initially put into operations. So be something like up here where my hand is waving; is that right?
A. Yeah, roughly a quarter inch, plus or minus a little bit. But yes.
Q. And then this area down here where I'm pointing at is, says it's 3.34 millimeters; is that correct?
A. Yeah.
Q. And is that similarly something, you know, along the lines of .131 inches?
A. Yes, yes.

Q. And so this is an area of pitting because of corrosion, correct?
A. Yeah, that appears to be a corrosion-caused pit.
Q. There was some discussion in your supplemental testimony about this area right here. Do you recall that, this undercut pit on Coupon No. 3?
A. Yes.
Q. And this kind of morphology is present in microbiologically influenced corrosion, right?
A. Well, any sort of pitting morphology can be present in microbiology influenced corrosion.
Q. Is that a yes?
A. Not really. I don't think that pit indicates microbiologically influenced corrosion personally.
Q. But the pit morphology --
A. Without other evidence.
Q. -- is present in microbiologically influenced corrosion, right?
A. There can be many different morphologies present. So a particular pit undercutting another pit is not necessarily indicative of that. It would not be used to diagnose it as MIC solely.
Q. But you can't rule it out based on looking at it, can you?
A. No, but nor can you attribute it to it either.

Q. Okay. Can corrosion growth rates from microbiology influenced corrosion be different than other corrosion mechanisms?
A. Well, yeah. All corrosion mechanisms probably have differing rates, but yes.
Q. And can they be at times an order of magnitude or two higher than other corrosion mechanisms?
A. Well, if the corrosion mechanism is very minimal, it could be higher, yeah.
Q. In your supplemental written testimony you claim that none of the on-site observations immediately after the removal of the steel liner samples from Tank 14 indicate the presence of MIC; is that correct? Am I accurately stating your testimony?
A. Yeah. There was no indication of MIC, and also this sort of environment or configuration is not where you would typically -- or it's not associated with MIC.
Q. So one of the reasons that you listed was the presence of moisture; is that correct?
A. No, no. That's not correct. I'm not sure I understand what you're asking.
Q. Sure. Maybe I can pull up your testimony real quick. What I have on screen is your supplemental testimony, Mr. Jamond. I'm going to scroll down for you to your testimony. "Although this pit morphology is

present in microbiologically influenced corrosion," you go on to say it's also present in other forms.

What I was asking you about here is, "the following observations were noted on-site immediately after coupon removal to identify the potential for microbiologically induced corrosion." And then you mention deposits, coatings, debris scale or biological materials; the presence of moisture; odors consistent with the presence of MIC; and the presence of petroleum product between steel and concrete surface. And your statement here is the one I was talking about: None of those observations indicated the presence of MIC.

So one of these that I was asking about is the presence of moisture. Is the presence of moisture indicative of MIC?

A. No, not standing alone it is not.

Q. So what did you mean when you said none of these observations indicated the presence of MIC, and you stated the presence are moisture. What did you mean by that?

A. Well, the on-site observations when the coupon was removed, and the environmental conditions, did not indicate presence of MIC. And I see what you're trying say. Maybe I shouldn't have said each in that phrase, but --

Q. Okay. That's okay, I'd be happy to clarify. So the presence of moisture could be indicative of MIC?
A. No, not standing alone, because there's moisture in concrete, and we never find MIC in reinforced concrete structures. So it is not indicative of MIC.
Q. But the fact --
A. But taking all the things together that's -- go ahead.
Q. No, no, no. I want to make sure I understand this. So you're not saying that each of these bullets that you listed here indicate that there is no MIC, you're saying something different, right? I just want to understand what you're saying.
A. I guess what I'm saying, and I think it's consistent with what was written there, except maybe the phrasing of the word each, was that the environmental conditions observed and the condition of the steel when it was removed does not indicate any presence of MIC.
Q. But you cannot rule out that that morphology was caused by MIC simply by looking at these observed conditions, right, the biological materials, deposits, coatings, debris scale, presence of moisture, odors, or presence of petroleum product between the steel and concrete surface, can you?
A. Well, you cannot conclusively rule it out, but I

don't think any reasonable corrosion engineer would attribute it to MIC though either.

Q. And what's the basis for that conclusion?

A. The environmental conditions. There's no presence of deposits, sludge, biofuels, the things you commonly see with MIC, and those are usually found in internals -- the pipelines or the internal of a fuel storage tank or other environments. That's typically where MIC has been identified.

Q. I'd like to ask you a little bit more about the corrosion analysis that was done as part of the destructive testing that the Navy performed on Tank 14. So how does the Navy's nondestructive examination or scanning of the quarter-inch steel liner work?

A. The nondestructive examination?

Q. Yes.

A. Frank Kern is the proper person to ask that question, unless you just want a -- I'm not involved with the scanning.

Q. So you provided some testimony that discussed the comparison of the nondestructive evaluation scanning to what was actually measured in the laboratory once the coupons were sampled; is that correct?

A. That is correct.

Q. But you can't speak to how the scanning works?

A. Well, as far as the whole scanning process and procedures, no, I wasn't involved with that. I was provided the data. I mean I'm familiar with how LFET scans are conducted, but the specifics of the Red Hill's Tank 14 and the inspection, I was not involved with that, I came in later.

Q. So how important is the nondestructive examination to ensuring tank integrity?

A. I would say that that's one of the tools to determine the amount of backside corrosion and the requirements for repairs.

