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

MEETING

HELD ON
TUESDAY JULY 30, 2013
5:30 P.M.

RICHLAND PUBLIC LIBRARY
RICHLAND WASHINGTON

MEETING

HELD ON

TUESDAY JULY 30, 2013

5:30 P.M.

MICHAEL TURNER: Thank you everybody for giving up a summer evening to come down here and learn about the 300 Area proposed plan. I trust you all have agendas with you somewhere. You will note that on the agenda we have a period at 7:30 that begins a formal public comment. I just want to keep that, everybody keep that in mind. If you're going to give public comment at 7:30 we're going to begin to give formal public comment but we also have a question and answer period before that. So there will be a lot of dialogue to go through and everybody will be available after this as well if you have any particular questions.

The exits as you can see there's one right there and there's one right here if there's an emergency. The bathrooms are out to right where you came in to the entrance to the library. I think that would be key for everyone to know.

Tonight we are learning about the 300 Area proposed plan. Standing behind me is JD Dowell. He's the assistant manager for river and plateau for the Department of Energy's Richland Operations Office. Also with us

tonight are Mike Thompson, who's a hydrogeologist specializing in soil and groundwater for the Department of Energy Richland office. Also tonight here is Larry Gadbois from the U.S. Environmental Protection Agency. And he is an environmental scientist as well as the 300 Area project manager. With that I'll turn it over to JD.

JD DOWELL: Thank you, Michael. Like Michael said I'm JD Dowell. I'm the assistant manager for the River Plateau which is responsible for all the projects as well as the CERCLA decisions that we're going to talk about tonight.

The first thing I would like to do is thank you all for coming out here. It's critically important that we get the public to come out and ask questions, listen to what we have to say. And that you get your questions answered. And every question answered that you have so that these decisions are clear.

Not only Department of Energy but I can speak for EPA and Ecology, we all work for you. We're public servants so it's imperative that you have this opportunity and this exposure to these decisions to the necessary detail that you have.

There's a broad experience level in the audience so we'll try and keep it in as much plain language as we can but if we get into something that you don't understand don't hesitate to ask. This is the first of three public

hearings. We've got another public hearing tomorrow night in Seattle and another next week in Hood River. So this is the first of these three public hearings that we'll have. And this is the first of six records of decisions that we'll be making along the River Corridor.

So before we get into the actual discussion of the 300 Area I'm just going to give you a little broad background of Hanford. Consider this like a Hanford 101. This is the 586 square miles of the Hanford area. You can't read the writing here. It says Hanford Reach National Monument, the Central Plateau in the blue area, and River Corridor in this light green highlighted area. The area that we're going to talk about tonight is called the 300 Area. It's one of the six subsets of areas within the River Corridor that are adjacent to the Columbia River. That's the decision we're talking about tonight.

We've been conducting cleanup work for the last decade and more along this River Corridor. We've been doing that to interim cleanup standards. Tonight we're going to talk about the final cleanup standards that will be part of the final decisions for these areas and starting again with the 300 Area tonight.

When you look at the Hanford overview there's two offices that are responsible for the remediation and cleanup work. Richland Operations Office. We're responsible for

the River Corridor and the Central Plateau. And within the Central Plateau the Office of River Protection is responsible for the tank waste, the 177 tanks that are buried beneath the ground.

Richland cleanup work includes the treatment of groundwater, all the contaminated groundwater, the deep vadose zone, and all the facilities in that area, as well as the burial waste sites, contaminated soils, and everything other than the tanks that are responsible for Office of River Protection.

So when we talk about the six major cleanup decisions on the horizon at Hanford this is the first of those decisions. It's called the 300 Area. That River Corridor area is 220 square miles. This is about a 30-square-mile area of that. I'm not going to go into too much detail on that.

You know, it's really imperative that we get public opinion, we get public comment. You help us make these decisions so don't hesitate to make sure that we've documented everything that you have to say about them.

Lastly, because I want to get off the stage and really get into the discussion on the 300 Area, there's a lot of ways for you to make your input. You can do it electronically. You can do it in writing. We'll take comments any which way that you want to give them to us. And

again, it's imperative that you understand and we explain how these decisions are being made and what the basis of those decisions are. That's our goal tonight. So thank you again for coming and without further hesitation we'll bring up Mike Thompson.

MICHAEL TURNER: I neglected to mention we have a webinar tonight. It's open to everybody out there on the world wide web. We've given that opportunity for this meeting only but it's another mechanism we're using for furthering public involvement.

