PROPOSED CLEANUP ACTIONS FOR REMEDIATION OF HANFORD'S 300 AREA (along the Columbia River)

MEETING

HELD ON
WEDNESDAY, JULY 31, 2013
6:00 P.M.

UNIVERSITY HEIGHTS CENTER
SEATTLE, WASHINGTON

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DIETER BOHRMANN: We are right at seven o'clock so let's get rolling. I want to welcome everybody to tonight's meeting on Hanford's 300 Area. I appreciate everybody coming out tonight. The focus of tonight's meeting is going to be a proposed plan to clean up soil and groundwater in the 300 Area, which is in the southeastern corner of the Hanford site and hopefully you were able to get a chance to look at some of the posters here. And if not feel free to do that. We encourage you to do that. I will say that the 300 Area tastes great. If you haven't had a piece of cake yet I encourage you to do that.

My name is Dieter Bohrmann and I do work for the Washington Department of Ecology but I'm wearing my facilitator hat tonight so that is the role I'm going to play and regulatory questions will be directed to the Environmental Protection Agency.

Let me just run down the agenda and then we can start with our first speaker. We're going to start with JD Dowell, an introduction of the Hanford site. He's the assistant manager for Richland Operations Office for the

U.S. Department of Energy. JD will then turn it over to Mike Thompson, also with Department of Energy. And that will be followed by Larry Gadbois with the EPA. And then Liz Mattson who is representing Hanford Challenge will share with us a local perspective. And that will be followed by Ryan Strong who is with Heart of America Northwest. So they are going to co-present on the local perspective.

And at about 7:30 we're going to go into a question and answer session so that will be an opportunity to continue the back and forth that we just had here with Jerry and Tom and some others and your opportunity to talk to the agencies and have some of your questions answered about what's in this proposed plan and what are the remedies that are being considered here. And after that we will go into the final part of our meeting which will be the formal comment period. So the difference between the Q and A session and the formal comment period is that those comments will be stated for the record. The meeting is being recorded here and there will be a transcript available on the Department of Energy website at some point following the meeting here.

So during formal comment period opportunity the agencies will not be able to respond at that time so please ask your questions during the Q and A period. So during the formal comment the agencies will respond in the comment

response document after the comment period has ended. So we won't be responding tonight, at tonight's meeting.

If you would like to provide written comments you may also do that on the back of your agenda here. You can turn those in at the end of the meeting or at another time. And of course this is not the last opportunity you will have to comment. The comment period is running through September 16th so you may e-mail or mail your comments in up until that date.

I think that covers the bulk of it. We also encourage if you have an opportunity we always like to know how we're doing and how these public meetings are working and how they can be improved. So if you could fill out one of these evaluation sheets for us that would be much appreciated. If you haven't had a chance to get one yet they are right up on the front table here. So we'll remind folks again at the end but really we appreciate your feedback on this.

So without further ado I think we'll turn it over to JD Dowell here to open the meeting.

JD DOWELL: Thank you. Good afternoon or good evening everybody. I'm going to turn this off. I think you will be able to hear me. Can everybody hear me? Great, great.

Good evening and thank you for coming. Thanks to

Heart America and Hanford Challenge and the general public that showed up here. It's really important that we get this opportunity to give you some exposure to the decision making on these kinds of decisions. You know, our perspective, my perspective has always been as a federal employee that I'm working for you. You're the tax payer. You are our primary interest. We're trying to protect the public and we're here to listen to you. We do have a short brief. We try to make it by 7:30. It's going to be challenging to do that. We did this last night in Richland and it took a little longer than that. And I want to make sure we take the time so that we -- because it is fairly detailed when Mike gets into his part of the brief to make sure you have all the insight. And we really encourage the questions. This is really exciting to us because this is the opportunity to see if we've got holes in our plan and this is a great group to do that with. So this should be an interesting night and hopefully we can answer your questions or take up look-ups if we can't answer them here.

So I would like to introduce a couple of other people. Sonya Johnson and Kim Ballinger are also some of the folks in the background. They're kind of the comment outreach-type folks that brought in all these placards and things like that, prepared the space. Thank you for that. Bruce Cord is also part of our team. Jim Hanson is another.

Dr. Jim Hanson is a biologist and our risk manager. He's part of our team. We've got Kathleen McKee here who is the stenographer. She's recording this whole thing so you will have a record if you need to come back to it. And Dave is the sound man back there in the corner. We can't see Dave but thank you for that.

This is our second public hearing of three. We have another public hearing in Hood River next week. It's on Thursday, the 8th of August. So if you have friends down there, get the word out. We'd love to see them come out to it.

So I just want to do kind of a Hanford cleanup overview. I think this group is pretty well educated on this. You have a fairly good background of materials about the history of Hanford. Forty-seven years of operations. Greater than 450 billion gallons of liquids discharged throughout the site in the history of those operations in this large 586-square-mile site. Tonight we're really focused on the River Corridor but before I get there there's two offices that operate the River Plateau. It's fairly simple. And if you look at this we're talking about this blue area right here. That's Central Plateau. And then this green outline here is the River Corridor. So those are the two functional areas or primary areas of operation for Richland Operations through the history of Hanford site. And

we're going to focus on the River Corridor and one part of the River Corridor tonight.

So there are two operational offices. The Richland Office, which is where we're from, are responsible for the three dimensions of waste in the River Corridor and Central Plateau. And what's excluded is really how you remember the Office of River Protection. The Office of River Protection is there to manage and process and remediate the tank waste. So tanks and the waste treatment is the other office. Pretty simple boundary.

For Richland cleanup work, like I said the three dimensions that you could think of are facilities, waste sites. We actually do clean air permits with the state. We've got the deep vadose zone and groundwater. We'll talk to that a little bit in a second. So hopefully that's fairly straightforward.

Just because we're talking about a final record of decision, we say "final." The reason we say that is because we're operating under interim cleanup actions right now. Those were designed in the nineties so that we could get started with the cleanup, start actually initiating some remediation. They were done to very conservative measures. We'll talk to those tonight. We're about 88 percent complete with the cleanup along the River Corridor right now. And the River Corridor is that 220-square-mile area

highlighted in green that includes the nine reactors and the 300 Area that make up that portion of the Hanford site. So again, if I'm going too fast forgive me but we've got to get through this.

Now, I talked about 88 percent complete. There are going to be groundwater operations and progress, pumping treatment operations on the River Corridor that are not part of what we're talking about from a standpoint of the final remediation in this ROD. There's also ISS reactors. All of the reactors are on ISS. The cores and hot stuff has been removed but the shells remain because we want them to be paved so we can have greater worker safety to go in and remove those facilities in about 70 years. That's the current plan.

The 300 Area is roughly right there when you look at this map or this chart. And Richland butts up to the bottom of the 300 Area. North Richland is right to the south of that. So this is probably the closest area to the city.

When you look at the six major cleanup decisions that we'll be making over the next five or so years you can see their broken down by reactor areas. They're fairly similar but they have different constituents of concern. And we'll be talking to the ones again on the 300 Area specifically. 300 Area, that's primarily a fabrication and

laboratory area. We put through about 20 million pieces of reactor fuel rods of uranium that were potentially irradiated to make plutonium. So a lot of material came through here, a lot of waste, and you'll know all about that by the end of the night.

Real quickly, the CERCLA process. Comprehensive Environmental Response, Compensation, and Liability Act of 1980. This process is what we're basically following tonight. When we go into a site inspection we determine areas or operating units where we determine if there's going to be a remediation action. We coordinate that with the EPA and Ecology under the Tri-Party Agreement. And then we use this process to analyze, scope, determine the risk, and then develop a remediation plan to which we bring to the public, which is what we're doing tonight. So that's what this does. Remedial Investigation and Feasibility Studies, RIFS. A very thick document. That's got a lot of the materials, the studies of the levels of constituents of concern or COCs. That's an important document. And that leads us into making a proposed plan for what we're going to do and a various number of alternatives that you'll talk to tonight and hear.

For what we're actually going to try and do we select one of those as the best one and that's what we're here to defend. That's what we're here to do is examine

that, demonstrate it to you, and for you to ask us the hard questions. So we're here at the record of decision. And this is the point where we're making -- addressing public comments. So we're going to take your questions and do question and answer tonight, as well as comments. And then those comments become part of the formal document when we publish it. And then it goes into the remedial action which means after we've made a record of decision, we've decided what we're going to do, we develop a work plan and then we execute that work plan. Typically that's done in about six months after a decision is made.

That's not it. We have a feedback process. Every five years these decisions are evaluated for remedy effectiveness. Remedy effectiveness. It doesn't mean we go out and reevaluate the whole site. We just evaluate the remedy to determine to the effectiveness that we are trying to target. Very important concept to understand that.

This is also important. There's a placard back there. I'm going to whip through this because you're probably familiar with it. This is the threshold, balancing, and modifying criteria. There's nine criteria we use for CERCLA when we look at these decisions. So they're not over-focused on budget. A lot of people say oh, you're just doing it because it costs less. That's one element. Another element I would suggest to you is community

acceptance. We take that very seriously at the Department of Energy and the EPA and Ecology. That's why we're out here. That's what this is designed to do, get those inputs. But I'm not going to go through all nine of these. They're back there on the placard. If you're interested you can see those there.

And lastly, the four areas of protection. This will kind of give you the way that we look at the constituents of concern, how we evaluate that risk, and what those risk paths can be to human health and the environment. So there's direct contact at the surface. Think of like a trench or surface land use, picking flowers, growing things, stuff like that. There's the groundwater protection to human health, which is here is the deep vadose zone. Anything that can trickle down and filtrate through the soils to the groundwater. There's the groundwater use itself for human health. So cleaning up this water to the best use, the best practical use, which in this case is drinking water standards, is our target for the River Corridor. And lastly surface water. And that's for human health and the eco effects. And that would be water like in the river. So when this trickles into the river we evaluate that as surface water effect as well. Think of those four dimensions and that's how those remedies are developed because we have to think of all four of those areas.

So lastly you can find out more on our website. I'm not going to go into that. We really do take this seriously. I think this is the best part of the process and we're here to learn. We're on your team. We're not the ones who made the mess. We're the ones that are here to clean it up. So we want to do that hand in hand with a partnership with our community. So thank you very much for your attendance. I'm going to turn it over to Mike.

MIKE THOMPSON: Good evening. I'm going to use the mic because last night my friend over there said I needed to use the mic for her to hear me when I walk around and talk to you. So she can hear me I'm going to use it tonight.

My name is Mike Thompson. By education and training and experience I'm a geologist, hydrogeologist. I've got degrees in geology and watershed management. Licensed to practice both geology and hydrology in the state of Washington. I've been working at Hanford for about 30 years, from the beginning of the cleanup. A number of different jobs there from Tri-Party Agreement manager to branch environmental restoration, groundwater technologist, to division director and all sorts of jobs. And before that I worked for a short stint with for example Energy Northwest licensing the power plant. And before that I worked for My Land Reclamation. And before that in exploration for oil.

So that's my background.

Let's talk a little bit about what we're here for tonight. The 300 Area, just to kind of put it in perspective for you -- I wish I had three arms. The 300 Area is just north of the city of Richland. The city of Richland is where I live. I get my drinking water, my family's drinking water, and up until tomorrow my grandchildren's drinking water. They're moving to Virginia. I live up in Richland. I get my drinking water from a facility that's right about here. This is the Columbia River. It flows by at an average of 115,000 cubic feet per second. And frankly it's the reason why I live in the Tri-Cities. I like to do things on the river. I'm a very avid fisherman. I like to duck hunt and those sorts of things. The city of Richland goes right about up to here. This is the dock where barges come in where submarine reactor compartments are offloaded and then dragged about at a walking pace up through here and then up to the 200 Area plateau. This is the core industrial zone of the 300 Area.