Q. Is that one of the tools, you know, that just happens to be used, or is it a particularly important or useful tool?

A. It is one of the primary tools. There might be other methods or there are other methods, but yeah, that's the primary scanning tool to determine the amount of backside corrosion.

Q. So we know that there's no secondary containment for these Red Hill tanks as they are currently configured, operated and presented in the Navy's Red Hill permit application. So tank integrity is reliant upon that quarter-inch steel liner of keeping fuel out of the environment.

My question is how accurate does the

nondestructive examination need to be to prevent fuel releases until the tank is up for its next inspection?
A. Well, I believe that it has to be accurate, but they also have some factors of safety factored in for times when maybe the accuracy isn't exactly as it needed to be, so that that with the aggressive Clean, Inspect, Repair program at Red Hill will ensure the tank's integrity is maintained.
Q. So would you say it needs to be a hundred percent accurate?
A. When you say a hundred percent accurate, I'm not sure what that means.
Q. Sure. No, that's a good question. So how -- when the steel liner samples were taken from the Tank 14 and were compared to the nondestructive evaluation that the Navy provided before the coupons were removed, how did you compare those for purposes of putting together this Destructive Testing Report that we just looked at?
A. So how were they compared?
Q. Yes. What was the purpose of doing that entire exercise?
A. It was to validate the NDE process, among other things, but that was the main component of the destructive testing.
Q. And what does validate mean?

A. Well, there was never an intent -- we could not statistically have enough coupons to show a statistical significance, but it was more of a demonstration of, okay, we're going to take these coupons. We know the ME identified and were going to section them and measure the actual thickness and compare and see like how close and how effective the NDE was.

Q. Did you set any benchmarks for how close or how effective it needed to be?

A. Yeah. There were benchmarks cited Destructive Testing Report, but that's dependent on the LFET device, the settings and all that that are somewhat out of our control. So that benchmark was, I'm not going to say arbitrarily, but it was chosen -- you know, it was difficult to come up with that number.

Q. What number was that?

A. It's in the report. I'd have to pull it up exactly because there's a couple -- hold on one second.

Q. Mr. Jamond, is it possible it was within 20 mils?

A. Yeah, I'm trying to identify that part in the report. It probably is that -- what I'm seeing here is 20 to 50 mils. Yeah, I believe that might have been the number. I'm just trying to pull it out of the report, but if you can put it up.

Q. Sure, I can put it up. Do you have a specific

page that you're referencing me to?
A. I'm just trying to find it actually, so --
Q. Okay. Well, let's leave that for now. I have a couple of other questions. We can get to that in a minute.
So if I read your testimony correctly, the Navy's nondestructive examination techniques attempt to detect areas where the Red Hill tank steel liner thickness is below a predetermined threshold; is that right?
A. Correct.
Q. And the Navy's decision as to whether to repair a portion of the Red Hill tanks' quarter-inch steel liner is binary, meaning it results in a decision to either repair or not to repair the area that's inspected based upon that acceptable threshold for thickness; is that accurate?
A. Well, the identification of an area that requires repair by the LFET is further proved up using other methods, and then to determined the repair area, and this is more Frank Kern's expertise, but they conduct additional thickness measurements to determine how large the repair plate area's going to be. So it's the first step.
Q. And for the Red Hill tanks, that acceptable thickness threshold is 1.60 inches; is that correct?

Sorry, I actually said that wrong, 0. --
A. .160.
Q. Yeah.
A. Yeah.
Q. I apologize. So let me restate that again. For the Red Hill tanks the acceptable thickness threshold is 0.160 inches.
A. That's the number that was published. I think there's a -- somewhat dependent on data, sort of a data-driven threshold. But once again, I'm not an expert on that, so that's just a guess on my part. But yeah, the number that was identified for Tank 14 where the coupons were taken was 160 mils, .160 inches.
Q. And anything that was less than 0.160 inches was actionable and requires repair?
A. Yes. From the LFET scan it's actionable, so further evaluation is conducted at that point at that area.
Q. And I know we sort of talked about this before, but in connection with the destructive testing, the Navy sent those 10 minor samples to a laboratory for analysis; is that right?
A. Yes.
Q. And that's the basis that you used to compare to the NDE results?

A. Correct.
Q. And so that's what we were looking at on the destructive testing results report cross section of Coupon 3 that had that undercut bit?
A. Yes.
Q. Okay. And that was done as IMR Test Labs?
A. Yes.
Q. Okay. So you had mentioned that the purpose of the destructive testing was to validate whether the nondestructive examination results were accurate and reliable; is that correct?
A. Yes.
Q. And when you looked at the level of what needed actionable repairs, what we just talked about, that 0.160 level, there were four coupons that the nondestructive examination -- or sorry, I should take that back. There were four coupons that the laboratory testing results indicated were below that actionable level; is that correct?
A. Yes, that's correct. I'm just counting them, so -- correct. Of the ten, yeah.
Q. Yeah. And so of those four, you had Coupons 2, 3, 6 and A1, which I believe stands for Alternate 1; is that correct?
A. Correct, yeah.