MIKE THOMPSON: Good evening. I'm Mike Thompson. I've been working here at Hanford for about 30 years now and have been involved in the 300 Area on and off pretty much from the beginning, starting with the Hanford Past Practice Strategy where we tried to get into interim cleanup and the initial records of decision that were made to start remediation at the Hanford site. And tonight we're trying to wrap up everything in the 300 Area to make a decision that incorporates all the waste sites, all the groundwater. Wrap it up and make a comprehensive decision for the future.

So in the 300 Area just to give you -- of course you all know where we're at. It's just north of the city of Richland. And it starts at the Richland city boundary. Goes all the way out to Energy Northwest, which used to be the Washington Public Power Supply System when I worked for

them. It includes two burial ground systems out here, 618-11, 618-10, the industrialized area and the 300 Area which you see here. The city of Richland as you can see, this isn't very bright unfortunately, the city of Richland comes right up through here. This is the core facilities here where we bring submarine reactor compartments in to be buried in the Central Plateau. And then of course the industrialized area which is really a small part of the total 300 Area. We'll talk about cleanup in that tonight.

What I would like to go over in terms of organization tonight is the 300 Area's location and general nature and extent of the contamination. What are the risks driving contaminants of concern that we're trying to address in the cleanup decisions and the remedial action objectives. Lightly touch on the progress that has been made to date because we've done a significant amount of progress in terms of taking away the facilities, cleaning up the source term, and making progress in the 300 Area. Common elements that are in all of the remedial alternatives that we're evaluating. Every one of the alternatives have some common elements so we'll go over. And also the uranium conceptional model and the remedial alternatives evaluated in the proposed plan.

So if you look at the city of Richland, which basically goes to here. This is the city limit as you can

tell. North is up this way. The Columbia River flows by. Average flow is 115,000 cubic feet per second. This is the core industrial area that we're going to talk about. We're going to clean this up to industrial standards on the basis that this has been and will be in the foreseeable future industrial area up here. There's one burial ground up here by Energy Northwest which will be cleaned up to industrial. Everything else in the 300 Area is cleaned up to a level that would allow virtually unlimited service use. Even though our land use plan is for conservation industrial we've decided to clean up to a higher level under the CERCLA guide limits.

So again, in terms of the map, the decision covers all that's in yellow. It does not cover the Hanford Patrol Academy camera facility and of course not Energy Northwest. But everything else within that large block of land the decision covers.

If you look in terms of contaminants of concern for groundwater what we do cover is those contaminants that emanate from waste from 300 Area activities. Primarily we're looking at uranium in the 300 Area core industrial area. We're looking at a couple of organic chemicals that are there. A tritium plume that came out of 618-11 burial ground. What we're not covering in this is the contaminants that are coming from facilities in the 200 Area that spread

across the site. Those contaminants will be covered in a 200 Area operable unit.

The risk-driving contaminants are concern for soils in the 300 Area. 300 Area was used primarily for the manufacture of the uranium fuel that went into the reactors for weapons production. It was also used for research and development. All of the processes that were used for separations of nuclear materials in the 200 Area were studied and optimized in laboratories here in the 300 Area. So not only did they manufacture fuel but also a lot of the materials and processes that were used in the 200 Area were studied here so those wastes were generated.

So in the soils we have uranium which is primarily a metal issue. Uranium isotopes, cesium-137, cobalt-60, strontium-90, and aloclors of PCBs. In the groundwater we're looking at uranium in posts in terms of gross alpha, the radiological component of it. And as a toxic metal tritium, nitrate, and volatile organics, primarily TCE and DCE.

Remedial action objectives, what we want to do of course is prevent human exposure to groundwater above PRGs. We want to prevent contaminants of concern from migrating or leaching through the soil resulting in groundwater contamination. We want to prevent human exposure in the top 15 feet of the soil and debris. And also we want to make

sure that in the industrialized area that's for industrial purposes and outside is virtually unlimited. Manage direct exposure to contaminated soils that are deeper than 15 feet. Prevent ecological receptors from direct exposure in the upper 15 feet of soil. And also restore the groundwater impacted by Hanford releases to standards within a reasonable amount of time. These are the general remedial action objectives that we've decided.

So in terms of recent remediation progress there's been a tremendous amount of progress that's been made in the 300 Area. Primarily we've removed most of the facilities that are not going to be needed for future use by the Pacific Northwest National Laboratory. There's still a couple of facilities left to go that they're working on. They've remediated a number of the waste sites. And in terms of what's getting the groundwater, one of the early actions that was done, and we're going to talk about this area right here a lot. These are where the liquid waste disposal areas were that we see. Upwards of two million gallons a day of contaminated fluids from processes in the 300 Area. And this is -- has been and is the source of uranium that feeds the plume.