There's been a lot of discussion earlier tonight about cleanup standards. This area here within these city streets within the area that has been industrialized will be still industrial area because of Pacific Northwest National Laboratory is retaining facilities out there. And the Department of Energy intends to reindustrialize this area.

This is the only part, and the 618-11 site up here, just a few acres, this is the only part that we're proposing to clean up to industrial standards. All the rest of it will be cleaned up to standards that would suit residential exposures. So industrial standards is only this industrial area where the dirt is now. The 300 Area is a pretty good-sized block of the Hanford site. It runs all the way from the city of Richland all the way up past the commercial reactor site up here.

Our overview of organization tonight, what I hope to do in terms of organization is talk about the location nature, and extent. What are the risks driving contaminants of concern. In other words what are the contaminants that we feel that are out there that are driving the risk. What is the cleanup progress that has been done under the existing record of decision for interim action. A lot of work has been done out there. There's some common elements in all the remedial decisions that are going to occur regardless of which one of the decisions is chosen in the end. We're going to talk about those. And then finally, the uranium conceptual model and remedies alternative because the only difference between all the alternatives that we're evaluating and talking about tonight are how to deal with the uranium source that's continuing to feed the half a square kilometer of uranium plume that's in the 300

Area.

So looking north again, the city of Richland is right about here. The pathway for the reactor compartments. This is the industrialized zone. Pretty much some of those buildings have been taken down but that's what it looks like today. 618-11 is up here fairly close to the Energy Northwest operating facility. 618-10 is out here. These are particularly interesting burial grounds in that the 300 Area has been used primarily for the manufacture of uranium fuel. Uranium fuel was then taken up to the reactors, irradiated, and then to the Central Plateau where separation processes were used to get the plutonium out of the fuel rods after they were irradiated. But most of the activity in the 300 Area was the fabrication of those fuel rods. However, at all of the production facilities up here, all the separation facilities, all those chemical processes, the research and development was done down here. So they brought irradiated fuel back down from the 100 Area and 200 Area down here to optimize chemical processes for processing this out. So there were some really, really, really highly intense radioactive materials that they didn't want to put in the ground beneath the burial grounds because of the proximity to the city of Richland so they drove them out in shielded trucks. And that's about as far as they could get before they start exceeding allowable distance for the

drivers. And they had these burial grounds out there that were specifically designed with caissons to -- paint cans with the waste that was in it into these caissons.

We have agreed in the interim record of decision to dig those burial grounds up. In fact we agreed to dig all the burial grounds associated with the 300 Area up in the interim record of decision. We intend to fulfill that commitment and that commitment is in this record of decision. All the burial grounds will be removed, treated, disposed and the material taken to the appropriate place in the 200 Area plateau or shipped off to other facilities that are intended for things like transuranic waste. So to answer one of your questions tonight, yes, all the burial grounds are covered. And we are intending to remove, treat, and dispose all the burial grounds.

PUBLIC CITIZEN: So does that include ditches, trenches, the whole works in relation to the sites?

MIKE THOMPSON: We'll talk about it. Okay? It's a different process a little bit.

So in terms of the map what's included, what's not included, this kind of nasty yellow-looking color here is the 300 Area upper area that's covered under the decision. What is not being addressed are areas that are still active. And that is the HAMMER Training Facility here, the Hanford Patrol Academy out here. And of course Energy Northwest

which is on a DOE site out here. The FFTF reactor is not part of this decision. It is covered under a MEBA decision. So the industrial area is down in here. There were two source operable units, 300-FF-1 which is primarily the liquid waste disposal sites that created the uranium plume; 300-FF-2 which is the source term that covers all the waste sites in here, and the 300-FF-5 which is groundwater.

So talking about groundwater which is one of my favorite things. The 300 Area decision area is here. Within that the uranium plume is this little dot right here. There is a nitrate plume from off-site sources. It's coming in from the west and is not a DOE-derived contaminant which we will monitor that over time. 618-11, 618-10 are the primary waste sites outside of that. 618-11, there's a tritium plume out here that although it's small it has some of the highest levels of tritium on the site. It was like two million picocuries per liter when we discovered it. But it's not moving very fast. Tritium has less than a 13 year half-life. But that means that every 13 years half of the radioactivity goes away. So it's half, half, and half. So 13 years half of it goes away. Another 13 years half of that, one less half goes away. And then 13 years after that half of a half of a half is left. So it's expo -- it's not a linear curve but it kind of makes a curve downward.

So the tritium plume that we're dealing with here,

this is from that 618-11 burial ground. I think that's from lithium aluminum tritium parts that were buried there in the past. What is not also being covered is there's what we call the base site line plumes. Base site line plumes are coming out of 200 east out of the PUREX facility primarily. That's the tritium, nitrate, ion 129 plume. They'll be covered with a groundwater-operable unit for the east side of 200 East Area in the future. So this kind of Pac-Man thing here that looks like it's gobbling up Energy Northwest is not covered in this decision here because it will be covered in another decision. We're not going to ignore it. It's just a different decision.

So the primary risk-driving contaminants, if you look in the proposed plan in the back of the proposed plan there's a very, very long list of preliminary remediation goals. Now, these are the concentrations of contaminants that one can leave in the ground below the excavation depth for protection, human health, protection of the environment, protection of groundwater but there's a short list of the heavy hitters if you will. For soils, uranium. And that's uranium metal. Most people think of uranium as a radioactive substance. The radioactivity of uranium is actually fairly small but it is an alpha producer. So being an alpha producer you don't want to ingest it. But it's a primary risk driver for uranium 238, a natural uranium,

which we're dealing with here is its toxicity as a heavy metal. It's a toxicity primarily through the liver.

Also the uranium isotopes. We want to recognize that it is an alpha producer so you want to make sure that we're covered that way. Cesium-137. If you look at the radioactivity of spent nuclear fuel processes the maturity of the radioactivity, the high radioactivity stuff, it's cesium-137, cobalt-60, and strontium-90. So those we want to make sure that we're covered. And then there's some aloclors PCBs that we're finding in the soils in the 300 Area.

In groundwater we're looking at uranium both in terms of gross alpha. There are standards for that. And as uranium metal. Tritium, nitrate, and the volatile organics of TCE and DCE. Those volatile organics, we'll talk about them a little bit later. They're not located in the primary hopper but they're actually remnants of something that was probably much bigger a long, long time ago. We'll talk about those later.

So there's a long list of remedial action objectives which I think I can summarize fairly quickly. We want to prevent human exposure to groundwater that contains concentrations above remediation levels. We want to prevent contaminants of concern migrating or leaching through the soil that will result in groundwater concentrations above

PRGs for protection of groundwater and surface water or groundwater discharges to the river. We also want to assure that in the upper 15 feet, which is the area that has been agreed to as the area of human exposure, primarily the area of environmental exposure, we want to assure that direct exposure in that 15 feet does not result in a level that's above risk levels or standards. We also want to manage exposure to contaminated soils deeper than 15 feet. And we want to prevent ecological receptors from direct exposure at the soils and also at the shoreline. And then also what we're talking about primarily today in terms of uranium is the restoration of the aquifer. There's a goal within the national contingency plan, the Superfund, that says we should restore the aquifer within a reasonable amount of time given the conditions of the site. Restoration of the aquifer for us means bringing it back to drinking water standards. I'm having a little bit of trouble convincing some people further east of that but for us it's drinking water standards.

So the recent remediation progress, we've done a lot of work investigating the groundwater, looking at the groundwater. But in terms of progress from the early nineties the real progress in terms of physical remediation is knocking down the buildings, digging up the waste sites, hauling the contaminated material away. The Pacific

Northwest Natural Lab will continue to occupy some of the buildings that you see here. There's also other buildings that you see here that will be dismantled and taken away. We'll talk about the ones that are going to be a real challenge and we'll hit on that. But in terms of progress -- can I have the next slide for a second? You can see this highly-industrialized area here which is a bunch of laboratory facilities and production facilities, uranium milling facilities and that sort of thing. If we can go back. That used to be here. So that's the kind of progress that you see in knocking down the facilities.

One of the first things we did is we -- we'll talk a lot about the liquid waist disposal sites. The north process pond, south process pond, and process trenches. I heard Jerry talk about them earlier. Those are located right there. Those are really the first things that we went after when we decided to do interim cleanup in the area. And the decision that we decided to do was remove, treat, and dispose. Now, that's a very popular remediation concept with the Hanford Advisory Board and with us. We've embraced it through most of the cleanup that we're doing.

What we agreed to do was first dig up the engineered structure. Then you dig at least as deep as 15 feet if there's contaminants there and you're still above remediation goals in terms of direct exposure. You go at

least 15 feet. Then after 15 feet you do an evaluation to determine if what is below 15 feet will impact groundwater above standards from water that seeps from the surface in snowmelt and rainfall. Okay? So you can leave some contamination behind that are 15 feet under that under that agreed process but it cannot be at levels that will re-contaminate groundwater from meteoric water.

What was not evaluated back in the early nineties because we didn't really understand the conceptual model was the impact of the river going up and down and causing groundwater to go up and down and the geochemistry involved in that. So when we thought that if we just took the vast majority of the uranium off from that first 15 feet, tens of tons of uranium. And from the characterization data that we had and the response in the groundwater we were a little bit fooled and we thought that would be sufficient. But within five years we found out that the uranium was not cleaning itself up at the rate that we would like it to. So after the first five-year review we started doing more characterization, more studies, more remediation, testing, those sorts of things. And it's gotten us to the point where we're at now.

Okay. So in the 300 Area we can talk about progress a little bit. So far there's been about a million tons, a million tons of contaminated soil and debris that

has been excavated from the 300 Area and hauled off to the disposal facility in the central part of the plateau. That's a lot of progress. That's a lot of work. There's about 38 tons of what is suspected transuranic waste that has been removed, shipped to the central waste process to be managed in accordance with TWE requirements. We've remediated all but about 34 of the 130 waste sites under the interim record of decision. Now, when we decided to go forward when we negotiated the schedule for getting to these records of decision we decided that we needed to go back and look at all the work that was done to make sure that all the work would comport with the new requirements because of changes in the laws. So we went back and looked at all 130 waste sites. And all but 34 of them have been remediated today.

Now, there are some challenges. We talk about how much we've done percentage-wise, that sort of thing. Three or four of the more challenging things to do in this operable unit are part of the cleanup. And they are the high remediation source removals. 618-10. We're working on that right now. That's being remediated actively going after. 618-11 is a little more difficult. One of the challenges of being right next to an operating nuclear plant. So that has not been started yet but the decision has been made of what to do there. It is to remove it, RTD. That's not going to change.

There's also a couple of areas that we discovered in the removal process in the remediation where we found really, really high levels of radioactivity, lethal doses of radioactively if you allow workers to get into that. So we haven't. It's very challenging, very difficult.

One is below the 324 building where a hot cell has leaked underneath the building. It's like 8,000-rad radiation which is a lethal dose. That's going to be a difficult removal but we're going to do it. And also this 340 vault. This is a vault that received radioactive waste from the building.

And to put it in perspective how deep we're digging this up, these little yellow shirts down here, this is a six-foot tall man here. So you can put it in perspective how deep we're digging. You know, first of all we removed the structure, right? So to remove the structure we're digging down below that. Now, what's right underneath of it we found that there's a little leak. It's not on the outside edges but in there where we have to drive I-beams to pick this thing up. There's a high amount of strontium-90 in there that we have to deal with. So we're actually looking at using phosphates to bind some of the stuff in the soil as we're remediating.

So here's what this meeting is mostly about, the uranium plume. The uranium plume in the 300 Area is

dynamic. It's persistent. And it has been studied to death. It's about 125 acres in size at any one time if you look airally. But it's like an amoeba. It moves with the response to the river. But the river levels change through the operations of the dams. It goes up and down a lot some days. I've seen boaters stranded on islands on the Columbia River.

