BEFORE THE STATE OF WASHINGTON

ENERGY FACILITY SITE EVALUATION COUNCIL

In The Matter Of:	)	
Application No. 2013-01	)	
	)	
TESORO SAVAGE, LLC	)	Case No. 15-001
	)	
VANCOUVER ENERGY DISTRIBUTION	)	
TERMINAL	)	
	)	

HEARING, Volume 19

Pages 4365 to 4557

ADMINISTRATIVE LAW JUDGE CASSANDRA NOBLE

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July 26, 2016

Clark College at Columbia Tech Center
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Vancouver, Washington 98683

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PROCEEDINGS

JUDGE NOBLE: Are the parties ready to proceed? Good morning. It's July 26th today, 9:03 a.m. We're back on the record before the Energy Facility Siting Council in the Matter of Application Number 2013-01, Vancouver Energy Distribution Terminal.

I note that we have Ms. Rugh back as our court reporter. And I also have been told that one witness that has previously indicated to be testifying today, which would be Mr. Roach, who will be testifying instead on Thursday.

Is there anything we need to do before we get started with testimony this morning?

MR. KISIELIUS: Not from the applicant, Your Honor.

JUDGE NOBLE: Are you ready to call your first witness?

MR. KISIELIUS: Yes, Your Honor. The applicant would like to call Dr. Elliott Taylor.

JUDGE NOBLE: Good morning, Dr. Taylor. Would you raise your right hand, please.

ELLIOTT TAYLOR,

having been first duly sworn, testified as follows:

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///

DIRECT EXAMINATION

BY MR. KISIELIUS:

Q. Welcome back, Dr. Taylor.

A. Thank you.

Q. I'd like to ask a couple questions about some of the testimony that we've heard over the course of the last two weeks or so, and to start with I'd like to ask you about formation of oil particulate aggregates. There was some testimony in recent days of Ms. Kat Brigham and Mr. Blaine Parker on that topic.

Did you review that today?

A. I did.

Q. Okay. So maybe before we get into the details I'd just like first for context, can you briefly talk about the formation of oil particulate aggregates?

A. Certainly. In the natural process of oil within the water systems, what can happen are two pretty similar but distinct processes, and that is oil can interact with material that's within the water column. One form is that oil can contact sediment, that's sediment or other material that's suspended in the water column, and in making that contact you form a combined particle. So that's the aggregate.

The other process is one where these aggregate -- particles actually contact the oil itself,

say, stranded oil on a shoreline and in that contact will pick up small bits of oil and then get washed off. And so that's another form of this oil-particle interaction. So one is oil encountering sediments that are suspended or material suspended in the water column, and the other one is that suspended material actually contacting oil and may be stranded and then lifting bits of that away. Sort of a natural dispersal process.

Q. Are we talking about how submerged oil becomes sunken oil?

A. No, not necessarily. This is a -- you're forming the aggregate but the aggregate has to be more dense than the water itself to -- and there has to be limited lifting from turbulence in order for those particles to settle. So you can form aggregates that are very, very close to or even lighter than the water itself, in which case they'll be suspended. If there's turbulence they'll be entrained in the water column.

And then depending on the actual density of the aggregate, if you have no turbulence then that aggregate itself may remain suspended, it may slowly float, or it may sink. It just depends on what the actual combined density of the aggregate is.

Q. So again, just for context, can you remind us your conclusion on that topic given the API gravity

range of oils that the facility will handle?

A. Yes. So the facility is looking at 1545 API, and those are all oils that will float on the water column. And as I mentioned in previous testimony, if you have a right combination of sufficient energy and sufficient suspended material then you can get some portion of oil to interact and form these oil particulate aggregates. But that is likely a small percentage of what would be the fate of a spill itself, and particularly we're talking about the heavier products.

Q. What about the conditions, typical conditions in the Columbia River?

A. So the typical conditions of the Columbia River are you need a lot of energy. So in some locations you may have that kind of energy conditions, but in general you don't have the energy conditions, and more significantly you don't typically have the suspended sediment load that you need to form a significant amount of oil particulate aggregate.

Q. So thank you for that context.

I think switching now to Ms. Brigham's and Mr. Parker's testimony on this topic, they suggested that vegetation, things like algae and milfoil, could also act in that capacity. So I want to ask you a couple

1 questions about that.
2 First, are you familiar with the vegetation of
3 the river and where does it grow?
4 A. Yeah. I certainly have seen plenty of beds or
5 vegetation along different portions of the riverbank
6 depending on where you are along the river. There are
7 locations. And I think even in their testimony they
8 indicated in areas where you have a sort of flow you can
9 get a lot of the algae and growth.
10 **Q. Okay. Let's talk now about what happens in the**
11 **event of a spill in the vicinity of some of that**
12 **vegetation. I think Mr. Parker relied on your testimony**
13 **to conclude that vegetation would have the same effect**
14 **as sediment, and then he goes on to say that when the**
15 **plants die they sink to the bottom with the oil.**
16 **So what's your response to that testimony? Is**
17 **the interaction between vegetation and oil the same**
18 **thing as oil aggregate formation?**
19 A. It's not the same thing. There's -- first of
20 all, if you have a spill that enters, a portion of that
21 oil gets transported into the bed of vegetation, then
22 you can expect some of that oil to be -- make contact
23 with the vegetation, clearly, and likely will stay
24 there. Vegetation, particularly at the surface, kind of
25 tend to slow the movement of the oil and so it'll hang

in there to a certain extent.

If there is a suspended load of vegetation, so some of the dead detritus in vegetation -- (Court reporter interruption.) Detritus in vegetation is suspended in the water column then there can, like sediment, there can be an oil particulate aggregate formed, or OPA. But again, that would be likely and very smaller, much smaller contribution towards the fate of the oil relative to the floating.

Q. Let's switch subjects and talk about the gravity of the oil, and here I'm referring to Dr. Rice's testimony. Dr. Rice testified to a chart that your colleague used showing recovery times for marshes exposed to oil spills.

Are you familiar with that?

A. Yes, I am.

MR. KISIELIUS: And, actually, Ms. Mastro, if we could pull up Exhibit 108, in case you need to refer to it.

BY MR. KISIELIUS:

Q. I want to focus on Dr. Rice's testimony. He suggested that lighter oil like Bakken and heavier oil like dilbit account for the oils that were more persistent. And so I want to break that down a little bit. Let's start with just his characterization of the

1 oils themselves.
2 I think Dr. Rice said dilbit -- and this is a
3 quote from his testimony -- is very heavy, among the
4 very heaviest of oils. And he called Bakken like a fuel
5 oil and among the thinnest of crudes.
6 Do you agree with that characterization?
7 A. Well, as I mentioned before in my testimony, the
8 two oils that we're talking about, the dilbit and
9 Bakken, are within a range of oil types and so they're
10 not at the extreme ends. There are products that are
11 lighter than Bakkens and there are certainly a number of
12 products that are heavier than dilbits. So they're
13 within the range of the full range of hydrocarbons.
14 **Q. Now, with that context, Dr. Rice said, as to**
15 **this chart that's now shown on the screen, that given**
16 **those two ranges of oil, he said those happen to be the**
17 **two different types of oils in this chart here that have**
18 **the most persistence and the most damage to wetlands and**
19 **cause the least amount of recovery per unit time.**
20 **So in your opinion, what, if anything, does the**
21 **type of oil have to do with the listings in the chart?**
22 A. Well, the first thing that I should point out is
23 there is no dilbit or Bakken spill in that list. None
24 of those spills encompasses either one of those lists,
25 so you've got to put that to the side.

1 But there's a lot of other factors that play
2 into the recovery and persistence. Long-term
3 persistence has a lot to do with oil loading, so how
4 much actually was deposited, where it was deposited, if
5 it was on a marsh platform or if it actually made its
6 way into the marsh soils itself, and then the natural
7 flushing that takes place in that habitat. So the time
8 of year.
9 There's a number of factors that play into that.
10 And I think this report, which is the Michel and
11 Rutherford report, as well as their API report which was
12 sort of an expanded version of this report, explains
13 that in more detail.
14 **Q. Does the type and extent of response and**
15 **recovery measures have anything to do with the time**
16 **impact shown on this chart?**
17 A. Very much so. I think that this is really one
18 of the objectives of the study itself was to learn from
19 the history of treatment, not just types of spills but
20 the treatment that was done on those spills and whether
21 there was a net benefit gained from that treatment or
22 not. In some cases we know, and there's good examples
23 here, and that's what the paper goes on to talk about,
24 cases where overly aggressive treatment actually delayed
25 recovery.

1 And so the key there is to understand that if
2 oil does get into a marsh, you need to be judicious
3 about what treatment techniques you're going to use and
4 to what extent you're going to use those in the marsh.
5 **Q. And can you explain, I think Dr. Rice talked**
6 **about the very first entry was the Gulf War oil spill,**
7 **and he said he didn't want to discuss that one because**
8 **it's an anomaly.**
9 **Is that the reason why that's even on the chart?**
10 **Does it reflect --**
11 A. Well, it's on the chart, clearly, because
12 there's a -- you're looking at a history of spills, and
13 so it's on the chart because that is a historical spill
14 that's been studied to a fairly decent degree. It went
15 untreated for many, many years, and finally in some
16 limited locations some treatment was done.
17 So there's follow-up and there's the opportunity
18 to look at the recovery or non-recovery, the delayed
19 recovery of very, very heavily oiled marsh in that case
20 that was not treated for many years.
21 **Q. Staying on this topic, the nature of the oils**
22 **that were -- that this facility will handle, yesterday**
23 **Mr. Holmes talked about an experiment he ran in which he**
24 **concluded that even a one-foot wave could drive oil to**
25 **the bottom of his tank.**

1 Are you familiar with that testimony?
2 A. Yes.
3 **Q. And can you explain what's occurring in this**
4 **experiment?**
5 A. In that case -- I mean I don't know if he
6 mentioned that the one-foot waves that drove oil to the
7 bottom of the tank, I have no idea how deep that tank
8 was. So that was a question.
9 But that process is that turbulence that we've
10 spoken of. And as I mentioned in previous testimony,
11 one of the natural processes of oil is if you have
12 turbulence you're going to get some of that oil can
13 break into droplets, become entrained temporarily in the
14 water column, and once the turbulence ceases those
15 droplets would refloat to the surface.
16 **Q. Is that the same thing as sinking?**
17 A. No, no.
18 **Q. Switch topics here and talk about the Mobil Oil**
19 **spill and Dr. Rice's testimony about the Mobil Oil**
20 **spill. So first and foremost, Dr. Rice said he couldn't**
21 **remember the API gravity of the oil involved in that**
22 **spill but suggested that it was a, quote, medium oil**
23 **roughly, not as thin as Bakken oil, not as heavy as**
24 **dilbit.**
25 **Do you agree with that characterization of the**

oil that was spilled in that incident?

A. No.

Q. Can you tell us what your understanding is?

A. Yes. The NOAA report is very specific. It tells -- it provides information on the tanks that were ruptured and the oil that was lost from those tanks. The API gravities were 12 1/2, 11 1/2, and 5 1/2 API. And if you recall, an API of 10 is the same as fresh water. So, for instance, the tank that lost 5.5, that's oil that is heavier than fresh water. It's a clear sinker.

Q. And how do all three oils compare to the range that will be handled at this facility?

A. Well, they're all heavier.

Q. So Dr. Rice said that in response to that spill that they detected oil in the water column and they detected oil in the sediments downstream.

Given what you've just explained of your understanding of the spilled oil, does it surprise you that oil was in the water column and then the sediments downstream?

A. Not at all.

Q. And would you expect the same amount of that if oils of the API range that this facility will handle were spilled?

1 A. No. Again, the API range for the facility are
2 higher so they're all lighter than what was spilled.
3 Even the heaviest of what is being contemplated for the
4 facility is lighter than even the lightest of what was
5 spilled in the Mobil Oil spill.
6 So we're going to see a lot more oil -- there's
7 going to be oils largely, again, will be floating on the
8 surface. There may be some entrainment temporarily
9 where you have turbulence and vertical movement within
10 the water column but then likely to resurface.
11 **Q. He testified that oil from that spill got all**
12 **the way to the mouth of the river in less than three**
13 **days, then was carried north up to the Washington coast**
14 **to a couple of bays.**
15 **So I want to ask you, based on the review of the**
16 **NOAA report, do you agree with that testimony and to**
17 **what degree did it reach the mouth, to what degree did**
18 **it travel outside of the mouth of the river?**
19 A. There were -- sampling was done and there were
20 reports both in the NOAA report and in the Park, based
21 on the international conference, that there was very
22 light and scattered tar balling along the beaches
23 immediately north of the Columbia River mouth. There
24 was sampling done so there was corroboration that there
25 were cases, instances of oil along the shorelines, but

1 both of them were characterized as very light oiling.
2 The NOAA report goes on to say that it was very
3 quickly diminished over time. And when they talk about
4 the razor clam impact, which they say was negligible due
5 to two things, one, black razor clams in the area, but
6 secondly because there was negligible shoreline oiling.
7 **Q. In your opinion, would you expect the same**
8 **result in terms of transport to the mouth of the river**
9 **given today's spill response capabilities?**
10 A. Well, given today's spill response capabilities,
11 it's a very different picture today. As we have heard
12 in my testimony, both written and verbal, there's a
13 tremendous amount of response capability in the river
14 now compared to what was available in 1984. You have
15 prepackaged deposed equipment up and down the river.
16 There's requirements for response times, planning
17 standards that have you moving equipment and personnel
18 into predefined targeted locations and GRPs for
19 protection, for containment, for recovery.
20 So it would be a completely different response
21 today relative to what happened in '84.
22 **Q. Yesterday Mr. Holmes -- on the same topic of**
23 **transport, Mr. Holmes said that it was highly likely in**
24 **his opinion that a spill near the facility would reach**
25 **the ocean. So can you make judgments about the**

likelihood of spilled oil reaching the ocean from your tabletop spill drill?

A. We certainly looked at a worst-case spill. In our case we were looking at the full -- you know, we had to assume that there was going to be a full rupture of the largest tank and somehow that all managed to get into the water. So that was our basic assumption.

That assumption, of course, is a volume that's greater than what a vessel spill would be even if you lost the full load of the vessel. So the worst-case from a tank being suddenly in the water is still more than the vessel worst-case spill.

We looked at the likely advancing trajectory, the leading edge of that oil downstream, and we looked at the equipment that would be put in place to recover that oil, deflect the oil to protect sensitive areas downstream. There may be some traces of oil that can progress further downriver. How far I would not know. But I would think that given today's response capability, what might reach the mouth of the river will be minimal -- probably, first of all, non-recoverable traces of oil that would make it, if it made it to the mouth of the river. If it were a Bakken spill, I don't think we'd see anything.

Q. Let me ask, you said you were measuring or

assuming the spill response capabilities downriver.

A. Uh-huh.

Q. What amount of recovery did you assume for those response measures? Is there a planning standard that you use?

A. When the -- yes. Amongst other things, when you look at recovery, in the planning standards you're looking at what you can collect off the water, so you're looking at skimming systems. And when you have a specific requirement for a skimmer, say you need to have, say, a 50-barrel-per-day skimming recovery capacity, what we typically do is we take a skimmer but then we de-rate it.

The nameplate or what the manufacturer says is one thing, but typically in our planning standards what we'll assume is that we can only get 20 percent of that recovery from what the manufacturer says. And so that when we talk about recovery capability, we talk about an effective daily recovery capacity or an EDRC. And that is typically 20 percent de-rated over what the manufacturer says.

Now, in practicality you may do much, much better, and in many tests skimmers can do much, much better than that 20 percent of the nameplate. But that just gives you a conservative measure so when you have a

1 specific recovery capacity, and the analysis we did of
2 the capacity, skimmer capacity for that scenario, the
3 numbers that you see for effective daily recovery
4 capacities are a fifth of what the actual nameplate is.
5 **Q. Let's stay on this topic of booms and other**
6 **response measures. Dr. Rice acknowledges he's not a**
7 **response expert, but also he called into question the**
8 **ability to use booms in the river. I think he said,**
9 **"It's just hard for me to concede that booms are going**
10 **to be effective." And here I think he was referring to**
11 **the currents expected in the river.**
12 **So to start with, you've been involved in spill**
13 **responses in a variety of environments; is that right?**
14 A. Yes.
15 **Q. And have you been involved in responses in what**
16 **you would consider to be more difficult conditions from**
17 **the standpoint of current than the Columbia River?**
18 A. Yes.
19 **Q. Okay. What's your response to Dr. Rice's**
20 **testimony that it's hard to concede that booms are going**
21 **to be effective?**
22 A. Booms -- boom needs to be configured for the
23 current conditions, and I think about any spill
24 responder who has been practicing, exercising, who have
25 done their homework knows that you have to accommodate

the boom for different currents. The faster the current the less angle of attack you have relative to the current.

So when you talk about, you know, one knot, that typically is the limit where if you were putting a boom perpendicular to the current you're going to start to lose oil and material underneath the boom. So what do you do, you angle the boom, and you angle the boom into the current so that you don't have that same force on the boom face and it's not trying to entrain the oil underneath it. And the faster the current the tighter the angle.

So it's certainly able to use boom at different current speeds. Even the GRPs have tables in them that indicate if the current is 1, 2, 3 knots, these are the angles you need to use.

Q. What about other techniques using booms to address efficiency? Can you explain? I think Dr. Rice acknowledged you can put booms in sequence.

Can you explain how that works?

A. Right. So everything I'm talking about right now is just fixed boom. And so if you, for instance, want to deflect oil, intercept oil and deflect it to a collection point, you would position a boom out there to do that work, and then you may put another line of boom

1 behind it and a third line behind that and a series of
2 cascading boom arrangements. So each successive line is
3 more protective, it's going to be more efficient,
4 ultimately, as you add up each one of these. But these
5 are all fixed boom configurations.
6 The other operation, of course, with boom is to
7 move the boom through the water to collect oil. And
8 that's what we typically will call sweep operations.
9 **Q. So yesterday Mr. Hicks testified also to the**
10 **effectiveness of booms and said, "In my view, 68**
11 **percent, even 91 percent collection efficiency is not**
12 **acceptable in the Columbia River."**
13 **So do you determine or estimate the recovery**
14 **rate of a spill response based on one particular -- the**
15 **effective rate of one particular measure?**
16 A. No, not at all. I mean, any response is going
17 to entail multiple lines of boom, multiple recovery
18 systems, multiple containment systems. And then
19 importantly, we can't forget that boom is also used to
20 protect areas, so it's used to deflect or keep oil out
21 of sensitive areas. A lot of the GRPs are calling for
22 exactly that.
23 And when we talk about efficiency, I think in
24 his case he was talking about the Current Buster 2 that,
25 you know, as currents increase or as wave chop

1 increases, that particular device, the Current Buster,
2 loses some of its very high rated efficiency. I mean
3 it's rated up in the almost 99 percent under -- within
4 its normal operating range. And if you go outside of
5 that normal operating range it may start to lose some
6 efficiency.
7 But that's just one single system that's
8 actually doing recovery. There will be another one
9 behind it plus all the boom lines and all the other
10 skimmers that will be operating as well. So we don't
11 characterize the response based on a single system at
12 all.
13 **Q. Let's focus for a second on the Current Buster**
14 **boom. Mr. Hicks testified to that yesterday and some**
15 **Internet research he had done on that technology. Are**
16 **there a variety of models of Current Buster?**
17 A. Yes.
18 **Q. And can you remind us which one is positioned at**
19 **the site currently?**
20 A. Current Buster 2.
21 **Q. Is that the same model as the one that he**
22 **described that requires large boats to deploy?**
23 A. No. You don't need large deep draft vessels to
24 deploy Current Buster 2.
25 **Q. And have the models been deployed at currents of**

5 knots?

A. The model has been deployed in currents of 5 knots. It's typically been used extensively, for instance, in Alaska where they have currents of 5 knots or more.

Q. Going back to Dr. Rice's testimony, he questions the ability to respond in a timely manner to a spill on the Columbia, whether at the facility, from a derailment, or from the vessel. I think he said, "You're really going to have booms already there so it's a problem."

What's your view about the available spill response resources along the river?

A. Well, again, going back to our conversation about the Mobil Oil spill, I mean what we have now is so vastly different than what we had in '84. There are deposed equipment is pre-positioned up and down the river, exercises done routinely. Clearly, having equipment at the facility and likely to be predeployed in cases of transfers does mean that your response times are going to be very, very quick.

If it's more remote locations there may be a transport time involved. But there are -- again, the homework that's gone into the GRP to try to identify staging areas, boat ramps and locations where you can

1 access the river via road or via boat are all with the
2 goal of shortening that response time.
3 **Q. Dr. Rice also testified about a specific**
4 **incident on the Mississippi, and said, "Booming wasn't**
5 **able to get there. The recovery here was .3 percent; .3**
6 **percent, that's not very much to recover. It was Bakken**
7 **oils that moved easily." So it seems like his**
8 **explanation suggested no booms were used.**
9 **Is it fair to judge the effectiveness of spill**
10 **response based on an example of where booms were not**
11 **deployed quickly?**
12 A. I would say that that's not likely the case
13 here. I would think that booms in any spill on the
14 Columbia River could be deployed very, very quickly.
15 But a Bakken, very light crude oil like Bakken is going
16 to undergo very vapid weathering quickly. And so if a
17 boom is not deployed quickly then there will be a
18 tremendous loss of that oil through natural evaporation
19 processes and natural dispersion processes.
20 **Q. Dr. Rice also talked about the Enbridge pipeline**
21 **spill, again acknowledging it was allowed to spill for**
22 **17 or 18 hours before it was discovered.**
23 **Does that, again, explain the limited recovery**
24 **from that type of a spill?**
25 A. Well, I wouldn't say there was a limited

recovery from that spill because there certainly was recovery, but that delay certainly allowed oil movement further downriver and allowed it to progress further downriver. But I would not at all expect anything like a 17- or 18-hour delayed response here.

Q. On that specific spill Dr. Rice talked about the persistence of the spilled oil being measured in decades. Do you agree?

A. Well, there may be small traces of oil. I don't expect that they would -- if we're talking on orders of decades, no. I think there may be on the order of years. But these are very widely dispersed traces and very degraded oil. I don't think it would be anything that you would be able to significantly quantify for very much -- for very many years.

Q. He also compared to the Deep Water Horizon. Is that in your mind a fair comparison to determine what you'd expect to recover from a spill response?

A. The Deep Water Horizon was a completely different type of situation. I mean that's a deep water well blowout, so it's very, very different from what we would see here.

Q. And still on the topic of spill response techniques, Mr. Holmes talked about the use of dispersants.

1 Are dispersants used in the Columbia River in a
2 spill response?
3 A. No, not at all.
4 **Q. Just a couple more questions.**
5 **There's been a lot of testimony in the last**
6 **several days about conditions on the Columbia River, and**
7 **there's some testimony about high winds and chop.**
8 **To your understanding, do those conditions apply**
9 **in the vicinity of the terminal?**
10 A. Well, when we went through and looked at the
11 characterization at the facility itself, that would not
12 be the standard conditions at the facility. You don't
13 have high sustained winds at the facility, you don't
14 have a significant wave chop at the facility. There may
15 be occasions when you have a storm blow through, a
16 northern blow through, something that will temporarily
17 create maybe high winds, more wave chop. But that would
18 be a temporary, limited event at the facility itself.
19 And as we talked about before, if the conditions
20 are such that it's sustained winds, for instance, of 35
21 miles an hour, there's no transfer operations and the
22 vessels back up.
23 **Q. To your understanding, where on the river would**
24 **you tend to find those types of conditions?**
25 A. Well, we heard yesterday, for instance, in the

Gorge, clearly it's a wind surfing paradise so you have a lot of high energy conditions through many days of the year and you have good winds. So in that specific location where the winds are funneled through the Gorge, you have a higher energy condition.