If you look at this area here, give you an example of the kind of progress we're making. That used to be there. So there's been a significant amount of progress in

the 300 Area in terms of what Washington Enclosures is doing and Rudy Garcia in the audience is overseeing that work. So there is some progress. Nearly a million tons of contaminated soil and debris have been excavated from the 300 Area and brought up to the 200 Area for disposal in the environmental restoration disposal facility. About 38 tons of suspected transuranic material has been removed and shipped to the central waste complex for disposition. And all but about 34 of 130 waste sites have been remediated at this point in time.

There are some challenges. And the challenges that are in front of us is first of all groundwater and we'll talk about that, look at how to deal with the uranium plume. But also there are high radiation source removals at the two burial grounds, 618-10, 618-11, and also soils below the 324 building and this 340 vault, which currently they're working on here. And you can see the depth of this. This was underneath the pot cells. And it's incredibly radioactive underneath them and they're trying to find a way to excavate that out. To put it in perspective this is about a six-foot tall person right here in the part that we're digging. We're just a few feet from groundwater on this.

One of the answers that we're doing here is we're actually going to use phosphates, which is in our proposal

for how to deal with the sources of groundwater, to tie up some of the radionuclides that are underneath this facility. So we'll be doing some test work there in the very near future.

So I apologize for this that it's not as dark as it should be but there is a persistent and dynamic uranium plume in the 300 Area that's about 125 acres in size. It's very dynamic in that the shape changes in relationship with the stage of the Columbia River. And the conceptual model is that we've removed the vast majority of the uranium that was put into the soil there in the excavation. We had about 281,000 yards of contaminated soil that's been taken out of the first 15 feet where most of the uranium resided and that's been hauled up to ERDA. But what's remaining is residual uranium between the bottom of the excavation depth and groundwater. Approximately one percent of the remaining inventory at any one time is in the groundwater. About three percent of that or three percent is tied up in the wetted soils in the groundwater. And 30 percent is in a region where it's periodically rewetted because as the river comes up and down groundwater backs up behind it. And the groundwater goes up into the soil, captures more uranium, brings it down, and that then feeds this persistent plume.

So at high river stage you can see, at the process trenches and down here you can see it's feeding. And at low

river stage this goes out to the river and you don't see it anymore but you see it anchored up here at the south end of the process trench. This behavior in combination with characterization data leads us to believe that the most significant part of uranium inventory that we have to deal with to make the uranium plume remediate itself faster is up here in this zone. There's also -- you can't see it very well -- there's a uranium plume here which is fairly new. And that resulted from excavation of a burial ground that had uranium in it. And we have to put water on the soil when we dig because uranium is an alpha contaminant and you don't want to breathe or ingest uranium. So that water drove uranium out of the soil and into the groundwater. And this is the sort of thing we're trying -- this plume here is the sort of thing that we're trying to avoid by doing further excavation.

So the process trenches are up here in this corner. And then the north and south process ponds are down here. And this is were the liquid waste was put into the soil. Approximately 74,000 to 130,000 pounds of uranium dissolved, most dissolved in particulate form or were disposed to these facilities. The south process pond first. When that started to fail they went to the north process pond and then eventually up to the process trenches.

So if you look at, this is a plot of groundwater

level and a plot of uranium concentration in a well in the most active zone where we think things are going on. And if you look, early -- this is 1987 to 1991. Prior to remediation you see the blue is water levels and the orange is uranium. You see highly variable but quite high concentrations, 400 micrograms per liter. This is the drinking water standard down here at 30. See this is very widely distributed in response to changes in water level.

We did a removal action early in the cleanup. And it was an expedited response action. I believe it was the first one we did where we removed the first few feet of soil out of the process trench because that's where the uranium was. And when we did that the uranium levels crashed to below drinking water standards but we also were putting clean river water into that facility as a discharge. And we hadn't developed the treatment plant out there for water so this is where the water from the laboratory still went. But after we stopped discharging out there and we cut off all discharges contaminated groundwater came back that was not affected by the removal action. And uranium levels came back up. So this is when we did our first record of decision that said basically all we have to do is dig the first 15 feet up and we think it's going to fix itself. We know better.

So if you look at the response over time you'll

see that uranium levels went up but eventually came down very close and hovered around the drinking water standard. And this occurred over time between '95 and 2005. But what happened between there is we did a remediation of those ponds, the north process pond, the south process pond. Went back to the trench, did that. Backfilled over the top, put a lot of water in the system. And that recharged the uranium again so it went up little bit. So you will see that the uranium went up, came back down. We did a lot of activity. It came up, came back down.