When we have high water in the river the groundwater gets backed up because the river come up, the groundwater stops. And then it still wants to go to the river but it again rises up in response to the river. When that happens it goes up to a level where it normally doesn't exist and it picks up the little bit of uranium that's still left in the vadose zone out there. Little bit compared to what was there originally. You've got to remember we put -- oh, what's the number -- 74,000 to 130,000 pounds of uranium into these liquid waste disposal facilities. It's a lot of uranium. So most of that has been dug up and hauled away because uranium generally likes to bind to the soil. It's moderately mobile but most of it has been removed and taken away.

So at high water when it comes up there is some uranium left, mostly at the process trench right here. And there's a little bit here that comes up. This one is getting smaller all the time. This one here is quite

persistent. And when the river goes down the groundwater tends to follow the river. So the groundwater has bicarbonate in it which tends to dissolve, helps dissolve uranium. River water does not. It helps it precipitate.

So what happens at low water is this plume that has been pushed back and up now goes towards the Columbia River. And this is the area where we talked about where it's about 4,000 feet or 4500 feet where above drinking water standards gets to the Columbia River. And it upwells into the bottom of the river along the shoreline. And it really expresses itself in the little springs along the river. So you will see that plume even at low waters anchored right about here. So this is what we think from here and characterization data is the hotspot.

This little devil over here didn't exist until we dug up this burial ground. Now, this is kind of important because when you dig up uranium-contaminated soil you have to put water on it for dusting purposes because you don't want the workers breathing and ingesting the uranium. Uranium on your skin is -- you don't want it there but it doesn't give you much of a dose. Uranium inhaled into your lungs does give you a dose. You don't want that. So what happened here was when they were digging this burial ground up, removing it, using water to protect the workers and the people downstream that were using the river we created a new

groundwater plume of uranium here which will dissipate with time. But this was caused by the remedial actions of remove, treat, and dispose of this burial ground.

So let's talk about the process trenches a little bit. These are the areas that received all the liquid waste from the disposal. First the south process pond. When it started to fail at high water before the dams were operating groundwater would actually come up into these and kind of spread around. Then they went to the north process pond and then the process trenches. The process trenches were the last ones to be used. All three of these have been dug up. What I mean by dug up, we've done the remove, treat, and dispose. Those have been excavated to about 15 feet. And 281,000 cubic feet of uranium-contaminated soil has been removed from these source areas. So we've done a significant amount of removal action for the areas that created the uranium. But what we found is that what the residual underneath of that, because of the river going underneath, still as persistent to the point where we have to deal with it. Next slide.

So this is a well in the hotspot. And this well tells a lot. Blue is the level of groundwater in the well. And you really don't need to look so much at the numbers. This is elevation, meters of elevation above sea level. This is uranium. The drinking water standard is here, this

little dot along here. This is the federal drinking water standard, 90, 180, 270, 360, 450. So what was happening before we did remediation the river levels went up and down. Uranium bounced around a lot between almost drinking water standards up to about 500 micrograms per meter parts per billion. The discharge of uranium to the trenches, the contaminated discharge, discharge with uranium in it, ended in 1985. However, we did not have a water treatment facility out there so water that was fairly clean river water was then disposed from '85 out to 1994 when we got a wastewater treatment facility out there. And in the meantime we sprayed the top of the trenches off 1991. 1991 I wrote a strategy for the Department of Energy that was negotiated with the agencies to go do the removal actions. It was the Hanford Past Practice Strategy. It was the basis of all the interim actions. So one of the first things we did was so we know that uranium was -- there's a lot of uranium in that trench. We scraped off the first couple of feet of that trench. It had a lot of uranium in it. Pushed it out to the end because we didn't have any place for it to go. We didn't want that really contaminated soil to be in contact with that water that's being discharged out there. Kind of a smart thing to do. And then later when ERDA was built we hauled it off to ERDA.

So what happened was, in looking at that response,

my heavens, the uranium went kind of well below the drinking water standards. Oh, what a good thing to do. This is great. Let's make a decision. All we have to do is dig up uranium in these facilities down the first few feet and we're going to get a response like this. So this is what fed the decision back in the mid-nineties to say let's wash the uranium out there. But we know better now. We know that not only do you have to dig up the vast majority of it in the first 15 feet. There's some hotspots that are left behind that will continue to bleed out, if you will. And what happened was as soon as we turned off the river water discharge the uranium bounced back.

So if you look at the trends in the river you can see it's kind of like this, up and down, but there's some really high peaks. But when the river goes up and the groundwater goes up it goes up and snatches some more uranium out of the soil. And you can see a pretty good relationship, at least I think I can. But if you get really high water you get high uranium. But after awhile it comes down almost to the drinking water standards. Well, what happened in here was we did the removal actions, the big dig if you will, for 281,000 cubic yards. And we backfilled over top of it, all using the water to control it, the discharge, the dust, that sort of thing.

So what happened there is we're putting water on

the system. And then when the river started to come back up again my heavens it bounced back up. Bounced up but it started to come back down again. Then over the last couple of years we've had some really good high water years. Okay? And the water levels balanced out. And what happened is the uranium kicked up pretty high, 4,000 micrograms per liter, but it bounced back really, really quick. So what we're seeing is that these levels decay away and over time, even though if you get a really high water year, they bounce back. So this is kind of for the behavior we're seeing, this is about the worst level out there. So give you some background of what's happening there. Next.

So in terms of remediation there's about 30 percent of the remaining uranium in this periodically re-wetted zone. And about half of that, maybe a little more than half of that is mobile. So as the river goes up and down and picks up that mobile stuff and it takes it down to groundwater. Again, relationship, well levels, uranium levels. It goes up, goes up, up, up, up. When it goes way up high it gets more. So when you get these really, really high years it gets more uranium though what we're seeing is this a fairly long response. This is a fairly short response. So even though we've gone up really high we've picked up some.

So the way I like to think of it is I'm about to

retire in a few years or sometime in the future. I'm not going to tell my boss back there when it is because it's negotiable. And when you're facing retirement you want your money to last so you build a nest egg. You can think of the uranium in the soil as a nest egg. It's a defined volume of a substance, whether it be money or uranium. There's a defined amount. What's coming down from the soil above, the dry soil, is a little trickle of uranium brought back down by a few millimeters of recharged water every year. So the amount of money coming into the savings account or the amount of uranium coming into that savings account is really small compared to what you had before. But you keep writing checks on that. So every time the river comes up, goes back down it removes a substantial amount of uranium. And I'm going to be honest with you. What happens to that uranium, some of it binds up but it is an advection, dispersion, diffusion down. Mostly it goes to the river. Okay? I'm going to be honest with you. That's what happens to uranium.

Now, the uranium is above drinking water standards. But the uranium drinking water standard is based on a 150-pound person, and I see a lot of 150-pound people out there, a lot smaller than me, drinking two liters of water a day every day and getting a (inaudible) dose. Now, the drinking water standard for that would be 48 but if you

look at the metal response, the heavy metal response it's 30 so we go with the 30. That's the federal drinking water standard. And it's based on a continual two liter ingestion of this all the time.

To get back to where I was so this goes to the river. And you're writing checks on this account. And there's nothing more coming into it. And sooner or later you're going to be out of savings or out of uranium. So it's inflow minus outflow the exchange of storage. Simple math.

So if you don't have a lot coming in, you're taking it out every year, pretty soon this one will go away. The models that were used in looking at the hottest part of the uranium say 28 years if the river behaves itself the way it did over the last few years. Is that something I can hang my hat on? No, it's not because I can't predict what the river is going to do. So I've been telling people less than 40 or 50 years, just to be conservative.

So if you do nothing, if you watch it, it should attenuate itself to drinking water standards in about 50 years but we want to do better than that is what we said last night. We're going to try to bind up, in other words take a lot of the source away. We're going to write a big check and bind it up so it can't be used. So we're going to put a hold on that money if you will and try to tie it up in

place.

So in terms of the alternatives that we're presenting today in all of the alternatives we will remove, treat, dispose contaminant sources. We will continue to remove the burial grounds. We will continue to dig up the river waste disposal areas that we find. We will continue to take out pipelines as appropriate, all continuing what we planned to do. We have to monitor the groundwater because the uranium is still going to be there regardless of what we do for awhile so we have to monitor that. And we will monitor the nitrates coming in from off site so we understand what's going on there.

Monitored natural attenuation. And that is a remediation process that is endorsed by EPA in a number of records of decision. But to call it monitored natural attenuation you have to have a mechanism that destroys the contaminant. Half-life of 13 years radioactive decay. Short half-life is a reasonable attenuation process. The attenuation of uranium, which I can't even think of what it is. It's so large you can't say let's monitor natural attenuation. It wouldn't be right. But for a short-lived radionuclide that would decay away in place and not get to the river, that's an appropriate thing to do because in 13 years half-life goes away. And it's not moving or anything. So that's a reasonable rational decision. So monitored

natural attenuation for tritium.

Now, organic chemicals, at some point in time there must have been one hell of a release of organic chemicals, PCE, in the 300 Area. But in the 300 Area there are two formations. One is a Hanford formation which is sands and gravels. And the groundwater velocity there is as much as 50 feet a day. To put that in perspective most groundwater goes about a foot a day. But in the central part of the 300 Area when the river is low we plot the groundwater going 50 feet a day. It's like a jet ski, right? And it's fleshed out all of that organic chemical out of the useable part of the aquifer. That means you can pump water out. Underneath of that we have a rainbow formation. On top of the rainbow formation this location is very silty, dirty, compacted sand that you have difficulty getting enough water to take a sample, let alone use it. So above it you've got no organic chemicals. Below it you've got some footprints of something that was there a long, long time ago that has since flushed out except for where it's been driven deep into these sediments that don't flush out.

But when we take the samples we see the degradation so above they're working. These aren't moving very fast. And there's not a lot of it. We see it in three wells. The right and proper thing to do is to let nature take its course. I don't know of any remediation process

that would work in formation of the site to begin with and it's degrading the lake. And no one is going to use -- you can't pump from there to get a rational amount of water to use it. Above it you can pump like hell to get all the water you want. But where the TCE in one well, the TCE is so tight you can't use the aquifer and the bugs are taking care of it. So that is monitored natural attenuation.

Now, we have to have institution controls regardless of what we're doing in cleanup until we meet the standards. The institutional controls are keeping people out. Don't have, you know, the kind of access that would cause an unreasonable amount of exposure.

Now, this is a nuclear facility and will be a nuclear facility for quite awhile. Pacific Northwest Natural Laboratory is using this for quite awhile so it is a nuclear facility. We will access controls there and suffice it to keep the public from being exposed. And quite frankly what has been cleaned up is quite good so we're doing pretty well. So this is what's common to all alternatives. Next slide.

So we've got six alternatives to deal with the source of uranium that is continuing to pump uranium into the groundwater. Now, the first one is required by law. It's no action. You can take that off the table. No one is going to discuss that and no one is going to consider it but

we have to have it up there but don't worry about it.

The second one is groundwater monitoring. This is where we sit back on our heels and we watch it. Okay? Which is what we started doing back in the mid-nineties. We know that's not going to work very well. So we don't believe that that's one that we want to do.

Alternative 3. Over the years we have looked diligently at all the remediation options out there for dealing with uranium that's deep in the soil that is being re-wetted and getting to the water. The problem with digging it up to dig up the source of uranium is estimated to be over a billion dollars. Okay? That's money. But the real reason you don't want to do it is because when you dig this up you're going to put -- you're going to release more uranium to the environment to the underlying groundwater.