Q. And did you hear anything in the testimony that you reviewed that would force you to change your conclusions or your analysis?

A. No.

MR. KISIELIUS: I have no further questions, thank you.

JUDGE NOBLE: Cross-examination?

CROSS-EXAMINATION

BY MS. BOYLES:

Q. Good morning, Dr. Taylor.

A. Good morning.

Q. My name is Kristen Boyles, I'm the lawyer for -- a lawyer for one of the intervenors. I just have a few questions.

Do the booms that you're discussing, the regular booms, effectively trap or capture submerged oil?

A. If it's oil that's in the water column itself, the standard boom will not trap that. The standard boom is designed to intercept oil that's on the surface.

Q. Do you know if there's a larger suspended

sediment load near the mouth of the Columbia River?

A. It varies. It varies not only geographically but it also varies temporally, so at different times of the year you have different sediment loads. But I don't know what the numbers are near the mouth, but I do know in this instance that you have a little bit more entrainment just from wave action and in some of the flats.

But again, when we're talking about the oil-sediment interaction, we're typically looking at very high sediment loads, somewhere on the order of 200 to 300 milligrams per liter. And I do not believe we reached those concentrations.

Q. Do you know how many of the NOFI Current Busters the project will have?

A. Well, two are what they're talking about right now. Sorry, go ahead.

In my understanding there's some other ones that are being procured for some of the river co-op itself.

Q. I guess that was my next question.

Do you know where they're going to be deployed? Where are they going to be kept?

A. Well, one is certainly kept at the facility, it's right at the facility. I don't know what the plan is for prepositioning the other Current Busters.

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1 **Q. And do I understand that sometimes the use of**
2 **booms, and in fact a series of booms, can deflect oil**
3 **toward the shore?**
4 A. An arrangement can be done to purposely redirect
5 oil to a collection point along the shoreline, yes.
6 **Q. And do you understand that some of the shoreline**
7 **areas are tribal Indian fishing sites?**
8 A. Yes.
9 MS. BOYLES: That's all I have.
10 MR. KERNUTT: I don't have any questions
11 based on counsel's questions.
12 JUDGE NOBLE: Redirect?
13 MR. KISIELIUS: None, Your Honor.
14 JUDGE NOBLE: Council questions?
15 Mr. Shafer?
16 MR. SHAFER: Dr. Taylor, thank you for your
17 testimony today.
18 As I was listening, I was just kind of
19 thinking of two different scenarios. One would be an
20 emergency response under let's say ideal conditions;
21 middle of the day, sunshine, calm conditions where
22 hopefully there would be a high likelihood of success.
23 But that same spill, heaven forbid that there should be
24 one, but let's say if that were to occur in the middle
25 of the night, pitch-black darkness, high wind

1 conditions, storm.
2 And so I'm trying to play out under the same
3 spill conditions, what would be the success of the
4 response in either of those two scenarios? Could you
5 help us with that? Let's say if the ideal conditions we
6 have maybe a 90 percent -- what we consider a 90 percent
7 success rate, with that same spill condition under
8 terrible conditions, how much does that drop? Is it in
9 half, is it a third, is it a quarter?
10 THE WITNESS: Well, clearly, different
11 environmental conditions are going to make a response
12 more challenging or less challenging. I'd hate to try
13 to put a percent number on success, if you will. If you
14 measure success as how much oil that was spilled is
15 recovered, the challenge there is if you have a Bakken
16 spill, you can know right off the top of the bat that a
17 lot of that is going to be lost through natural
18 processes, period, even under ideal conditions, because
19 there's just natural high evaporation.
20 So you can't just measure success on how
21 much was spilled and how did I recover. You need to --
22 boom becomes more difficult to deploy when you have the
23 higher current conditions. But we have tools like the
24 Current Buster, like boom vanes that allow us to --
25 (Court reporter interruption.) Vanes, v-a-n-e-s, that

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1 allow a boom to be deployed under more adverse
2 conditions or faster currents, you don't even need a
3 boat, with a boom vane. So there are ways that we can
4 tackle things to sort of compensate for more difficult,
5 challenging conditions.
6 I would say that you have to -- under more
7 demanding conditions you're going to have to be more
8 conservative about the leading edge, where it's located.
9 You're going to have to put in place a greater sequence
10 of intercept points and collection points and protection
11 points downstream than you would under ideal conditions
12 so your response is going to spread out further.
13 But -- and if it's sustained like that,
14 well, then part of the natural process of that higher
15 energy is also leading to a faster weathering of the oil
16 itself anyway. So those processes of evaporation and
17 natural dissolution and dispersion happen faster when
18 you have that high energy condition. So there's going
19 to be a natural tendency to have a greater loss of the
20 oil through natural processes under those conditions.
21 MR. SHAFER: I'm just wondering if maybe
22 we're getting to a point where in terms of readiness and
23 materials and staff and training, you know, we're in a
24 good place but success is more a function of the
25 conditions, you know, the site. And if that is the

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1 case, then what's that range of conditions in the
2 Columbia River, you know, or the Gorge area? What's
3 that range of conditions?
4 And then further looking at it, if a spill
5 were to occur under the worst-case conditions, what
6 would be expected in a success rate in that event?
7 THE WITNESS: Yeah, I think that a lot of
8 that planning that has gone into the GRPs to look at
9 areas that you're going to protect or areas where you
10 may use some deflection to collect oil, they're all
11 looked towards a view of what's feasible under not just
12 ideal conditions but under even more adverse conditions.
13 There's clearly a point, you can reach a
14 point in which, you know, conditions can be unsafe. You
15 simply are -- you may have a condition where it's just
16 unsafe even for people or equipment out there. And we
17 have to acknowledge that those conditions may exist
18 momentarily from time to time or maybe from place to
19 place.
20 So one thing is for sure. You're not going
21 to put people's life at risk to do a response if you
22 have very unsafe conditions. You may mobilize
23 equipment, you may pre-stage equipment, you may
24 implement downstream tactics where maybe conditions are
25 a little safer or where they're not so extreme, and be

1 ready to respond in an area if you have those high
2 conditions.
3 That's usually what you'll do is respond
4 where -- and many of the GRPs are focused around, well,
5 here typically the flows are slower or it's more
6 protected and we're going to be more efficient in this
7 particular location relative to another location.
8 So at the time of response all of these
9 things are being gauged. Unified command is looking at
10 conditions and saying it's not feasible, safe, or
11 practical to do it here at this location so what's our
12 next -- where are our next practical locations where we
13 can do this. And you'll -- you may have to come back
14 and revisit that area once the conditions subside to
15 where you can actually be safe about implementing your
16 spill response in that particular area.
17 MR. SHAFER: All right, thank you.
18 JUDGE NOBLE: Mr. Stone?
19 MR. STONE: Good morning, Dr. Taylor.
20 With respect to the oil spills that you've
21 been involved in response for, what is the range of
22 percentages of oil recovered during those spills?
23 THE WITNESS: Well, most of them are -- it
24 really varies because I've been involved in spills on
25 land where your recovery rates are much higher. They're

usually in the 80 percent once you account for oil lost through natural processes. Two spills in which recovery was almost non-existent and, unfortunately, some of those were because equipment wasn't available, wasn't in place. And so oil was naturally allowed to weather and recovery was only the volumes of oil that were collected subsequently.

MR. STONE: Well, just in respect to spills on water, what would be the range of percentages of oil recovery?

THE WITNESS: Off the top of my head, I would not be able to say what it is. I mean usually the rule of thumb is if you're getting somewhere in 15 to 20 percent of the oil that was spilled from on-water recovery operations, you're doing well. But most of the time you're talking about about a marine open ocean condition. Percentages are higher typically on a river because it's confined.

MR. STONE: Right. Now, your testimony has been that oil not recovered, a certain percentage of that goes through a weatherization process and evaporates.

Is there always an estimate of how much oil that's not recovered by physical means evaporates into the atmosphere?

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1 THE WITNESS: That's very standard practice
2 here in the U.S. and in many countries. Some countries
3 aren't aware of the process and they don't typically
4 enumerate that. But one of the things that is typically
5 done in the states for unified command is to do a mass
6 balance, and that is estimating specific conditions at a
7 site how much would be expected to evaporate, how much
8 would be expected to naturally disperse, how much would
9 be expected to dissolve, yes.
10 MR. STONE: As a result of that, what is the
11 range of percentage of the oil that evaporates in those
12 spills?
13 THE WITNESS: The range is huge depending on
14 what type of oil it is. Again, we go to the very, very
15 high end, gasoline, almost 100 percent evaporation.
16 MR. STONE: Well, let's say like a Bakken
17 crude.
18 THE WITNESS: Bakken crude is typically on
19 the order of about 20 percent.
20 MR. STONE: Okay. And do atmospheric
21 conditions --
22 THE WITNESS: I mean -- Bakken, I'm sorry.
23 Bakken crude -- dilbit was on the order of about 20
24 percent. Bakken crude is on the order of about 50
25 percent.

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MR. STONE: Fifty, 5-0?
THE WITNESS: Yes, sir.
MR. STONE: With respect to the evaporation rate, is that affected by atmospheric conditions, temperature, relative humidity?
THE WITNESS: The rate of evaporation, yes. Ultimately you'll get maybe to the same percentage but it just may happen faster or slower. There's several things that play into a temperature; air temperature, wind. And then how much spreading that oil has. If it's concentrated, if it's caught inside of a boom, say predeployed boom, then it won't spread and so the evaporation rate is slower because it just doesn't have the surface area.
MR. STONE: So the typical atmospheric conditions in the Pacific Northwest of cooler temperatures and high relative humidity throughout much of the air, would you expect evaporation rates to be lower?
THE WITNESS: Lower than -- warm temperatures and higher winds, yes, but it's pretty small. And ultimately you still get to the same degree of evaporation, it just may be slightly slower.
MR. STONE: Sure. Changing subjects to tar balls, how do tar balls form and does it take a certain

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1 type of crude oil to enable tar balling to take effect?
2 THE WITNESS: You certainly need a heavier
3 component to your oil for tar balls to form. So once
4 you've lost some of the light ends and as oil is broken
5 up through the mechanical energy, wave action, it breaks
6 into smaller bits and those smaller bits end up
7 continuing to weather slowly. Even though you may have
8 lost some through evaporation there is other processes;
9 you have photooxidation and you have some
10 biodegradation. So it continues to weather, and those
11 small bits that were broken up now are what are forming
12 these tar balls.
13 MR. STONE: Okay. So by physical action in
14 the water, the bits come together and form tar balls?
15 THE WITNESS: It's not so much the bits
16 coming together as it is the oil breaking into smaller
17 pieces.
18 MR. STONE: Okay. One final question.
19 When crude oil evaporates, what is left
20 behind? Or is it the entirety of the crude oil
21 collection of compounds, are they all evaporate or are
22 some of them left behind?
23 THE WITNESS: No. When you have a crude oil
24 it's usually a range of different hydrocarbon chains,
25 the lighter ends, it's the light hydrocarbons that are

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evaporating off, and it's leaving sort of intermediate length chains of hydrocarbons and more complex hydrocarbons behind.

MR. STONE: Okay. Thank you.

JUDGE NOBLE: Mr. Snodgrass?

MR. SNODGRASS: Good morning. I really just have one question, and it's sort of spurred by looking at the Rutherford table there.

And you spoke at some length in your testimony, prefiled today and before, about the booming capacities along the river. So I just wondered what level of -- and obviously you need to look wider than the Columbia River for this.

Is there any information such as that can kind of summarize looking at a wider range of data essentially booming performance in recent spills? Because certainly one of the questions raised, to me at least, by the Mississippi barge incident is that you indicated there was quite a bit of -- that the lack of recovery there was they just didn't boom it, is what I understood.

And so I have no doubt there are regulations in the facilities in the past that are probably less than here, but it certainly raises a question whether the plans work out as intended. And so I just wondered

if there's any kind of summary like that where even though that has limitations, it lets us look at a historical record and get a sense of, even if it's a small one, of, you know, how soon did the booming occur and what was its general effectiveness and to the extent what techniques might have been used, what type of boom.

Is there anything you can provide us along those lines?

THE WITNESS: Not that I can think of off the top of my head in terms of sort of a comprehensive study of spills and effectiveness.

There's a lot of work that's gone into looking at boom efficiencies for different oils under different wave conditions, under different currents. There's a facility in New Jersey called Ohmsett which is used -- do a lot of these experiments, and it's -- granted, those are under specific conditions and not real life conditions.

What's clear is if you -- the sooner you boom, the sooner you can get boom to a location the greater your success rate. That's very clear and, hence, one of the reasons we preboom now in this state, because you will have containment at a location should there be a loss during transfer operations.

So a lot of effort has gone into making sure

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1 that boom is available in a short timeframe to improve
2 that success rate.
3 MR. SNODGRASS: To your knowledge, why
4 wasn't there booming in that situation?
5 THE WITNESS: I don't know the details of
6 why there wasn't boom deployed there, but NOAA made it
7 pretty clear that for recoverable oil, that that window
8 of opportunity with the Bakken oil under those
9 conditions was probably limited to about eight hours,
10 and they did not have boom out there. And then that oil
11 is going to undergo natural weathering faster than you
12 would be able to get containment and recovery in place
13 if you didn't.
14 MR. SNODGRASS: Thank you.
15 JUDGE NOBLE: Mr. Rossman?
16 MR. ROSSMAN: Thank you.
17 In your prefiled testimony you referenced
18 that 15 to 18 percent of the spilled oil that entered at
19 Kalamazoo, and that incident ended up attached to bottom
20 sediments. Do you recall that?
21 THE WITNESS: I do.
22 MR. ROSSMAN: Do you know how that occurred?
23 What physical mechanism caused that oil to sink to the
24 bottom?
25 THE WITNESS: It goes to -- there's a couple

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1 of possible factors. One is the process I described
2 earlier this morning which is that oil and particulate
3 aggregation. The Kalamazoo happened during high flow
4 stage and it was carrying higher sediment load. So
5 that's one aspect. The oil had -- again, there was a
6 delayed response, there was time for oil to interact
7 with suspended sediments.
8 The other important factor is that the river
9 was in a flood stage and it had a lot of flow overbank,
10 off the bank, and then back into the body of water so it
11 was not channelized and so there were a lot of debris
12 that was actually being pulled in off the overbanks as
13 well. And the spill itself happened in a ditch that led
14 to a small creek that then went to the river, and so
15 there's opportunities along that travel path for oil to
16 interact with material as well.
17 So there's potentially different locations
18 where you had that oil and particulate interaction
19 there.
20 MR. ROSSMAN: So, fundamentally, the
21 interaction of oil and something denser than water
22 together form a particle that's going to sink; is that
23 fair?
24 THE WITNESS: That's correct.
25 MR. ROSSMAN: I'm really struggling to

1 understand why vegetative matter in the Columbia River
2 that wasn't floating on the surface wouldn't meet that
3 situation, why oil that contacted that -- oil that had
4 gotten entrained in the water column contacted submerged
5 vegetation, why that wouldn't sink.
6 THE WITNESS: If I left that impression,
7 that's my mistake. It could. So that is a process,
8 like with sediment, that could happen. So if you have a
9 vegetation particulate that wants to sink and oil
10 attaches to it, it may. It may sink. It depends on
11 what the gravity of that oil is. If the oil is
12 entrained, remember if I don't have that turbulence that
13 entrains the oil and now I stop the turbulence, that
14 droplet, if it is less dense in water, it's going to
15 resurface.
16 So if that same droplet contacts vegetation
17 in the water column that is moving around but now I
18 don't have that turbulence that's maintained and
19 suspended, if that droplet combined with that vegetation
20 matter is sufficient to lift the vegetation, then it's
21 not a sinker. It will slowly refloat. Or if it's
22 perfectly balanced with the water it's going to remain
23 suspended. Or if the vegetation matter is heavier or
24 the oil combined with that vegetation material is
25 heavier than water around it, then it might sink.

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1 So just the fact that we've combined those
2 two doesn't necessarily mean it's sinking. It has to
3 have a combined density that's greater than fresh water
4 and then no energy that maintains it in suspension so
5 you have to go to these quiet spots for that to slowly
6 settle out.
7 And that's what you see even with the
8 vegetation. Vegetation is very easily suspended so it's
9 very close to the density of water, even though dead
10 vegetation. If you've gone down to the river and you
11 kick the bottom you'll see it pop up very quickly. That
12 means it's very close to the density of the water.
13 And so it really depends on what the gravity
14 of the oil is that contacted that particulate, and if
15 it's vegetated particulate it may remain suspended or
16 there may be a portion that makes it ultimately to the
17 sediment -- or to the bottom. Again, that pathway is
18 not the pathway of the bulk of the oil. Remember, even
19 under those conditions in Kalamazoo where 80 percent of
20 the oil was on the surface or more.
21 MR. ROSSMAN: And, I guess, are you aware of
22 any sort of deficiencies in the plans that were in place
23 before the incidents in Kalamazoo and on the Mississippi
24 River?
25 THE WITNESS: I don't know of the

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1 deficiencies of the plans per se, no.
2 MR. ROSSMAN: Do you have any idea of sort
3 of the resources that were available in either of those
4 incidents that could have been deployed to contain oil?
5 THE WITNESS: When you say "either," what's
6 the other?
7 MR. ROSSMAN: Kalamazoo and the Mississippi
8 River.
9 THE WITNESS: Oh, and the Mississippi River,
10 okay.
11 No, I don't know. I know that on the
12 Kalamazoo they had contractors in the area. And with
13 the barge spill on the Mississippi River, I suspect the
14 barge -- that operator had a spill plan and had a co-op
15 or something identified. But I don't know where the
16 pre-staged equipment was nor do I know what the sort of
17 the timeline of events were that got things rolling.
18 MR. ROSSMAN: And has anything you've looked
19 at suggested that there were deficiencies in the
20 planning or response capabilities in those incidents?
21 THE WITNESS: Well, I think one of the
22 criticisms that came out of the Kalamazoo response was
23 that it was slow, it was slow to get going. There was a
24 delay in confirming that there was a release and a
25 shutting in that pipeline, there was a delay in getting

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1 resources to the site. Now you're stretching my memory.
2 I did read the PHMSA report on that, and I
3 know that one of the recommendations that came out of
4 that report was don't just go downstream and put your
5 boom in place but go up to where you have your spill
6 location and put containment. Even though some has
7 already maybe moved away, go to where the bulk of that
8 oil is. And so one of the recommendations was to have a
9 capacity to build a series of weir dams -- (Court
10 reporter interruption.) Weir dams on creeks or small
11 streams that can contain the bulk of the oil.
12 MR. ROSSMAN: Is there -- are there
13 technologies like booms that can be deployed at the
14 river bottom to contain the oil that has made it to the
15 sediment?
16 THE WITNESS: Yes. And if you recall when I
17 was here last time, I talked about the API report that
18 just came out on submerged and sunken oil, and it looks
19 at different strategies and equipment to do just that.
20 And that is to put in place gabion baskets or filter
21 fences on the bottom that would actually stop and arrest
22 movement of anything that was moving along the bottom.
23 MR. ROSSMAN: To what extent does the
24 capacity in the Columbia River presently, could that be
25 deployed? Could any of those technologies be deployed

with the current capacity on the Columbia River?

THE WITNESS: They certainly could. You would want to choose your locations. Remember when we talked about that -- if there is a small portion that makes it into the sediment ultimately, it's going to be in locations where you have very low flow because that's where now things can settle out. And in those locations is where you would look to implement this type of strategy.

MR. ROSSMAN: Was it part of the desktop modeling, simply deploying bottom-of-the-river resources?

THE WITNESS: No, it was not. Again, the fate of this oil is that it's a floater. And as I mentioned earlier, the conditions in the Columbia River really are not those that you would expect to form any significant amount of oil particulate aggregates. So we just don't have -- that's not really a pathway that we can foresee in the Columbia River for even the heavy oil.

MR. ROSSMAN: With the lighter oil, I think your testimony was maybe after eight hours and I think I've read elsewhere maybe four to six hours, after that point you're unlikely to be able to recover much of it?

THE WITNESS: That's if it's allowed to

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1 spread and undergo natural processes. If it's
2 contained, then yes, you clearly have a longer window to
3 work with. Because remember, when it's contained the
4 evaporation rate slows down so you have a bit more time.
5 MR. ROSSMAN: I guess I'm just wondering how
6 the downstream resources, would they have any effect in
7 a spill in that lighter kind of oil but stuff that was
8 further downstream than that? Even if it's not
9 recoverable, would you still be able to boom it away
10 from sensitive areas or is it at that point so finely
11 dispersed that even booms aren't going to be --
12 THE WITNESS: Well, depending on the actual
13 situation and the trajectory where oil is going, you
14 know, you would conduct overflights so you could
15 identify where you actually have oil. If it's along the
16 riverbank then I would certainly look at putting boom
17 to -- first of all to stop it from progressing down the
18 riverbank. But then as a precaution, clearly we would
19 put boom in place to protect water intakes, sensitive
20 areas and things like that downstream within a
21 reasonable distance. As long as I can see the oil on
22 the surface, again, Bakken is very, very light so that
23 oil is clearly floating. I mean even the dilbit is
24 floating, but Bakken is even lighter.
25 MR. ROSSMAN: Thank you very much.

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1 THE WITNESS: Sure.
2 JUDGE NOBLE: Mr. Moss.
3 MR. MOSS: Dr. Taylor, I don't need you to
4 expand on your testimony, but I would like to make sure
5 that my notes are correct regarding some of the points
6 you made earlier today.
7 As I understood what you said, the type of
8 oil that might be in a spill connected with this
9 terminal, Bakken and dilbit, most of that oil will
10 float, and the proportion that forms an aggregate sinks
11 or suspended would be relatively small?
12 THE WITNESS: That's correct. And
13 specifically both of those oils are going to float. And
14 the condition in the Columbia River really are not those
15 that are conducive to that oil particulate aggregation.
16 But I'm not going to dismiss there may be a very small
17 percent that could become -- that could go and form an
18 oil particulate aggregate. Again, those oil particulate
19 aggregates themselves are still -- the behavior of those
20 aggregates is going to depend on turbulence and the
21 actual net density of the aggregate.
22 MR. MOSS: My follow-up to that is, does
23 that mean a relatively small proportion, does that mean
24 that it's insignificant in terms of environmental
25 impact, in your view?

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1 THE WITNESS: Well, because that's a very
2 small portion of the oil, I would say relative to the
3 potential impacts of the spill it's very small. I
4 wouldn't necessarily say insignificant because I think
5 that is another definition.
6 MR. MOSS: It's not as bad as it could be
7 but it's still not something you would want to invite?
8 THE WITNESS: Correct. Now, we don't want
9 any spills. No spills.
10 MR. MOSS: I'm sorry, I didn't mean to talk
11 over you.
12 In terms of the weights of these oils, I
13 remember reading in some of the exhibits, or one of the
14 exhibits at least, that in terms of the dilbit, because
15 of this weathering process and some of the evaporation
16 of the light ends, that it actually takes on the
17 characteristics of a much heavier oil fairly quickly.
18 Is that consistent with your understanding?
19 THE WITNESS: It has a fairly quick
20 evaporative loss of the light ends, that is correct.
21 Usually within the first 24 hours is when you get to
22 those light ends. And then you have a higher density
23 oil. Again, the tests that we did, for instance, where
24 we were working with Cold Lake bitumen -- or blend --
25 (Court reporter interruption.) We were working with

1 Cold Lake Blend and Access Western Blend where we were
2 testing these in tanks and let them naturally evaporate.
3 The densities of the weathered oil did not reach the
4 density of fresh water for the Cold Lake case, and in
5 the case of Access Western, it took days for it to get
6 to that, to being what it would be right at fresh water
7 density.
8 MR. MOSS: Thank you. Mr. Stone asked my
9 first question about tar balls. But I also understood
10 you to say in that testimony that they dissipated --
11 this is the Mobil spill -- that they dissipated fairly
12 quickly. I wasn't sure I understood that.
13 THE WITNESS: Yeah, that's what -- in the
14 NOAA report they were able to find some. Of course,
15 they had cleanup crews going out and looking for tar
16 balls to collect those, but very quickly there was
17 nothing to collect.
18 MR. MOSS: Okay, I see.
19 Is there a current speed at which booming
20 simply becomes ineffective?
21 THE WITNESS: Well, it depends on, again,
22 how you're using that boom. If I'm sweeping, if I'm
23 taking -- let's say that I'm using the Current Buster or
24 I'm using a conventional boom and I'm pulling it through
25 the water to move over an oil slick and recover it.