Last couple of years we've had incredibly high water years. And what happened there is the groundwater goes up higher into the system, grabs some more of the uranium, comes down. But you'll notice that the spike goes down very quickly. So the recovery is getting faster and approaching groundwater all the time. So given what we see in this sort of a situation we believe that with time the groundwater will clean itself up, and especially if we can tie up some of that source term that hovers right above the groundwater.

So the challenge is not dealing with what's left up here. The challenge is really dealing with what's immediately above the groundwater. And that's going to be hard to do. There's about 30 percent of the uranium that's left after all the remediation activities. Then there's a

periodically rewetted zone at about four percent here distributed, one percent at groundwater, three percent in the soils.

So the challenge is treating this zone and making that effective. And again, this is the same sort of relationship between uranium levels and water levels. You can see there's a direct correlation between the two.

So as we go forward with our alternatives there are common elements that are going to be the same in all of the remediation alternatives that we're dealing with. So what we hope to do, and this is common to all the elements, all the alternatives, we're going to continue and complete the remove, treat, and dispose of the source terms, the contaminated soil, the buildings, those things out there that we started to do back in the '90s. We're going to complete that effort. That hasn't changed. We're going to live up to that commitment. We're going to monitor to assure that the uranium and the nitrate attenuates. Now, nitrate is coming in from offsite from other facilities. We believe that will attenuate with time. We're going to do institutional controls to assure that there's no access to the groundwater. And then we're going to manage the surface infiltration until standards are met to protect human health and the environment. So this is common to all of them.

So we developed six alternatives. The first

alternative, which is a no action alternative, is required by law. That's not on the table so we can take that off.

So five alternatives. Alternative 2 is basically monitor the groundwater and see how long it takes to go away. This is similar to the alternative that was selected back in the early '90s when we thought that the source was really the upper part of the vadose zone versus the periodically rewetted zone.

Alternative 3 is the application of an in situ, in place chemical treatment where you put phosphate into the system. And the mobile fraction of the uranium then combines with phosphate and precipitates out as a relatively stable alunite mineral. And that would be done in two phases throughout the system.

And then alternative 3a which is enhanced attenuation. This is an attenuation decision. We believe that the plume will attenuate itself within a reasonable amount of time but if we enhance that attenuation by treating a portion of the hotspot there we think that will be a lot better. This is our preferred alternative. It also has all the common elements emanate for tritium and organics. We're going to monitor the groundwater for uranium and nitrate.

Alternative 4 is to do deep, focused remove, treat, and dispose of hotspots and add phosphate to the

outside peripheral part. Alternative 5 is dig it up and haul it away.

So groundwater cleanup is really driven by three factors: Mitigate risk to human health, mitigate risk to the environment, and restoration of the aquifer. Frankly the uranium plume that's currently getting to the Columbia River is not at levels of risk for human health. The uranium plume that's getting to the river is a small discharge to the river. Where it's discharging at the river is at levels that are below levels of risk for human health and the environment that are established. And it does not impact the water that I drink from the City of Richland in terms of uranium levels.

You cannot see a statistical difference between upstream and downstream of Hanford of what's put in. And if you compare what the Hanford contribution is in the Hanford Reach, the 54 miles, we're about anywhere from two percent to eight percent of the total uranium that goes into the river. The vast majority of uranium that goes into the river is a combination of natural uranium seeping in in groundwater and surface water discharges and uranium from fertilizer applications. So the three irrigation returns that are on the other side of the river actually put in 10 times more uranium than the Hanford component does. So what's driving our decision for doing this work is

restoration of the aquifer within a reasonable time frame given the conditions of the site. We're going to be out there for decades. And it's our goal to try to get this system to come back to drinking water standards within a reasonable amount of time.

So we talked about all these points. We talked about all these. And so the preferred alternative, there's about 130 total waste sites of which 38 require no additional action. We're going to remove, treat, and dispose of 74 to industrial standards within the core industrial zone and 12 to residential standards, which are outside of the core industrial zone. And we think that by the time the record of decision is written there's about 34 of the 130 waste sites left to go. And seven of those sites are tied up here with uranium.

So we want to treat this core zone of where we believe the vast majority of uranium that's left that's impacting the groundwater, we want to treat that with phosphates. And that would be done by surface drip irrigation, injection through vadose zone injection. And then also put some in the groundwater to catch anything that may come through.

Monitored natural attenuation is a good choice for tritium. The half-life of tritium is less than 13 years so it will attenuate away long before it gets to the river. You

don't need to spend money on that. And the organic chemicals in groundwater, it's a very small occurrence. And from all the characterization data it appears that natural processes are also dealing with those quite effectively. And we would of course continue groundwater monitoring and institutional controls until we meet standards.