Q. For Coupon 3 and Coupon 6, that is half of the four coupons that required actionable repair, the nondestructive evaluation techniques did not indicate that repair was needed; is that right?
A. Yeah, that's correct. Although I'd point out that Coupon 6 is right at the threshold 157.9.
Q. But it was below --
A. Yeah, technically it's below it, yeah. Yes.
Q. So the destructive testing, at least as applied to the coupons removed from Tank 14, confirm that the nondestructive examination was only accurate in detecting actionable metal loss 50 percent of the time.
A. Yeah, for these ten coupons, I mean that's one way to look at it, that -- although there were couple extenuating circumstances for Coupon 3 that are identified in the report, and Coupon 6, there was a low volume pit, not super deep, still at the threshold of the repair limit.
Q. But just to be --
A. But yeah, I mean, technically, yeah.
Q. Oh, go ahead, I'm sorry.
A. I mean there's still some context to that, especially with Coupon 6. And then Coupon 3 had some extenuating circumstances that are detailed in the report. But yeah.

Q. I understand what you're saying here. I just want to make sure things are perfectly clear. So for Coupon 3, the PAUT, right, which is the prove-up measurement, did not identify metal loss; is that correct?

A. Well, the prove up?

Q. Mm-hmm.

A. We didn't have prove-up data in the Excel spreadsheet. We had a -- and then once again, this might be better asked of somebody else that was there during this evaluation, but they identified what LFET -- it was a strange situation, I guess. They thought it was some kind of internal defect of the steel, but -- and then I guess they proved up adjacent areas, and but not that actual area, and there turned out to be corrosion there when we cut it out.

But as stated in the report, I think the evaluation wasn't completed. The complete laying out of the repair evaluation wasn't completed before we started this coupon removal process, and they were told to hold off, so that's the scenario where it gets a little complicated because we came in and stopped them from doing the layout and cut out the coupon. But, yeah, that one had corrosion below the threshold.

Q. I'm going to pull up another exhibit here, give

me one second. Okay, can you see my screen?
A. Yes.
Q. So this is a page from Destructive Testing Report at Navy 9661, which is page 59 of the PDF. This states: The LFET minimum thickness was .033 inch. During PAUT prove-up, the thickness was identified not to be metal loss, but instead a non-actionable lamination. Therefore, repair was not specified, and backside corrosion was not expected.
Does that sound accurate to you?
A. Yeah, that's basically the scenario I was attempting to describe a second ago.
Q. So destructive testing found pitting and a minimum wall thickness of .132 inches. The LFET value did not fall within the 20-mil accuracy range for pitting.
Mr. Jamond, are you familiar with the Department of Health and U.S. EPA's evaluation of the Navy's destructive testing efforts?
A. Yes.
Q. And what is the process that the Navy is now in with the Department of Health and U.S. EPA with respect to destructive testing?
A. Well, we embarked upon Section 5.4 of our AOC, which contains research initiatives, process improvement

and other evaluations, including detailed evaluation of the concrete, efforts to determine corrosion rates, efforts to streamline and improve NDE processes.

Q. Does that include modifications to the Navy's Tank Inspection, Repair, and Maintenance process?

A. Yes, I believe it does.

Q. The nondestructive examination and the destructive testing results, the comparison we just showed, the 50 percent accuracy rate, it demonstrates that the TIRM process still needs to be fixed, doesn't it?

A. I wouldn't use the phrase fix. I believe as far as the TIRM process, they're always -- they're continuously improving as the technology's available and new methods become available. That's constantly evolving, and these further efforts under 5.4 are more formal efforts at continuously improving it as well.

Q. Are they more formal efforts because the Navy's NDE, as demonstrated by the destructive testing, is not accurate and not reliable?

A. No. I believe that the more formal research efforts that are going into place are part of a desire to improve, as well as to accommodate the regulators' concerns.

Q. Let's put up another exhibit.

A. But once again, it's kind of out of my expertise here to make conjecture on these kinds of questions, but that's my opinion.
Q. Mr. Jamond, can you see my screen?
A. Yes.
Q. Are you familiar with this letter, dated March 16, 2020, from the U.S. EPA and the State of Hawaii Department of Health?
A. Yes.
Q. What is this letter?
A. Well, this is a letter in response to the conclusions from the Destructive Testing Report that the Navy provided.
Q. Can you read to me the portion of this letter starting here from "Specifically" where my hand is waving just down through the end of the paragraph?
A. Specifically, the Regulatory Agencies do not concur that the NDE results are validated, both by destructive testing and thorough, case-by-case analysis. As a result, and pursuant to Section 7(b) of the Red Hill AOC, the Regulatory Agencies are disapproving the results report.
Q. Is this the letter that prompted additional conversations between the Navy, and the Department of Health, and the U.S. EPA about how to fix TIRM?

A. Yeah, this prompted discussions with the Regulatory Agencies on improvements that --

Q. And are some of these --

A. -- they would like to see based on these results.

Q. I apologize, I did not mean to -- go ahead and continue.

A. That was it.

Q. And here on page 3 of this document, it's an enclosure talking about the Regulatory Agencies' interpretation of the destructive testing data. There are four different items that are laid out in that with respect to additional evaluation and associated impacts on TIRM. The first one says: Evaluate technology and develop processes to improve the NDE procedures. This process should then be assessed for its effectiveness which should be done with another destructive test.

Is the Navy planning on doing more destructive testing?

A. I don't know the answer to that. Yeah, that's not a decision that I'm involved with. I could provide consultation on it, but no, it's not a decision I know the answer to.