You're right next to the Columbia River. You're right upstream from where I get my water. I don't want to put more uranium in the river doing a remedial action than what would be there if we did option two, which is do nothing. So the unintended consequences of digging it up at that level at that size is not rational in my mind. And we would have to build a couple ERDA cells to handle it. And if you look at the mileage, you look at the diesel consumed, you know, the emissions and all these sorts of things. You look at green technology, it doesn't fit. But mostly it's

the unintended consequences of putting more uranium in the groundwater and in the river that's the issue why you would not choose the dig-it-up option, which is number five by the way.

So we looked at dig it up. We looked at biological processes. We looked at things. There's a lot of research out there about if you use bugs with uranium you get it from an aerobic oxygenated system to an anaerobic where the oxygen goes away. The chemical stage of uranium changes when you take the oxygen away and binds up really, really well. Okay? It looks really, really good but then you walk away. You run away. You don't look back. And then the oxygen always comes back. And what happens when the oxygen comes back, uranium is happy. It starts to become mobile again. It wants to return back. It's not like chrome-6 where once you get it in chrome-3 it's very happy it's chrome-3. It prefers to be chrome-3. Uranium prefers to be in a mobile state. When you oxidize it it's wanting to be mobile again. So we took that off the table.

We looked at pump treatment systems. We looked at binding up. We looked at permeable reactive barriers. And what we came down to was we originally thought that we could precipitate some out by putting phosphates in. You change it from a carbonate form to a phosphate form. It's very immobile. You get it out of the system. And we were going

to build a habitat there like we have at 100M which is a permeable reactive barrier.

Well, with the groundwater flow and the velocities as fast as they are and the chemistry differences between groundwater, surface water we dropped the appetite for it. It's just not going to work. That part of the test failed. The part of the test that didn't fail was dropping it out as alunite. That worked very good for us.

So alternative 3 is a two-phase approach where you start off in one area and then you do a very large area treatment. About $120 million worth of treatment. And you proceed that way. Alternative 3a which is the one that has been negotiated with EPA. And EPA and we have put, you know, we've developed the proposed plan is that we're going after the hotspot up there which is the main source of what's in the uranium. The rest of it through characterization efforts we believe that the rest of it will attenuate by itself within the amount of time that it would take for the treated area to rebuild. So it's optimization of the engineering alterative. So alternative 3 is our preferred alternative.

Alternative 4 involves digging up part of it. Alternative 5 is the big dig. So our preferred alternative is alternative 3a. And keep in mind that we're still going to do all of the common elements.

So groundwater cleanup is driven by three things: Mitigation of risk to human health from exposure or consumption and exposure of uranium. The uranium that's upwelling into the river, I want to be very clear on this, the uranium that's upwelling into the river and coming out on the shoreline is above drinking water standards. Okay? If you drink two liters of it a day every day you will exceed the dose limits. And the chemical limits for uranium. The river itself, 150,000 cubic feet per second, the river itself has about one picocurie per liter of uranium in it. Where I get my drinking water from the city of Richland, the first inflow from the home stream, it's less than one picocurie per liter of uranium. As a matter of fact the city monitors gross output and you can convert that over to that. So the river itself is not the issue.

The exposure at the shoreline at low water is not the issue. The amount of uranium in the soils that are there at the shoreline is not an issue. And for perspective purposes only, we're not using this as an excuse not to do cleanup, the uranium coming in across the river from three uranium -- or three irrigation outfalls is 10 times more uranium than what's coming out of the 300 Area and all of Hanford. Hanford produces anywhere from about two to maybe eight percent of the total uranium loading in the 54 miles of the Hanford Reach.

So in terms of protection of the river, the river is safe. I recreate on the water. I fish on the water. I hunt on the water. I play in the water. I get my drinking water immediately downstream from this so the river is safe. So why are we doing this? We're doing it because the national contingency plan says restore the aquifer within a reasonable time frame given the circumstances of the site.

Now, there's some uncertainties I have to admit in terms of how long it will take for that uranium to clean itself up. We believe we can do significantly better than what natural attenuation alone can do. So we're planning to go after the hotspot. We want to inject phosphates at the surface and the vadose zone and in the groundwater in that area to try to bind up this hotspot of uranium. And by doing so we'll do better than natural attenuation and enhanced attenuation. We can't call it a monitored natural attenuation because we're not destroying the contaminant. We're binding it up in place. And a stable mineral does not dissolve like the current uranium does. So it's that last factor that's driving us to make the decision.

So we talked a little bit about this and I want to go over it. The uranium-contaminated areas located within the core industrial zone, no one is going to be using that groundwater for the next 50 years. DOE and the National Lab will be using that core industrialized zone as a nuclear

facility. And we will control access to it and control access to the groundwater.

The existing area has an alternative drinking water supply that's piped in from the city of Richland so we don't have to use the groundwater. The amount of flux going to the Columbia River is that two to eight percent of the total loading. It's about 100 to 150 kilograms per year versus 10 times that coming up from the irrigation returns and a lot more coming from the Yakima River. So to put it in perspective how much we're putting in. But we're not using that as an excuse not to do anything because we have to restore the aquifer.

Uranium concentrations upwelling from the river substrate at times do indeed exceed federal drinking water standards. It's about 120 at the most picocuries per liter. The standard for drinking water is 30. But that is far below levels of environmental concern that are established for uranium. And there's no statistical difference in what we see up gradient and down gradient of Hanford and the uranium in the river. There hasn't been for a long time. And if there is a statistical difference about eight percent of it is ours.

So restoration of the aquifer, in other words achieving federal drinking water standards, is the reason why we're going forward with this. The primary source of

the contamination is that fraction, that 30 percent that is local and periodically re-wet itself. And about one percent of the inventory is dissolved in groundwater. Three percent is bound up in groundwater solids. And about two percent of the total amount in any one year goes to the river. So the two percent of the total goes to the river in any one year and about 15 percent of the mobile stuff isn't periodically re-wet itself. So even with the declining curve you should be able to get there in a fairly reasonable amount of time.

So the continuation of the plume the model says 28 years. I think to be safe I'll say 30, 40 or 50 years. There may be some wells out there that on occasion because if you get those going really high those will exceed standards but most of those times those levels will be below standard. And that's okay within the guidelines that the EPA has.

So alternative 3a, the alternative that we're proposing, we believe it has the best balance in all the CERCLA criteria. It meets the threshold criteria. It meets the balancing criteria. And we're now trying to figure out if it meets the modifying criteria. So out of 130 waste sites we looked at 38 require no additional action. Remove, treat, and dispose to industrial standards this core zone with 74 waste sites within that little core zone. And there's 12 waste sites outside the core zone. They'll be

done to those residential standards.

When we get the record of decision, if we get the record of decision this fall or early winter or whenever we think there's about 34 of the waste sites yet to be remediated. But we've gone back and looked at everything that has been done to make sure that it comports with the new requirement.

So there is this hotspot out here which seems to be the anchor of the plume. And this is where we want to do the treatment. To see if that works. And we should know when it's funded when we put it in very shortly after we put it in if it works.

If it doesn't work we're required at least every five years to go back and review the protectiveness of this decision. So even though it's -- the acronym we call it a final record of decision. There's no such thing as a final record of decision. There is a record of decision for interim action, which we did back in the nineties, and a record of decision. All of those have to by law be reevaluated every five years.

Natural monitored attenuation because tritium has a short half-life and TCE and DCE three wells, DCE one well, TCE. And this part, it's decaying away so the monitored natural attenuation fits for that. And then groundwater monitoring and institution controls are going to be

necessary until we reach standards. So that is our preferred alternative that we're putting out today. And I'd be glad to answer -- oh, Larry has got one more final slide.

LARRY GADBOIS: I'm going to be quick because I know a whole bunch of people have things they want to say. We have things we wanted to say and this is all about exchanging of information, you hearing from us, us hearing from you and having a dialogue. And then informal comments as well.

Just a reminder. In public comment we're going to have a Q and A and you can answer some information. If you ask questions we don't know off the top of our head we can get back to you. And then after we'll do a comment and that's for the record and that's not a part of response. That becomes part of the record of decision.

Mike has given you the bulk of the information. I'm Larry Gadbois with EPA. EPA as the regulator, our job is to oversee the Department of Energy and help them do the task. Everybody in this room I think wants the same objective. We want a good cleanup. And EPA's job is to oversee and help DOE make a good cleanup decision and execute it. That's our job to oversee them. So I'll be available for Q and A and why don't we proceed to Liz are you up next?

LIZ MATTSON: My name is Liz Mattson and I am the

program coordinator for Hanford Challenge which is a non-profit organization focused on making Hanford a model of safe and effective cleanup. And I'm actually going to be introducing one of our legal interns, Nathan Reeves, who has been working with us this summer and we asked him to look at the 300 Area and the proposed plan and come up with some comments to give him some experience doing that this summer. So Nathan, if you want to come up. He's going to share some of his findings. And here he is.

NATHAN REEVES: Hi. As Liz said my name is Nathan Reeves. I'm an intern with Hanford Challenge. I think the best use of this time is probably just to sort of re go over some of the things we've already heard. We've spent over an hour now listing to the plan. And I think it would just be good to sum it up in a few minutes and get some simple concepts that we can all hang onto.

So first of all we know where the 300 Area is. Now it's in the southeast corner of the site. It's a fairly small area of the site compared to the full site. It contains the three organizational units that are covered in this plan. So we heard about that just a few minutes ago. 300-FF-1 is part of the industrial complex where the uranium was leaking in the ground. 300-FF-2 is most of the 300 Area where there were waste sites and other things going on. And 300-FF-5 is the groundwater that's under the site. So those

are some important things to help you -- to help coordinate you as to where these different things are going to be going on.

The 300 Area industrial complex is that smaller area in the southeast corner of the 300 Area where all the buildings are. This is where Northwest Natural Laboratories is going to be operating and where the uranium is. That's the area of the site that's been proposed to be cleaned up to industrial standard, whereas the rest of the site has been proposed to clean up to residential standard where it's safe for people to live there. But the cleanup of the industrial complex to the industrial standard requires institutional controls, which are things like fences, guards, and making sure that people don't get in there, that people aren't exposed to things they shouldn't be. So one of the things to think about when we're thinking about institutional controls is how long they're going to be viable. The cleanup of this site is supposed to be forever so if institution controls are required then they're going to be required forever as well. So that's just something to keep in mind.

Now, we heard about six alternatives that are evaluated in the plan. The first alternative, do nothing, really seems way out of line. I don't think anyone is considering that seriously. We're required to look at it

under the law so it's there but no one is really considering it.

Alternative 2 is the monitored natural attenuation, MNA. That's an important term to remember, MNA, monitored natural attenuation. That basically means we're not taking action, we're just looking at it and making sure -- we're observing the natural processes. Alternative 2, again I think Mike said we're not really considering that.

Alternative 3 and 3a are the ones that use uranium sequestration. So this is the injection of the phosphates into the ground. 3a uses it in a very small square area, as Mike said, where the hotspot is considered to be. Alternative 3 as opposed to 3a would start there but then would expand to more areas if it works.

Just a few -- just to remind you guys about uranium sequestration. That's drilling wells, injecting phosphates that's supposed to bind up with the uranium and keep it from dissolving into the groundwater. That technology has been tested a little bit but not -- has never been used on a full-scale cleanup operation. The proposed plan in alternatives 3 and 3a doesn't really include backup plans that have been made into a plan. So if sequestration doesn't work the plan doesn't really tell us what happens then.

And then alternatives 4 and 5 include some RTD, remove, treat, and dispose, which is, as we've heard, digging up areas, removing the soil, taking it to a secure landfill, and filling it with clean soil. Alternative 4 also includes the uranium sequestration.

So that's a basic overview of what we've heard I think tonight. Real quick, gives you an idea of some of the terms of some of the plans. Some questions that Hanford Challenge has and things just to keep in mind as we're asking questions and then we're commenting, we heard a little bit about the plan for tritium and some of those organic chemicals. That plan is common throughout all of the alternatives and it is monitored natural attenuation. We would just like to know what else is considered there, why we chose monitored natural attenuation. Just a little more detail on that we think would be helpful to understanding that part of the plan.