TAYLOR

1 That river can be flowing at 8 knots, and if my boat is
2 going downriver at 8 knots, I have no net speed relative
3 to the water, correct? If I advance my boat at 9 knots,
4 I'm gaining on that oil at 1 knot. So I can use my boom
5 in different ways at higher current speeds. It's going
6 to be more challenging to put a fixed boom in, say,
7 along the shoreline and deflect into a collection point
8 when I have very high speeds, but that doesn't mean I
9 can't do on-water operations in which I'm advancing on
10 an oil slick moving at a relative speed to the current.
11 So it doesn't necessarily mean I can't do response, I
12 can't undertake a response.
13 I'm sure that once you get up to very, very
14 high speeds, now you may be talking about a mountain
15 stream where you've got turbulence and all the rest of
16 it, and so now you have other things that are happening.
17 But you just need to think about how you're moving and
18 how you're using that boom relative to the current.
19 MR. MOSS: At the risk of being glib, the
20 metaphor of herding cats came to my mind when I heard
21 you talking about -- (Court reporter interruption.) Of
22 herding cats came to mind when I heard you talking just
23 now about deploying a boom in a downstream direction at
24 a speed of 9 knots. That sounds like a pretty tricky
25 operation.

TAYLOR

THE WITNESS: I was using an extreme example. But I think you -- the idea is I can move relative to the current and manage my relative speed for the boom.

MR. MOSS: But how effective is that?

THE WITNESS: It's always effective.

MR. MOSS: Do you know of examples where that's occurred and at what speeds?

THE WITNESS: I can't pull one up just off the top of my head, no.

MR. MOSS: Thank you very much. I appreciate it.

JUDGE NOBLE: Mr. Stephenson?

MR. STEPHENSON: Dr. Taylor, we heard yesterday that typical currents on the Columbia are 2 to 3 knots. Is that your understanding?

THE WITNESS: Well, my understanding is that the currents are variable. They're variable down the river, they're variable across the river, they're variable in seasons. So there's a range of currents, and I think that's the first thing you have to keep in mind.

In looking at the average flow at the facility, and this is one of the tables that we pulled up when we were here last time, when we looked at the

monthly average flow, it was -- for every month it was ranged between .8 and .9 knots at the facility based on the average flow. That doesn't mean that at times it's going to be faster or at other times it could be slower, but it very much depends on time of year and specific location, discharge from the dams. There's a number of things. I would say in general when we're talking about the facility, it's going to be close to a knot.

MR. STEPHENSON: Thank you. And the Current Buster, is that perpendicular to the flow or at an angle?

THE WITNESS: That's -- the Current Buster has a built-in angle, and so that is actually relative to the current itself, so 5 knots at advancing speed. And that was deployed, so it was put into a river in which you had currents of that speed.

One of the things that I know the manufacturer has been looking at and LES has been looking at up in Alaska is for oil recovery, in order to improve the efficiency of oil recovery, the Current Buster is not just containment but it's a collection system. So that concentrates oil and then it actually collects it in a pocket, and it's like a weir stream where it's holding that oil there so that you can then pump it out of that pocket.

TAYLOR

1 And so at higher currents at 5 knots, for
2 instance, one of the things they're looking at is
3 increasing the drainage through the back pocket so that
4 you don't fill that pocket up overly quick. You have to
5 allow a faster drain because you have faster movement of
6 water coming into it. But it's still work. And again,
7 it's efficiency. You may be losing some efficiency when
8 you have the higher current but it's still a very, very
9 effective system. And that's just one system.
10 MR. STEPHENSON: Last question. Yesterday
11 we heard about the Mosier incident, and it took 36 hours
12 to get the unified incident command up and in place.
13 That certainly is longer -- and there was response
14 already happening.
15 But what's your opinion as a spill expert on
16 how we can do better than 36 hours and how does that
17 inform your opinion on this proposal?
18 THE WITNESS: Well, I think that you would
19 find that the -- you know, a spill under the Northwest
20 Area Plan is very clear. Your unified command is going
21 to be Coast Guard, potentially EPA, the spiller, and
22 then you may have local representation and tribal
23 representation depending on the situation. I think that
24 forms up very, very quickly.
25 I think what may be conceived or thought of

TAYLOR

1 as a long delay in forming a unified command is that
2 understanding that -- of who is participating at that
3 command level. But I think that was in place much
4 faster.
5 And I think under the Northwest Area Plan,
6 this is practiced over and over, not just on actual
7 spills but also in exercises over and over. I think
8 it's -- I think we have a good, very, very good system
9 in place. (Court reporter interruption.) System in
10 place.
11 JUDGE NOBLE: Mr. Siemann?
12 MR. SIEMANN: Good morning.
13 THE WITNESS: Good morning.
14 MR. SIEMANN: So my sense is that you have
15 painted a somewhat rosy picture of our preparations and
16 capacity for responding to a spill and yet a lot of the
17 questions from the council have sort of -- you know,
18 when you go into the details it seems less rosy, I
19 guess. And so I want to -- that's sort of the first
20 part of my question is sort of an opportunity to give
21 you an opportunity to respond to that.
22 The second part of my question is, given all
23 of that, what are the things that we should be most
24 concerned about with a spill, even if things do work
25 well or if they don't work well?

TAYLOR

1 THE WITNESS: Well, I'll be the first one to
2 say we don't -- no spill is our goal. And the goal --
3 and in my world, I go out and I train people and I work
4 with them and I write plans. But I don't want anybody
5 to have a spill. So clearly that's the goal.
6 But we acknowledge that accidents happen at
7 times and so we want to be prepared for those
8 situations. In this part of the world we have one of
9 the greatest spill response capacities that exist
10 regionally relative to most any other place in the
11 world. It's remarkable. That doesn't mean that spill
12 is going to be easy to deal with necessarily. But I
13 think we have a process in place which makes that
14 response much more effective than you're going to see in
15 many other places around the world.
16 The fact that we have a unified command,
17 players typically know who is going to come in and
18 participate; that they practice their roles and
19 responsibilities, that we already have pre-identified
20 target locations where equipment is going to be deployed
21 so that your contractors can start deploying equipment
22 instantly, I mean within very, very short timeframes,
23 hours or less even. You're going to have deployment
24 going in places to work and to minimize the spreading of
25 the oil and potential impacts of that oil downstream.

TAYLOR

1 So I paint a rosy picture in the sense that
2 we have a tremendous capability here, and it's practiced
3 and practiced and practiced. So I think that's
4 important to know that.
5 Clearly there's going to be challenges, and
6 every single spill is a different situation. There's
7 going to be a lot of the same activities from spill to
8 spill. You're going to look at containment, you're
9 going to look at collection, you're going to look at
10 protection, you're going to look at cleanup. So these
11 are all normal processes that we'll have, but they're
12 all tweaked and gauged for the specifics of a given
13 situation.
14 As we were talking about earlier, you can
15 always call on a -- you know, we talk about these
16 worst-case spills. Somehow magically we transferred
17 380,000 barrels of oil out of a tank and we put it into
18 the river. I don't know how that happens. But we run
19 an exercise anyway assuming that this happens to see,
20 okay, well, what are the resources we can bring in and
21 how are we going to deploy those over a series of time
22 to minimize the effect of that potential oil getting
23 into the river.
24 The response is pre-thought-out, it's
25 preplanned, and then of course you put in the measures

TAYLOR

1 to make sure it doesn't happen to begin with. So all
2 the prevention is going to be fundamental in any design.
3 And then prebooming, for instance, where we
4 talk about, okay, well, if we know that there's a
5 potential risk of a spill during a transfer operation we
6 will actually have stuff in the water, or you have
7 escort vessels with tankers. And all these things are
8 going to minimize, A, the risk of it happening, and B,
9 if something does happen to have a very quick and
10 immediate response.
11 I don't know if that helps you at all, but I
12 mean, I think that, again, the capacity we have here
13 is -- it's huge. And all the planning that we've put in
14 place is to really, really minimize the potential
15 effects of a spill. We're looking at that parallel
16 effort of containment, collection, and protection all at
17 the same time.
18 MR. SIEMANN: I guess what I'm struggling
19 with is that even with all of that, success is still
20 suggested to be collection of less than 20 percent or
21 less of the spilled oil. And so it seems like that's a
22 low bar of success that the effects are likely to still
23 be present. And that's under sort of perhaps ideal
24 circumstances, and so when you get less ideal
25 circumstances the success rate is probably going to be

TAYLOR

lower.

Response?

THE WITNESS: That 20 percent number that I threw out earlier, that's open water marine conditions, and so that is not where you have resources immediately available. So that's a place where you have -- there's going to be a longer time, a longer delay to get resources in.

And you're also talking about open -- or marine conditions where you have more wave energy and more currents. And so there's two effects; one, environmental conditions which are more -- just typically more challenging in the marine open ocean environment relative to a river, and secondly, you have a time where you have to get the resources out to where that spill site is, we don't know where. We're talking about spills that happen offshore. You don't know where that spill is happening so now you have to get resources to that location.

Here we know where the facility is situated, we have equipment at that facility, we have equipment all the way down the river. So it's already -- you already have a lot of pre-located equipment that can be deployed very close to where it's already located to intercept and to protect areas or to intercept and

1 collect oil. So the success rate here would be very
2 different than what I would expect offshore, very
3 different.
4 The other aspect, of course, is that if
5 the -- as I mentioned earlier, the sooner we have
6 containment the success rate shoots way up. As a matter
7 of fact, if you have predeployed boom and you happen to
8 have a spill during a transfer, your success rate is
9 almost 100 percent. It's all there. And again, you
10 have to measure that in context of what you're
11 recovering, taking into account also what is naturally
12 evaporating.
13 So that's where a lot of misnomers go in the
14 sense of, well, you spilled 100 barrels but you only
15 gathered 50 barrels. Well, yes, but 50 percent of that
16 oil evaporates so you're not going to get 100 barrels.
17 So I just want to -- I think you're not
18 going to have 100 percent success rate if you have oil
19 that's not instantly contained. That's a given, okay.
20 But I think that the faster you're in there with your
21 equipment, which we have up and down the river, the
22 success rate is going to be much, much higher.
23 MR. SIEMANN: So I'll ask the same question
24 again.
25 What are the things we should be most

1 concerned about with a spill and a spill response, the
2 places where we as a council ought to be thinking more
3 deeply?
4 THE WITNESS: I think it would really -- it
5 probably just comes down to, you know, assurance of a
6 balance of resources with the different types of oils
7 that you're going to be handling. You've got oils that
8 are heavier and oils that are lighter, and so the
9 equipment that you would use might need to be different.
10 But I think that's already taken into account. But you
11 want to keep that in mind.
12 You want to -- and a balance of those
13 resources up and down the river. If you happen to have
14 a spill that you need to look at recovering oil that's
15 been weathered, say the heavy oil that's weathered for
16 several days, you will need to have higher pump
17 capacities and higher -- different type skimmers, for
18 instance, maybe downriver where you're going to be
19 dealing with that type of situation.
20 So it may be looking at the profile of the
21 types of equipment that you have along the river more
22 than anything else.
23 MR. SIEMANN: Thank you.
24 JUDGE NOBLE: Any other council questions?
25 Mr. Shafer?

TAYLOR

1 MR. SHAFER: Dr. Taylor, one follow-up
2 question.
3 Is evaporation harmless? And I'm thinking
4 in terms of a scenario, let's say there's a rather large
5 spill that's on a very hot day, there's a lot of
6 evaporation that's occurring. It might seem encouraging
7 that it's lifting a lot of this oil out of the water,
8 but is it harmless if it's in the atmosphere or are
9 there elements or compounds that are simply transferred
10 into the environment and into the air that could cause
11 respiratory problems?
12 THE WITNESS: Well, when you have a lot of
13 evaporation you need to be cautious of the volatile
14 organic carbon that's in the air, the OCs that in the
15 atmosphere particularly right over the area where it's
16 evaporating.
17 So it's very typical, for instance, for
18 first responders to go in and actually measure, you
19 know, the atmospheric conditions for benzenes and
20 volatile organics -- (Court reporter interruption.)
21 Volatile organics, to make sure that they know what the
22 risks are going into a specific area. They may have to
23 wear respiratory protection during the early stages of a
24 response.
25 So there's always going to be air monitoring

that will happen because there is a component immediately above where oil is evaporating that you need to be aware of. But the other aspect of that is it dilutes very, very quickly. So air movement, and of course the volume, the huge volume of atmosphere above just means that it will be very quickly diluted, and of course with more wind it's even faster.

MR. SHAFER: Thank you.

JUDGE NOBLE: Other council questions? Questions -- well, questions based on council questions are next, and I'd like to get an idea of how many there will be because it's time for a break.

Please proceed.

RECROSS-EXAMINATION

BY MS. BOYLES:

Q. Dr. Taylor, is it correct that there are times when river conditions don't allow for prebooming and yet vessel loading will still occur?

A. There are conditions in which you would not necessarily preboom. But yes, you could continue vessel loading operations, yes.

MS. BOYLES: Thank you.

CROSS-EXAMINATION

BY MR. KERNUTT:

Q. Dr. Taylor, my name is Matt Kernutt, counsel for

1 the environment in this proceeding. I just have one, I
2 believe just one question in relation to the council
3 questions.
4 You testified in relation to the response
5 capabilities at the terminal and below the terminal
6 downstream from the terminal in relation to your
7 tabletop exercise. Is that accurate?
8 A. Yes.
9 **Q. Your tabletop exercise did not address response**
10 **capabilities upstream of the facility; correct?**
11 A. The tabletop exercise was specific to the
12 worst-case spill from the facility, so it would
13 originate at the tank farm and with the current would
14 move downstream.
15 MR. KERNUTT: Thank you. No further
16 questions.
17 JUDGE NOBLE: Other questions based on
18 council questions?
19 MR. KISIELIUS: I think I have just two.
20 REDIRECT EXAMINATION
21 BY MR. KISIELIUS:
22 **Q. In response to Mr. Shafer's question and**
23 **follow-up to Ms. Boyles' question, is there a threshold**
24 **beyond which transfer operations would not occur based**
25 **on weather conditions?**

A. Yes. I think that's laid out in the prebooming description within the application. Sustained winds of over 35 miles an hour, for instance.

Q. One more question in response to Mr. Siemann's question.

Did your spill drill look at offsite resources downriver in relation to their effectiveness for the range of crudes that will be handled at the facility?

Q. Yes, because we ran two exercises, actually. We did one for Bakken oil and one for dilbit, so we were looking at both sets of resources.

Q. Okay. And what did you conclude?

A. Again, we had tremendous capability, both boom-wise and recovery-wise, for both types of oils for the range of oil.

MR. KISIELIUS: Okay, thank you. No further questions.

JUDGE NOBLE: Dr. Taylor, thank you very much for your testimony. You're excused once again.

THE WITNESS: Thank you.

JUDGE NOBLE: We will be in recess until 10:50.

(Recess taken from 10:35 a.m. to 10:54 a.m.)

JUDGE NOBLE: Call your next witness.

MR. JOHNSON: The applicant recalls Gregory

1 Challenger.
2 JUDGE NOBLE: Mr. Challenger, would you
3 raise your right hand. You've been sworn before but you
4 were excused as a witness.
5 GREGORY CHALLENGER,
6 having been first duly sworn, testified as follows:
7 DIRECT EXAMINATION
8 BY MR. JOHNSON:
9 **Q. Good morning, Mr. Challenger. Were you present**
10 **for Dr. Taylor's testimony earlier this morning?**
11 A. Yes, I was.
12 **Q. And were you present yesterday for Mr. Lumley's**
13 **testimony?**
14 A. Yes, I was.
15 **Q. I have a few follow-up questions with regard to**
16 **Mr. Lumley's testimony and some others that we've heard**
17 **throughout the last week or so.**
18 **Mr. Lumley testified yesterday that in your**
19 **testimony and in your description of your analysis of**
20 **potential spill impacts on species that are habitats and**
21 **relative recovery of those tended to play down the**
22 **effects of a possible spill.**
23 **How do you respond to that?**
24 A. I certainly don't mean to play down effects of a
25 spill and in no way did I mean to insinuate that we're

1 better off for a spill. As Mr. Lumley said, that there
2 have been some successful mitigation projects with
3 Bonneville Power; likewise, there have been successful
4 projects to mitigate long-term losses for the oil spills
5 as well. And that's the opinion of government agencies
6 as well.
7 But I certainly don't mean to belittle the value
8 or the connection or anything like that to the river,
9 I'm just trying to be objective in terms of what the
10 literature and what the data say. I certainly agree
11 with Mr. Lumley that they could be a serious effect on
12 people and a disruption to their lives even if we are
13 arguing that it's more temporary.
14 JUDGE NOBLE: Mr. Challenger, you know what
15 I'm going to say.
16 THE WITNESS: I need to talk more slowly.
17 Thank you.
18 So basically I don't mean to devalue the
19 connection to the resource. The value of the resource
20 is extremely valuable. I would not personally want to
21 take money for loss of a resource. That's not what this
22 is about, however. Damages are dollars. That's the
23 responsible party's problem. The loss is compensated by
24 projects, by restoring services, organisms, making sure
25 these use values and the other value we place on the

resources will be there in the future. Not about dollars. And I would agree that I would not -- I don't want dollars for resources either.

BY MR. JOHNSON:

Q. And related to that, several witnesses have testified about the inability to compensate for damages to values other than the value, for instance, of a specific fish that might perish as a result of a spill or a specific habitat that might be affected.

And can you just expand on how NRD compensation is intended to function and in fact required to function with regard to restoration of those resources?

A. Yes. Under OPA, by law the funds for damages must be applied to restoration projects that have a nexus, meaning that they are restoring the injured resource. The wording is "requiring or replacing equivalent services," something like that. But by law it's required on projects.

Q. Okay. Moving on to another topic, Mr. Slockish and others have testified about a spill at 15 Mile Creek which you briefly touched on, I believe, in your testimony.

Can you just give a better description of what that incident was?

A. Well, that was a pesticide spill which was very

1 different than crude oil. And my only point in that
2 instance, it would not be similar as a crude oil spill.
3 But my only point in that instance was that it was the
4 early restoration point. The fact that during -- a lot
5 of times during the spill response, not waiting for the
6 potential years to go by to develop a Natural Resource
7 Damage Assessment settlement, it's become fairly common
8 to do emergency or early restoration projects. In the
9 New Carissa we did plover habitat restoration. There
10 was concern of potential local population effect, and
11 that was very successful.
12 So I'm not saying it's okay to break things
13 because we can fix them. It's preferable not to break
14 them. I'm just saying that there are good examples of
15 early projects. We want to avoid, as Dr. Taylor said,
16 and then we want to mitigate and minimize our loss. And
17 then we want to compensate with projects with Natural
18 Resource Damages -- and that was -- getting back to 15
19 Mile Creek, my example, is just that that was viewed by
20 ODF&W as a successful early mitigation project.
21 **Q. How about the circumstances of that spill? You**
22 **said it was a pesticide; is that right?**
23 A. Correct.
24 **Q. And was that a marine vessel or was that a rail**
25 **spill?**

JOHNSON / CHALLENGER

A. No, it was a truck that went off of a bridge on I-84 and lost its cargo in the lower 400-meter section of the 15 Mile Creek.

Q. Okay. And I'm going to ask you again if you could slow down a bit to help out the court reporter.

Shifting to various species of fish in the river, a number of witnesses have discussed the potential impacts on lamprey, and to a lesser extent to sturgeon, as opposed to focus on salmonid species. During your testimony earlier I think you suggested that this was not a primary focus of your analysis.

Why is that?

A. Well, it's not that it wasn't a focus -- well, maybe not a focus, but it's not that it was -- (Court reporter interruption.) It's not that it wasn't that. I didn't ignore it in my analysis. I understand that salmon are very important. Maybe I emphasized that to the neglect of the lamprey. But I did consider things like lamprey and sturgeon and resident fish.

And in our examples, for instance, of the Enbridge spill, the heavier oil, you're not going to have oil covering the bottom of the river. There will be a lot of areas with sediment and lamprey that aren't oiled. Is this to say there won't be impacts? There certainly could be, but it's not likely to be complete.

1 There would be a lot of -- the majority of the bottom
2 habitats will in fact not be oiled as it was in the
3 Enbridge case.
4 **Q. Okay. Do you know if lamprey in the Columbia**
5 **River is listed as a threatened or endangered species**
6 **under the Endangered Species Act?**
7 A. I believe they are not.
8 **Q. And there tends to have been a focus on**
9 **threatened and endangered species both in your work and**
10 **in the work of Mr. Holmes and Mr. English.**
11 **Why a focus on those species?**
12 A. Well, it's always a concern when you have lower
13 numbers of reproducing adults, that they could be more
14 vulnerable to perturbation. So obviously we look at the
15 most susceptible organisms for major effects, potential.
16 **Q. Is that what you did in your work?**
17 A. I definitely considered that in terms of
18 isolated populations.
19 **Q. Okay. So we talked a bit about lamprey. How**
20 **about sturgeon? Are sturgeon found in the Columbia**
21 **River -- are the sturgeon found in the Columbia River a**
22 **listed threatened or endangered species?**
23 A. I believe one of the species is, the green
24 sturgeon.
25 **Q. And did you make any findings with regard to**

1 sturgeon or impacts -- spill impacts on the sturgeon
2 population?
3 A. Well, it would be -- as the Mobil Oil spill, it
4 would be likely that there would be exposure. They
5 measured oil in tissues. That would happen. Again, as
6 with the lamprey, they're a bottom fish, and there would
7 be some that would be affected and likely some that
8 would not.
9 **Q. Okay. And with regard to threatened -- well,**
10 **let me follow up and just say, can you draw any**
11 **conclusions about any threats to total sturgeon**
12 **populations within the river?**
13 A. Well, in drawing those sorts of conclusions, we
14 kind of -- we looked at the literature, we looked at all
15 of our case studies that I've worked on NRDA on, maybe
16 50 oil spills, or 70. I'm not aware of the population
17 effects, I'm not aware of it in the literature. As
18 James Holmes described yesterday where in the NRDA world
19 we're sort of aggregators of information. And I just
20 haven't seen this sort of extirpation of a local
21 population, or if it has been produced I'm not aware of
22 it. And like a scientist, we don't want to say never.
23 We want to remain objective. But we just haven't seen a
24 lot of evidence.
25 **Q. And just for the record, when you say "NRDA" are**

1 you referring to the acronym N-R-D-A which refers to
2 Natural Resources Damages Assessment?
3 A. Yes.
4 **Q. All right. Are you familiar with the ESA, that**
5 **is, the Endangered Species Act, consultation process?**
6 A. Yes, I am.
7 **Q. And do you know if there's an ongoing ESA**
8 **consultation process with regard to the Vancouver Energy**
9 **Terminal project?**
10 A. That is my understanding.
11 **Q. And do you know if the applicant has received**
12 **any feedback from the U.S. Fish and Wildlife Service**
13 **related to that consultation?**
14 A. I believe they received a concurrence letter
15 relevant to the listed bull trout.
16 **Q. Okay.**
17 MR. JOHNSON: And for the council's benefit,
18 that's admitted as Exhibit 63.
19 BY MR. JOHNSON:
20 **Q. And with regard to other species, do you know of**
21 **the results of any consultation under the Endangered**
22 **Species Act with the Natural Marine Fisheries Service?**
23 A. Yes. They looked at the marine species.
24 **Q. And do you know if they've drawn any conclusions**
25 **yet with regard to the specific project and its**

1 potential impacts on salmon or other species?
2 A. I'm not aware of any conclusions yet on this
3 incident. There is another -- there's a facility in
4 Columbia City [sic] Bio-Refinery where they did make a
5 finding of, I believe it was "may affect but not adverse
6 affect." I'm not sure.
7 MR. JOHNSON: And for the council's benefit,
8 again, that is an exhibit that's been admitted as
9 Exhibit 234.
10 BY MR. JOHNSON:
11 **Q. In your experience, do possible crude spill**
12 **impacts on threatened and endangered species receive**
13 **consideration by those federal agencies, that is, the**
14 **U.S. Fish and Wildlife Service and the Natural Marine**
15 **Fisheries Service during the consultation process?**
16 A. Yeah. That is the purpose of their
17 consideration is a listed species.
18 **Q. Okay. And sticking with that theme, there has**
19 **been testimony primarily by Drs. Penney and Rice about**
20 **impacts on populations of fish and particularly**
21 **responding to your testimony about such impacts or lack**
22 **thereof. And Dr. Penney testified that Snake River**
23 **redfish lake sockeye salmon which migrate through the**
24 **Columbia River are a listed species under the Endangered**
25 **Species Act.**

1 Do you know if that's correct?
2 A. Yes, I believe it is.
3 **Q. I'm sorry?**
4 A. Yes, it is.
5 **Q. Okay. And he also testified that your focus on**
6 **the mortality of individual fish, when you testified, as**
7 **opposed to larger populations, ignored the risks to**
8 **individual populations such as the redfish lake sockeye.**
9 **How do you respond to that?**
10 A. Well, you know, understanding there are
11 populations that are sometimes isolated or small, as I
12 mentioned, they may be at greater risk to perturbation.
13 It's just that the likelihood of all of them being
14 affected I would say is very low. Again, never say
15 never, but there's just no examples in the literature
16 of, look, here's a population that was extirpated
17 because of an oil spill or here's a population that was
18 wiped out.
19 So there's just no evidence -- and it would be
20 highly unlikely that all the members would be affected
21 with water column concentrations sufficient that they
22 would be -- that they wouldn't make it. Again, never
23 say never, but we just don't have any evidence to
24 support that.
25 **Q. Okay. And so does your consideration of the**

individual populations such as the redfish lake sockeye alter your conclusions about the viability and survivability of total populations of species in the event of the worst-case spill that you evaluated?