Q. B says: Conduct additional analyses on the condition of the concrete structure and embedded reinforcing steel.

Is that something that the Navy's performing?
A. That is one of the efforts that is proposed under Section 5.4, yes.
Q. C says: Evaluate potential causes for corrosion and possible actions to reduce corrosion rates, if possible. Is that something that the Navy's doing?
A. Yeah, it's part of the execution plan of the 5.4.
Q. And that execution plan has not been provided as part of this proceeding, has it? You're not aware of it?
A. No, I'm not aware if it's been provided or not.
Q. D says: Immediately reevaluate the repair threshold and associated factor of safety to account for inaccuracies in NDE corrosion rates and possible delays in repair cycles. Is that something that the Navy's doing right now?
A. Yes. I believe Frank Kern and his team are putting together a document that's going to, I guess, clarify the threshold, the factors of safety, and the determination of those parameters and provide it to the regulatory agencies.
Q. And this concludes with: Based on our, the Regulatory Agencies', calculations, the current Clear, Inspect, Repair is averaging 30 years, with the longest duration being 59 years for Tank 18.

Do you have any reason to disagree with that statement?
A. Yeah, I don't know historically the interval of each tank inspection.
Q. And it notes that: While the next set of inspections are currently scheduled within 20 years, the schedule has already been pushed back from the time the TIRM, or TIRM report was published in 2017; is that correct?
A. I honestly don't know.
Q. Okay. This letter from the Regulatory Agencies recognizes there's some really serious problems with the Navy's Tank Inspection, Repair, and Maintenance process, doesn't it?
A. No, I think it's just identifying areas for improvement, where any process has areas for improvement. I wouldn't say -- use the phrase you just did, but --
Q. If you have a 50 percent accuracy rate for identifying actionable metal loss in a tank that has no secondary containment, is a hundred feet above a sole-source aquifer, isn't that a problem?
A. Yeah, well, it's such a small sample size, so, you know, could have easily gone a hundred percent accurate and we'd be arguing, oh, that's too small a

sample size to say that's accurate, so it can go both ways. But there's -- every process has room for improvement, and under the Section 5.4, they're forging ahead on making improvements.

Q. Is the destructive testing dataset the best, most recent and most complete data that we have if we're going to make decisions on how to fix TIRM moving forward?

A. I wouldn't say that because it's not complete. It's such a small sampling. I would -- the larger dataset would be the NDE data that's obtained from all the scans and prove-ups, but the destructive testing component does provide some insights.

Q. And isn't it true that a smaller sample size may not be able to prove something is reliable, but it can certainly prove something is unreliable?

A. Well, if you're shooting for a hundred percent, then yeah. But I think it goes both ways because the small sample size might show that, oh, like you said, they think it's 50 percent, but you take ten other coupons, you get to a hundred, it's just really not enough to say either way.

Q. Should we be shooting for better than 50 percent?

A. Yeah, we would like to be, but my point is that you can't say it can't validate it, but it can only

invalidate it because I don't believe that's true. I think statistically you can't make a claim either way.

We were just attempting to take the coupons that were practicable to take, which ten actually is a lot as far as all the logistics in obtaining them, and then evaluating how it compares, but you can't really make some sweeping generalization that it's only 50 percent accurate, that's not valid.

Q. But you're saying it's more than 50 percent accurate?

A. I'm saying that the destructive testing -- yeah, I believe it is, in my expert opinion that it's more than 50 percent accurate. I'm just saying that the destructive testing that we conducted, you can't really make a -- assign a percent accuracy to the whole NDE program.

Q. But applied in the context of the Tank 14 samples, it was 50 percent accurate on identifying actionable metal loss?

A. Yeah, I'd have to say that's true, but with the context I provided earlier.

MR. BROWN: Okay. I have no further questions at this time.

HEARING OFFICER CHANG: I was going to suggest this is the time for a break. Ten minutes? Then we can

evaluate where we're headed for the rest of the day. All right, see you in ten.

(A recess was taken.)

HEARING OFFICER CHANG: Let's go back on the record. Mr. Frankel?

MR. FRANKEL: Thank you.

CROSS-EXAMINATION

BY MR. FRANKEL:

Q. Mr. Jamond, you don't live on Oahu, do you?

A. No, I live in Ventura, California.

Q. Would you say you take a conservative approach, in other words, protective of the environment, or more practical approach when assessing corrosion of underground storage tanks?

A. Oh, absolutely a conservative approach.

Q. Okay. And is inspection of the tanks important?

A. Yes.

Q. Inspection can help identify areas that need to be repaired?

A. Yes, inspections are the tool, one of the tools that identify areas that needs to be repaired.

Q. And inspections might find suspected areas of corrosion?

A. Yes.

Q. And so inspections are protective of the

environment?
A. Yes.
Q. Are 20-year inspection intervals conservative, or practical sort of interval?
A. Well, I think they're conservative. A 20-year inspection interval involves a lot of inspections, right? A more practical approach would lengthen that interval, but a conservative approach takes a 20-year, but ensures that there's no loss of tank integrity.
But once again, that's sort of out of my area of expertise, so that's conjecture on my point.
Q. And so a more conservative approach would be a ten-year interval, wouldn't it?
A. Yeah, but if it's not possible to conduct such inspections, then -- yeah, in theory it's more conservative, but yet it might cause more disruption. Just so many other factors to evaluate, and I do believe the Navy has taken a conservative approach with this 20-year interval.
But once again, these aren't my decisions. I'm just stating that I think it's conservative.
Q. Well, you said so 10 years would be more conservative, but practical issues dictate 20-year intervals you're saying, right?
A. Well, I'm saying there could be other factors to

consider than just the interval, and that as far as inspecting every 10 years might bring up other issues. And if something's totally not required, that it's also a waste of taxpayer dollars to inspect these tanks in very short intervals.