Another question we have is what happens if sequestration doesn't work. We heard that there's going to be a five-year review. I think it would be helpful to know what standard is going to be used in that review, how we're going to evaluate everything to make sure that we're actually cleaning up the way we want to clean up.

And finally we would like to know how the plan would change if we wanted to clean up the entire 300 Area,

not just -- including the industrial complex, to residential standards instead of industrial standards. And so I didn't hear an explanation of why the industrial standard was chosen and what the costs for a procedure change would be to clean that all the way up to residential standard as well.

So those are just a few questions to keep in mind as we ask questions as we make comments. As we said earlier, the comment period is open through mid-September. You'll be able to submit written comments through that time. You will also have the opportunity a little bit later to verbally submit comments or just to submit written comments tonight. You can do any or all of those things. You can speak tonight, you can submit a written comment later. You'll be able to go back and look at what we said tonight. Just again something else to keep in mind as you're preparing to comment and ask questions today. Thank you.

DIETER BOHRMANN: Ryan?

RYAN STRONG: I will be very, very quick because I think most of you saw the presentation so I won't just redo the presentation all over again. I just want to make a couple of points. There's a thousand kilograms of uranium that's not being cleaned up. Right? So some of that submitted, acknowledged by the agencies that that is going into the Columbia River. We don't think that's good. More of that is just going to stay right where it is and that's

not safe, right, because in 50 years, however long it's going to be people are going to dig sewer lines. People are going to dig basements to building. That contamination is still going to be there. Now, the DOE is very confident in its institutional controls. We're not as confident in its institutional controls because we've just seen institution controls fail. They sound great but they fail. So they're very confident; we're not. That's a big difference that we have with them.

As far as recreational use I forgot to mention Native Americans. And I'm not the first that forgot to mention Native Americans. It seems to be a problem that we kind of have where we just forget about Native Americans and their rights to the land, their rights to the river, their rights to eat that fish, their rights to that riverbank where uranium is springing up right where children play. Right? So let's not forget the Native Americans. They're not industrial workers, right? So let's not forget them.

Let's talk about 15 millirem which is the cleanup standard. Sort of went over this but 15 millirem is eight additional cancers per 10,000 individuals. Adults, right? So that doesn't meet the federal standard of 1 per 10,000 and it certainly doesn't meet the applicable standard or state standard of 1 in 100,000. We think MOCA applies. We think that we should meet that standard.

As far as land use goes we think that the definition of the industrial area is way too broad. There's a very small group of buildings that are going to supposedly still be used for industrial areas. Fence those buildings off. Make sure that no contamination gets out. Make sure that no people get in. And if the phosphate injection works in that area or something maybe that can qualify, maybe, but not the trenches up top. That's not part of the industrial area. So that's our main point there. Let's make sure that we're using the most accurate definition of what the industrial area is. We think it's too broad.

Last thing I wanted to touch on, this idea that we're going to contaminate the groundwater more by cleaning up. Right? You don't have to wet the groundwater. That's a false assumption. We'll talk more about that later. That's not the right way to do it to protect the workers. There's other ways to do it. So even if we do 15 feet like they're planning and we wet, well, that's still going to contaminate the groundwater more. Right? And so if we go 30 feet and we wet, well, that will contaminate the groundwater too but it's going to contaminate the groundwater no matter what if we don't use the right technique for not contaminating the groundwater. That's our position on that.

I think that's all the notes I have so I'm looking

forward to the question and answer period.

DIETER BOHRMANN: Okay. Thank you, Ryan. Thank you, Nathan. We are behind schedule. I apologize for that. I want to be respectful of people's time. A couple of options here. We could continue on with the Q&A, start the Q&A now. I don't want people -- there's about a dozen people that are signed up for formal comment. I don't want folks to leave without getting the opportunity up to do that. So we could do the formal comment period now and then do the Q&A following that. The agencies are available to stick around a little bit longer if we prefer to do that. Feedback on that? Yay or nay?

PUBLIC CITIZEN: I'm just saying if we could have a short Q&A I think it will help people formulate their responses. And in saying that I need to leave but I have a very quick question so I opted for Q&A.

DIETER BOHRMANN: Okay. So folks okay going like 15 minutes Q&A and then jump in and then we can go with the comments? Okay. Well, let's go ahead and do that. We have another microphone we can pass around if we need to. This is a pretty small room so we may not need it but for the transcript and for the stenographer it will be helpful to make sure everyone's questions are captured. So we'll just start right over here.

PUBLIC CITIZEN: When you talk about removing this

to off site I don't know if you're aware, you might be, that yesterday or today they were having hearings in Washington, D.C. about mobile Chernobyls. And putting toxic waste on the road. And the threat of accidents, of terrorists. And I'm wondering what you-all are talking about, where you're going to move this stuff. And how are you going to move it. I happen to live -- I just moved here from Las Vegas. And we have been aware of stuff going to the Nevada test site without any radiation symbols on them. And we don't know what's in them and we know that the DOE, and other agencies, have kind of this little loose thing about mixing waste and they're not telling us what's in it. So I have to tell you I'm very concerned when you're talking about moving this outside and where it's going and how it's going to get there. Are the governors of those states going to be notified when it's coming and what it is.

LARRY GADBOIS: Okay. Most of the waste that's a result of the cleanup that we're generating, most of the waste is eligible to be disposed on site. Primarily that's in our environmental restoration disposal facility in the central part of Hanford. A small portion of the waste is transferred out. And that has to go to the waste installation part of the project plant in New Mexico. So that we package either on site or there is a commercial facility in Richland that can package that.

PUBLIC CITIZEN: There are people in New Mexico that are fighting that.

LARRY GADBOIS: Oh, of course. All through this, this is a controversial topic.

PUBLIC CITIZEN: Yes, it is.

LARRY GADBOIS: We haven't been getting sent to us here but other parts of Hanford generate spent fuel that would have gone to the Yakima unit but that's off the table.

PUBLIC CITIZEN: We closed that.

LARRY GADBOIS: So at this point spent fuel that was at Hanford is still at Hanford and the future home of that we don't know. But we haven't had much of a spent fuel issue for the 300 Area.

JD DOWELL: And those things meet all the different compliance. Lately it's done in the course of regulations and law.

PUBLIC CITIZEN: No, it isn't.

JD DOWELL: We're talking about the 300 Area.

PUBLIC CITIZEN: Okay. But I'm talking about the shipments. They're not done legally.

JD DOWELL: Okay. Well, we can take further questions if you have them and answer them but what we ship we meet the law with. And we also have agreements with each state's governor so that we drive through the states on their order.

PUBLIC CITIZEN: I have to tell you but I just spoke to the guy who is head of the nuclear projects agency for the department of -- for Nevada state. The governor has not signed off on any of this coming through. I have to tell you that. Okay? And that's right from the governor's office.

MIKE THOMPSON: We appreciate the comments but we would like to kind of focus it on the 300 Area. There are people who want to give comments.

PUBLIC CITIZEN: Gosh, I wish you two hadn't said that because you're shipping waste using parade permits locally. Anyway. Just so we can get straight it's not quite proforma.

My question was, I've got a couple of quick questions. What is the half-life of uranium 238?

LARRY GADBOIS: 238 is about four and a half billion years.

PUBLIC CITIZEN: So natural attenuation for that is probably not.

LARRY GADBOIS: It's just laughable. Nobody would make that claim.

PUBLIC CITIZEN: All right. And are there decay products associated with the presence of uranium 238?

MIKE THOMPSON: The primary decay product of natural uranium that is of interest in terms of human health

and environmental health is radon gates. Okay? We did look at that and that's covered in the RIFS report.

PUBLIC CITIZEN: So if you leave it there you won't get radon gas coming up into whatever structures or people that might be still there.

MIKE THOMPSON: We've looked at that. As a matter of fact somebody from the EPA called me one day. Said Michael, you must evaluate this. I said sir, yes, sir, because it was a rational question.

PUBLIC CITIZEN: And finally the thorium question. There are thorium trenches out there. There's a lot of thorium disposed of. I don't see it in the documents here. We detected it in our own readings and, you know, what do you have to say about that?

MIKE THOMPSON: We've not found thorium at levels of concern in the rate that we've done. So thorium, you're going to find thorium everywhere. You're going to find plutonium everywhere. As a matter fact you may find plutonium in the sediments of the reservoir from which Portland gets its drinking water because of atmospheric testing and because of high levels of rain over there. You can find plutonium on the west side. As a matter fact where I like to camp at Ohanapecosh, the levels of plutonium in the soil there are higher than the levels of plutonium generally at Hanford.

PUBLIC CITIZEN: Before Hanford there weren't levels of plutonium.

MIKE THOMPSON: Yes, it's atmospheric testing by us and other countries, yes. But what I'm saying is you're going to find -- you're going to find some level of these contaminants virtually everywhere. So the question is is it a level of concern, can we find it at levels that pose risk, and we have not.

PUBLIC CITIZEN: You look at isotopes.

MIKE THOMPSON: Yes. There was a lady back here?

PUBLIC CITIZEN: I spent last night watching for three hours the Senate committee, Wyden's committee, talk about the handling of nuclear waste. And one of the big questions that people said that we haven't clarified what was DOE waste, which was the most toxic, most radioactive waste, and the commercial waste. Of course the nuclear industry wants to get nuclear facility waste handled in commercial reactors. But what at Hanford is the figure on the DOE waste and the DOD waste, the commercial waste? I know the DOE is responsible for all the waste but it's -- this has been the biggest scandal that the DOD have walked away from their big mess that they created because that -- all of the people agreed at the hearing, the ones that are for more nuclear energy production, that combining the waste, you know, just makes it almost, you know -- it's not

even clarified what the problem is. What is it?

LARRY GADBOIS: The 300 Area has been Department of Energy nuclear materials and nuclear waste generated. They haven't -- essentially haven't been involved in the commercial nuclear sort of things that you're talking about. So we're talking about--

PUBLIC CITIZEN: No, clarifying the defense department waste that was the most radioactive that is in these sites. Now, how much at Hanford is that? Does anybody know?

LARRY GADBOIS: I don't know about a Hanford total.

JIM HANSON: About 400 million curies.

PUBLIC CITIZEN: The weapons waste.

JIM HANSON: It's about 400 million curies at Hanford.

PUBLIC CITIZEN: And then what is the commercial waste?

JIM HANSON: About 20 billion.

PUBLIC CITIZEN: Well, that was a question at the Senate hearing yesterday.

PUBLIC CITIZEN: Yeah, I have some questions and I will save my comments for the comment period but some of the questions I have is, you know, we've heard a lot about uranium but uranium comes in several different isotopic

forms. They're very different in their radioactive effect. So I was interested in, you know, we've heard about the runoff in the pre-nitrate streams and the Yakima River also brings in a lot of uranium but that's 238. So I was just curious as to if you have any reading of the relative ratios of 238 to 235 in uranium that is under the Hanford site and leaching into the groundwater.

MIKE THOMPSON: Sure. What was done in the 300 Area was the fabrication of uranium into configuration that is suitable for fuel rods in the reactors. So it was primarily 238. There was not a lot of enrichment in most of the runs at Hanford. Enrichment can go anywhere from a fraction of a percent down to I think 10 percent which is highly enriched by 235. But most of the reactors at Hanford throughout the life used primarily 238. So what was used there is this is where they took billets or massive amounts of uranium and shaped it into fuel rods and clad those fuel rods to go up to--

PUBLIC CITIZEN: Yeah, I understand that. But my understanding is--

MIKE THOMPSON: So it's mostly natural uranium.

PUBLIC CITIZEN: My understanding is that you do it enriched. And it is a matter of percents of maybe up to 20. And if you go up to 95 for a weapons grade. I understand that. But you -- just raw 238 doesn't make a

good fuel. You do have to enrich it some. And you're saying 10 percent or less?