A. No, it doesn't. But let me be clear that that doesn't mean the impact wouldn't be meaningful, and it would certainly affect the tribes and the users. There could very well be an impact, but there's just no evidence that there would be population loss.

Q. And also in Dr. Penney's testimony, in response to some council questions he stated that it's possible that a crude spill could interfere with chemical signatures that salmon use to reach their natal streams, and as a result there could be population impacts to those species.

How do you respond to that?

A. I believe the data on that indicates that's not the case. There's sort of two situations. There was a study of pink salmon in the Exxon Valdez of the embryos that develop in the oiled gravel that returned were found to not differ significantly from the -- (Court reporter interruption.) From the on-reference locations, unoiled locations. So the developing embryos in the oil, they found the natal stream.

The other situation would be with adults that

are returning and there's a spill. Examples we have of that would be, say, Bellingham pipeline explosion. That was a light, very light product, it was gasoline. But it was a lot, nearly 400,000 gallons in a small stream with a hatchery at the mouth of the stream. We had three months until the fish were returning. And there's still PAH and residues in the creek and sheening in some places. But they came back and they found the stream. And we did our best to agitate all the spawning gravel and release the product, and we spent months. And they reproduced successfully and there has been a return every year. (Court reporter interruption.) There has been a return every year.

Q. And just for clarification, Dr. Rice testified about his own work and studies related to impacts on pink salmon in Prince William Sound and related spawning streams. And I just want to make sure if I'm correct that you're distinguishing between that work and work specifically related to the ability of the fish to return to their natal streams.

A. Correct.

Q. Okay. So you're not discussing Dr. Rice's work in response to my question?

A. No.

Q. Okay. Dr. Penney also stated that because the

1 Columbia River is a modified system, in his words, that
2 existing stressors and different fish stocks combine
3 such that salmon recovery in the event of a crude spill
4 may be slower than you have concluded.
5 Did you agree?
6 A. In large part -- I mean most rivers are modified
7 and there's a lot of stressors, so relative to other
8 cases I'm not sure that the Columbia is unique in that
9 regard. But there could be varying rates of recovery of
10 species. Like I would say the redfish, the sockeye lake
11 redfish in the river, they have the longest journey of
12 all the fish and have to go through the most dams. And
13 that has been a challenge to restore. They had very
14 good runs in recent years, I understand.
15 But I would say in large part, though, that
16 there are other stressors that can affect recovery, but
17 there's no indication that that's going to be an
18 incredibly long period of time.
19 **Q. With regard to impacts on salmon specifically,**
20 **or for that matter other species, do you consider your**
21 **work to be particularly optimistic?**
22 A. Well, I'm just trying to be objective and state
23 what the technical literature says on the subject. I
24 know I was optimistic when I reported what Jackie Michel
25 said on the paper on wetlands, but that was their words.

1 Jackie Michel and other Michels are probably, if not the
2 most, one of the most renowned oil spill experts in the
3 world. Some of those cases I worked on and I'm just
4 reporting what the literature says.
5 **Q. Okay. Dr. Rice also testified that in the case**
6 **of the Exxon Valdez spill there was whale and otter**
7 **impacts that you didn't acknowledge in your testimony**
8 **and that this suggests the possibility of population**
9 **effects relating to -- from a crude spill.**
10 **Did you agree with his conclusions?**
11 A. Well, you say "suggesting the possibility." I
12 guess in science anything is possible, but it's not a
13 foregone conclusion that there are population effects.
14 There have been several recent papers in the literature
15 in 2013, I believe, on both of those animals that
16 present a lot of compelling evidence of lack of
17 population effect.
18 Killer whales, for instance. I think it was
19 Mark Fraker in Human and Ecological Risk Assessment in
20 2013 did a review of -- there are a number of pods in
21 the Prince William Sound. (Court reporter
22 interruption.) Number of pods, and I believe five of
23 which were observed in oiled areas on a total of four
24 days throughout the whole response in spite of aerial
25 overflights pretty much constantly looking for them.

JOHNSON / CHALLENGER

1 And of those five pods, two of them subsequently
2 declined, one of which was the mammal-eating pod, the AP
3 pod, hadn't reproduced -- (Court reporter interruption.)
4 The AP, they're mammal-eating instead of fish-eating,
5 and they had not reproduced for five years prior to the
6 spill. They were in sort of a reproductive bottleneck
7 with high contaminant loads. There was some question as
8 to whether that was a preexisting issue. The other pod,
9 the AP pod, had lost a number of females after the
10 spill.
11 And in that literature -- I'm just trying to
12 summarize as best I can. In that literature they found
13 in that pod, they didn't know for sure if they were lost
14 after the spill. They hadn't seen them for a number of
15 months and the last census was sometime before. Several
16 of them were seen with gunshot wounds that can kill
17 mammals. This group interacts with the gill net -- or
18 the Long Arm fishery and the fishermen occasionally
19 shoot them.
20 So, you know, you have a number of pods. And in
21 fact, the group that the AP pod is in, the population
22 has been increasing, and the other pods. So in nature,
23 one of the problems with NRDA, in my view, is we view it
24 as static. Everything has to be the way it was prior to
25 the spill. That's not how nature works. If you studied

10, 20, 30 different populations of animals -- (Court reporter interruption.) Sorry. (Laughter.)

Q. You've got to keep it slow.

A. If you study a bunch of different populations of animals, in the absence of the spill you're going to find some went up and some went down. And the authors in this paper conclude that you can't distinguish, it's inconclusive. Some went up, some went down. Exposed groups had no effect.

The otter study was kind of similar. I think it was Garshelis and Jones in the Marine Pollution Bulletin -- do you want me to spell his name? G-e-r-s-h-i-l-i, something like that, i-s [sic]. They did a critical review of all the otter studies and found that one thing that was interesting was the post-spill population was higher than the pre-spill population.

And researchers all basically concluded that the population was on the rise prior to the spill so that possibly it should have been even higher. As these authors point out, that the otter demographic is really poorly understood, sort of bounces all over the place.

And one of the things I found interesting in that paper was that if the researchers had broken up their reference in oiled impact areas into the same oiled and impact areas that were done in another study,

1 I think it was the harlequin duck study, they would have
2 found no different difference. And the otter results
3 basically come from one area of Northern Knight
4 Island -- (Court reporter interruption.) The otter
5 conclusions basically come from results of one area on
6 Northern Knight Island that in fact paralleled the
7 results of the nearby reference site. And basically I
8 think the final conclusion was that there were three
9 otters less at that site, and that drives the entire
10 thing. And again, that's not a definitive conclusion.
11 And so there's -- it's not a marked -- it's not
12 an easy answer. It's a synchronous event. Basically
13 that's the evidence we had. The oil spill occurred, we
14 noticed something, maybe it was the oil spill. But as I
15 said, based on the results, some populations increase,
16 some populations decrease. And that's kind of what we
17 found.
18 **Q. The focus of this hearing is obviously the**
19 **Columbia River and potential impacts here. So what**
20 **bearing does the otter and the whale, killer whale**
21 **impacts, or lack thereof, have on your analysis of**
22 **potential species impacts in the river?**
23 A. Well, I don't think we have killer whales here
24 but we may have river otters. But so it's not
25 incredibly relevant, I guess. They are not species that

1 are here.
2 **Q. Okay. Dr. Rice testified about studies**
3 **regarding sublethal effects of crudes, specifically PAHs**
4 **and exposure to pink salmon, additionally on tuna, mahi**
5 **mahi embryos, et cetera, and concluded that the impacts**
6 **of such exposure will in fact result in population**
7 **impacts to certain species.**
8 **Do you agree?**
9 A. There's no conclusive evidence of that.
10 Dr. Rice is certainly an expert in researching and
11 studies of those things. And I'm not here arguing that
12 that doesn't occur, I think that it probably does, those
13 things do occur. It's just that there haven't been
14 demonstrated population effects in pink salmon.
15 As I talked about in my previous live testimony,
16 I think there's some compelling evidence of otherwise.
17 Not to say that those things don't happen to developing
18 embryos.
19 **Q. I think Dr. Rice pointed out that post-Exxon**
20 **Valdez there were up to 2 million pink salmon that**
21 **didn't return to Prince William Sound, but at the same**
22 **time there were very robust return runs.**
23 **So is there any way to connect those results**
24 **back to the pink salmon studies that he referenced?**
25 A. I would say there's no way to be able to say

1 that conclusively, that there's this many missing
2 salmon. There's -- in ecology there's something called
3 density dependence. To the layman, a similar expression
4 would be nature abhors a vacuum -- (Court reporter
5 interruption.) Nature abhors a vacuum, meaning that
6 when you mow your lawn it grows faster. If you take a
7 half the deer population out of the woods, they have a
8 lot more food.
9 So there's a lot of limiting factors and it
10 could be quite complicated, but I don't think you can
11 say this many were missing. And there were robust runs
12 and there was no evidence of population change.
13 **Q. There was also testimony from Dr. Rice about**
14 **pink salmon exposure in the natal streams, that is**
15 **exposure to crude and related PAHs in their spawning**
16 **waters, and that after several months of low dose**
17 **exposure there were developmental effects noted.**
18 **Assuming that there were such effects, how do**
19 **the exposure scenarios that he discussed differ from**
20 **those that we would anticipate in the Columbia River?**
21 A. Well, as discussed, most of the spawning areas
22 are not in the lower Columbia River. There are some,
23 but most of the spawning areas are up in tributaries.
24 So overall, to all the fish, this is not likely to be a
25 major player in the post-spill assessment here.

JOHNSON / CHALLENGER

Q. I want to shift back to your discussion of wetland recovery and some criticism that's been leveled at you. Again, I think Dr. Rice pointed this out, and you started to allude to this earlier when you were talking about Exhibit 108 which was the exhibit that Dr. Taylor spoke to earlier that you said was prepared by Dr. Michel.

Can you just more fully respond to the criticism that your conclusion that wetland recovery could be expected in a range of one to two years, can you just expand on whether or not, in light of Dr. Rice's criticism, that -- whether that's altered your opinion?

A. Sure, no problem. There are heavy oils and light oils throughout that diagram. It's not just the long-term recovery. In fact, if you look at that diagram, all the river spills are with the heavy refined products are down near the bottom, the faster recovery times. And Dr. Michel talks about reasons why some -- they recover faster; things like chop, things like sediment load, things like flooding, current, water movement.

Good examples on that chart, another NRDA case I worked on is the Julie N on the Fore River in Portland, Maine. The wetlands was very heavily oiled, the wetlands were covered in oil, and there was rain and

1 river flow and sediment load, and they recovered very
2 quickly.
3 So the rivers in that diagram are pretty low on
4 the chart, meaning that the recovery times were faster.
5 **Q. And then earlier this morning Dr. Taylor was**
6 **asked some questions about the fate and transport of**
7 **potentially spilled oil in the Columbia River and it**
8 **potentially reaching beyond the mouth of the river out**
9 **to the Pacific ocean.**
10 **In light of his testimony, are you able to draw**
11 **any conclusions about potential impacts or recovery of**
12 **marine species or habitat in the ocean?**
13 A. Let me first say that I would agree that there
14 would probably be some tar balls and things out there.
15 I do not believe it would be -- I do not believe you're
16 likely to find measurable and observable impacts in the
17 ocean, which is, when I say measurable and observable,
18 that's a NRDA requirement under OPA in the language.
19 You might find on the beach, you may find some
20 birds because birds can get oiled and fly and they want
21 to come ashore, and they do. But I don't believe you'll
22 find measurable and observable impacts in the ocean.
23 MR. JOHNSON: Nothing further.
24 JUDGE NOBLE: Cross-examination?
25 CROSS-EXAMINATION

LOTHROP / CHALLENGER

BY MR. LOTHROP:

Q. Rob Lothrop for opponents.

Mr. Challenger, can you describe to the counsel for Columbia River chum spawn?

A. I understand there is some spawning below and along the dam, there's some spawning there and other locations. There is some spawning in the lower Columbia River.

Q. And are Columbia River chum listed under the Endangered Species Act? (Court reporter interruption.) Chum, I'm sorry. C-h-u-m.

A. Columbia River chum? I'm sorry, I'm not sure, to tell you the truth. They probably are.

Q. And one other question.

Have you encountered an article entitled, "Effects of Diluted Bitumen Exposure on Juvenile Sockeye Salmon: From Cells to Performance," the authors include Sarah Alderman and Christopher Kennedy?

A. I couldn't summarize it for you, but I've heard that.

Q. It's a very recent article. I was curious about that. Did they observe effects on sockeye salmon?

A. I believe they did.

Q. Related to swimming performance?

A. Yep, yep.

Q. In oil -- I'm sorry, in PAH concentrations in parts per billion?

A. Yes.

MR. LOTHROP: I have no further questions.

CROSS-EXAMINATION

BY MR. KERNUTT:

Q. Hello again, Mr. Challenger. For the record, Matt Kernutt, counsel for the environment. I have one question, subpart question.

You testified that, if I recall, a spill on the Columbia River would likely not be relevant or have impacts on Orcas.

Is that accurate?

A. Well, there aren't a lot of Orcas in the Columbia River. Might they venture around the mouth from time to time, I probably imagine so.

Q. Do you know if Columbia River salmon are critically important for Orcas?

A. There are many Orcas that eat salmon and they are very important to them.

MR. KERNUTT: Thank you. No further questions.

MR. LOTHROP: Your Honor, if I might backtrack for a moment. If possible I'd be willing to share this article that I described with council

electronically and with co-counsel. But would it be possible to enter that as an exhibit in this proceeding?

JUDGE NOBLE: It's possible, but you need to share it with the other side to see if there are objections. So let's take that as an offer of the exhibit. We'll get a number for it and then let Mr. Johnson take a look at it.

MR. LOTHROP: Certainly.

JUDGE NOBLE: Maybe this afternoon we can deal with that.

MR. LOTHROP: Yes, Your Honor.

JUDGE NOBLE: Mr. Johnson will have to let me know if he has insufficient time.

MR. JOHNSON: I'm sorry, Your Honor?

JUDGE NOBLE: You'll have to let me know if that's insufficient time.

MR. JOHNSON: No, I think we can look at it. I'm not going to stipulate to its admission at this point.

JUDGE NOBLE: Yes. Redirect?

REDIRECT EXAMINATION

BY MR. JOHNSON:

Q. In response to Mr. Lothrop's question about Columbia River chum, you said that they are possibly a listed species. Assuming they are, would they be

1 considered or subject to the Section 7 ESA consultation
2 with the National Marine Fisheries Service?
3 A. Yes, they would.
4 **Q. And you said that you have some familiarity with**
5 **the, I'll call it for short the dilbit study related to**
6 **impacts on sockeye salmon.**
7 **Do you know if the exposure scenarios in that**
8 **study involved exposure in the spawning streams for**
9 **those salmon?**
10 A. I'm not sure where they did that also. But just
11 to be clear, there are impacts that have been identified
12 in the literature, and I think I've acknowledged that
13 there would be impacts. The question being asked is do
14 we have evidence that this would maybe extirpate the
15 local population or have a long-term population effect.
16 And that's not evident in the literature, it's not
17 clear.
18 MR. JOHNSON: Thank you. Nothing further.
19 JUDGE NOBLE: Council questions?
20 Mr. Snodgrass?
21 MR. SNODGRASS: Good morning.
22 Really just one question or a series of
23 questions on one issue, and that is your testimony today
24 before has focused on -- appropriately on discreet
25 events and what the science says about those impacts of

1 discreet events. And so I just -- I don't have any
2 background on any of this. I just wanted a sense of --
3 and this may require some kind of studies, but judgment
4 as well, about longer term events. You know, I'm just
5 speaking broadly.
6 Is it a fair assumption that as rivers
7 industrialize, including trafficking of oil -- (Court
8 reporter interruption.) Industrialize, including
9 trafficking of oil but also other commerce, that
10 overall, there are habitat and species impacts in the
11 river overall over a long period of time?
12 Is that a fair working assumption?
13 THE WITNESS: I think it's been a fair
14 assumption in our history. If you look at the
15 Willamette River history -- (Court reporter
16 interruption.) If you look at the Willamette River
17 history and as you urbanize and put more people into the
18 area, many years ago we weren't as knowledgeable as we
19 are today, we did a lot of damage.
20 But I think today, the regulation and laws
21 are such that -- and I'm involved in the Portland Harbor
22 CERCLA case -- is that hopefully that sort of thing
23 wouldn't happen again. The non-point runoff, meaning
24 the PAH that gets to the -- or other chemical that get
25 to the water from just all of us living here that runs

1 off the land, that's maybe a more difficult issue. But
2 from industry itself, I think the laws have changed and
3 it's getting better.
4 MR. SNODGRASS: So what I would understand,
5 then, is that, again, we're speaking obviously very
6 generally, that runoff is a bigger -- has been
7 historically a bigger contribution to the ecological
8 degradation of rivers as they industrialize?
9 THE WITNESS: I think historically a lot
10 from industry because there's discharge and things like
11 that were not regulated like they are now. And it's
12 kind of a combination of everything.
13 MR. SNODGRASS: Thank you.
14 JUDGE NOBLE: Mr. Challenger and
15 Mr. Snodgrass are a perfect storm for our court
16 reporter. (Laughter.)
17 Any other council questions?
18 Mr. Stone?
19 MR. STONE: Good morning. With respect to
20 Section 7 of the Endangered Species Act, Section 7
21 consultations occur among federal agencies when a
22 project has a federal nexus.
23 Does this project have a federal nexus?
24 THE WITNESS: I'm not sure. You mean the
25 federal government is proposing it?

MR. STONE: No, it means the federal government is involved as a permitting authority or financing source for the project.

THE WITNESS: I believe they would be the permitting authority for the Corps of Engineers.

MR. STONE: Right. So the area administered the Corps of Engineers with respect to their permit that they are required for the dock construction, it's my understanding that that permit only covers the very specific area around the dock structure itself and what that impact might have on salmon.

Is that your understanding?

THE WITNESS: I'm not exactly sure. I believe in the Fish and Wildlife concurrence letter they mentioned that they were considering the 100 some miles downstream, but I can't be positive.

MR. STONE: What about the 100 miles upstream?

THE WITNESS: I don't know.

MR. STONE: Okay. So you're not sure if the Corps of Engineers in their permitting activities considered the indirect effects of this project with respect to transportation of the oil to the terminal or from the terminal?

THE WITNESS: I'm not real sure.

1 MR. STONE: Okay, thank you.
2 JUDGE NOBLE: Other council questions?
3 Mr. Moss?
4 MR. MOSS: Thank you. I want you to help me
5 make sure my notes are accurate. I'm going to
6 paraphrase and you correct me if I'm wrong in that sense
7 and then I'll ask my question.
8 You testified briefly about the Bellingham
9 spill some years ago. I believe you said that was a
10 gasoline spill into a river or creek, I think it was
11 Whatcom Creek and Reserve. You said it was a
12 significant volume and it persisted for some period of
13 time.
14 My question is, what was that period of
15 time? I didn't get that.
16 THE WITNESS: Well, it actually is going to
17 have a shorter persistence because it's very light
18 product. But it did persist for the -- the fear was
19 that it happened in early June and there were salmon
20 returning end of August, and so we had a short window to
21 clean up as much as possible in the hopes to save
22 salmon. So I'm not aware of any long-term studies. We
23 negotiated a very fast NRDA settlement in that case, a
24 lot of projects, but the salmon ended up returning. And
25 persistence would be expected to be lower in that

1 gasoline.
2 MR. MOSS: Was it cleaned up in fact in time
3 for that return?
4 THE WITNESS: Yes. It was very quick. I
5 believe all the agencies and the Department of Ecology
6 would call that very much a success. It was a horrible,
7 tragic incident. And like I said, you'd rather not
8 break things and have to fix them, but you do what you
9 can.
10 MR. MOSS: I wasn't entirely clear on what
11 you mean when you use the phrase "no population impact."
12 Now, I'd like you to clarify that for me. For example,
13 does that mean if 50 percent of the population is
14 affected by an incident, is that a significant
15 population? Or is that a population impact or not?
16 THE WITNESS: Yes, I would be able to say
17 that you would be able to measure and observe that with
18 studies. And it's not to say there aren't meaningful
19 effects on numbers of organisms. What we're talking now
20 is this long -- and relative to the EIS, this long-term
21 population effect.
22 MR. MOSS: Yeah, I'm not a biologist, so
23 what I'm trying to understand is if there's some
24 threshold where something becomes -- considered to be a
25 population impact as opposed to something less than a

1 population impact.
2 THE WITNESS: The threshold, at least in the
3 field study or something like that, would be a
4 statistically significant difference. Which in a large
5 sample size it could be a small effect, it could be a
6 population. You can detect a small effect in the
7 population of samples.
8 MR. MOSS: Thanks.
9 JUDGE NOBLE: Other council questions?
10 Questions based on council questions?
11 MR. LOTHROP: I have none, Your Honor.
12 MR. KERNUTT: I have none either, Your
13 Honor.
14 JUDGE NOBLE: Mr. Johnson?
15 MR. JOHNSON: Nothing further.
16 JUDGE NOBLE: Mr. Challenger, thank you very
17 much for your testimony. You're excused.
18 The next witness is a completely different
19 subject and it's 11:40. So I'm not sure whether it
20 would be a good idea to proceed. We have a relatively
21 light schedule this afternoon, it seems.
22 Mr. Johnson, do you think that's accurate?
23 MR. KISIELIUS: I believe that's correct,
24 Your Honor. And actually, we're -- the next witness is
25 in the building but didn't expect this witness to go as

1 quickly so we're actually getting him here in the room.
2 JUDGE NOBLE: He's not here then?
3 MR. KISIELIUS: He's here in the building,
4 he's just not here physically in the room, so I
5 apologize. We can get him in here if we want to start,
6 but we can also break.
7 JUDGE NOBLE: We have a vote up here for a
8 long lunch. (Laughter.) So we'll be in recess until
9 1:00. Thank you.
10 (Lunch break.)
11 JUDGE NOBLE: Before we start there are a
12 couple of new exhibits. Not a couple, there are three
13 exhibits. And correct me if I'm wrong, the only one
14 that has been offered is 5332, and I don't recall that
15 1047 and 1048 have been offered.
16 MS. MARTIN: Maybe I should come up and
17 sneak in. Thank you very much. That has not yet been
18 offered. Those are exhibits that the parties have
19 stipulated to their admission, so the Port of Vancouver
20 would offer them now to be admitted.
21 JUDGE NOBLE: All right. It's my
22 understanding there's no objection to 1047 and 1048; is
23 that correct?
24 MS. MARTIN: That's correct, Your Honor.
25 JUDGE NOBLE: 1047 and 1048 are admitted.