Q. Well, if you're -- again, I am attempting to isolate those issues of practicality, such as money, such as operations. I'm talking about taking a conservative approach to protecting the environment. An interval of 10 years would be more conservative and more protective of the environment than an interval of 20 years for inspection, correct?

A. Yeah, there's just so many other factors. But if you just isolate it like that in saying you're inspecting it more often, in that regard, yes. But what I want to reiterate, there's a lot of other factors in it. It's not just practicality, there might be other factors as far as the inspection that doing it so often might just not make sense.

Q. Okay. But you did say in the beginning of your testimony in my cross-examination of you that you take a conservative approach.

A. Yeah, as corrosion engineer we take the conservative approach, yeah.

Q. How many through holes caused by corrosion have

been discovered in total in the Red Hill tanks?
A. I don't know.
Q. So I think I read you're a corrosion control and inspection subject matter expert; is that right?
A. Yes. That's my title.
Q. But you don't know how many through holes corrosion have caused in the Red Hill tanks?
A. No, I don't know. I mean I could look up a report, but I have not been involved with the Red Hill tank inspection program except for my involvement with the destructive testing, and now Section 5.4 of the AOC.
Q. Okay. In your testimony you talked about -- you said the concrete behind the steel liner inhibits corrosion of the steel from the back; is that right?
A. Yes.
Q. And you also talked earlier about how important that concrete is, correct?
A. Correct. Yes, I did talk about that.
Q. Nevertheless, the concrete hasn't prevented corrosion, has it?
A. No. There has been corrosion identified, backside corrosion identified on the tanks, and there was corrosion on the coupons that we removed, some of them.
Q. Well, okay. You were not expecting to find

corrosion behind each metal coupon removed from Tank 14, were you?

A. Well, just going off of the NDE data, there were areas that we expected to find not very much loss of cross-sectional area due to corrosion, and there were some coupons that we took out that we expected it.

Q. Okay. So my question is, there were areas where you expected to find no corrosion, correct?

A. What do you mean by no corrosion? Like no discoloration, no measurable metal loss, no significant loss? It's kind of a vague question.

But we expected from the NDE to find areas that did not have significant metal loss due to corrosion, true.

Q. So let's look at Exhibit N-40. So can you see that? Can you see the screen?

A. Yes.

Q. So it appears that the regulators and the Navy agreed certain coupons were selected, some with isolated pitting, general pitting, pitting with general corrosion, and no identified corrosion were selected.

A. Correct.

Q. But you actually found that four -- at least one coupon, if not more, there was corrosion?

A. At least one coupon of the ones that we didn't

expect corrosion, is that what you're saying?
Q. Correct.
A. Yeah, but for example, like one of them that we expected no corrosion in Coupon A2, the thinnest area was .248 mils of normally -- .248 inches on a normally .25-inch thick plate. That would be classified as no corrosion.
Q. But you guys said it had corrosion?
A. Well, in the field notes that were taken, I think that they identified rough spots. But the thing about rough spots is you don't really know if that means there's any appreciable metal loss, or it's just discoloration, staining, so that is why we conducted the laboratory analysis. But in the field notes they were going off of discoloration or rust on the surface, which can be deceptive.

But to answer your question, a .248 out of a .25, I would attribute that as no, no corrosion.
Q. And you take a conservative approach in analyzing corrosion of underground storage tanks?
A. Yes.
Q. Okay. And you've described this test as being a small sample size, right?
A. Yes.
Q. But the Navy's not planning on obtaining any more

samples?
A. I'm not sure if any additional destructive testing is going to be conducted on other tanks, Red Hill, I just kind of -- like I said in the previous testimony, I'll provide consultation on it, but it's not a decision that I make, and I'm not aware of what the plans are.
Q. So the data we have is the data in this report, right?
A. Yes.
Q. And it may be a small sample size --
A. For the destructive testing.
Q. Yeah. May be a small sample size as far as you're concerned, and it's not particularly convenient data for the Navy, is it?
A. Well, yeah, like it's not a hundred percent like as predicted, but I just don't think anybody thought it was going to be a hundred percent. There's always some variation in testing.
Q. And there was a lot of variation here, correct?
A. Well, a lot? Yeah, there's variation, and as was pointed out, you have two locations were below the threshold. But a lot of variation, yeah, it's open to interpretation, so I won't say that's not true, but I'm not going to totally confirm that and say it's a lot.

Q. And you take a conservative approach to corrosion of underground storage tanks.
A. Well, my evaluation of the data doesn't really have anything to do with my approach to underground storage tanks. You asked what I thought the data looked like, not what approach I was taking.
MR. FRANKEL: Okay. No further questions.
HEARING OFFICER CHANG: All right, thank you.
Mr. Paige, any questions for EHA?
MR. PAIGE: No questions.
HEARING OFFICER CHANG: Okay. Any redirect?
MR. MCKAY: Yes, sir.

REDIRECT EXAMINATION

BY MR. MCKAY:
Q. Mr. Jamond, you mentioned, when Mr. Brown asked you questions about Coupon No. 3, you said there were extenuating circumstances for Coupon No. 3. What are those extenuating circumstances you mentioned?
A. Yeah, it's stated in the report that the way -- really Frank Kern should answer this because he was involved during this NDE, but as we put in the report, they did an LFET scan which identified actionable areas, and they went back for prove-up using a different technique, basically a phased array ultrasonic testing, and they didn't identify those areas, and so they had

made a note that it was a flaw in the steel and not a-corrosion-caused damage. And then they were to go back out and lay out the repair area of adjacent areas making ultrasonic thickness measurements, however, they didn't conduct those further layouts because we were going to remove the coupons, so we had the contractor stop any repair layouts until we extracted the coupons and completed that process.