MIKE THOMPSON: Oh, yes. Far less.

PUBLIC CITIZEN: Okay, fine. Then some of the other questions I have. The industrial area, my concern echoes what they were saying. When you talk about the industrial area my understanding is that you're making it as safe as the industrial standard that we were talking about that it presupposes that the area is either a parking lot covered with asphalt, sealing in what's in the ground, or it's concrete inside a building, again sealing in what's in the ground. So my interest was how much of this area that's going to be set aside to be remediated to the industrial standard, how much of that is actually covered with either asphalt or concrete and how much is just exposed ground?

MIKE THOMPSON: Sure. Let's talk about the perception of what industrial cleanup means. The residential scenario that we used to develop remediation goals would be people living there all the time and there are -- there is irrigation. So you've got a lot of water moving down through the system. One of the primary differences that we cited for the 300 Area industrial zone would be that well, families aren't going to live there. It's going to be adult workers for the most part working anywhere. Outside, inside, it doesn't have to be paveed. So

you can be working in the dirt because we've dug this stuff down to 15 feet and backfilled behind it. And a lot of that backfill actually meets residential standards. I looked at that awhile back when we did the 300 Area end states thing.

But the primary difference is how much soil -- how much contaminant you can leave behind in the soil below 15 feet. And there is a difference between the remediation goal for a residential scenario which includes irrigation and an industrial scenario which does not include irrigation which would be natural precipitation on top of a plant community, on top of parking lots and that sort of thing. And that plant community does not evolve to a mature sort of step. So it's kind of a moderate amount.

PUBLIC CITIZEN: All right. So let me ask you a question about that then. With respect to an industrial area can we say that there is any kind of guarantee that the area that's going to be designated remediated to industrial standards, is there any guarantee or control saying that none of that will be used for residential purposes or by the City of Richland up to 50 years out? Is there any real way of nailing that down or is it just we hope it won't be used?

LARRY GADBOIS: The record of decision that we're proposing would put an institutional control which applies to the land. And DOE as the land owner now has to ensure that any activity they do or if they allow somebody to come

on site that they would honor those. So the DOE is responsible for that. And EPA can take and enforce it if they don't live up to that.

If DOE turns the land over to somebody else, you know, sells the land or gives it away a deed is generated and there's a deed restriction on that that would transfer. So it's an imposition on the land that DOE is responsible for fulfilling.

Let me get to that one other thing when Mike was explaining what does industrial land use. This is a cleanup level for the soil that would allow future industrial users to be exposed to that soil and be protected. And our industrial scenario is 40-hour week, 50 weeks a year, outside all eight hours in the dirt. So it's not on a parking lot or in a building. They're outside exposed to the dirt so we're setting a dirt cleanup level.

PUBLIC CITIZEN: And that is -- the cancer is supposed to be what, 8 per 10,000? That does seem a bit high.

LARRY GADBOIS: For the radionuclides we're using a 1 in 10,000. For the chemicals we're using the MOCA numbers.

PUBLIC CITIZEN: Larry, you're not using those numbers.

LARRY GADBOIS: Yes, we are. Let me get the one

up. The 15 millirem, when we did the interim actions we used 15 millirem. There was a draft proposal out there at the time. That's what we adopted. What's in the proposed plan and I challenge you to prove me wrong is we're using a risk-based standard of -- the standard of 1 in 10,000.

PUBLIC CITIZEN: That's federal standard.

LARRY GADBOIS: Yes, that's federal standard. We're not using 15 millirem there. And the remedial investigation disability study talks about that and why we're not doing that and we're going with a risk-based standard. EPA no longer supports the 15 millirem that we used to use.

PUBLIC CITIZEN: So my question has to do with the discharges to the river where essentially you're proposing a formal decision under which 150 kilograms of uranium per year will discharge to the river. Do you have an NPDES permit in place or applied for for that discharge to the river? And do you have a consultation under the Endangered Species Act since this is critical habitat for those discharges to the river?

LARRY GADBOIS: First part, NPDES, no. CERCLA actions don't do permits. I think you know that. As for the consultation I'm not sure where it's -- the Department of Energy does consultations with Fish and Wildlife for those sorts of species. Department of Energy does a

biological assessment. The Endangered Species Act has some of its own processes. And that's a regulation that comes into play when you do a CERCLA action. You look at other environmental laws that are out there.

PUBLIC CITIZEN: So will you send us that consultation? I mean why don't the two of you send me the consultation?

LARRY GADBOIS: I don't have it.

MIKE THOMPSON: Jim, can you help?

JIM HANSON: Yeah, I'm not aware of consultation going on with this action.

MIKE THOMPSON: And you had something on a previous comment you wanted to?

JIM HANSON: On the 15 millirem versus risk level? The proposed numbers in the (inaudible) for rads are the lower of the 15 millirem versus the risk level of 10 minus 4. So 1 in 10,000. And what you'll find, what you're probably looking at, we're still seeing the interim action number. That number actually ends up being lower than the risk-based number. What you see is your calculation that shows that you've identified 8 in 10,000. That's an average concentration. And so when you look at the different emitters, the alpha emitters typically go -- the risk level if you go tritium risk level that will be a much higher concentration and less conservative. So we're going with

the lower.

PUBLIC CITIZEN: Now, we will comment extensively on that. You're not meeting 1 in 10,000. And you're not even attempting to meet MOCA. But your PRGs, your remediation goals clearly identify either four millirems for water standard. And they clearly identify 15 millirem as the equivalent.

LARRY GADBOIS: Again, like Dr. Jim Hanson said, for the radionuclides we're using the more conservative of the 1 in 10,000 risks for the interim action. We've been doing cleanup out there. Like you've heard we've been doing a lot of cleanup action. We've dug up most of the waste sites already under an interim action. We don't want our final ROD to be any worse than that. So we're at least as good as the interim actions. And then where a risk-based standard for radionuclides is more conservative, that's what we're proposing to use. And I would love you to find where the proposed plan says something other than that because we scrubbed that pretty thoroughly.

PUBLIC CITIZEN: Absolutely.

DIETER BOHRMANN: Can we take one more question here and then I think it's about -- this is a little fast here but it's about 20 til. We'll get to the formal comment period.

PUBLIC CITIZEN: Hi, my name is Tommy Gunn with

Washington Physicians for Social Responsibility. We're concerned about what's being assumed and really not talking about. So one of the assumption, and it's a lot of it was in a 2011 study that Bob Alvarez did who has a lot of experience with the site. And he found through research about 3.5 tons of plutonium that was not counted in the inventory. Not just at Hanford. This is throughout the complex. And then he started looking at, for example, what's called absorption rates of soil. One of the assumptions that we have at the Hanford site the higher the number the more the soil actually absorbs plutonium for example. And he said that the operating model at Hanford is 150 absorb rate, its KD rate, whereas most of the measured material in the soil is about 10. So we're making a mistake of a factor of 15 over how long -- how fast these, plutonium in this case, travels both in water but mostly in soil.

I think that we've got a problem here. You know, we've talked about 130 sites. I would like to see test wells drilled, maybe three, at each downstream portion of those sites. That's not terribly expensive. Let's not wait around for five years to find three more uranium hotspots. We could actually have drilling taking place at these 130 or 134 sites, even just on the 300 level, and find what the up and down are.

I'm a little concerned about that last blip of

uranium close to the Columbia in 2010 because that means to me there's a little something more than just floating up and down because it's so high up. Well, it's based on two wells maybe. Maybe three or four. But just in the 300 Area you can do some test wells. They need to be deeper. What about -- 15 feet is no magic number in terms of soil. You know that stuff goes a lot further down and hits groundwater a lot further down than 15 feet. And I'm hearing that that's what you folks are doing generally to dig up the soil and remove it. It might be some of the hottest but there's also some other material. You know, we've got 42 byproducts out of the reactor that's radioactive ions. And they go a lot of different places, including sticky plutonium that doesn't bind with the soil at Hanford as much as we thought. So this stuff needs to not be simulated tested. It needs to be measured at the site. And I know that there's room to do this but it's not terribly expensive in relation to a lot of other stuff that's spent every year out there.

MIKE THOMPSON: Well, a couple of things in response. Plutonium, our knowledge of plutonium, it generally is very as you say sticky. It likes to bind to the soil. And if the chemistry is such within normal ranges plutonium binds up extremely well to the soil. It doesn't move very far. If it does get into the groundwater it binds to the soil within the groundwater.

Early days of Hanford before we had tanks there were things called reverse wells. Anywhere else they would have called it an injection well where waste was actually injected into the aquifer. There's a number of these. Small but a fair number. Those have been studied extensively because that's where things like plutonium and uranium and cesium and strontium and that sort of thing were injected directly into the groundwater. So it's sort of a serendipitous laboratory nature to look at the stuff so we've studied that so we know it pretty well.

Plutonium generally does not move very far. Now, there's a couple of exceptions to that. One exception is if you get very high pH or very low pH. So in the 200 Area if you had a liquid waste disposal creek that received things like plutonium and uranium and those sorts of things, binds up fairly well close to the surface. But if say for instance the folks that are doing the work have to meet production schedules and they need some place to put their waste and this thing is bound up they've been known to put acid solutions into those to break it free and to use it. That's one of the practices that was used. So there are some areas in the 200 Area where the waste has solidified. And plutonium was deep into the soil. You can see that. It's in the characterization. It's very well published.

The other is if you have really, really extreme

chemistries in the stuff. You can get some (inaudible) in the processes. And plutonium likes to bind really, really well so there is another mechanism for that as well. Transport this. More than what is generally considered for the sticky stuff.

In the 300 Area I hope we haven't given you the impression that our knowledge ends at 15 feet because over the last 24 years we've drilled a tremendous number of holes out here looking exactly for what you're talking about today. Characterization data, three dimensional. You're actually go down taking samples looking for things like uranium, plutonium, strontium, cesium. Generally in the early days it was the radionuclides. And then later as we saw in the Tri-Party Agreement and we got into this there are remedial investigations that occurred that were approved by the agencies where we looked at the characterization looking for that. So we do have a lot of characterization data below the 15-foot interval. So if you would look in the state document all of the information that's available. Look through plots and you'll see uranium, plutonium, strontium. All that's available for your perusal.

PUBLIC CITIZEN: So you're talking about the EIS document?

MIKE THOMPSON: No, this isn't an EIS thing. The proposed plan has a big, thick document associated with it.

It's the Remedial Investigation Feasibility Study. Everything that we know that's pertinent about the decision, you know, all that characterization data is published in there. So if you want to go back and look at that it's all there. You can make your mind up as to whether it is sufficient.

PUBLIC CITIZEN: Just one quick question. How about PCBs, polychlorinated biphenyl, for a second? Are you monitoring for PCBs in the fish or where are the PCBs at? How much is used in the 300 Area?

MIKE THOMPSON: We're finding PCBs in some of the soil sites. And frankly we're finding some of the aloclors of PCBs in some of the sites a little deeper than we would have expected. But they are looking as they're excavating and we would look as we drill for PCBs. And we have found some. That's why you saw on those contaminants of concern because we've identified that in the characterization. So we want to be very careful and look for that and make sure we get it.

DIETER BOHRMANN: Okay, thank you everybody for your questions. And like I said, if we have further questions after we're done with formal comment the agencies are going to be available to stick around and talk to you further.

When you signed in you had the opportunity to

check the box if you wanted to provide formal comment so I'm just going to go down the list in order that folks signed in at and we'll go from there. If there are people who still want to comment who didn't sign up we can do a check-in after we get through this list. I will ask that you state your name for the record and we have you speak into the microphone to make sure we accurately capture your comment on the recording here. Not going to put a clock on you but, you know, if you could keep your comments to about three minutes I think that would be a good start. And then, you know, if we have some time and you want to comment further after that we'll go from there.