Larry, you want to wrap up?

LARRY GADBOIS: Sure. Again, I'm Larry Gadbois with the EPA. EPA has been working with the Department of Energy during this active cleanup for over 20 years. And our job is regulatory oversight of what's been going on. Like Mike illustrated, a lot's been done but we're looking forward on what needs -- the remaining work that needs to be done and what is our proposal to the public on what we believe is the best answer going forward and other alternatives that we've looked at. And we packaged those in a proposed plan and we provide public comment opportunities. And that's what tonight is is part of this.

We're in a public comment period through September 16th. And we highly encourage you to pick up some of the information you have here or you've already looked at. If you have information that you would like to share you can do that tonight. You can do that online or via mail. There's multiple opportunities for you to submit input. And that's a really important part of the job. We have ideas, you all

have ideas. And this process is designed to pull together the best thinking of everybody so we can make the best decision going forward.

At the end of the public comment we take all the comments. We look at all the information in there. And Department of Energy and EPA provide a response to those comments. And that's included in part of what we call a record of decision that includes a response to comments, how we considered the comments, and how that has changed the remedy that we end up selecting at the end of all of this.

So Michael, do you want to introduce the next part of where we're going?

MICHAEL TURNER: I will, yeah. Thanks.

LARRY GADBOIS: Okay.

MICHAEL TURNER: As part of our public involvement process and our plan and how we run meetings we offer a local perspective. And in this case we have Susan Leckband who is going to -- you represent the League of Women Voters, correct?

SUSAN LECKBAND: Right. And I'm also speaking for the HAB.

MICHAEL TURNER: And Susan is also speaking for the Hanford Advisory Board. Thank you, Susan.

Question back here?

PRIVATE CITIZEN: If we have questions on the

presentation do you want us to wait?

MICHAEL TURNER: We're going to have question and answer period right after Susan speaks.

SUSAN LECKBAND: And I'll make it short.

Thank you. As Michael said my name is Susan Leckband. I am vice chair of the Hanford Advisory Board, which is a board of interest. I don't know. Is everyone here familiar or is anyone unfamiliar with what the Hanford Advisory Board is or does? Unfamiliar, okay. The Hanford Advisory Board is a board of interests. It has 31 seats and each one of those seats represents a separate interest.

We provide advice and recommendations, conversations, to the Tri-Party Agencies. We are a FACA board, F-A-C-A, Federal Advisory Committee Act charter board. And we meet formally five or six times a year. We also have several subcommittees. We have been following the actions of Hanford cleanup. We are specific to environmental management. And we provide advice to the Tri-Party Agencies, the Department of Energy, EPA, and the Washington State Department of Ecology on Hanford cleanup matters at a policy level.

We also engage in conversations during our subcommittee meetings mostly monthly. We have two very technical committees that really delve into the technical aspects and then raise up the advice to a policy level. So

we are incredibly interested and have been interested for many years in the cleanup along the Columbia River. One of the tenets of the Hanford Advisory Board is protect the river. Everybody drinks from that water in the tri-party area. And we are very concerned that any decisions made will evolve into the best cleanup possible.

As JD said, this is the first of six final decisions along the river. We've been studying the RIFS, the Remedial Investigation Feasibility Study, as well as the proposed plan very carefully because it will set the standard or the tone for the rest of the decisions. There's been excellent work done. The Department of Energy and EPA have done monumental cleanup along the river. We're very pleased with that.

We did issue some advice in June of this year regarding this particular action that's going on right now. It is Advice Number 270. You can find all of the Hanford Advisory Board advice and the Agency response at www.hanford.gov and find the Hanford Advisory Board. It's listed on the right. Click on that and you'll be able to see meeting minutes and all kinds of advice. And you can see the in-depth advice that we have provided over the years.

We're certainly happy that they are going to continue with the cleanup in the 300 Area. We do have some

concerns. The Hanford Advisory Board as a baseline believes in retrieve, treat, and dispose. Many of the contaminants that you see here were disposed of as was per the requirements during those times when it happened but we know better now. We know that there are treatments for those sorts of things. So as a general rule we believe, the Board believes that retrieve, treat, and dispose properly is the best way to safeguard the health of the Tri-Party Agency constituents, which of course is the Tri-Cities, and really the whole Pacific Northwest. The Columbia River is vital to the economy as well as to the environment of the Pacific Northwest.