Q. What would that repair layout have accomplished?

A. Well, when they conduct these layouts to determine where they can load the plates, they have to find metal thick enough that they can weld to, so they'll use straight beam ultrasonic thickness testing to determine the thickness, you know, moving away from the damaged area so they get to an area where there's enough metal that they can weld the repair plates too. So the Navy's position of that, well, they would have found this area because of the laying out of the repair for that adjacent repair, identified repair.

Q. You also indicated the significance of Coupon No. 6. What was the context? You mentioned coupon No. 6 should be considered in context. What is that?

A. Yeah, because the identified remaining thickness of the thinnest area was 0.158 inches, which is right at the threshold, and the other component of that is this

pit was a relatively small volume pit, and LFET has some limitations on the really small pit because it's a mass measurement that's measuring the remaining thickness of using the electromagnetic technique, to a small volume pit is a bit hard to detect, especially when it's not even anywhere near through metal with a .158 inches remaining at the cross section.

Q. And that's within .2 mils of the repair threshold?

A. Yeah. .2 mils of the repair threshold which contains factors of safety in it.

Q. Is this the first time that you're aware of where they've cut coupons from Red Hill?

A. This is the first time I'm aware that they've cut coupons. They may have cut coupons during some repair processes, projects earlier on, but I'm not aware of it.

Q. But the first time that they did this laboratory analysis that you're aware of?

A. Yes. This is the first time we've cut coupons and conducted the whole battery of tests and compared it to the NDE, yes.

MR. MCKAY: I'm going to ask to have Exhibit N-44 back on the screen.

Q. That's the third paragraph of Navy 0010366 of Exhibit N-44. I'm sorry, the third paragraph there.

Can you read that full paragraph, Mr. Jamond?
A. That starts with "To clarify?"
Q. Yes, sir.
A. Okay. To clarify, the Regulatory Agencies are not requiring the resampling of Tank 14 under Section 5.3.2 of Red Hill AOC Scope of Work. For the most part, the data collected for the results report enabled the Regulatory Agencies to arrive at several important conclusions, although some of the data collection and analysis deviated from the expectations and the originally approved workplan. However, further work shall be performed to the Regulatory Agencies' satisfaction to address the differences in interpretation and data gaps found in the initial Destructive Testing Study. This additional work should include both further effort to improve the nondestructive testing protocol as generally envisioned in Section 5.4 of the AOC SOW, and two, further destructive testing to address data deficiencies identified by the Regulatory Agencies and their experts, and to evaluate the proposed improvements to the nondestructive testing protocol.
Q. I'm going to ask to pull up Navy N-40, at Navy 0009677. Section 6.2, the next section. Can you read Section 6.2, please?

A. The TIRM report includes details about how the corrosion rate assessment in the modified API Standard 653 inspection is performed. Coupon 3 contained the most unexpected metal loss at an average rate of 1.57 mils per year, based on a loss of 118 mils over 75 years, from 250 mils in 1943 to 132 mils in 2018. Since the TIRM process used in Tank 14 assumed a rate of 2.96 mils per year, the results of the destructive testing validate that the assessment is conservative. No changes to the corrosion rate assessment are recommended.

Q. So is it the Navy's position with this statement that the level of, or the amount of corrosion they were looking for was what the test validated? Not necessarily at NDE coupons, is that your interpretation of this statement?

A. Yeah, well, for this coupon -- well, as it states, the most metal loss of the ten coupons, its rate was still well under the assumed rate for determining threshold and repair intervals. Did that answer the question?

Q. I think so. There were also false positives in the testing, wasn't there?

A. Yes.

Q. So in context, if there were a false positive

without the coupon testing, is it safe to presume that area would have been repaired?

A. It may have been repaired, depending on where they're at in the prove-ups and the laying out of the repairs. Once again, this might be something for Frank Kern, but as they go out to lay out the repair area, they use additional ultrasonic testing, and if they didn't identify any corrosion, they might have done further studies like on that area.

But to answer your question like more simply, yeah, they would weld a repair plate over it if their prove-ups show that there was a false positive.

Q. I believe Mr. Brown asked you whether the Navy was working to improve the process of the AOC. Is it your understanding that the purpose of the AOC's to apply the best available practicable technology for all sections of the AOC?

A. Yes, that's true.

Q. And currently this NDE the Navy's using, that is the best available practicable technology in this industry, in the POL industry?

A. Yes.

Q. And it's not just limited to the POL industry, this technology, LFET and the PAUT, they're used to examine all sorts of other structures, aren't they?

A. Correct.
Q. Metals and concretes and other materials not related to oil and gas?
A. Yes. If there's a high risk they would use these high level NDE techniques, yes.
Q. You testified about the conditions of MIC, and Mr. Brown asked you where MIC would be present. Given the conditions of the environment of Red Hill, you know, where it's located, the environment it's exposed to, do those have any impacts on the level of pH you would expect in the concrete or the level of chlorides you might expect in the area?
A. Are you referring to MIC or pH changes of the concrete?
Q. Well, I'm referring to pH in general. The environment the concrete is in is significant to how it reacts, right? I mean if concrete was in brackish or salt water at a lower water level table, it would react differently than it does a hundred feet under the ground where it's situated.
A. Yeah. If it was in salt water, you would have chloride defusing from the surface into the concrete causing, you know, say it's a reinforced concrete structure, a pier or something, and then over a number of years the chlorides would defuse in and cause that to

breakdown and corrosion of that steel reinforcement happen. But in a buried structure with no large supply of chlorides, you would not expect that no happen.