So our first person who signed up is Armand Kechel. Sorry if I butcher your name here. Is Armand still here? Okay. Steven Gilbert is--

PUBLIC CITIZEN: I'll provide a couple of comments.

DIETER BOHRMANN: Excuse me. Can you just state your name?

PUBLIC CITIZEN: I'm Steven Gilbert. I'm with -- president of the board of Washington Physicians for Social Responsibility. Toxicologist for the University of Washington.

So one of my comments are we spend 35 billion a year on nuclear weapons. We spend 5.5 trillion overall on

nuclear weapons. I think cleaning up Hanford to return it to where it was is an important goal and we should accept responsibility for that and we can certainly take a bigger fraction than what we spend on nuclear weapons, including the cleanup site.

Also I want to point out that there's an assertion here that a 150 kilogram male is used as a standard. Now, children eat more and drink more than adults do. And I wonder if your standard would change if you took a two- to three-year-old kid and used that as the standard. See if they're eating fish or drinking the water that's in the Columbia, your grandchildren for example.

The other thing I do think the area should be to residential standards. We should try to get it back to what it was initially and not fool around with trying to make or put in controls that we know. That's just shoveling the work. I'll leave it there.

DIETER BOHRMANN: Thank you. Our next commenter is Mary Hansen followed by James Kelly. Is Mary here?

PUBLIC CITIZEN: I'm Mary Hanson and I am cochair of Seattle Fellowship of Reconciliation. And I would just like to concur with the comments that Steve Gilbert just made and also with the comments of Tom Carpenter, Tom Buchanan, Jerry Hallett, and the interns.

I just really think that the concern I have is

that not putting enough money into it and not bringing it up to the standard that we can bring it up to. And I personally do not feel comfortable at all with kind of making assumptions that things will work out. I think we're going into a time where things are rather chaotic. And I'm very uncomfortable about the fact that you have our state's only nuclear power plant right, you know, with a parking lot right near this. And the comment was made how much dangerous waste there is stored at that site. That is of extreme concern to me. So it's not pertinent to this directly but I would prefer to see huge amounts of money poured into putting that waste into hard cask storage because the danger to Richland and the danger to the effort to do this remediation are made, in my opinion, jeopardized by the fact that you have the fuel rods on the roof of a nuclear power plant right nearby. And so I would like to see that process speeded up because even though I understand that different organizations have different responsibilities for different things. Ultimately the birds, the squirrels, and nature and water don't even know. That isn't real to all of that. So I think we need to really demand more in the way of resources so that we can deal with making the whole area safer, the parts that you're responsible for and the parts that other entities are responsible for. And I will make further comments in writing before the 16th of

September. Thank you.

PUBLIC CITIZEN: Jim Kelly from Seattle. And I actually don't really have anything to add in terms of oral comments right now. I do want to really echo one of the things that the intern and Ryan mentioned which is from Heart of America which is that there has been really no discussion about treaty rights of the Yakima Nation. And to me that is very disturbing, particularly in light of some of the comments that were made. Almost -- essentially just saying that nobody uses this area in that way. You know, to me that's very insensitive. And so, you know, I really am concerned about that particular point. But I will also submit some written comments. So thanks.

DIETER BOHRMANN: The next commenter is Roxy Giddings followed by Peggy Maze Johnson.

PUBLIC CITIZEN: I'm Roxy Giddings. 12211 C Street South in Tacoma, 98444. And I'm telling you that because I didn't write it down and I don't have e-mail so I can't receive any comments from anybody except through snail mail. A wonderful idea, snail mail.

I got on the telephone with Denny Heck for an hour the other day. He's our state guy, number 10, our federal guy. And he sent me some things, including the Hanford funding summary. And I would like to know how much of the request for 2014 of the $2,000,203,624 will go to this

particular section of the cleanup at Hanford. I've been coming to these now for ever since they started. We're still paying out for World War II. Remember how long it takes. Anyhow, I understand the Operations Office and the Office of River Protection and all these other things but I kind of think I would like to have a response to that question. How much of the request is going to go to this because that's a lot of money. And I also would like to say that the total requested for 2013 is 2,000,155,886. 155,886,000. I can't even read all these zeroes. But we haven't gotten that much. So I guess I would just like to say ask for as much as you need and we will do the best we can to get Congress off their sequestered butt -- don't put that in there. And I want to thank you for using the word "sequestered" in the proper way. If we're going to sequester some of this stuff if we really want to hold it down and keep in in control. Okay.

DIETER BOHRMANN: Peggy--

PUBLIC CITIZEN: She's gone.

DIETER BOHRMANN: Next commentator is Tom Buchanan followed by Barbara Zepera.

PUBLIC CITIZEN: Just one comment. I know in West Valley, New York, which was the historical site of the first reprocessing plant, which never really worked but there was actual waste brought to the West Valley site. A lot of it

is under water. And one of the things that they've done to prevent the waste from traveling into the water systems is to dig a huge trench and fill it with an absorbent. In this case it was cetalite which is used to at least absorb some of the radioactive elements that were impinging. And one of the things that would be possible, and we're talking about an engineering solution, at some point should be at least proposed. It's alternatives. How long would that trench be in the 300 Area along the Columbia, how long would you have to dig pilings down to protect and keep that seepage that's in many ways going into the Columbia now? How often would you have to take that cetalite out and put some more in, because we're talking about mass solutions of a very, very tough problem? And what I'm asking for as well is having this not the single solution, just like the hotspot should not be the single solution in terms of seeing it go up and down. I would not be surprised to see many other hotspots. I don't want to wait five more years to see some more hotspots trickling down in the underground groundwater or in the vadose area. I don't want to see that. And I want to see a barrier on the Columbia because every year that it drops in it's not just drinking water standards at Richland or at the Hanford Reach that I'm concerned about.

What about when it reconcentrates? What about those sturgeon behind the dams? What about downstream? When

the biological symptoms collect and start to reconcentrate so much of the radioactivity. It's a very serious problem and we don't deal with that in this vision of the cleanup process. We deal just with onsite and offsite drinking water standards. I realize we have to have some standards but we also should measure the biota and the living systems including plants and see where this stuff concentrates again. We know it's in duck eggs. We know that it's in other species. We know it's in fish. So why don't we have some indicator species? And why don't we protect the river with as much engineering as we have that's not terribly that expensive in terms of -- we've been digging trenches out there for years. Let's build another trench. And in this case let's fill it with material and see if we can stop a lot of the leakage that's going into the Columbia right now. Thank you.

DIETER BOHRMANN: Barbara Zepera.

PUBLIC CITIZEN: I would like to put two things on the record because obviously I really don't trust anything that the DOE is doing. The NRC is now totally controlled by the nuclear energy plan pushers. But on the record Ron Wyden's committee yesterday, the Senate committee on nuclear issues on cleanup and containing the waste. The FIFO person spoke briefly. And Ron Wyden spoke and Cantwell spoke and they're in the Congressional Record. And I wish their

statements would be put on the record of this hearing because they're trying to get at the real issue. And David Lochbaum -- I think it's L-O-C-K-B-A-U-M -- union of Concerned Scientists, had a clear statement. I can't repeat his statement here but I would ask that you put his statement on the record of this hearing because I am a bomber. I lived in Richland and my mother worked at the very lowest level in the decontamination lab. And she was a Reagan Republican. But she had to go through this. And I've said this repeatedly at all of these hearings that the supervisors who really tried to hold up the so-called safety standards were not promoted. In fact they were criticized. And as long as we have a society that says that anybody that tells the truth in government is put in jail for 100 years we're not going to solve any problems like this.

I was -- I had security clearance. I worked at Boeing on test flights. Not bombers. I worked at the applied physics lab. And I worked for the physicists who were doing the submarine target projectories arrays -- solar arrays. And they said that all the secrecy that we have really is stupid because if we wanted to really confuse the enemy we'd give them all our data because it's much harder for them to look at our data and figure it out than it is for everybody who is a real scientist. Our real problem is that all the people getting physics degrees and math degrees

are from China now, so. My daughter got her Ph.D. in economics and all of the people that got Ph.D.s down at Davis in science and physics, 90 percent of them were from China.

And anybody that is putting people in jail. I mean we have a government that is so stupid that they are putting people that tell the truth and tell the stupid mistakes that we have done in our government and are unwilling to find them. We can't solve these problems. But I would ask that the Union of Concerned Scientists statement that was on the record of the Congressional Record yesterday be put on this record. And I also ask that Plutopia by Kate Brown, a new book that's come out about the Hanford -- both Hanford in Richland and Ozersk in Russia each issued at least 200 million curies of radioactivity in the four decades of operation for weapons. This is twice what Chernobyl emitted.

And in the TV last week they had a reporter go to Fukushima. They weren't getting very big readings when they walked around the plant in the dirt. But when they got near any of these plants that are just growing up in these empty streets their meters went off the charts because the plants. And that's why you're getting higher readings from irrigation probably because the plants, our food basket, is being radiated by this unclean weapon system that we have

been hiding from the truth. But I urge people to ask for this book in the library so they have to carry it. Plutopia, Kate Brown. And I ask people to go to the Congressional Record and read what -- there's a few people in Congress, Maria Cantwell, Ron Wyden, that are trying to get at this cleanup. And we're insane if we don't really do it. And we can't just sit here and give us, you know, well, weapons don't have anything to do with it.

DIETER BOHRMANN: Could you state your name for the record please? I think we missed that at the beginning.

PUBLIC CITIZEN: Barbara Zepera. I'm in the phone book. I live at 308 East Republican Street, apartment 710, Seattle, 98102.

DIETER BOHRMANN: Thank you. I just want to make sure we associate your name with your comments so we can get a response to this document. Next commenter is Jude Kmil.

PUBLIC CITIZEN: Hi. I am Jude Kmil. I live in Seattle. And I was not clear on something like this attenuation in terms of how long that would last. If you do it. Five generations? Two generations? Does it just last forever? Does it stay down forever? I wasn't clear on that so I wanted to be made clear on that. And I wanted to say that I think again the best thing for us to do is just to clean it up. Take the money, get it out of the soils. Not 15 feet down. Get it out of the soils. Clean it up. And

it's a very simple statement and I can say more but I can't really follow the last one. Thank you.

DIETER BOHRMANN: Okay. We have Bert Webb followed by Liz Mattson and Jerry Hallett is our final commenter signed up.

PUBLIC CITIZEN: Okay. Hanford is one of the most polluted sites on the planet. And I consider it an environmental crime of huge proportions. With respect to the Native Americans the Yakima Indian Nation originally was given a reservation where the Hanford site became. And then they were moved west of that but they still by treaty rights had the right to monitor the environment. And I was actually hired by the Yakima Indian Nation in the mid-70s to help them find a nuclear contractor that could oversee at Hanford by the Department of Energy and Department of Ecology. And as we can see, 40 years later and more apparently not enough is being done.

Your presentation was too technical by far. You know, you dropped a lot of different technical terms you didn't define. So to even think about being done from 7:00 to 7:30. It took you almost an hour to dump that load of technical information on us. And then you want to list out a nuclear engineer. Could not follow about half of what you're talking about. For the record by the way my name is Burt Webb. I have a blog at newville tidings dot com but I

blog daily on nuclear matters.

You need continual monitoring. There's too many unknowns. There's just far too many unknowns at Hanford with respect to what is still in the ground, what's going to come out of the ground, when it's going to come out of the ground. You need to be continuously monitoring it. Like the guy said wells, biological issues, plants, animals, and so one.

I have just a minor side question. I was at a hearing at Magnuson Park. And the Navy is cleaning that site up but apparently they haven't heard from the Department of Energy and EPA because they were saying that 15 millirems was just fine, thank you very much. So maybe all the federal departments ought to talk about that if you don't think 15 millirems is good enough.