In the advice, and I'm going to quote from the advice, we advise DOE and EPA to undertake a treatability test to determine the effectiveness of the uranium sequestration, which is what is in the proposed plan, as the preferred alternative. Upon a successful test result the proposed plan for a record of decision will be better informed and would be done in a more timely and cost-effective manner. If the test was not successful the Board advises the Agencies to continue to work with the Board on a path forward. And we also advise the Agencies to continue to communicate its plan for detecting with the Board and with the public. And we advise DOE and EPA that if this test is successful to look at the rest of the Hanford site

for opportunities to use the successful test. And in my closing remarks I do want to say that the Hanford Advisory Board has also issued a couple of -- in the past, these are historical documents -- these are flow charts protecting, how to protect the groundwater, how to involve the public in decisions that will help protect the groundwater, cleanup decisions, as well as Central Plateau actions. And these are part of the mantra of the League of Women Voters and that is become educated, be involved, understand, and try to participate in those kinds of decisions. That's it.

MICHAEL TURNER: Thank you, Susan. This part of the program or the meeting is now where we're going to open it up for questions and answers. We have a half an hour for that until 7:30 but we'll be a little flexible.

A couple of parameters if you would. Please try and keep your questions focused on the topic at hand. I know some of these questions will delve into other areas and we'll deal with those the best we can but we're here to talk about the 300 Area proposed cleanup plan. So if we can, just focus those question as best you can on that area.

We have comment cards that were available when you came in if you prefer not to voice your question. If you would rather write them down we have some folks in the back that will take your question or I will take them. We also have webinar questions that I may get handed so I may

interrupt for a second to ask a question that came in from somewhere around the globe.

With that let's open it up for questions. Our Agency folks will respond. And Susan, if you get a question are you willing to respond?

SUSAN LECKBAND: Oh, sure.

MICHAEL TURNER: Okay. So go ahead. Let's start over here.

PRIVATE CITIZEN: Hi, there. I'm Laura Hanson. Can you, Mike, go ahead and expand a little bit on what the institutional controls would include and how long?

MIKE THOMPSON: Sure, I'd be glad to.

The Department of Energy will be utilizing the 300 Area for quite awhile in the future. Pacific Northwest National Laboratory will be out there at least until 2027. So we will be doing nuclear operations out there which means that, you know, because of that you want to have safety around that controlled access and that sort of thing. So it's very easy for us. You know, it's Department of Energy managed land. So the controls are basically access controls to the surface, access controls to the groundwater.

The third part of the institutional controls is from here forward we want to assure that we don't put water in the wrong places out there. That we can manage the infiltration of rainwater off of parking lots and buildings

and that sort of thing in a smart way that you don't put it where there's residual contamination.

The excavation work that was done out there is basically done such that the agreement was that first of all we would dig out the engineered structure. And then we would dig as deep as 15 feet chasing contamination if it went that far that was above levels that would be an issue for direct contact. And then below 15 feet we would evaluate that residual contamination underneath to see if there was a potential impact for groundwater in the future. So we're going to continue that work out there until that work is done so when we're done you can have virtually unlimited access to the surface out there. We looked at some of the cleanup we did in the industrial zone. Most of that is also at levels that will be available for any unlimited surface use.

But we want to make sure that there's no use, consumptive use of the groundwater until it returns to drinking water standards. We want to assure that the access to what is left deep does not come up to the surface. So there's institutional controls with that. So that virtually sums up what the institution controls will be. And those would be codified and put in any use agreement of the land. You know, we're trying to reindustrialize part of that. It would be in those use agreements or any land transfers would

have to go as of safety restriction to do that.

PRIVATE CITIZEN: Thank you.

MICHAEL TURNER: Questions? Right here please.

PRIVATE CITIZEN: It's going to be from a low level but anyway, are groundwater and river water mixed or are they separate entities?

LARRY GADBOIS: They do mix. Hanford and the mountains to the west of Hanford receive rainfall. And the rainfall goes into the groundwater and that groundwater gradually moves to the Columbia River. All through Hanford it's gradually moving to the river. But as you know the river goes up and down on a daily cycle due to the dams and seasonally even higher due to the summer runoff and spring runoff and that's so that when the river goes way up the river water is now higher than the groundwater. And river water actually flows into the groundwater for a period of time. Then when the river goes back down you've got the route goes back. So for awhile near the river it's back and forth. Way inland it's always going towards the river.

MICHAEL TURNER: I want to remind you that we have a plethora of information in the back as well. If your question didn't get answered and you want to ask it out publicly. FAQ sheets. There's some background from contractors back there on how the progress has gone in the 300 Area. Any other questions? Here's one back here.