1 So now let's deal with 5332, which was part of the basis
2 for some testimony we had this morning. And I would ask
3 if there's an objection to Exhibit 5332.
4 MR. JOHNSON: Yes, there is, Your Honor.
5 The exhibit was not offered by a sponsoring witness on
6 the part of CRITFC or any other tribal entities. It
7 wasn't offered then, they didn't lay a proper foundation
8 by attempting to use it through Mr. Challenger.
9 Mr. Challenger wasn't qualified to lay the foundation
10 for the exhibit. And it wasn't an impeachment exhibit
11 because, A, he testified he wasn't all that familiar
12 with it, and B, he testified that it wasn't inconsistent
13 with his ultimate conclusions. So we would object on
14 those grounds.
15 JUDGE NOBLE: Response?
16 MR. LOTHROP: Thank you, Your Honor.
17 This article was published June 20, 2016, in
18 the Journal of Environmental Toxicology and Chemistry,
19 so it came to our attention after we had prefiled
20 testimony, and in fact just very recently.
21 Mr. Challenger was familiar with its
22 contents, I think he testified accurately to its
23 contents. I believe it's relevant to the fish species
24 that are present in the Columbia River, and I think it
25 may be helpful to the council. It is a -- and apologies

1 to the council, we might have been able to offer this
2 through our witnesses but witness preparation takes
3 awhile, and at the time our witnesses testified we did
4 not have the opportunity to fully coordinate this with
5 them.
6 It's relevant. There are other studies like
7 this with regard to other species. I think it would be
8 helpful to the council. But I don't think this is a
9 dispositive issue one way or the other in this
10 proceeding. It is one more piece of evidence. But it
11 is relevant to sockeye. It is not pink salmon and it's
12 not tuna, it's not mahi mahi, it is sockeye salmon.
13 MR. JOHNSON: May I respond, Your Honor?
14 JUDGE NOBLE: Yes.
15 MR. JOHNSON: The problem is, and the reason
16 we have rules for admission of exhibits and we require
17 that they be admitted at the appropriate time and
18 through the appropriate witness, is so that the other
19 party has an opportunity to fully vet the exhibit,
20 prepare its witnesses to testify about it. And
21 undoubtedly, had we been made aware of the exhibit
22 through their witnesses, we would have had the
23 opportunity to do that, and we didn't.
24 And, you know, if this was published in
25 June, on June 20th, they had more than ample opportunity

1 to find the exhibit, work with their experts on it, and
2 have it admitted. But that didn't happen. And at some
3 point the rules of evidence require that if they had not
4 laid the proper foundation and had not properly admitted
5 the evidence it shouldn't be in the record.
6 JUDGE NOBLE: I understand all that. And I
7 need to ask you, are you saying, Mr. Johnson, that you
8 have not had ample opportunity to review Exhibit 5332?
9 MR. JOHNSON: No, but our experts haven't.
10 And, you know, we're in the last day or two of our
11 rebuttal case and that's when this exhibit was presented
12 to us. Had it been presented through one of their
13 witnesses during their case-in-chief which would have
14 been the appropriate time, we could have vetted it with
15 our witnesses, had them explain it, have them testify to
16 it. But that didn't happen and it's not going to happen
17 now. So we would object to the admission of the report.
18 JUDGE NOBLE: Well, I think it should happen
19 and I think that you should have additional time to
20 review it and review it with your witnesses. This
21 exhibit is not overly long, it's double-spaced. It can
22 be read, and your witnesses have shown deep credentials
23 for understanding this material. And so I will give you
24 some additional time to review it and present any
25 additional arguments you may have. We can deal with

1 this on Thursday morning. So I reserve ruling on this
2 until then.
3 But I do understand the arguments about the
4 late disclosure of it, and I'm not faulting the
5 opponents, I understand why this has come up and came up
6 in the course of the Challenger testimony. And
7 Mr. Challenger said he was familiar with it, so perhaps
8 you could have him review it and give you opportunity to
9 present any evidence about information in the potential
10 exhibit.
11 So on Thursday we will deal with this again,
12 but I will tell you that at this point I am inclined to
13 admit it unless you can give me some reason why I should
14 not. So part of my reasoning for that is the APA rule
15 on the admission of evidence. And I think that it does
16 appear, even from your own witness's testimony that it
17 is the kind of material that reasonably prudent persons
18 rely on in the conduct of their affairs.
19 And so that's what we're going to do with
20 that, reserving ruling on it.
21 MR. JOHNSON: Thank you.
22 JUDGE NOBLE: Are you ready to call your
23 next witness?
24 MR. KISIELIUS: Yes, Your Honor. The
25 applicant would like to recall Dr. Kelly Thomas.

1 JUDGE NOBLE: Dr. Thomas, I know that you
2 were sworn as a witness before but you're coming back
3 after being excused so I'd ask you to raise your right
4 hand.
5 J. KELLY THOMAS,
6 having been first duly sworn, testified as follows:
7 DIRECT EXAMINATION
8 BY MR. KISIELIUS:
9 **Q. Dr. Thomas, I'd like to ask you some questions**
10 **about the testimony of Ms. Linda Garcia, Dr. Ranajit**
11 **Sahu, and Mr. Robert Blackburn. Specifically -- well,**
12 **let me ask you, are you familiar with their testimony**
13 **about various facility incidents that they suggested**
14 **were analogous or representative of the risk of the**
15 **Vancouver Energy facility?**
16 A. Yes, I am.
17 **Q. I don't know that your microphone is on. There**
18 **you go.**
19 A. Sorry. Yes, I am.
20 **Q. Okay. I'm going to walk through each of the**
21 **three incidents and ask you a couple questions about**
22 **them.**
23 **First is one in Texas City. Ms. Garcia**
24 **identified a facility incident in Texas City from the**
25 **1940s. And from her testimony she said it was, quote,**

1 the biggest oil storage facility disaster in this
2 country. She said it held approximately the same amount
3 of oil in their storage tank and leveled everything
4 within a three-mile radius and flattened homes. She
5 said five miles out of the radius even destroyed many
6 things.
7 So I want to ask you, are you familiar with the
8 incident that she's describing?
9 A. Yes, I am.
10 **Q. And what did you review to become familiar with**
11 **that incident?**
12 A. Well, I was already familiar with the incident.
13 It's kind of a classic case study of ammonium nitrate
14 fertilizer explosions. But in preparation for this
15 testimony, I did review several texts on accidental
16 exposures in industrial accidents.
17 **Q. So is it accurate to characterize this**
18 **particular incident as a crude oil storage incident?**
19 A. No, it is not.
20 **Q. What actually occurred?**
21 A. So in 1947 the ship the Grandcamp was docked at
22 the Texas City port facility and was being loaded with
23 ammonium nitrate as well as other cargo. It was loaded
24 with approximately 2,200 tons of ammonium nitrate as
25 well as other cargo when a fire broke out in the hold of

1 the -- one of the holds of the ship. The captain
2 ordered that the holds be closed up, that the hatches be
3 closed, and that steam be applied to the hold in an
4 attempt to deprive it of oxygen. But that heated the
5 ammonium nitrate and lead eventually to an explosion.
6 The explosion threw pieces of the ship
7 approximately three miles that damaged everything in the
8 vicinity, caused a large wave to go onshore. It knocked
9 two light airplanes out of the sky that had been
10 circling above the ship. It killed firefighters that
11 were responding to the ship fire. It damaged five
12 chemical processing plants including the Monsanto
13 styrene plant -- (Court reporter interruption.) Sorry.
14 Monsanto styrene plant that was located essentially just
15 across the slip from the Grandcamp, and also caught on
16 fire at the storage tanks.
17 The damage was quite extensive. In fact, it
18 damaged another ship that was also loaded with ammonium
19 nitrate, the High Flyer. And the High Flyer had
20 slightly under 1,000 tons of ammonium nitrate on it and
21 it exploded the next day while it was being pulled out
22 of port.
23 **Q. You said that there were nearby oil storage**
24 **tanks that burned. Were there any reports of oil**
25 **storage tanks exploding?**

A. No, there were not.

Q. Okay. So is Ms. Garcia correct that the majority of the damage was from the initial explosion?

A. Yes, she is.

Q. Was that from the vessel?

A. That was from the Grandcamp, the ship, the ammonium nitrate explosion.

Q. So do you think that this particular incident that you've just described demonstrates or proves Ms. Garcia's assertion that an explosion at the storage tank facility would level the Fruit Valley neighborhood?

A. No, I don't think it supports it at all because the explosion involved ammonium nitrate, a ship carrying ammonium nitrate.

Q. Okay. And in your opinion, is the Texas City incident a good comparison for understanding the risks of the Vancouver Energy facility?

A. No, it's not. They're completely different. (Court reporter interruption.) No, it's not. They're completely different.

Q. And to confirm, did your study look at the risk of explosion at the facility?

A. Yes, it did.

Q. And could you remind us what your study concluded about the risk of explosion to offsite

1 populations?
2 A. The risk to the offsite population were well
3 below established risk tolerance criteria without
4 further prevention or mitigation systems.
5 **Q. And what about the risk to the Fruit Valley**
6 **neighborhood more specifically?**
7 A. That would be the same. The risk is well below
8 well-established risk acceptance tolerance criteria.
9 **Q. I know we've been talking about explosions here,**
10 **but did any of the facility risks create potential**
11 **problems for the Fruit Valley neighborhood?**
12 A. No. The risk to all offsite populations was
13 acceptable.
14 **Q. Let's switch incidents here and address the**
15 **issue of flashing that Dr. Sahu raised in his testimony.**
16 **And there's a specific incident that I want to talk**
17 **about that he referenced, but before we do that, can you**
18 **describe for us again, what is flashing? Maybe I'll**
19 **start with Dr. Sahu's testimony.**
20 **He said it was when vapor pressure is the same**
21 **as atmospheric pressure so the liquid transforms into a**
22 **vapor. And in the release scenario, that vapor cloud,**
23 **if it reaches an ignition source, turns into a vapor**
24 **cloud explosion. And sometimes those vapor cloud**
25 **explosions are abbreviated as VCE.**

1 So do you agree with his description of
2 flashing?
3 A. No, I don't.
4 **Q. Can you describe your understanding of flashing?**
5 MS. BRIMMER: Maybe Mr. Thomas can testify
6 to his understanding, but I have an objection to him
7 testifying to anything that is like a chemical or air
8 pollutant type description, because I don't think his CV
9 qualifies him to give expert testimony on those kinds of
10 issues.
11 JUDGE NOBLE: Response?
12 MR. KISIELIUS: Your Honor, Dr. Thomas
13 talks -- his background and his CV talk about his
14 experience, extensive experience addressing risks of
15 various types of facilities, not just crude oil storage
16 facilities but chemical processing plants. He's an
17 expert in precisely this topic and he's responding to an
18 issue that Dr. Sahu raised.
19 He will describe his familiarity with the
20 incident itself that we're going to address in a second.
21 But he's already demonstrated the expertise to address
22 the subject matter that he's testifying to.
23 JUDGE NOBLE: As to the risk he's
24 demonstrating his expertise?
25 MR. KISIELIUS: Correct. We're talking

about flashing as the chemical interaction, and his testimony is going to be to describe that phenomena.

JUDGE NOBLE: I'm going to sustain the objection and I'd ask that you move on to a question more akin to risk.

MR. KISIELIUS: Your Honor, if I might, the flashing incident is an incident of risk to which Dr. Thomas has already investigated this specific risk with respect to the facility. If I could at least -- if I could have an offer of proof to lay the foundation as to his ability to testify to this.

JUDGE NOBLE: Sure.

BY MR. KISIELIUS:

Q. Dr. Thomas, how are you familiar with the flashing phenomenon as it pertains to chemicals? Do you address that in your professional experience?

A. Sure. It was part of the consequence studies involving chemical processing facilities, one of releases that's of concern were releases --

JUDGE NOBLE: Dr. Thomas, I'm listening to you and I'm not able to hear you. You're talking in that direction and you're talking too fast.

THE WITNESS: I apologize.

So we do consequence evaluation studies and risk studies that involve chemical processing

1 facilities. And part of the scenarios that we look at
2 when we're evaluating chemical processing facilities are
3 releases that would flash. So I'm familiar with them,
4 I'm familiar with how we model them. Of course, I took
5 courses in school that dealt with thermodynamics and
6 physical chemistry which that embodies. (Court reporter
7 interruption.) Which embody that.
8 BY MR. KISIELIUS:
9 **Q. And, Dr. Thomas, when you conduct Quantitative**
10 **Risk Assessments for chemical processing facilities, is**
11 **this one of the issues that you assess?**
12 A. It is certainly a phenomenon that takes place,
13 and some of the releases, which are releases which
14 involve materials that are stored at pressure or below
15 their normal load, are subject to flashing if there's a
16 release.
17 MR. KISIELIUS: Your Honor, with that
18 foundation I'd like to proceed with some questions about
19 flashing so that he can then testify to one of the
20 incidents that one of the opponents' witnesses testified
21 to that we request the ability to rebut.
22 MS. BRIMMER: Your Honor, I'm going to renew
23 my objection. What he has elicited is testimony where
24 he looks at instances of flashing as a consequence that
25 he then does risk analysis on. The initial question to

1 which I objected was he was asking about how flashing
2 occurs, what is flashing. That is something Dr. Sahu is
3 an expert in, but I have not heard any expertise from
4 Mr. Thomas.
5 JUDGE NOBLE: I'll sustain the objection.
6 BY MR. KISIELIUS:
7 **Q. I'm going to ask you about the incident that**
8 **occurred, your expertise in reviewing consequences.**
9 **Dr. Sahu compared it to a facility explosion in**
10 **England, he talked about a flashing incident there. He**
11 **talked about one of the most destructive accidents, in**
12 **his words, that happened in England about 30 years ago**
13 **where something flashed for 45 seconds in a plant on a**
14 **Saturday, and nobody was there. Just a small leak in a**
15 **large pipe, and 45 seconds there was a vapor cloud**
16 **reaching the parking lot. When somebody started a car,**
17 **that was the ignition source, and 33 people died and the**
18 **whole facility was leveled. In his testimony he also**
19 **referred to it in a town called Farmsborough and later**
20 **clarified it did not include crude oil.**
21 **So I'm going to ask you, are you familiar with**
22 **that incident?**
23 A. I believe the incident he's referring to is the
24 Flixborough incident.
25 **Q. So is there not a Farmsborough incident?**

1 A. There's not a Farmsborough that I'm aware of in
2 the U.K. There's a Farmborough in the U.K. but it's in
3 the south of England but doesn't to the best of my
4 knowledge have petrochemical facilities associated with
5 it.
6 **Q. And did you look for evidence of a vapor cloud**
7 **explosion in Farmborough?**
8 A. I did. And I'm quite confident I would have
9 been aware of it had there been one there. But I did
10 nevertheless do a search and could not find one. And
11 one of that magnitude would be of historical proportions
12 and would be written up in the literature.
13 **Q. Given your area of expertise, your risk**
14 **assessment expertise on behalf of a variety of different**
15 **facilities, would there be a vapor cloud explosion of**
16 **that magnitude of which you would not be aware?**
17 A. I do not believe so.
18 **Q. So you referred to the Flixborough incident.**
19 **Why do you think that's the event to which Dr. Sahu was**
20 **testifying?**
21 A. The general contributes and parameters that he
22 assigned to the incident in Farmborough line up pretty
23 well with the Flixborough incident.
24 **Q. Let's talk about some of those key attributes.**
25 **Dr. Sahu stated that the event he was discussing**

occurred about 30 years ago.

When did the Flixborough incident occur?

A. Flixborough occurred in 1974, so it would be about 40 years ago.

Q. He said the incident occurred on a Saturday. What day of the week did the Flixborough incident occur?

A. Flixborough incident took place on a Saturday.

Q. He said the release went on for 45 seconds. How long did the release in Flixborough go before ignition?

A. There's been a variety of investigations on the Flixborough incident, and the short end of the range from those investigations would be about 30 seconds, on the long end of the range from those investigations would be about 90 seconds. So between 30 and 90 seconds.

Q. He said that there were, I think he said 33 people killed in that incident. How many people died in the Flixborough incident?

A. Twenty-eight.

Q. Okay. And he said that flashing played a role. Did flashing play a role in Flixborough?

A. It certainly did. It was a release of

1 cyclohexane from a temperature of 155 degrees C and a
2 pressure of 125 PSIG. Normal boiling point for
3 cyclohexane is 81 degrees C, so it was roughly 70
4 degrees C above its boiling point. So when the 20-inch
5 pipe failed, a large majority of the cyclohexane
6 vaporized, it flashed.
7 **Q. Okay. Sounds like you're familiar with that**
8 **incident. How are you aware of it?**
9 A. Well, I've been aware for an extended period.
10 It's kind of a classic case study in industrial vapor
11 cloud explosions. It also is one that's written up in
12 the American Institute of Chemical Engineers AICHE,
13 Chemical Process Safety, CCPS, textbook on vapor cloud
14 explosions, flash fires. That's a book that the company
15 that I work for -- (Court reporter interruption.) It's
16 a book that the company I work for, BakerRisk, authored,
17 and that I helped with.
18 **Q. I think if you lean into the microphone it may**
19 **help a bit.**
20 **So can you remind us again what was the chemical**
21 **involved in that incident?**
22 A. Cyclohexane.
23 **Q. Does the type of chemical involved in the**
24 **incident make a difference in the analysis of that**
25 **specific risk, flashing, that is?**

A. Absolutely, as does the conditions under which it's stored, as does the conditions outside of the release in terms of confinement and congestion when a vapor cloud is created. Whether it's just a flash fire or a vapor cloud explosion or a severe vapor cloud explosion is a function of confinement and congestion that the vapor cloud encounters.

Q. And what can you say about the vapor cloud -- risk of a vapor cloud from cyclohexane as compared to petroleum crude oil?

A. When cyclohexane is stored at elevated temperature and pressure, as was the case at the Flixborough incident, it poses a much larger hazard than crude oil stored at ambient or near ambient temperature.

Q. And, I'm sorry, does that mean it's more prevalent for cyclohexane or less?

A. It's poses a more -- when cyclohexane is stored at an elevated temperature and pressure point, it poses a much higher hazard in terms of the vapor cloud that would be created.

Q. And did your study look at the risk of this type of incident at the facility?

A. Our study looked at releases from throughout the facility under the conditions that are relevant to the crude oil being stored as well as the confinement and

1 congestion that's present at the site.
2 **Q. And can you tell us what your study concluded**
3 **about this risk?**
4 A. Well, with regards to offsite risk, as we talked
5 about before, the offsite risk --
6 MS. BRIMMER: Your Honor, I've been allowing
7 this because Mr. Sahu did throw this out as an example,
8 although I only remember one at the time. But this is
9 not an entrance point to elaborate on the original risk
10 testimony. Mr. Sahu -- Dr. Sahu didn't talk about risk.
11 Risk isn't his expertise. He didn't purport to offer
12 any testimony on risk. He was here as an air quality
13 expert and a permitting air quality expert.
14 There was in fact no risk testimony beyond
15 people having these examples to illustrate other points
16 of their testimony. So this doesn't really seem like
17 rebuttal anymore, it seems like another bite of the
18 apple with respect to direct testimony.
19 MR. KISIELIUS: May I respond?
20 JUDGE NOBLE: Yes. That's why I'm looking
21 at you.
22 MR. KISIELIUS: Thank you. Dr. Sahu, it is
23 correct, is an air emissions expert, does not have the
24 same qualifications to address this risk. Nevertheless,
25 he testified about the risk of flashing and explosions.

1 If they're willing to withdraw that testimony then we
2 don't need to proceed. But if they didn't elicit that
3 testimony from him, that wouldn't have put us in the
4 position of needing to rebut it. Dr. Sahu testified to
5 the risk of flashing and explosion.
6 JUDGE NOBLE: Right, but he testified to it
7 from a scientific point of view. I thought this witness
8 was going to be talking about relevant risk, the danger
9 of risks. He's actually already testified that it isn't
10 comparable to a crude oil situation, which seems to
11 exhaust the subject, but --
12 MR. KISIELIUS: Your Honor, if I might, the
13 implication of Dr. Sahu's testimony was that there was a
14 risk of this event occurring. And this is the expert
15 that can respond to that and explain from a technical
16 scientific risk analysis standpoint why it is not. And
17 that's what we're trying to do is respond and rebut.
18 JUDGE NOBLE: I see that, but I think that
19 you're extending this witness into a scientific area
20 that he doesn't have qualifications to testify about.
21 He does have ample qualifications to testify about
22 various risk situations. The science behind the
23 explosions he's describing has already been described
24 sufficient for him to testify further about his
25 expertise which would be risk.