MR. MCKAY: Thank you. I don't have anything further.

HEARING OFFICER CHANG: David, are you able to hear us?

MR. BROWN: I can hear you.

HEARING OFFICER CHANG: Okay. Do have any more questions?

MR. BROWN: I do have a few questions.

HEARING OFFICER CHANG: Okay.

RECROSS-EXAMINATION

BY MR. BROWN:

Q. Mr. Jamond, you just had a few discussions with Mr. McKay about Exhibit N-44, which we had talked about briefly as well, which is the letter from the Department of Health and the U.S. EPA disapproving the Destructive Testing Results Report.

I'd like to point you to the sentence that Mr. McKay showed you, which is starting here with -- do you see my screen?

A. It's still loading.

Q. Okay. Let me know when you can.

A. Yes, it's up.

Q. And this is the sentence that says: For the most part, the data collected for the results report enabled the Regulatory Agencies to arrive at several important conclusions. So I'd like to ask you about those conclusions and whether they're being addressed as part of Section 504 of the AOC.

So the first conclusion is about coupon results, and the regulators, including the Department of Health, indicated that there are false positives and false negatives. We talked a little bit about false positives. We talked about the false negatives, and Mr. McKay asked you about the false positive.

So for these false positives that were identified, that means that the nondestructive examination indicated that there was actionable metal loss when there actually wasn't; is that correct?

A. The false positive is that a thickness was identified below the threshold, but when actually the destructive test identified the thickness was larger than indicated by the LFET.

Q. Right. And the conclusion there is that the NDE gets it wrong both ways, right? We're more concerned about when it's reporting non-actionable metal loss when it really should be repaired, but these are examples where it was reporting the other way around, isn't that

right?
A. Yeah. It's showing that the measurement was not completely accurate, but it's more conservative.
Q. Right. But it's inaccurate in both ways, so you could get a repair that you needed to do that you didn't, or repair that you didn't need to do that then you go and do.
A. Yeah, except that not necessarily -- if you have an identified area that it's a, quote, false positive, there's a likelihood that under the layout of the repair and ultrasonic testing that goes along with that, it might be identified as a false positive. I'm not exactly sure how that process functions, but that could happen.
Q. And the second important conclusion that the Department of Health and the EPA arrived at were that deficiencies in data collected or deviations from the workplan. The Navy's laboratory analysis did not or was not able to identify the thinnest portion of each plate which made a good portion of this destructive testing exercise and analysis incomplete.
Is that something that's subject to Section 5.4 of the AOC?
A. I don't concur with that conclusion. But Section 5.4 of the AOC is going to look at the

destructive testing result in comparison with the NDE as part of one of the research initiatives. So it's being covered, but I'm not sure I -- I do not agree with the conclusion that we didn't find the thinnest sections, or the lab didn't.

Q. And a third conclusion is there's uncertainly regarding NDE accuracy. The Regulatory Agencies believe there's a lack of sufficient correlation between NDE and laboratory measurements; is that correct?

A. Can you repeat it, what you said. It just faded out, sorry.

Q. That's okay. The Regulatory Agencies believe that there lacks sufficient correlation between NDE and laboratory measurements. Is that subject to reexamination in Section 5.4 of the AOC?

A. Yes. And that is going to be looked at, further evaluation of NDE and improvements, by continuous improvements as well as the 5.4 research initiative.

Q. Okay. And I think the final conclusion that I have here is that the Regulatory Agencies believe the Navy is underestimating corrosion rates for Tank 14 and should reassess corrosion rates used in calculating repair thresholds under TIRM.

Is that something that's being addressed in the AOC Section 5.4 policy?

A. Yes. They're going to be conducting an assessment of corrosion rate determination for the NDE process, as well as thresholds and thresholds for repair.

Q. Okay. Mr. McKay also asked you about the Navy's position on Coupon 3 and Coupon 6. Did the Department of Health and EPA address that position in this document?

A. As far as the -- oh, there it is for Coupon 3.

Q. So the Department of Health's and EPA's statement, the results report claims that a nearby area was indicated for repair and for this reason the site of Coupon 3 has been selected for repair.

So the Navy's argument on this coupon is essentially there were some additional corrosion nearby that might have gotten repaired, therefore, this coupon could be repaired. Is that what it's saying?

A. Yeah, that's the -- the situation was that all this area wasn't specifically -- I mean it was actually identified with the LFET, but it was the prove-up that somehow didn't show it, but that the statement is that under like laying out the repair of the adjacent corroded area, they would have identified this as well, and had applied a patch plate over it.

Q. So is it your opinion, Mr. Jamond, that simply

because another area of the Tank 14 might needed to have been repaired, that therefore that excuses the fact that the Navy missed this defect?

A. No, it doesn't excuse the fact as far as the NDE missing it. The significant point is that the tank integrity would have been maintained because in laying out the adjacent repair, this corroded area surely would have been identified.

Q. So you would have got lucky?

A. Well, because there was adjacent corrosion, you know, you would measure beyond it. Lucky, I don't know. It's just it was a breakdown in the NDE, but we don't feel that the integrity would have been compromised because it would have been repaired.