PRIVATE CITIZEN: I have several questions so if you wanted to go ahead.

PRIVATE CITIZEN: Okay. Thank you, Jean.

My other question is so your preferred alternative if I understand it correctly is you want to inject this phosphate. And so what I'm curious about is what is the time span? How long will it take to do that? And then you would do a second repeat? Is that right? But I'm just curious how long would it take and how long do you expect it to be effective and how did that affect your institutional controls with making sure you didn't have water in that? And then depending on how long that would take what's the chances that budget could impact this path that you would take?

MIKE THOMPSON: Oh, let me handle that. To go back to your initial questions, the preferred alternative is an attenuation alternative for the uranium. Best way I can describe it is I'm approaching retirement somewhere in the fairly near future, in fact a couple years. When you look at retirement you want to look at your budget and you generally have a nest egg which you're going to live on. And think of the uranium that's left in the deep soil as a nest egg. And that each time the groundwater comes up and down you write a check against that nest egg but there's not a whole lot of money coming in. So you're withdrawing out of

that nest egg and just getting smaller every year. And if the river really comes up one year like it did the last couple of years it's like buying a car. You've made a big withdrawal off of that nest egg and it goes down really fast right there. So if you keep writing against that nest egg pretty soon the money is going to be gone. That's what we want to do with the uranium.

The models that we have predict that it might take 28 years for the uranium to attenuate away. Now, do I believe those models a hundred percent? No, because there's a lot of uncertainty. Primarily the biggest uncertainty is what's the river going to do over the next 30 years. I don't know. But using the past behavior of the river and what we know about inventory and what's left the model says about 28 years. So I've been telling people less than 50 years because there's some uncertainty there, right?

So if we can treat even a portion of that highest concentration part it's going to make that -- it's going to take a bigger chunk of that nest egg away. And what's going to be left is going to be smaller so reaching standards it's going to get there faster. So depending on how successful we are in applying this, now we know it works. We've had it work in the laboratory. We've had a single well test out there where we put phosphates in and we saw the treated area drop dramatically with concentrations. At the time we were

looking at also forming another mineral called habitite which would be a reactive barrier but the geochemistry and the physical conditions weren't conducive so we X'd that off and we're just doing the alunite part. So depending on how successful we are in getting the solutions where we need to go will depend on how fast that attenuates away.

Now, the rest of the equation is budget. We're going to be making a lot of decisions here at Hanford in terms of cleanup decisions. And I can't say what the budget is going to be to match that. But we have to prioritize the work. And what we would like to do is prioritize the work in terms of as best we can risk-based decisions. You know, where is the risk that you really want to deal with. If I had maxed it up I would apply the money to the chromium remediation before I apply money to this because the chromium probably has more risk to the river than this does. But, you know, that's a risk decision that we have to make in the balance of all the work we do. So there's uncertainties in the budget and those uncertainties are going to play out with allocation of that money.

LARRY GADBOIS: Let me add one more idea to the 28-year idea. The plume is much larger than what we're proposing going after with the active part of our remedy. If we didn't do anything, roughly 28 years it would play out and it would be below standards. We want to do better than

that. Let's see if we can accelerate on 28 years. Well, the edges of the plume remediate themselves much more quickly. The long pole in the tent if you will is this core part of the plume. And if we want to be all done faster than 28 years let's get rid of that long pole of the tent. And that's what this preferred alternative is is treating that part. If we can extract that, if we can deal with that, then the rest of the plume is playing out sooner than that. So that's why we're proposing. The whole idea is let's accelerate cleanup of the groundwater faster than nature would do on her own.

MIKE THOMPSON: And we have to go back at least every five years and take a look at the performance to assure ourselves that it's still protective. So there's that safety net of going back and re-reviewing everything you've done and comparing what you expected it to do versus what you see in the field. And you have to ask yourself at least every five years is the decision still protective. Now, the original decision that was made in the early nineties, because of that early disposal action where you saw the uranium levels crash, well, we were kind of fooled by that. So in the first five-year review it was obvious that more was going on there. So that's when we went through and did a lot of investigations and figured out the full component of the conceptual model. And that's why

we're here today is because that first decision did not work at the time frame that we expected it to. It will eventually work but not within the 5 to 10 years that we hoped it would. So there's that safety net of going back and doing your evaluation of is this decision still good, is this still protective in coming down. So that's required under law to do that.

So we talk about final records of decision. There's really no such thing as a final record of decision. It is a record of decision under CERCLA. And we say final just to discriminate between the interim work versus we wrap it all up together to try to make a comprehensive decision.

PRIVATE CITIZEN: Thank you.