1 So I'm sustaining the objection and I'd ask
2 you to move on.
3 MR. KISIELIUS: Okay.
4 BY MR. KISIELIUS:
5 **Q. From the basis of the standpoint of risk**
6 **assessment, is the Flixborough incident a good**
7 **comparison for understanding the risks of the Vancouver**
8 **Energy facility?**
9 A. No, it's not. The risk associated with loads
10 stored well above its boiling point under pressure and
11 subject to flashing and creation of a large vapor cloud
12 from that is not comparable to the risks associated with
13 crude oil stored at air ambient temperature.
14 **Q. I would like to switch to the third incident and**
15 **talk about the other U.K. facility incident that the**
16 **opponent witnesses have discussed.**
17 **Are you familiar with Mr. Blackburn's testimony**
18 **about the facility incident in Hertfordshire, England?**
19 **It was one that he relied on to establish a maximum**
20 **foreseeable loss.**
21 A. Yes, I am.
22 **Q. How are you familiar with that incident?**
23 A. I personally investigated the incident that's
24 being referred to which is the Buncefield explosion. I
25 went to the Buncefield facility that was involved in the

1 investigation.
2 **Q. When you say you were involved in the**
3 **investigation, what does that mean?**
4 A. I was retained by Total -- (Court reporter
5 interruption.) Total, T-o-t-a-l, to investigate the
6 incident in terms of cause and origin.
7 **Q. Okay. And in response to questions from**
8 **Mr. Siemann, Mr. Blackburn characterized it as a**
9 **crude-by-rail incident. Do you agree?**
10 A. I do not. The Buncefield terminal didn't have a
11 rail. Product is fed in by a pipeline, product leaves
12 by pipeline and by truck, and the tank involved in the
13 incident contained gasoline.
14 **Q. And can you tell us what happened in that**
15 **incident?**
16 A. Yes, I can. A transfer of gasoline was being
17 made to one of the tanks from a remote refinery in
18 Essex. Transfer was underway at night. Around 3 in the
19 morning, the level indication in the tank indicated to
20 the operators that the transfer had stopped. In fact,
21 it had not stopped. Transfer continued. Around 5:30 in
22 the morning the tank overflowed. A cloud of gasoline
23 mist and vapor was created, and around 6:00 that cloud
24 was ignited.
25 The cloud encountered a very severe high-level

1 congestion in the form of trees in the nearby vicinity.
2 These wouldn't be trees that you would look out a window
3 and see, these are trees that were created, and created
4 a visual screen around the facility. The technique is
5 called coppicing -- (Court reporter interruption.) I
6 may misspell it, but it's c-o-p-p-i-c-e-d. So it
7 involves cutting the trees repeatedly when it's young to
8 create many trunks and branches so that you get a visual
9 screen.
10 But that causes a high degree of congestion and
11 a high degree of -- high degree of congestion can be
12 found in a pipe rack or refinery or a terminal plant.
13 And that visual screen then is kind of like a hedgerow,
14 you've seen those, allow the flame to accelerate to a
15 very high flame speed and cause the significant vapor
16 cloud explosion as a result.
17 **Q. And is this an accurate comparison of the risk**
18 **you might expect from the Vancouver Energy facility?**
19 A. No. Again, it's the presence of that very high
20 level of congestion that really allowed the flame speed
21 to be generated. The tank involved a gasoline tank
22 being filled remotely by pipeline.
23 **Q. And so just to be specific, what can you say**
24 **about the differences about the product involved in the**
25 **incident as compared to what we're talking about here?**

A. Sure. Gasoline is generally more volatile than crude oil and less viscus. It's easier to form a mist.

Q. And then what about the opportunities for vapor cloud congestion; did you look at those as part of your study?

A. Sure. As part of our QRA we looked at the confinement and congestion that's actually present on the site of the proposed terminal here, the proposed facility at the terminal. And we have nothing remotely approaching the level of congestion that was present at Buncefield.

Q. And in your QRA, are these parameters important in understanding the risk profile of the facility?

A. Certainly.

Q. To your understanding, are there operational and design differences between Hertfordshire and Buncefield, I guess, and the Vancouver Energy facility that would speak to the likelihood of a vapor cloud explosion?

A. Well, certainly the product that's being handled, crude oil versus gasoline, is different. It's not being fed by remote pipelines and essentially in an unmanned operation where the people involved with the transfer or in the control room are not looking at anything.

As far as the specifics of how the tanks are

1 configured, I can't speak to that.
2 **Q. In your opinion, is the Buncefield incident a**
3 **good comparison for understanding the risks of the**
4 **Vancouver Energy facility?**
5 A. No, I do not believe it is.
6 **Q. Let me ask you some general questions about the**
7 **use of these specific incidents.**
8 **Is the reliance on a handful of examples a good**
9 **way of assessing the risks presented by this facility,**
10 **from your standpoint?**
11 A. No, particularly --
12 MS. BRIMMER: Objection. I think that
13 mischaracterizes the situation. No one is relying on
14 these as an example. He's been asked about the specific
15 examples as compared them to this situation, but I don't
16 think there's been a characterization in the opponents'
17 case that these examples represent anything.
18 JUDGE NOBLE: I'll overrule the objection.
19 I think it's a fair question. You may answer.
20 THE WITNESS: And I apologize, could you
21 repeat the question?
22 BY MR. KISIELIUS:
23 **Q. I can ask it again if that's helpful.**
24 **What do you think about the use of a handful of**
25 **facility incidents as a way of assessing the risks**

1 presented by this specific facility?
2 A. No, I think the better way is to look at the
3 actual facility of interest and its attributes and
4 characteristics. These examples, as I said, are not
5 directly applicable to the oil storage terminal.
6 **Q. And is that what you did with your QRA?**
7 A. Yes, it is.
8 **Q. More generally, there's been some criticism from**
9 **some of the opponents that risk science like this is**
10 **somehow different than real world events.**
11 **How do you respond to that criticism?**
12 A. I think we account for real world events in our
13 Quantitative Risk Assessment but we pair them with the
14 appropriate frequencies to place them properly in the
15 risk space.
16 **Q. And so in your opinion, which is the most**
17 **accurate way to assess risk at the facility?**
18 A. I feel the risk to the facility is best assessed
19 by doing a Quantitative Risk Assessment on this specific
20 facility of interest.
21 **Q. I'm going to switch subjects now and ask a**
22 **couple questions to start.**
23 **Does BakerRisk help its clients assess insurance**
24 **needs for industrial facilities?**
25 A. Yes, we do.

1 **Q. And are you familiar with the methods that**
2 **BakerRisk uses in assessing insurance needs of the**
3 **industrial facilities?**
4 A. Yes, I am.
5 **Q. How are you familiar with those mechanisms?**
6 A. We have an insurance risk engineering team at
7 BakerRisk that works with the development of the
8 software that is used for that purpose. I've discussed
9 on a number of occasions the methodologies and
10 approaches that are used to perform the insurance risk
11 engineering. I myself do not perform insurance risk
12 engineering service.
13 **Q. But you developed the software that they use?**
14 A. Yes, I've worked on it.
15 **Q. How many -- so what's the end product of the**
16 **insurance assessment that BakerRisk does?**
17 A. It's an evaluation of maximum estimated loss
18 that can take place in terms of damage to that facility,
19 in terms of business interruption.
20 **Q. Okay. And how many insurance risk engineering**
21 **surveys does BakerRisk do?**
22 A. On average, we do about 65 a year.
23 **Q. And do you do any for crude oil storage tanks?**
24 A. Yes, we do.
25 **Q. And are you familiar with the range of coverage**

1 that you have assessed for these types of facilities?
2 A. Sure. I actually looked at the last five or six
3 that we did. They ranged in capacity from about a
4 million barrels up to 16 million barrels in terms of the
5 size of the facility.
6 **Q. And what was the range of the insurance for**
7 **those types of facilities?**
8 A. Maximum estimated losses were in the range of
9 about 30 million to about 130 million. Obviously the
10 lower end of that tended to be facilities that were well
11 designed and smaller capacity. The larger of that range
12 tends to be facilities that have some design issues and
13 are of larger capacity.
14 **Q. And how does the size of the Vancouver Energy**
15 **facility fit in that spectrum?**
16 A. So the proposed facility is a little over two
17 million barrels, so it's on the low end of the one- to
18 16-million-barrel range.
19 **Q. And in your estimation what does that mean about**
20 **where that would fit, where this facility would fit in**
21 **terms of insurance needs?**
22 MS. BRIMMER: Objection, Your Honor. This
23 witness has said that he does not perform the insurance
24 analysis, so I think we just reached the end of his
25 expertise.

1 MR. KISIELIUS: Your Honor, he just
2 testified that he helped design the software that they
3 use in facilitating and assessing insurance needs for
4 their clients. He's testified that this is part of the
5 regular service that his company provides as the service
6 to their customers, and he's testified to the research
7 he's done on insurance needs at analogous facilities.
8 MS. BRIMMER: Your Honor, he said he helped
9 with the design and building of the software, and he
10 specifically said he does not perform insurance
11 analysis.
12 JUDGE NOBLE: Well, again, I think that it's
13 a fair question. And it does seem to be part of his
14 expertise, although I don't think he's going to be going
15 too far into the insurance testimony since he does not
16 do insurance analyses. Is he?
17 MR. KISIELIUS: No, Your Honor. This is the
18 last question on the insurance analyses. I was going to
19 explore further his experience in terms of ranges of
20 insurance from matters he's been personally involved in.
21 JUDGE NOBLE: All right. I'll overrule the
22 objection. You may answer.
23 THE WITNESS: You'll have to ask the
24 question again, I'm sorry.
25 BY MR. KISIELIUS:

1 **Q. So you had talked about a range of insurance**
2 **needs for facilities that corresponded roughly to the**
3 **range in size. And I was asking in order of magnitude**
4 **where the Vancouver Energy facility fit in, and you**
5 **testified to the lower end in terms of the size.**
6 **My question was, what does that suggest to you**
7 **about where the insurance needs would fit in for that**
8 **particular facility?**
9 A. Thank you. I would expect that to be on the
10 lower end of the range, so down towards 30 million.
11 **Q. And I think you testified about the range of the**
12 **insurance and what it actually covers when you were**
13 **talking about that 30 to 130 million range.**
14 **Could you explain that again?**
15 A. Sure. Our insurance risk engineering surveys --
16 (Court reporter interruption.) Our insurance risk
17 engineering surveys are focused on a loss of capital and
18 trying to settle the damage to the plant as well as the
19 business interruption associated with it. So capital
20 loss to the plant and business interruption.
21 **Q. And so not any sort of offsite damage?**
22 A. No. It's onsite loss focused.
23 **Q. Can you use your QRA to assess insurance needs**
24 **for offsite risks?**
25 A. It's difficult, but our Quantitative Risk

Assessment for this facility looked at risks associated with offsite fatalities. The societal risk we had offsite was on the order of 5E to the minus 9 per year for fatality, so a little less than one in 100 million years. If you want to be conservative, you could say you wanted to insure against a loss of life. If you want to be really conservative you can say you want to ensure against the financial equivalent of two loss of life.

Q. And are you familiar from your work with ranges of dollar figures associated with damage for loss of life?

A. I'm familiar with legal cases that I and others BakerRisk have been involved with, yes.

Q. So being insensitive, what is the dollar figure that typically you've seen in the work that you've done that's been associated with risk of -- or damage with loss of life?

A. So it varies with the nature of the fatality and the locality and case specifics, but in the range of 10- to $20 million is the legal liability that corresponds to typical jury awards for loss of life.

Q. You said conservative, one or maybe two people. Can you translate that again into figures?

A. So that would be 10- to $40 million if you

1 wanted to be conservative.
2 MR. KISIELIUS: I have no further questions
3 for you, thank you.
4 JUDGE NOBLE: Cross-examination?
5 CROSS-EXAMINATION
6 BY MS. BRIMMER:
7 **Q. Hello, Mr. Thomas. My name is it Janette**
8 **Brimmer, I represent some of the opponents.**
9 **Are you familiar with a Texas City refinery**
10 **explosion in March of 2005?**
11 A. The BP Texas City?
12 **Q. Texas City refinery explosion in March of 2005.**
13 **I don't recall if it was BP.**
14 A. I believe that would be the BP Texas City ISOM
15 unit. (Court reporter interruption.) ISOM, short
16 acronym for isomerization.
17 **Q. And in that incident workers were killed?**
18 A. Yes.
19 **Q. And there were injuries to well over a hundred**
20 **other people associated with that incident?**
21 MR. KISIELIUS: Your Honor, I'm going to
22 object. Your Honor?
23 JUDGE NOBLE: Repeat the question and then
24 tell me the objection.
25 MS. BRIMMER: My question was asking

1 Mr. Thomas some specifics that he recalled that there
2 were over a hundred other people injured in association
3 with this event.
4 JUDGE NOBLE: And your objection?
5 MR. KISIELIUS: Relevance. We brought
6 Mr. Thomas back because we've had multiple examples of
7 what he's testified to as irrelevant things that
8 opponents have assessed are comparable. He's testified
9 that they're not. They're irrelevant. She's now asking
10 questions about a refinery incident which is unrelated
11 to the risk profile of the crude oil storage facility.
12 MS. BRIMMER: Your Honor, they're
13 questioning Ms. Garcia's fears of similar incidents.
14 She's talked about a Texas City refinery -- or a Texas
15 City explosion. They offered some rebuttal that maybe
16 she was misremembering that. And I'm inquiring as to
17 whether that's perhaps the incident that got confused,
18 that confused it. And he did say that he knows about
19 that incident.
20 MR. KISIELIUS: Your Honor, if I might
21 respond. She clearly said the event was in the early
22 1940s. Ms. Brimmer is now asking questions about a
23 refinery incident in 2005. They're expanding the list
24 of things.
25 JUDGE NOBLE: The general nature of this

1 testimony is the comparability of different incidents
2 that have occurred, and your witness has been explaining
3 the differences and why they're not relevant to
4 Vancouver Energy Distribution Terminal. This is another
5 question about another facility. It's right along the
6 same lines as the testimony you were eliciting, although
7 a different facility, as I understand it.
8 So it's a fair question and it's relevant to
9 what he's been saying, and I'm going to overrule the
10 objection.
11 BY MS. BRIMMER:
12 **Q. And you do recall that it injured over a hundred**
13 **other people?**
14 A. I don't recall that. But I don't disagree that
15 that was the case. So I'm not -- just to be clear, I'm
16 sorry, I'm not telling you that you're mistaken. I'm
17 just telling you I don't recall how many people were
18 injured.
19 But there were quite a few people in the
20 vicinity of the process unit. The unit next to it, and
21 I forget the unit designation next to it, was undergoing
22 turnaround -- (Court reporter interruption.) The unit
23 next to it was undergoing turnaround so they were
24 undergoing major maintenance, so they had portable light
25 wood trailers in to support that, as well as tents. And

all of the workforce for that turnaround was essentially being housed, officed, staged between the unit that was being worked on and the ISOM unit. We as an industry --

Q. That isn't my question, Mr. Thomas.

A. Sorry?

Q. You have to wait for a question to be in front of you. The question was the number of people that were injured, and I think you answered that.

A. I thought you were asking about if I was familiar with the incident.

Q. I asked about specific details. Thank you.

A. I apologize.

Q. That's okay. And I just want to confirm that that incident was in Texas City.

A. Yes, ma'am, it was at the -- the incident you're referring to, I believe, was at the BP Texas City refinery. It's no longer owned by BP, it's now owned by Marathon, Marathon Galveston Bay Refinery.

Q. Thank you. I want to turn to a more general question about the incidents that have been discussed in your rebuttal testimony today.

Is it fair to say that these are accidents?

A. Certainly.

Q. And that, for example, with the incident in the U.K., I think we called it the Buncefield incident as an

1 example, there are miscommunications or mistakes that
2 get made that result in accidents?
3 A. I would certainly say that some accidents are
4 caused by miscommunications, or the other factor you
5 said was mistakes.
6 **Q. And sometimes those have very serious results?**
7 A. They can be.
8 MS. BRIMMER: Nothing further, Your Honor.
9 JUDGE NOBLE: Redirect?
10 MR. HALLVIK: No questions.
11 REDIRECT EXAMINATION
12 BY MR. KISIELIUS:
13 **Q. Dr. Thomas, I have just a couple questions for**
14 **you.**
15 **Ms. Brimmer was asking you about a 2005 Texas**
16 **City incident. Did you say that was a refinery?**
17 A. I'm sorry?
18 **Q. Did you say that was at a refinery?**
19 A. BP Texas City refinery.
20 **Q. And does a refinery present the same risk**
21 **profile as a crude oil storage terminal?**
22 A. No, it does not.
23 **Q. So would you say that's an accurate comparison**
24 **for assessing the risk at the Vancouver Energy terminal?**
25 A. No, it is not.

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1 MR. KISIELIUS: No further questions.
2 JUDGE NOBLE: Council questions?
3 Mr. Shafer?
4 MR. SHAFER: Dr. Thomas, thank you very much
5 for your testimony today. One question.
6 You're familiar with the City of Vancouver.
7 Would you say that this project constitutes the largest
8 threats of a facility incident within the City of
9 Vancouver, or might you be aware of other facilities
10 that would be, say, comparable and that magnitude?
11 THE WITNESS: I apologize, but I have to
12 confess complete ignorance to what other facilities are
13 present in the City of Vancouver. I simply didn't look
14 at that. I didn't know that was --
15 MR. SHAFER: I'm just trying to scale where
16 might this fit in terms of other industrial sites or
17 other facilities within the city.
18 THE WITNESS: I apologize, I don't know what
19 other industrial sites are in the facility so I can't
20 rank this for you.
21 MR. SHAFER: Okay, thank you.
22 JUDGE NOBLE: Mr. Snodgrass?
23 MR. SNODGRASS: Good afternoon. Just a
24 couple of questions. And one I guess just following up
25 on the monetary value of your experience in loss of life

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1 cases.
2 Is knowing -- is estimating potential loss
3 of life and the work you do an important aspect in
4 obtaining insurance for your clients?
5 THE WITNESS: So I think the way that you
6 asked that question, the answer would be no. Our
7 insurance risk surveys are focused on the loss of
8 capital and business interruption to the facility. So
9 we're normally not being asked from an insurance
10 perspective about loss of life.
11 MR. SNODGRASS: Okay, thank you.
12 The other question that somewhat related was
13 back to the FN curves, and I don't want to spend too
14 much time on that because I know your prior testimony,
15 but I just want to make sure I'm understanding
16 correctly.
17 So in looking at the offsite FN curve in
18 the -- in your May 2016 QRA, I just want to make sure I
19 understand the tolerable range. It looks like that the
20 tolerable range for a single fatality is 1E to the minus
21 4 in figure ES2. That's one in 10,000; is that right?
22 THE WITNESS: Can I come look at what you're
23 looking at?
24 MR. SNODGRASS: Sure.
25 MR. KISIELIUS: Your Honor, if it would

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1 help, I have a copy of his report that he can look at.
2 THE WITNESS: I should have asked if it was
3 all right. I apologize.
4 JUDGE NOBLE: Let your counsel show you.
5 THE WITNESS: Sorry. And you said you were
6 looking at Figure ES2?
7 MR. SNODGRASS: Correct, yes.
8 THE WITNESS: Yes. And so your question
9 was?
10 MR. SNODGRASS: The upper limit of the
11 tolerable range, I just want to make sure I'm getting it
12 right. It looks like at a level of one fatality, it
13 looks like it's 1E to the minus 4?
14 THE WITNESS: Yes, sir.
15 MR. SNODGRASS: In any given year that
16 there's a one in 10,000 chance of that fatality
17 occurring; is that right?
18 THE WITNESS: Yes.
19 MR. SNODGRASS: Okay.
20 THE WITNESS: And that would be the upper
21 range. But that would suggest if you were below that
22 range but above one in a million, it would suggest you
23 should be considering additional preventive and
24 mitigative systems to the degree practical and cost
25 effective to implement that to try to ride it down below

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one in a million.

MR. SNODGRASS: I guess just a general sense of how much -- you indicated it was essentially from the U.K. and that there wasn't necessarily U.S. governmental standards behind that but it was widely accepted by industry here; is that --

THE WITNESS: Yes.

MR. SNODGRASS: By industry, I guess what industries?

THE WITNESS: Petrochemical, refining, fertilizer production. Those are the major three industries we work with. It may be used by others but I'm not aware of that and can't identify other industries for you.

MR. SNODGRASS: Okay. You may have answered the question then.

Do you know, if you don't know what they are, are there other standards used by other industries in this country along those lines?

THE WITNESS: I'm aware of no other standards that are different from this that are used by U.S. industries. But I do have to allow it's possible that could be the case.

MR. SNODGRASS: Okay. Last question, I guess, was just by in conducting QRA work, is there any

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1 accounting for unknowns?
2 THE WITNESS: Yes, in the sense that what
3 we're using, for instance, for leak probability or
4 historical numbers that reflect FNs, that is, we're
5 looking at the past in terms of what has happened and
6 we're to express leak frequencies for piping, for tanks,
7 for pumps, for different types of equipment. And that
8 wraps up what's happened.
9 MR. SNODGRASS: Okay. So essentially no
10 unknowns; is that fair to say?
11 THE WITNESS: Say that again?
12 MR. SNODGRASS: No unknowns? The broader
13 question behind this is that although it's a refinery
14 incident, and I appreciate that refineries are more --
15 my understanding is they're more dangerous and complex
16 than this, there was earlier testimony about the
17 incident that led to some fatalities at the Anacortes
18 Tesoro facility, and the testimony is that the response
19 was the industry didn't know about this.
20 And so I took that to be -- there wasn't a
21 lot of iteration on that, but I took that to be it
22 wasn't a failure of communication or use of equipment
23 but it was a phenomenon that occurred as an industry
24 that was not previously understood.
25 Is that your understanding?

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1 THE WITNESS: I'm not familiar with that
2 incident.
3 MR. SNODGRASS: I guess less probing that
4 incident, more -- I would assume the unknown unknowns
5 are less in a facility like this than a refinery but
6 that it's still a complex facility with multiple points
7 of transfer over a broad arena of combustible substance.
8 Is there any portion of the risk analysis
9 that somehow considers these kind of unknown unknowns?
10 THE WITNESS: Sometimes I'm a bit slow but I
11 understand your question now. I apologize for making
12 you ask it three times.
13 So certainly facilities that are being
14 commissioned that involve brand-new processes and
15 brand-new chemistry, that's a pretty serious
16 consideration in terms of the level of conservatism you
17 need to layer in to cover that. The more well-known the
18 operations are the less relevant that becomes.
19 Certainly the storage and transfer of crude
20 oil is pretty well-established technology. However,
21 that being said, we do maintain margins of conservatisms
22 in our analysis and in order to provide some packing.
23 For instance, in the curves you're referring to, if
24 you're referring to the onsite one, you would see that
25 we exceed that lower risk tolerance criteria to

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1 primarily due to flash fire events in the rail loading
2 area.
3 Well, the way we've calculated it, we're not
4 taking into account that, for instance, people would
5 probably be wearing fire-retardant clothing, not taking
6 into account that there would be flammable gas detectors
7 that would warn non-essential personnel -- (Court
8 reporter interruption.) Not taking into account
9 flammable gas monitors that warn people that weren't
10 required for the immediate emergency response to
11 immediately vacate the area.
12 We don't take credit for the fact -- and I
13 don't know how they're really configured, but we would,
14 if we were taking credit for it, probably an interlock
15 that when flammable gas petro goes off, it stops any
16 transfer. There's probably electronic stops for -- or
17 emergency stops, rather, for the operators that push the
18 alarm. They don't take credit for that in our base risk
19 analysis.
20 If we get to the point that people are
21 looking at specific prevention mitigation steps, then we
22 would begin to take into account to show them what level
23 of risk reduction would be credited for those.
24 So we do maintain some conservatism for how
25 we push the analysis but not as much for technology

1 that's fairly well known, say some new oxidation
2 chemistry.
3 JUDGE NOBLE: Other council questions?
4 Mr. Moss?
5 MR. MOSS: Thank you. You talked about, I
6 believe the turn of phrase was "acceptable risk
7 tolerance standards."
8 THE WITNESS: Risk tolerance criteria, yes.
9 MR. MOSS: Okay. Is the focus in that on
10 the probability of explosion or its consequences?
11 THE WITNESS: Both. It's focused on the
12 risk, essentially the product of the consequences and
13 the frequency at which those consequences come to pass.
14 MR. MOSS: While you and Mr. Snodgrass
15 apparently have a more sophisticated understanding of
16 this than I do, did I understand you to say a moment ago
17 that the standard you want to strive for is one death in
18 a million, a probability of one in a million of a single
19 death?
20 THE WITNESS: It was looking at the FN
21 curves, technically it's the cumulative frequency of all
22 events that would cause a death should be less than that
23 frequency.
24 MR. MOSS: That's what you want to aim for
25 is one in a million?

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1 THE WITNESS: Yes.
2 MR. MOSS: Okay, thank you.
3 THE WITNESS: And I should clarify, sir.
4 For offsite populations. The criteria for onsite
5 populations is higher, the idea being that if you come
6 to work at the facility, you're understanding that
7 you're going to be exposed to a higher level of risk
8 than somebody in the general population.
9 MR. MOSS: You anticipated my follow-up and
10 answered my question.
11 THE WITNESS: No, I was afraid I may be
12 misleading.
13 MR. MOSS: That's fine.
14 JUDGE NOBLE: Mr. Siemann?
15 MR. SIEMANN: Good afternoon.
16 You mentioned that there are -- if I
17 understand correctly, you mentioned that there are two
18 different types of risk analysis. One is that you did
19 the QRA, and there's a separate one in your agency or in
20 your organization which is the insurance risk; is that
21 correct?
22 THE WITNESS: Yes, sir.
23 MR. SIEMANN: And those are done separately,
24 because I understand you don't involve yourself in the
25 insurance risk aspect.