Q. But when you look at the decision as to whether you looked at this data, you would have made this repair, let's assume that the other portion of the tank next to it didn't need to be repaired, you would have missed it.

A. Yeah, well, it was identified in LFET as an area of below the threshold, and it was the prove-up that, for whatever reason, came back they stated that, oh, it was an internal flaw and not corrosion.

Q. And you make your decision based on the prove-up because the prove-up is supposed to be more accurate,

correct?
A. Yes.
Q. But it wasn't.
A. Or more localized.
Q. But it wasn't, was it?
A. Not in this case.
Q. For Coupon 6, it states: The regulators were assured that all areas of metal thickness below 200 mils would have been recorded during a first pass of low frequency electromagnetic scan.
This was also missed, wasn't it?
A. Yes. It was identified to be below 200 mils through destructive testing.
MR. BROWN: I don't have any further questions.
HEARING OFFICER CHANG: Thank you. Mr. Frankel, any follow-up?
MR. FRANKEL: No, thank you.
HEARING OFFICER CHANG: Mr. Paige?
MR. PAIGE: None.
HEARING OFFICER CHANG: Mr. Jamond, I have just one general area of questioning for you.

EXAMINATION

BY HEARING OFFICER CHANG:
Q. You know, the steel was originally a quarter

inch. By the time the tank inspection was being done, the Navy was working with a goal of having 1.6 or .16, and so that indicates that over the course of time the thickness of the steel reduced from .25 to .16 or less. What are the causes of that?

A. Okay. From the destructive test is identified out the metal loss was attributed to pitting or localized corrosion in most cases, which were that some areas are .25, and then pit occurs, and you'll drop down to these corroded areas with metal loss.

There's a lot of discussion on what the mechanism corrosion is. It could be from moisture in the concrete, it could be due to areas where there's been voids between the steel and the concrete that developed either during construction or over time. We didn't identify significant chlorides in our analysis of the concrete powder so it didn't seem to be chloride-induced attack. So it's not a hundred percent clear, and that's why further evaluation under Section 5.4 of corrosion rates mechanism is being conducted.

Q. How does the voids contribute to the metal loss?

A. As the steel is in contact with the concrete, the concrete acts as a passivating agent, so that if it caused the steel to be in contact with sound concrete, you wouldn't expect any corrosion, it's passivated. But

if there's a void and there's some presence of moisture, you'll get some atmospheric-type corrosion occurring at the voids, like something's sitting out in the air, but to a lesser degree because it's trapped behind a concrete structure. But there's still -- you won't get -- that's a passivating effect from the concrete.

Q. I was involved in another case recently that dealt with corrosion of steel that was embedded in concrete and the like, and in that case they were able to examine the source -- a point of corrosion using, and I'm not sure the name of the device, but the spectra analysis. So they were able to do a test as to what chemical components were present in the corrosion spots to give some idea as to what were the possible causes of the corrosion. In that case it was chlorides.

But there's been no discussion of testing of the corrosion to try to identify the corrosive elements that might have been contributing causes?

A. Yeah, analysis was conducted of the corrosion products, and there were some chlorides found in the corrosion product, but there was no clear indicator of the mechanism of corrosion. You know, you didn't find a super high level of chlorides where you'd exhume like -- say like a reinforced concrete structure like a pier you would see a huge spike in chlorides. We didn't get

that. So there was no clear indicator that you could attribute the corrosion to, and that's often the case in the corrosion world, it's a bit nebulous knowing exactly what caused it.

But like I said, that's part of the reason they're conducting further evaluations of this exact subject, further evaluations of corrosion product, and also an attempt to identify the time that the corrosion took place, that's one of the studies. But at this point in time we just don't know.

Q. I'm curious how one determines when the corrosion took place.

A. Yeah, it's a novel study. They're going to try to do some dating on the corrosion products. This is a research effort out at UH, and it's just starting up, so they're going to use some sophisticated spectrographic equipment and attempt to do it. I don't know what the probability of success on that is, but it's an interesting study.

Q. New technology.

A. Yeah. I'm not a hundred percent familiar with it. That came out of a different group, but I did read the proposal and I had sat in on the initial presentation.

HEARING OFFICER CHANG: Okay. Thank you very

much. Any follow-up questions, Counsels?

MR. BROWN: Nothing from the Board.

HEARING OFFICER CHANG: Thank you very much, Mr. Jamond.

THE WITNESS: Thank you.

(Witness excused.)

HEARING OFFICER CHANG: Okay. Let's go off the record and talk a bit.

(Whereupon, at 4:40 p.m., the hearing was recessed until 8:00 a.m. on Wednesday, February 3, 2021.)

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C E R T I F I C A T E

I, DONNA N. BABA, a Certified Shorthand Reporter in the State of Hawaii, do hereby certify:

That I was acting as shorthand reporter in the foregoing matter on Tuesday, February 2, 2021.

That the foregoing proceedings were taken down in machine shorthand by me at the time and place stated herein, and were thereafter reduced to print under my supervision;

That the foregoing represents, to the best of my ability, a correct transcript of the proceedings had in the foregoing matter.

I further certify that I am not counsel for any of the parties hereto, nor in any way interested in the outcome of the cause named in the caption.

Dated: Honolulu, Hawaii, February 18, 2021.

/s/ Donna N. Baba

DONNA N. BABA, CSR #103