I am afraid to say that the Department of Energy and other agencies at Hanford have a really wretched record with respect to transparency, safety, planning, competence. They've even been caught breaking laws. The tank fiasco that has been happening now with leakage in the double-walled tanks that were guaranteed never to leak. The vitrification plant that they sank a lot of money into before they even understood what they were up against and then had to stop because they realized it just wasn't going to work. So you'll excuse me if I lack confidence in your

process.

LIZ MATTSON: I'm Liz Mattson with Hanford Challenge. Thanks for the opportunity to comment today and for explaining how the comment periods that we have until September 16th. We always appreciate when that is done, when we request that and that request is met. I have a few comments today and then I'm also going to submit comments in writing.

Some of my concerns are about the uranium sequestration since it is not a sure technology. We're not completely sure it's going to work. We need a backup plan. And so I hope that the Department of Energy and EPA will consider that as they're looking at their preferred alternative and considering public comments that if it doesn't work they need a plan in place that's not just monitored natural attenuation and letting uranium go into the river and washing away that way, which eventually gets to drinking water standards in the aquifer but is a pretty passive plan. And I think removal, treatment, and disposal is potentially an option. Obviously it's a complicated situation with the 300 Area but I think it should be considered as part of a backup plan if uranium sequestration does not work.

And then one of my biggest concerns is around residential standard versus industrial standard. And for

the industrial complex the assumption that we can put institutional controls in place and keep people with restricted use to that area forever is something that is very troubling to me. And I think we need to be really careful any time we make assumptions about controlling land and the decisions of people that will come after us.

It's really easy to forget about decisions that were made before. We have trouble remembering things that happened a year ago, five years ago. Transferring information to people in the future is a challenge. And it's easy to forget especially when what we leave behind is invisible. We've seen people change their land use in other situations and this is probably not going to be that different, especially with the city of Richland right next to that area. It's really easy to imagine that some day someone will want to build a house there and having a residential standard, cleanup standard in that area would make more sense and help protect the future of the people that come after us. Thank you and I will be submitting more comments in writing.

PUBLIC CITIZEN: Jerry Hallett for Heart of America Northwest. First let me start by requesting that this portion of the record that the public interest presentation given shared by Hanford Challenge and Heart of America Northwest be considered formal comments to make it

easier for us not to repeat all of that again.

And secondly in regard to since as I understand it the question and answers have been recorded I am very concerned with Mike Thompson's presentation because apparently he's been very candid in saying that you believe that it will take 50 years for monitored natural attenuation to reach the drinking water standard but the proposed plan documents that will be the basis for the decision and basis for other evaluations clearly identifies 22 to 28 years. There's obviously professional discrepancy here. And I believe it's very important that we have on the record that you offered a professional opinion that it will take 50 years. And that the record itself and the proposed plan itself be changed to reflect significant uncertainty in the 22- to 28-year range.

That range, near as I can tell, for example, fails to consider the fact that it is expected that we are going to increase the flows and returns to the Columbia River which will increase the bank storage and influx of water to a higher level than we have currently today. That is a plan that our environmental agencies have adopted and are seeking to implement. And there is no consideration in the proposed plan that I've been able to find that refers to the fact that we're going to have a higher average flow level, not just a historical flow level.

Thirdly, let's start with the big picture now. The 300 Area and areas covered by these proposed records of decision are the southern gateway to the Hanford Reach National Monument. It is clear from the history of development along the Columbia River in the past 10 and 15 years that there is incredibly intense pressure to develop this area. The City of Richland has proposed developments. Trident has. Energy Northwest has. It is going to be developed.

I am very disappointed that EPA, which for years stood up at these public meetings and told us that they would absolutely reject the Energy Department's use of its land use plan as the basis for cleanup decisions has now rolled over and is accepting this. The Energy Department's land use plan only controls how it will use the 300 Area while the Energy Department is doing cleanup and controls the land. Pacific Northwest National Lab under other Energy Department decisions isn't even part of the cleanup any longer. It isn't even part of that land use plan. And to say that we're going to make a permanent cleanup decision based on the temporary land use while the Energy Department is using the area is not only shortsighted but illegal and a great disappointment to hear EPA now having retreated tremendously from its prior statements. Washington Ecology we would urge to refuse such occurrence. And it's

disappointing that we didn't hear from Washington Ecology tonight except as the moderator.

What we heard tonight very clearly is that there is not even an effort to meet Washington State's Model Toxic Control Act risk requirement and standard which federal law says the more stringent state standard has to be attempted to be met. That state cancer risk standard is 1 in 100,000. So if we accept EPA's statements tonight that we're cleaning up to 1 in 10,000 cancer risks for adults exposed, that is not meeting our state standard or even attempting to do so.

Secondly, MTCA, the state's Model Toxic Control Act, requires that an industrial cleanup standard can only be used where there is no reasonably foreseeable future use, reasonably foreseeable future use any time for the area where nonindustrial workers may be invited in for using it. We already have these areas that were recently cleaned up that are already being used for trails and river shore access. We know that's going to be used and Washington State needs to step in and say you're not meeting our MTCA requirements.

Thirdly in that regard, the state law says that we have to have a shoreline plan that will be used after the federal government leaves. And there is no discussion of this in any of the documents. The shoreline is critical habitat. What is typical for river shore or even stream is

200 feet of protected land. Instead we have an industrial area zone proposed with significant contamination much closer to the high water mark of the river. And Ecology needs to weigh in and say what's acceptable to Ecology for how far back from the river we have to have designated equivalent to critical habitat and critical zone for protection under shoreline management and growth management standard. And then we have to apply cleanup at least to that shoreline area, which is not the industrial zone.

So in some -- it's disappointing that we seem to have a retreat from commitments from our agencies that were going to meet our state or even our federal cleanup standards and that we're going to now allow the Energy Department to say that a temporary land use plan is the same thing as a permanent decision about what is reasonably foreseeable, including the failure to address how it will affect the treaty rights under the law and fish, the shoreline and public areas.

And my final comment for the evening is that it is highly ironic that the excuse given for not adopting a retrieve, treat, and dispose alternative and not even examining other alternatives here is that the groundwater infiltration increase for uranium when we did retrieve, treat, and dispose. Larry, you know that I was the person who came to EPA and complained about the amounts of water

that were being applied to those 300 Area sites. Now to say that we applied too much water and we drove uranium into the groundwater therefore we shouldn't be applying water and digging up as much is highly ironic and wrongheaded. There's no discussion in the plan of numerous other alternatives to control and suppress dust. And that needs to be explored. The plan needs to be pulled back, reviewed, and have those formally presented in a revised proposal. Thank you.

DIETER BOHRMANN: Okay. Jerry was the last person signed up for formal comment. Is there anyone else who wishes to make a formal comment?

PUBLIC CITIZEN: My name is Tom Carpenter and I'm with Hanford Challenge and I've just got a short comment and we intend to submit written comments. But I think one of the facts that was prevailing here tonight was that the half-life of uranium was 4.6 billion years. And that's about the age of the planet Earth. I've read that the sun may not last another five billion years. So we won't even make it to the 10 half-live for uranium 238 to go away.

And you know, when I think about it before the 20th century most of that uranium was socked safely away inside of mountains. And it wasn't available biologically as much as it is today. Well, we mined a lot of that uranium and we brought it to places like the Hanford site.

We brought it from fairly dry areas and put it

into -- next to a river. And with half-lives this long, you know, it's preposterous to think that whatever is on the Hanford site today, including that uranium, isn't going to be in the environment (inaudible) for years. Maybe a couple thousand. But at some point that uranium will be where it is right now in the long view. And get into the air, the water, the food in the general living environment. And that goes for the plutonium. That goes for all the long-lived products out there. And I think we need to think about Hanford in those terms. And, you know, commercially the power plants in those terms and radioactive waste in those terms. Whether it comes out of fertilizer, whether it comes out of, you know, making nuclear weapons or for nuclear plants we need to be aware of what we're doing to our genetics in particular.

As an alpha emitter when this stuff gets inside you it can damage the genetic structure. And even if 99 percent of that genetic damage is repaired and 1 percent is not over time that can build up and cascade and lead to birth defects and mutations that are not desirable. So I worry about that.

And when I think about the figures, you know, it will cost a billion dollars to go after uranium in the 300 Area. And I think about the, you know, how much that Steve Gilbert mentioned that we spend $5.5 trillion, actually $8

trillion in adjusted money to make nuclear weapons, a trillion dollars. A billion dollars doesn't sound so bad, right? I mean that's half of what Hanford spends in a year. And it is a lot of money. And I would like to see other areas of Hanford given a higher priority frankly. I don't think this is the huge big priority. I think the hotter waste is. And I think the pollution in the soil underneath the tanks and the hotter waste there and some of the other, you know, urgent dangers of explosions. Those are priorities. But it doesn't mean this one isn't just because it's a lower level priority.

So, you know, for the short-term I could see trying the polyphosphate to, you know, hopefully bind and prevent the uranium from going in but I don't want to walk away from the problem. I want to see a removal, treatment, disposal option for all of that contamination. And I don't care if agriculture puts in more or not. We've got to do our part to, you know, put back to rights what we're doing to future generations just like we need to there. Thank you.

DIETER BOHRMANN: Is there anybody, anybody else who wishes to make a formal comment? Nathan?

PUBLIC CITIZEN: My name is Nathan Reeves for Hanford Challenge. My comment will be short. I would urge the responsible agencies to consider two time-related

values. First, the cleanup should be finished and done as soon as possible. And second, the cleanup should be structured in such a way as that it will last forever. And those two values lead me to two concerns. First, that the industrial complex be cleaned up to the industrial standard. I believe that it's not a standard that is going to be safe forever. I believe that the residential standard should be considered there. And second, I believe that the plan, the proposed plan should include a backup, a specifically-worded backup to the uranium sequestration technology. Even if that technology doesn't work and it's revisited in five years I don't feel that that's soon enough. The cleanup should be completed as soon as possible and in order to do that we ought to have a backup plan in place. Thank you.

DIETER BOHRMANN: Okay, thank you. Last call for formal comment. Anybody else?

PUBLIC CITIZEN: My name is Laura Maierhofer. And just very briefly I would like to see the responsible agencies consult with the Fish and Wildlife Service regarding compliance with the Species Act and the Critical Habitat Act.

DIETER BOHRMANN: Okay. Thank you everybody.

PUBLIC CITIZEN: One more. Hi, my name is Anthony Devron. I just wanted to make a comment about the fact that I really don't feel that there's enough people here. And

whoever was involved with letting people know that this meeting took place didn't do a good enough job. And considering the amount of people that this issue affects, not just here in Washington but down river in Oregon and Portland, there really should be more people here focusing on this issue.

DIETER BOHRMANN: Anybody else? And remember, this isn't your last opportunity. The comment period is open until September 16th. You can provide written comments tonight or any time up until that time. Okay. I want to thank everybody so much for coming out and spending your evening with us, coming out and talking to us. Just a reminder. If you have filled out one of your evaluation sheets for the meeting if you could please turn that in to the front table. We really appreciate your input. Don't forget to grab a piece of cake for the road. And there is one more public meeting on the 300 Area. It's a week from tomorrow in Hood River, Oregon. So thanks again and have a good night.

(The proceedings were recessed at 9:30 p.m.)

CERTIFICATE

I, Kathleen M. McKee, do hereby certify that pursuant to the Rules of Civil Procedure, the witness named herein appeared before me at the time and place set forth in the caption herein; that at the said time and place, I reported in stenotype all testimony adduced and other oral proceedings had in the foregoing matter; and that the foregoing transcript pages constitute a full, true and correct record of such testimony adduced and oral proceeding had and of the whole thereof.

IN WITNESS HEREOF, I have hereunto set my hand this 9th day of August, 2013.

/S/ Kathleen M. McKee

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