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1 Is it possible that the outcomes of those
2 two analyses would be different?
3 THE WITNESS: To some degree it's expected.
4 The insurance risk engineering task is much, much
5 simpler than QRA and the time spent with it is much,
6 much less. They're looking only at what they consider
7 to be likely major events as opposed to trying to look
8 for all events like we do in the QRA.
9 So from the insurance risk engineering
10 survey of crude oil and storage facility, the insurance
11 risk engineering folks would never consider a vapor
12 cloud explosion. They would consider it much too
13 unlikely to worry about it. Whereas, in the QRA we
14 include those type of events. But we just -- you know,
15 we look at the specifics of the facility to determine
16 where that really falls out in terms of risk.
17 In the insurance risk engineering world you
18 just say, well, that's not going to happen so I'm not
19 going to worry about it.
20 MR. SIEMANN: So in your experience -- and I
21 think I know the answer to this question but I'm going
22 to ask it anyway. In your experience, which version
23 comes up with a higher level of risk typically?
24 THE WITNESS: To a certain degree it's kind
25 of apples and oranges. One is just what's the financial

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1 risk the company is running in terms of loss of capital
2 and business interruption, and hence, what should they
3 be getting insured for and what would the insurance
4 market basically demand that they buy insurance for.
5 If the company tries to buy insurance for
6 half that much, well, then the insurance companies are
7 going to really charge them a higher rate for that.
8 Because the insurance company will believe we couldn't
9 see a loss like this, therefore if they're only insuring
10 for that, you know, we could get hit with that multiple
11 times. Whereas, the QRA is really focusing on life. So
12 to a certain degree it's really apples and oranges, and
13 I can't give you a direct, which says there's more risk.
14 In this particular case for this particular
15 facility, the QRA is saying there's more risk because
16 we're considering things like vapor cloud explosions
17 that the insurance risk engineer is just going to sweep
18 to the side and say it's too low of a probability to
19 worry about.
20 MR. SIEMANN: Thank you.
21 JUDGE NOBLE: Mr. Rossman?
22 MR. ROSSMAN: Following up on those
23 questions, when you were last here I think we talked
24 about some types of risk that were out of scope like a
25 seismic event exceeding the design capability of the

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1 facility.
2 THE WITNESS: Yes, sir.
3 MR. ROSSMAN: Would the insurance risk
4 assessment take those into account?
5 THE WITNESS: I don't believe we've ever
6 factored that into an insurance risk engineering survey.
7 I can't say categorically since I'm not involved with
8 them every day, but I'm involved in the calculation
9 methodology, and that's never come up as anything that
10 would be input into the models.
11 So with a pretty high level of confidence,
12 no. But I would have to make allowance for some client
13 at some place at some time may have asked that question
14 and I'm just unaware of it.
15 MR. ROSSMAN: Would your risk models factor
16 in the types of events that led to the two large
17 explosions that you talked about like a sensor failing
18 and the tank overflowing?
19 THE WITNESS: So we do have scenarios where
20 we drain an entire tank, dig a hole and let all the tank
21 inventory come out.
22 MR. ROSSMAN: I'm sorry, does that go to the
23 consequences that would then happen if that were to
24 happen or the likelihood of that happening in the first
25 place?

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1 THE WITNESS: So it's based on historical
2 information on loss of contents from tanks is where the
3 frequency comes from. So it factors loss of tank
4 contents for a variety of reasons; tank failure, tank
5 overfilling, failure of a flange connected to the tank.
6 All those causes are wrapped up in historically what has
7 happened, and historically what has happened is the
8 basis for the frequency is for the tank.
9 MR. ROSSMAN: So if I understand correctly,
10 you do modeling of what's going to be built at the
11 facility and think about the failure rates of those
12 various different components?
13 THE WITNESS: Yes. We're specifically
14 considering the tanks that would be there, the equipment
15 that's going to be at the facility.
16 MR. ROSSMAN: Okay. I'm wondering if
17 there's other dimensions of risk like seismic that are
18 just sort of fundamentally out of scope of your
19 analysis. And I would assume like an intentional
20 sabotage or an act of terrorism would be outside the
21 scope of your analysis?
22 THE WITNESS: Yes. Similarly, there are
23 things that could happen that we don't account for.
24 Maybe we have a micrometeorite strike the tank. We
25 don't include that. We could have a -- I'm sure there's

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1 things like that. I would say that, you know, when we
2 look at tank failures, historically they've happened and
3 so we're representing that rate in our analysis.
4 Whether other things could happen like terrorism, yes.
5 MR. ROSSMAN: So your analysis would include
6 past tank failures that have have been caused by an
7 earthquake but not modeling the probability of an
8 earthquake on this site?
9 THE WITNESS: No, I wouldn't say that. I
10 think that would be misleading. I am pretty sure that
11 the database of tank failures upon which the tank
12 failure frequency is based does not include seismic
13 failure.
14 MR. ROSSMAN: Can you say more about the
15 parameters of the data sets that are included in the
16 basis of the risk analysis?
17 THE WITNESS: Sure. It's any tank release
18 that could be found that was due to the failure of the
19 tank or failure of the components or it just overflowed
20 all goes into that number.
21 MR. ROSSMAN: So would that include --
22 THE WITNESS: But I'm pretty sure that
23 seismic-induced tank failure is not included in that
24 database, because the assumption is that you're going to
25 design to a certain design basis, and if you get beyond

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1 that then the impact is well beyond your site. It's no
2 longer a site-driving risk.
3 MR. ROSSMAN: So the database would include
4 things like failures caused by a material deficit?
5 THE WITNESS: Sure; corrosion, crane impact,
6 operator error, mechanical damage. Most of them are
7 corrosion-induced, but there are other causes that would
8 cause tanks to release their contents.
9 MR. ROSSMAN: Okay, thank you.
10 JUDGE NOBLE: Other council questions?
11 Mr. Snodgrass?
12 MR. SNODGRASS: Just a quick follow-up again
13 to make sure -- after hearing your exchange with Council
14 Member Moss, to make sure I understand the FN and what
15 then what the implications are.
16 Now, I think when you spoke -- responded to
17 Mr. Moss you said the target is a one in a million
18 level?
19 THE WITNESS: Yes. That's 1E to the minus
20 6.
21 MR. SNODGRASS: And so that's the lower
22 bound on Table ES2?
23 THE WITNESS: On the figure.
24 MR. SNODGRASS: Figure, sorry. And so the
25 upper bound is one in 10,000, as we talked about. I

1 guess what is the difference in -- if you were between
2 one in 10,000 and one in a million, what do you do? And
3 if you're less than -- if the risk is greater than one
4 every 10,000, what do you do?
5 THE WITNESS: And so if you're in between
6 the upper risk tolerance criteria or the lower risk
7 tolerance criteria, in this case we were looking at a
8 single line of one, and so the 180 to the minus 4 to the
9 180 minus 6, the implication is that you should be
10 evaluating additional prevention and mitigation steps.
11 And to the degree that is practical and cost effective,
12 you should implement them. So your goal is to drive
13 risk below the lower risk tolerance criteria.
14 If you're above the upper risk tolerance
15 criteria, it basically says you don't get to consider
16 whether to apply additional mitigation and prevention,
17 you have to apply additional mitigation and prevention.
18 MR. SNODGRASS: And mitigation and
19 prevention that gets you below that level?
20 THE WITNESS: Yes, sir.
21 MR. SNODGRASS: Thank you.
22 JUDGE NOBLE: Mr. Rossman?
23 MR. ROSSMAN: I'm sorry, I do have a
24 follow-up, but I'm still -- I'm just really struggling
25 with this concept of sort of risks that are in and out

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1 of scope.
2 So I guess as I understand it, you're
3 modeling sort of theoretically the facility based on the
4 components and maybe some features at the site. But
5 that doesn't go to other external risk factors that
6 might impact the site.
7 So a facility that you model would have the
8 same risk profile whether it was seated in a seismically
9 active area or non-seismically active area so long as in
10 both cases it had been designed to the seismic standard
11 of the area?
12 THE WITNESS: Yes, sir.
13 MR. ROSSMAN: Okay, thank you.
14 JUDGE NOBLE: I missed this earlier, and it
15 was along Mr. Rossman's question.
16 Would you just say what you mean by loss of
17 capital? I understand what capital is, but what's in
18 that scope?
19 THE WITNESS: Sure. So if you have a fire
20 or an explosion that damages equipment, in the case of a
21 refinery, distillation columns, reactors, in the case of
22 this facility if you had a fire that burns a tank --
23 (Court reporter interruption.) If you had a fire in the
24 oil storage tank, for instance, you would damage or
25 destroy the tank and it would have to be replaced. So

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1 it was the cost of replacing that equipment; piping,
2 reactors, pumps, valves, et cetera, et cetera.
3 JUDGE NOBLE: So it's loss of capital
4 facilities as opposed to loss of capital from outside
5 causes like being sued or something --
6 THE WITNESS: That's exactly right.
7 JUDGE NOBLE: Versus environmental damage?
8 THE WITNESS: It's the facilities as well as
9 the business interruption, because it'll take you a
10 certain amount of time to rebuild the facility and get
11 it back in operation.
12 JUDGE NOBLE: Thank you.
13 Questions based upon council questions?
14 MR. KISIELIUS: Your Honor, if I could just
15 interrupt for a second.
16 Before we begin, I just -- if we could check
17 in on the extent of the questions, because we've had
18 somebody waiting for since 2. And I appreciate we're
19 trying to fit this in, but it would be great to finish
20 with Dr. Thomas. But I just don't know how long this is
21 going to extend.
22 JUDGE NOBLE: Let's get an idea.
23 MS. BRIMMER: I have two questions.
24 JUDGE NOBLE: Two questions.
25 MR. KISIELIUS: Great.

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RECROSS-EXAMINATION

BY MS. BRIMMER:

Q. Mr. Thomas, thank you. I want to follow up on the most recent questions that Council Member Snodgrass asked.

You were talking about the need or the possibility of addressing a risk probability to human life, the one in 10,000 and one in 10 million. And you said that you may recommend things to the degree that they are practical and cost effective.

Do you recall that?

A. Yes.

Q. Who decides that something is cost effective?

A. Normally that decision is in the hands of the facility owner/operator.

Q. And what if they decide it's not cost effective? What happens then?

A. Then they wouldn't do it.

MS. BRIMMER: Nothing further, Your Honor.

JUDGE NOBLE: Any other questions? Mr. Kisielius?

MR. KISIELIUS: Just one.

REDIRECT EXAMINATION

BY MR. KISIELIUS:

Q. So in your QRA, in the instances in which

1 there's been a risk that's been identified as being
2 slightly above that green line on the FN curve to onsite
3 populations, first of all, is that the only instance in
4 which any risk has been projected to exceed the green
5 line?
6 A. I'm sorry, I don't understand your question.
7 **Q. I apologize, I'll try it again. Let's start**
8 **with the first basic question.**
9 **We're talking about the FN curves, and Ms.**
10 **Brimmer was just asking you about those, and you had a**
11 **discussion with Mr. Snodgrass about that. Where the**
12 **only instance in which the projected risk is in excess**
13 **of that lower limit on the FN curve, the green line?**
14 A. Are you asking about this facility or all
15 facilities BakerRisk has worked with?
16 **Q. No, no, this specific --**
17 A. This facility?
18 **Q. Yeah.**
19 A. Oh. It's the onsite risk, and it's associated
20 with events in the offloading racks where the trains
21 come in. And it is related to flash fires exposing
22 workers at the rail unloading facility to the hazard of
23 the flash fire.
24 **Q. And what are the types of things that you would**
25 **expect to see mitigation measures to drive the risk**

1 below those lines in that type of area?
2 A. So first off, I think the appropriate thing
3 would be to put the workers in fire-retardant clothing.
4 That way if there's a flash fire the potential for burn
5 injuries is greatly reduced.
6 Secondly, I would recommend and expect to see
7 flammable gas monitors installed in the area so that if
8 there is a release the workers in the area are alerted
9 to that release. I would expect that the emergency
10 response procedures of the release would be people that
11 aren't required to be there to respond to what's
12 happening, evacuate.
13 I would expect to see that the flammable gas
14 monitors either by an interlock tripping off the
15 transfers that are going on and/or the operators would
16 have emergency stop capability when the alarm went off.
17 Those are the types of things that you would
18 expect to see implemented in order to reduce that risk.
19 MR. KISIELIUS: Thank you. I have no
20 further questions.
21 JUDGE NOBLE: Dr. Thomas, thank you for your
22 testimony. You are excused as a witness.
23 THE WITNESS: Thank you.
24 JUDGE NOBLE: We'll be off the record for
25 five minutes to set up the phone.

(Recess taken from 2:19 p.m. to 2:26 p.m.)

JUDGE NOBLE: Ms. Reese, would you raise your right hand, please.

JO REESE,

(Present telephonically)

having been first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. JOHNSON:

Q. Ms. Reese, this is Dale Johnson again. Can you hear me?

A. I can.

Q. If at any time while we're talking here, if you have trouble hearing me I want you to stop me, okay?

A. All right.

Q. And as we like to tell all the witnesses, please take your time answering these questions and go slowly. There's a court reporter in the room and she's trying to transcribe your testimony, okay?

A. Okay.

Q. All right. Now, you've not testified yet so I'm going to ask you a few questions.

First of all, can you go ahead and state your name and spell it for the record, please.

A. Yes. Jo Reese, J-o, R e-e-s-e.

Q. All right. And again, you provided prefiled

1 testimony in this matter, did you not?
2 A. Yes.
3 **Q. Okay. And your CV is attached to that prefiled**
4 **testimony; is that right?**
5 A. Yes.
6 MR. JOHNSON: Okay. And for the council's
7 reference, that's at Exhibit 356.
8 BY MR. JOHNSON:
9 **Q. I'd like you, though, to take a brief moment and**
10 **discuss your areas of expertise and your educational**
11 **background, please.**
12 A. Certainly. I'm a professional archeologist, and
13 I received my M.A. in anthropology from Washington State
14 University in 1986. I'm focused on the archeology of
15 the Pacific Northwest, especially along the Columbia
16 River.
17 **Q. All right. And there's been some testimony**
18 **specifically from Mr. Huber earlier this week.**
19 **Have you reviewed that testimony?**
20 A. Yes, I read it.
21 **Q. Okay. And before we get to some specific**
22 **questions about his testimony, I want to ask you some**
23 **background questions regarding your involvement with the**
24 **Vancouver Energy terminal project, okay?**
25 A. Sure.

1 **Q. First of all, I'm going to draw your attention**
2 **to an exhibit, it's marked Exhibit 279, and it's**
3 **entitled, Cultural Resource Review for the Tesoro Savage**
4 **Vancouver Energy Distribution Terminal Project, dated**
5 **December 9, 2013.**
6 **Are you familiar with that exhibit?**
7 A. Yes.
8 **Q. Okay. And I haven't called it up here because**
9 **sometimes it takes us some time to get the exhibits**
10 **displayed. I'm just referring to it as Exhibit 279 for**
11 **the benefit of the other parties and the council.**
12 **Can you just briefly describe what that report**
13 **is about?**
14 A. Yes. It's an overview with our initial study
15 for this project and focused on stability as a cultural
16 resource study.
17 MR. JOHNSON: Okay. At this time, Your
18 Honor, the applicant would offer Exhibit 279 into the
19 record.
20 JUDGE NOBLE: Is there an objection to
21 Exhibit 279?
22 MS. BOYLES: There was, Your Honor, an
23 objection. I'm afraid I cannot remember why.
24 MR. JOHNSON: Ms. Reese, you may not be able
25 to hear. The lawyers are doing some talking here so

1 just stand by.
2 THE WITNESS: Okay.
3 MS. BOYLES: We will withdraw the objection,
4 Your Honor.
5 JUDGE NOBLE: Exhibit 279 is admitted.
6 BY MR. JOHNSON:
7 **Q. Ms. Reese, I'm going to ask you just a handful**
8 **of questions about Exhibit 279.**
9 **It is noted that that's a redacted version. Can**
10 **you explain why?**
11 A. Yes. The redacted version has blacked out the
12 archaeological site location information, and that is
13 because archaeological sites are susceptible to being
14 vandalized, so the location of those sites are
15 protected. And that way the redacted version would
16 otherwise go to the public, the archeological site
17 location information.
18 **Q. Okay. And is this a report that is supplied to**
19 **the state and federal government?**
20 A. Yes, it was.
21 **Q. And does the state and federal government -- or**
22 **do the state and federal government receive non-redacted**
23 **versions?**
24 A. They did, yes.
25 **Q. Okay. And was this report provided to the**

Washington Department of Archeology and Historic Preservation, also known as DAHP?

A. I believe DAHP got the report a few months -- within a few months of the date of the report. I did not supply it directly to them, but I do know that they did get it within about that timeframe. And it was also provided to the Corps of Engineers during the permit application to the Corps.

Q. All right. Did DAHP have any comments regarding the report?

A. They commented on the section of the cultural resources that we prepared, I think for the DEIS report. And their comment focused on asking for additional information related to the construction of a proposed facility and whether those impacts may encounter native soils that might retain archaeological deposits.

Q. All right. And did you provide any further information or perform any further analysis based on their comments?

A. Yes. The project team asked for a study to probe the deposits, so we prepared a geoarchaeological study. And the Geoprobe Work Plan, we prepared a Geoprobe Work Plan, and that addressed both the Corps' and DAHP's request for getting more information on the depth of soil and where native soil may be reached, and

then further to verify that there were no archaeological deposits at that depth.

Q. All right. And the Geoprobe Work Plan has been marked as Exhibit 260. Do you have a copy of that?

A. Yes.

Q. And can you just again describe your role in the preparation of that document?

A. Yes. Myself and our geoarcheologist prepared the plan to present geoprobes throughout the project facility to examine the soils as they came up, to put together and to figure out where the depth of fill was and to determine whether the final, as deep as the project impact may go, might encounter archaeological sites.

MR. JOHNSON: At this time, Your Honor, the applicant offers Exhibit 260.

JUDGE NOBLE: Objection to 260?

MR. KERNUTT: No objections.

JUDGE NOBLE: It's admitted.

BY MR. JOHNSON:

Q. And did the U.S. Army Corps of Engineers have any communication with tribal representatives to review the Geoprobe Work Plan?

A. Yes. The Corps has responsibility to consult with tribes and the DAHP, and they did.

Q. All right. And were you involved in correspondence from the Corps' cultural resources section that was sent to DAHP and various tribal representatives requesting comments on the Geoprobe Work Plan?

A. Yes, I'm copied on e-mails that relate to that, so -- at the end of September, the end of September 2014, where the Corps provide geoprobe -- proposed the draft Geoprobe Work Plan for comments.

Q. All right. And were there any tribal entities, specific tribal entities that you can identify who received those same communications?

A. So in addition to DAHP, the tribes that were coordinated with were the Grande Ronde, the Cowlitz, the Umatilla, the Yakama. It looks like that's it.

Q. And with regard to the Umatilla, is there a specific individual who was contacted?

A. Yes. Teara Farrow Ferman.

Q. Okay. And who is Teara Farrow Ferman?

A. Teara is the program manager for the Cultural Resources Retention Program for the Confederated Tribes of the Umatilla Indian Reservation. She's the person who represents the tribal cultural resources.

Q. Okay. And were there any subsequent communications from the Corps' cultural resources

1 section to you, DAHP, and/or the tribes related to
2 comments about the geoprobe plan?
3 A. When we finalized the Geoprobe Work Plan we sent
4 that out to everybody in the same distribution, plus
5 others, the Corps and others. And then when we were
6 doing the geoprobe work, the geoarchaeological study, we
7 provided weekly summaries to all parties.
8 **Q. Did that include Ms. Ferman?**
9 A. Oh, yes.
10 **Q. And what was the result of your geoprobe work?**
11 A. Well, we did not find evidence of any
12 archaeological deposits within the project to the depths
13 that we probed, but we did -- were able to put together
14 an interesting overview of the depositional history and
15 the evolution of the land form. So a portion of that
16 area was the river channel and then it evolved into a
17 more low-lying wetland over time.
18 **Q. And again, was evidence of any archaeological**
19 **site discoveries as a result of that work?**
20 A. No, no evidence of an archaeological site.
21 **Q. Sorry. We need to be careful that we don't step**
22 **on each other here so you need to wait until I'm done**
23 **and then answer.**
24 **And is there a version of your geoprobe report**
25 **in the Application for Site Certification?**

1 A. We did provide a redacted version. And again,
2 archaeological site location information was blacked
3 out --
4 **Q. Okay. And --**
5 A. Any archaeological location in my report.
6 **Q. Okay.**
7 MR. JOHNSON: And for the council's
8 information, that report is at Pages 2255 through 2414
9 of Exhibit 1.
10 BY MR. JOHNSON:
11 **Q. And did you assist in preparation of the portion**
12 **of the site application -- or Application for Site**
13 **Certification that addresses historic and cultural**
14 **resources?**
15 A. Yes.
16 **Q. Okay. And is that also included in the**
17 **application itself?**
18 A. We provided the information from our report and
19 sections of the report under data on archaeological
20 sites.
21 **Q. Okay.**
22 MR. JOHNSON: And for the council's
23 information, that information is provided at Pages 709
24 through 722 of the Application for Site Certification
25 which is Exhibit 1.

BY MR. JOHNSON:

Q. Okay. And getting back to Mr. Huber's testimony, you said that you reviewed that testimony; is that right?

A. Yes.

Q. And in Mr. Huber's testimony, he comments on the fact that you did not address all the cultural resources within a half mile of the rail line.

Can you explain that?

A. Yes. So AINW was asked to prepare the data for maps to be included in the appendix in the DEIS that would show the quantity of archaeological resources and historic resources within both the rail corridor and a shipping or marine corridor.

Mr. Huber is correct when he says that I noted in my prefiled testimony that my firm compiled existing archaeological and historic resource information for Oregon and just historic resource data for Washington.

And we were asked to not do the archaeological resource data for Washington and instead part of our (inaudible) was looking for (inaudible) was instructed to compile maps for the archaeological sites in Washington. So we did not handle the archaeological site data for Washington for those maps.

Q. Can you just describe the relevance of the

1/2-mile radius -- well, not radius, but the 1/2-mile on each side of the rail line?

A. So the rail corridor we're studying for resources was 1/2-mile on each side of the rail and then with a mile wide corridor. And then the marine corridor was a 1/2-mile-wide corridor which was a 1/4 mile on each side of the proposed delta route, was actually wider than that because it was a 1/4 mile inland from the shoreline plus the river itself. So different widths for the different corridors.

Q. Okay. And do you have any -- do you know why your firm was asked not to handle the archaeological site data for Washington?

A. My understanding was that in order to do that portion, DAHP had needed to give us their GIS data for the state, and they were reluctant to do that. They were able to do that apparently for Oregon though.

Q. All right. With regard to the rail corridor in Washington that would be expected to be used by the unit train supplying crude oil to the Vancouver Energy Terminal, were you asked to compile, then, just historic resources along the railroad corridor?

A. Yeah, we did historic resources on both sides for both corridors and the archaeological resource for Central Oregon for both corridors.

Q. Okay. I'm sorry, were you done?
A. What was that?
Q. Were you done or did I cut you off?
A. No, that's fine.
Q. Okay. And just maybe it would be helpful just to give us a brief explanation of the distinction between archaeological resources and historic resources.
A. Historic resources are buildings and structures, so buildings (inaudible) and the build environment that would be up to within -- up to and within the last 50 years. Those are historic resources.
Archaeological resources would be typically things that are buried and around shipwrecks. That sort of thing would be archaeological.
Q. Okay. And did you have occasion to meet with staff from the Washington DAHP and/or Oregon's Historic Preservation Office to discuss your work and the data that was available or to historic resources?
A. We did not meet with the DAHP or discuss with them the data for Oregon. But we did discuss with the Oregon SHPO obtaining data from their office and how to manage that data.
Q. And the SHPO is the State Historic Preservation --
A. Oregon SHPO.

1 **Q. Okay, all right. And was there any**
2 **communication with -- in terms of your work with any**
3 **entity regarding an analysis of cultural resources along**
4 **1/2 mile of the Washington rail corridor, and why --**
5 **again, why you weren't asked to do that work?**
6 A. So for cultural resources or archaeological
7 sites, they're historic resources and other kinds of
8 resources, but we were asked to not do the
9 archaeological resources on the Washington side of the
10 corridor. And again, I believe it was simply more
11 within the comfort zone of DAHP to have those data
12 managed by (inaudible) --
13 **Q. And is it your -- I'm sorry, I think I might**
14 **have cut you off again.**
15 A. I'm good.
16 **Q. Is it your understanding, then, that those**
17 **issues were being dealt with in the context of the SEPA**
18 **analysis for this project?**
19 A. I believe so.
20 **Q. Mr. Huber comments that you only identified 44**
21 **sites within 1/2 mile of the BNSF line, and that these**
22 **44 sites were only historic and not archaeological.**
23 **Again, can you just respond to that?**
24 A. The map that we prepared for the project doing
25 this analysis, we ended up with 44 historic resources in

Klickitat County, not archaeological resources.

Q. Okay. And Mr. Huber also testified that you did not contact the Umatilla as you began your work on this project; is that right?

A. That's true. They seem focused on tribes that were regularly coordinated with when working within the City of Vancouver, and then the Umatilla were added to the coordination and to the Corps.

Q. And what process were they contacted through the Corps?

A. So the Corps is responsible for consulting with tribes with DAHP as part of Section 6 responsibility, and they included the Umatilla, I believe, because of comments that I know nothing about.

Q. Okay. And I think you previously testified that the Umatilla were sent your Geoprobe Work Plan and provided no comment on it; is that right?

A. Correct.

Q. Okay. And are you aware of any other ongoing meetings or communications between the U.S. Army Corps of Engineers and the Umatilla tribe concerning this project?

A. I had heard through the project team that the Corps was having meetings, regular meetings with the Umatilla. I don't know that directly.

1 **Q. Okay, thank you.**
2 MR. JOHNSON: Nothing further.
3 JUDGE NOBLE: Cross-examination?
4 CROSS-EXAMINATION
5 BY MS. CARTER:
6 **Q. Hi, I'm Julie Carter, attorney for the**
7 **intervenors. I just have one question.**
8 **So the report that you're referring to, that is**
9 **for the facility only?**
10 A. Yes.
11 MS. CARTER: I have no other questions.
12 JUDGE NOBLE: Any other cross-examination?
13 MR. KERNUTT: No.
14 JUDGE NOBLE: Redirect?
15 MR. JOHNSON: None, Your Honor.
16 JUDGE NOBLE: Any council questions? No
17 council questions.
18 Ms. Reese, you are excused as a witness.
19 Thank you very much for your testimony today.
20 THE WITNESS: You're welcome, thank you.
21 JUDGE NOBLE: I think we have one more
22 witness for this afternoon; is that right?
23 MR. KISIELIUS: That's correct, Your Honor.
24 JUDGE NOBLE: This might be a good time to
25 take a quick break. So 3:00 we'll be back on the

record.

(Recess taken from 2:50 p.m. to 3:01 p.m.)

JUDGE NOBLE: Call your next witness, please.

MR. KISIELIUS: The applicant would like to recall Captain Marc Bayer.

JUDGE NOBLE: You've already been sworn, but for this afternoon's testimony since you were excused as a witness, would you raise your right hand.

MARC BAYER,

having been first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. KISIELIUS:

Q. Hi, Captain Bayer. I'd like to ask you a couple questions about the testimony of Dr. Ranajit Sahu.

Did you review that?

A. Yes, I did.

Q. And I want to focus in on Dr. Sahu's testimony about the process for testing of vessels for vapor emissions and ask you some questions about that operational procedure. But let's start with the equipment.

Dr. Sahu testified about sniffers and suggested that they're not -- they're calibrated to detect limits of 10,000 parts per million and cannot detect leaks

below that amount.

Based on the ones that you use, is that testimony correct?

A. No, that's incorrect.

Q. Can you describe the equipment that you use?

A. So in the areas where we operate, we use vapor recovery. In southern California, northern California, and the Valdez terminal in Alaska, we use three types of VOC detectors or sniffers. We use a -- something called a multi-ring, a fox burrow, and a photo vac. And those instruments measure VOCs down to 0.1 parts per million and 0.5 parts per million up to 5,000 or 10,000 parts per million. So they come out to 0.1 to 0.5, and then they read out at increments of 0.1 and 0.5 parts per million.

Q. So you just described 0.1 and 0.5. Are those different increments for different types of --

A. This is just different -- one meter happens to measure it in tenths and the other happens to measure in units of half a part per million as opposed to a tenth of a part per million.

Q. Okay. And are these -- how often are these units calibrated?

A. Annually, the units are calibrated by the manufacturer. And they're sent to the manufacturer, the

1 manufacturer calibrates them, they're sent back with
2 documentation to that effect. And then the docking
3 station for the units that resides in the inspection
4 company's office is also -- has span gas -- (Court
5 reporter interruption.) Has a span gas so that they
6 can -- the unit calibrates every time it's put into the
7 docking system to charge. And those records are
8 retained as well.
9 **Q. And who conducts the tests? Is it the company,**
10 **is it you or somebody else?**
11 A. No. We use a third party inspection company.
12 We use the same inspection companies that conduct the
13 custody transfer between the terminal, the ship. And
14 they're licensed by U.S. customs to do this objective
15 review. And they also do the testing for us.
16 **Q. Dr. Sahu -- I want to get to the questions about**
17 **how those are actually used, but to start with, he had**
18 **some testimony about the vessels and described**
19 **900-foot-long vessels with tens of tanks.**
20 **So is that a correct characterization of the**
21 **types of vessels that would call at the facility?**
22 A. No, it is not. The vessels that -- the tankers
23 that could come to the terminal, the 46,000-ton which is
24 the everyday ship, or even some of the larger ones, all
25 have six sets of tanks, 1 through 6 port and starboard,

and then -- for a total of 12 cargo tanks. And then on the after end of the cargo tanks, on the cargo block there are two slop tanks that could carry cargo. They typically do not. And they're also integral to the cargo system in that they're fully monitored the same way.

Q. And is that true for all three sizes of vessel?

A. Yes, it is.

Q. And then in terms of the length, is that -- to what was Dr. Sahu referring on the 900-foot-long vessel?

A. So again, the bread and butter ship, the 46,000-ton tankers, they're roughly 600 feet long by 105 feet wide, so they're not 900 feet long. The largest vessel, the 159,000-ton tanker that we don't expect to see, I believe is roughly 900 feet long. And then the middle sized ship is 105,000-ton tanker that are usually around 810, 814.

Q. Let's get back to the testing here with the sniffers you previously described.

Can you tell us how those are used? How do they test for emissions?

A. So if I understand the question correctly, you want me to describe --

Q. The process. How is the test run?

A. Okay. So the inspector comes out to the ship

after the start of the loading and he brings the tester with him. And when you turn the unit on each time, it goes through a self-check process, which is also, that information is retained inside the unit.

So after the unit is turned on and it goes through the self-check process, the inspector, just like you would if you were testing at a land-based facility, tests sort of a road map around the ship. So he'll start at some location on the ship, I'm just going to make the assumption since you're portside 2, he'll start somewhere the port slop tanker number 6 cargo tank; and then work clockwise around going forward and back aft.

And what he'll do is as he -- his road map, if you will, he'll be looking at flanges, ullage ports -- (Court reporter interruption.) U-l-l-a-g-e -- I figured that was going to be a tough one -- ullage ports, tank tops, valves. And he'll go up, he'll note what he's testing, its location, and what the reading is, and any other potential sources of emissions.

Q. And how close?

A. Within a few inches of the unit and the source.

Q. And what happens if the sniffer gets a reading?

A. So there's an audible alarm and then there's also a visual alarm.

Q. And do they document the readings at each of

1 these places they're checking?
2 A. Yes, they do. It's documented and then it's
3 provided at the end of the inspection to the vessel and
4 the terminal.
5 **Q. Okay. Let's then focus on some of Dr. Sahu's**
6 **testimony about the use of the term "vapor type."**
7 **You had testified earlier that the vessels you**
8 **had investigated checked out at 100 percent vapor type.**
9 **And Dr. Sahu suggested that you were using the**
10 **regulatory meaning of that term, which includes I think**
11 **an amount 10,000 parts per million of leakage that can**
12 **happen and still be qualified as vapor type.**
13 **Are you familiar with that testimony?**
14 A. Yes, I am.
15 **Q. So when you used the phrase "100 percent vapor**
16 **type" did you mean it in the regulatory sense or in the**
17 **literal sense?**
18 A. I meant it in the literal sense. And I also --
19 he mentioned something about an acceptable loss of
20 product. And I read in -- well, I'm familiar with it,
21 the Bay Area Air Quality Management District, I think
22 it's Rule or Regulation 844, I might have it backwards,
23 that it's acceptable to have, I believe it's three drops
24 of oil per minute or fugitive -- or emissions of up to
25 10,000 parts per million.

1 And in our guiding principles and safe
2 operations, we don't accept any leakage. So if you have
3 one drop or three drops, we shut down, we correct the
4 issue, and then we resume transfer. And the same would
5 go with fugitive emissions. We believe in do it safely
6 or don't do it at all and there's always time to do it
7 right. And that's the way we practice.
8 **Q. So when you testified about the vapor types of**
9 **the vessels, how did you know that they were literally**
10 **vapor type that we're not getting readings?**
11 A. So when we -- when I first -- when I testified
12 the first time, I was curious, because I hadn't been
13 looking at the results of the ships, I asked one of my
14 people to pull the records for some of the ships. And
15 we pulled the records for ships that would be coming to
16 this terminal, our time-chartered ships, and I had them
17 look at it.
18 And what we found when we pulled a number of
19 reports was they had gone through and they --
20 MS. BRIMMER: Objection, Your Honor. I
21 think this is hearsay. He was not qualified as an
22 expert on the air emissions. That was his fact
23 testimony. We never got prefiled written testimony that
24 he was an expert on air. His prefiled written covered
25 only marine vessel spills and tanker traffic. He's not

1 qualified as an expert on these matters, he's offered as
2 a fact witness on that.
3 MR. KISIELIUS: Mr. Bayer qualified as an
4 expert on marine vessel operations. He's now describing
5 the part of the marine vessel operations where he relies
6 on third party tests to come in and certify that the
7 vessel meets his specifications. And he's testifying to
8 the records that he reviewed to satisfy that.
9 MS. BRIMMER: There is no prefiled written
10 testimony about air emissions or vapors or barge loading
11 at all. It is not part of his expert testimony.
12 MR. KISIELIUS: Your Honor, if I might
13 respond to that as well. This is rebuttal testimony.
14 Dr. Sahu went at Captain Bayer's testimony and testified
15 to his understanding of it, which was incorrect. And
16 Captain Bayer is trying to explain it.
17 MS. BRIMMER: And that testimony was offered
18 as fact testimony at the initial part of this
19 proceeding.
20 JUDGE NOBLE: Well, I'll give this witness a
21 little bit of latitude to testify about what he learned
22 in the conduct of his own investigations, but he really
23 isn't an air expert and so I don't want to see you go
24 too far down this road.
25 So how many questions do you have about

1 this?
2 MR. KISIELIUS: Not many, Your Honor. Just
3 asking him the records of what he found.
4 MS. BRIMMER: And those records are hearsay.
5 MR. KISIELIUS: And as an expert in marine
6 operations, he's allowed to rely on information he
7 receives in the conduct of his business. And as Your
8 Honor has pointed out to several other witnesses to whom
9 we've objected, there's broader latitude, even if you
10 were not an expert, to furnish a hearsay witness.
11 MS. BRIMMER: Can I just make one
12 correction? He did not testify that he received this in
13 the regular course of his business, he said he asked for
14 this to be pulled as part of his fact testimony.
15 JUDGE NOBLE: That's right. And he was an
16 expert witness but not an air expert witness, so I'm
17 allowing this answer. And maybe -- I don't know what
18 the next question is going to be but I really want it to
19 be limited. So I don't think he should go too far into
20 an area that belongs to an air expert.
21 MR. KISIELIUS: Understood, Your Honor. And
22 I don't plan to ask Captain Bayer what it means for
23 emissions. I'm just planning to ask him in the course
24 of his operations for the vessels that are under his
25 control, the results of the tests and what they say.

1 JUDGE NOBLE: Well, how far in depth into
2 this area are you going to go?
3 MR. KISIELIUS: I only have one more
4 question.
5 JUDGE NOBLE: Let him answer the previous
6 question, if you remember it.
7 BY MR. KISIELIUS:
8 **Q. Captain Bayer, did the reports you get from**
9 **these third party contractors indicate the actual**
10 **readout of the VOC sniffers in the areas that they --**
11 **where they applied them?**
12 A. Yes, they did. It's part of my responsibility
13 for operations to make sure that we operate safely
14 without any emissions and keep the -- the same with what
15 the doctor said about leakage, that's -- I'm responsible
16 to make sure that we operate safely and responsibly.
17 So could you just remind me of the question?
18 **Q. So do the reports that you receive identify any**
19 **readings in the vicinity of the areas where the tests**
20 **are applied?**
21 A. Yes. The reports identify what was tested and
22 the actual reading at the time that it was tested.
23 **Q. And when you testified earlier about the 100**
24 **percent vapor type, were you referring to the readings**
25 **that you received on those tests?**

BAYER

A. Yes, I was.

Q. And can you tell us what the readings were for those tests?

A. The readings were zero.

MR. KISIELIUS: Thank you. No further questions.

JUDGE NOBLE: Cross-examination?

MS. BRIMMER: None, Your Honor.

JUDGE NOBLE: Thank you.

And council questions? I believe Mr. Lynch has a question, which I'm giving you latitude. If Mr. Lynch's questions strays into an area where the parties want to do more questioning on --

THE WITNESS: I'm sorry, I'm having a little bit of trouble hearing.

JUDGE NOBLE: Yes. We're just chatting up here, sorry.

Mr. Lynch?

MR. LYNCH: A guy walks into a bar. (Laughter.)

This is actually a piloting question, but I wasn't sure who to ask this question to and so I was hoping to ask this question of you because you've piloted up and down the Columbia River; is that correct?

THE WITNESS: I've transited up and down the

Columbia River with a pilot on board.

MR. LYNCH: That's right.

Do you have a sense of the area, I think it's around Longview, that's called -- I'm not sure if it's Bigalow Point or Barlow Point, where the river takes a bend to the left?

THE WITNESS: A bend to the left going downriver or bend to the right going upriver?

MR. LYNCH: Excuse me. A bend to the right going upriver.

THE WITNESS: A bend to the right going upriver.

MR. LYNCH: Correct.

THE WITNESS: I can't picture it off the top of my head. If there was a chart or something -- I didn't bring my charts this time. If there's a chart I could look at.

MR. LYNCH: What my question relates to, that's in an area where it's been identified in the record that we have in front of us where wake stranding can occur for fish.

And I'm just wondering what your sense may be is if the vessel is actually slowed down in that area, would that have an impact on the fish that could be -- that are potentially stranded there, or is it just

1 the size of the vessel by itself that would produce that
2 regardless of the speed?
3 THE WITNESS: I'm not an expert on wake
4 stranding, that's not my area of expertise, but I do
5 know that if the ship is deeply loaded and it's going
6 relatively fast, you're going to create more of a wake
7 than if it's light loaded and you're going relatively
8 fast. And then if you slow down, in both instances you
9 would have a smaller wake.
10 Did I answer your question?
11 MR. LYNCH: Yes, thank you.
12 THE WITNESS: So slowing down would reduce
13 the wake that the ship would produce.
14 MR. LYNCH: Okay, thank you.
15 JUDGE NOBLE: Any other council questions?
16 Mr. Rossman.
17 MR. ROSSMAN: Thank you for coming back.
18 If I recall Dr. Sahu's testimony, he also
19 described annual or semi-annual pressure testing of the
20 tanks that's required.
21 Is that something you're familiar with?
22 THE WITNESS: You mean for vapor tightness?
23 MR. ROSSMAN: Yes, I believe so.
24 THE WITNESS: Yes.
25 MR. ROSSMAN: Did you -- is that something

1 that you see in the results of those tests?
2 THE WITNESS: Yes, I have.
3 MR. ROSSMAN: When you're referring to 100
4 percent vapor type, does that also mean that no loss of
5 pressure is registered on any of those tests?
6 THE WITNESS: It's interesting that you ask
7 that question. Just recently I looked at, I believe my
8 ship the OSV Nikiski and the OSV Boston, and looked at
9 the results of their vapor test. And they have the
10 ships -- they put a certain amount of pressure on the
11 system, and they held it for two hours without any loss
12 of pressure.
13 MR. ROSSMAN: And your testimony goes to
14 vessels that Tesoro contracts. Do you have -- there
15 would be other vessels potentially coming to call
16 contracted by other shippers; is that right?
17 THE WITNESS: That's correct.
18 MR. ROSSMAN: Is there anything in the
19 protocols of loading that would -- would the test
20 results go to Tesoro staff at the docks also?
21 THE WITNESS: So the way we operate is if
22 we're operating at the terminal and also if we're going
23 to another terminal, we have our vetting process. I
24 think I described it a little bit last time.
25 During that vetting process we verify that

the ships have their -- are in compliance with their annual vapor tight testing. And then if there was any question at all, we would ask that -- we would have somebody out there doing VOC testing during loading to confirm that the results are no emissions.

MR. ROSSMAN: I think I recall that Dr. Sahu didn't know what level of depressurization is acceptable on that annual vapor testing. Do you happen to know?

THE WITNESS: I don't. But all I can say is that there's no depressurization on those ships that we have, that I've looked at.

MR. ROSSMAN: All right, thank you.

JUDGE NOBLE: Other council questions? Questions based on council questions?

RECROSS-EXAMINATION

BY MS. BRIMMER:

Q. Captain Bayer, I just have one question to follow up on Council Member Rossman's question.

You talked about a particular ship that held pressure for two hours. The regulations do allow some loss, though, regardless of how your ship have performed on tests; correct?

THE WITNESS: Understood. I believe that's the case.

MS. BRIMMER: Nothing further.

JUDGE NOBLE: Any other questions based on council questions?

MR. KISIELIUS: No, Your Honor.

JUDGE NOBLE: Captain Bayer, thank you for coming back and testifying again. You're excused again in this case.

THE WITNESS: Thank you.

JUDGE NOBLE: Are there any further witnesses today?

MR. JOHNSON: No, Your Honor. I can chart out the plan for tomorrow if you'd like now.

JUDGE NOBLE: Is there anything else that we need to do?

MR. JOHNSON: There is one other housekeeping matter. I've already talked to Ms. Boyles about this.

The applicant has filed a supplemental declaration, if you will, for Ms. Kaitala. You'll recall she's the BNSF witness, and there was some council questions requesting some specific information. That's been filed. And attached to that is Exhibit 0372 which is the BNSF Northwest Division 2016 Wildfire Preparedness Plan, and we would move for admission at this time.

JUDGE NOBLE: Is there an objection to

1 Exhibit 0372?
2 MS. REED: No, Your Honor.
3 JUDGE NOBLE: 0372 will be admitted.
4 Anything else that we need to do before we go over
5 tomorrow's schedule?
6 MR. JOHNSON: No scheduling, thank you, for
7 us.
8 JUDGE NOBLE: For tomorrow, Wednesday the
9 28th.
10 MR. JOHNSON: So tomorrow, Your Honor, in
11 the morning, Chris Barkan will be here. Again,
12 Mr. Barkan's expert testimony regarding railroad
13 assessment, tank car design, rail line, et cetera.
14 You'll recall he's part of our case-in-chief, not a
15 rebuttal witness per se, although he'll be rebutting
16 some testimony that's provided by Mr. Chipkevich,
17 Millar, Huber and Hildebrand.
18 And then we'll have a rebuttal witness, Greg
19 Rhoads, who will be responding -- or his area of
20 expertise is rail and facility incident issues. He will
21 provide rebuttal testimony relating to the testimony of
22 Chipkevich, Hildebrand, Molina, Schaeffer, Lester, Scott
23 Johnson, and Robert Johnson.
24 And then if we get through those witnesses,
25 we would have Mr. Dave Corpron who has already

1 testified, he'll be providing rebuttal testimony.
2 You'll recall Mr. Corpron is the engineer responsible
3 for design of the facility. So his issues are facility
4 design, permitting including interactions with state and
5 local agencies. And there are a number of witnesses he
6 would be rebutting. Those would include at least
7 Mr. Clary, Molina, Sahu, Wartman, Chipkevich. I think
8 there's an element of maybe Mr. Blackburn and
9 Hildebrand.
10 So we would propose to bring him on in the
11 afternoon if we get though Barkan and Rhoads.
12 JUDGE NOBLE: And then how does it look for
13 Thursday? Are we able to say --
14 MR. JOHNSON: Thursday we've got -- assuming
15 Mr. Corpron testifies tomorrow, we'd have Ms. Hollingsed
16 come back. You'll recall she provided testimony related
17 to insurance and financial assurances primarily
18 rebutting Mr. Blackburn's testimony.
19 We would have Mr. Brad Roach prepared to
20 testify about, again, some facility purpose and need
21 testimony.
22 And then Mr. Larrabee we expect will likely
23 be our last witness. You'll recall he's the manager for
24 the facility and will provide rebuttal testimony related
25 to a number of issues that have arisen. And I haven't

yet gone through and identified each of those.

So we're looking at three witnesses on Thursday; Hollingsed, Larrabee, and Roach. And that's it.

JUDGE NOBLE: Thank you. And then just to review, on Friday will be closing arguments in the morning and public argument in the afternoon, which is all the public argument will be limited to the evidence that has been presented in this adjudication. And then there will be rules of participation. And I understand that some people have formed groups around a spokesperson to be as efficient as possible about that. So we'll announce any further plans about that as we go along, but I just wanted to make sure to reiterate that once again.

Is there anything further we need to do on the record before we adjourn for today until tomorrow morning?

MR. JOHNSON: Not from the applicant.

JUDGE NOBLE: In that case we are adjourned until 9:00 on July 28th, tomorrow morning. Thank you all.

(Proceedings adjourned at 5:09 p.m.)

1 C E R T I F I C A T E

2

3 STATE OF WASHINGTON)
) ss.
4 COUNTY OF SNOHOMISH)

5

6 THIS IS TO CERTIFY that I, Diane Rugh, Certified
7 Court Reporter in and for the State of Washington,
8 residing at Snohomish, reported the within and foregoing
9 testimony; said testimony being taken before me as a
10 Certified Court Reporter on the date herein set forth;
11 that the witness was first by me duly sworn; that said
12 examination was taken by me in shorthand and thereafter
13 under my supervision transcribed, and that same is a
14 full, true and correct record of the testimony of said
15 witness, including all questions, answers and
16 objections, if any, of counsel, to the best of my
17 ability.
18 I further certify that I am not a relative,
19 employee, attorney, counsel of any of the parties; nor
20 am I financially interested in the outcome of the cause.
21 IN WITNESS WHEREOF I have set my hand this _____
22 day of _____, 2016.
23
24
25 DIANE RUGH, RPR, RMR, CRR, CCR
CCR NO. 2399