MICHAEL TURNER: I'm struggling with your analogy on nest eggs because of my age it's difficult.

PRIVATE CITIZEN: What are the lower contamination limits based on? Overall looking at the river water, the contamination we've got in the soil. And where does it go when it gets done. I know you've got models for all of that. Are the lower limits really based on the EPA requirements?

MIKE THOMPSON: Well, there's two things you do under the Superfund law that you have to meet. And Larry, back me up if I get this wrong. You have to meet applicable regulations, applicable--

PRIVATE CITIZEN: Applicable.

MIKE THOMPSON: So if there's a regulation out there that gives us a standard, such as a drinking water standard. A drinking water standard for uranium is 30 parts per billion so we have to meet that. There's standards for some chemicals for surface water protection and we have to meet those. There is not an ambient water quality standard per se in the federal -- ambient water quality standards for uranium. There is a FACA surface water standard and it's much higher.

But you also have to deal with risk. And there's risk calculations in terms of appropriate levels of risk for both human and environment. And we have to do both, meet all the standards. And we also have to assure that the levels of risk are withing a range that's established within the law. So within our calculations we've established those risk levels and we've looked at the law. And what we're trying to do for the groundwater, the most restrictive, is the drinking water standard. We're trying to bring that groundwater back to drinking water standards to protect and have that resource available for future generations.

PRIVATE CITIZEN: And that's necessary?

MIKE THOMPSON: Under the law. Yeah, under the law, under the national contingency plan it is the goal to restore aquifers to its highest beneficial use, which in

this case would be drinking water standards.

PRIVATE CITIZEN: What I'm concerned with is the TPA had a lot of stringent requirements in that respect 20 years ago. And we've done a lot of cleanup since then and they should be using lessons learned in making sure that a lot of these stringent requirements aren't really necessary. And I think the TPA constituents should get together and review the TPA requirements from all aspects of cleanup. And they're going to do it pretty soon when they start cleaning up the rest of these waste tanks.

LARRY GADBOIS: And that's a very good point.

PRIVATE CITIZEN: They'd better get together and do it because they can save a lot of effort I think if they do.

LARRY GADBOIS: And in the process of putting together this proposed plan for the 300 Area we've looked at all of the current, new regulations, not things that were set 20 or 30 years ago. So we're looking at what the current laws expect in terms of cleanup. And that's what this cleanup plan is built around.

PRIVATE CITIZEN: In the Manhattan Project people expected to clean this up in 100 years. Do you think they did? Do you think they weren't doing things right in the way they thought was right? If you had a lot of these older guys here that have been through all of this stuff there

would be a lot of head shaking. And just the main thing is that we make sure that we're using realistic requirements and needs when you dump some of this stuff in the Columbia River going down there seven mile an hour. You know, I don't really see how there can be much in there that would hurt us from a drinking water standpoint. And so much is natural in there anyway.

LARRY GADBOIS: And the focus again for the groundwater part here is we're trying to restore the groundwater to a beneficial use. We would love to have groundwater going into the river. And that's not causing a risk, that's not causing a violation of laws. But the groundwater itself, we can do better than just let nature play out. And that's what we're proposing.

PRIVATE CITIZEN: If you've got a lot of filtering going on there back and forth you probably end up with uranium deposits that you can go and mine them later on.

LARRY GADBOIS: We don't have that much.

MICHAEL TURNER: Another question back there? Do you want to go ahead and ask your two-part?

PRIVATE CITIZEN: I have more than just two and most people know that. That's why I was going to let everybody go ahead of me and they did go ahead of me.

MICHAEL TURNER: Do you want to get in?

PRIVATE CITIZEN: I don't want to be forever long

but you can go ahead and talk.

MIKE THOMPSON: Mr. McCain?

PRIVATE CITIZEN: I have a quick question, Mike, that hopefully you can answer quickly. The question, the River Corridor documents seem to be hard to find. I'm wrestling with this 4,500-page monster that we're supposed to be reviewing. And in the course of going through that I'm finding a lot of peripheral material I would like to be able to find, specifically right now related to the 324 building. Is there some place I can go to get some of those reports that have been released? Are there any web pages out there? It's not in the administrative record. I've already checked.

MIKE THOMPSON: You didn't find it in the administrative record?

PRIVATE CITIZEN: No.

MIKE THOMPSON: Okay. If you can give me a list of what you can't find I will be glad to fix that problem because anything that is utilized in the decision needs to be in the administrative record. And if you believe that there's some documents out there that are not in there we need to fix that.

PRIVATE CITIZEN: Just a point of clarification. I'm Jim Hanson from DOE. We found that there is a lot of literature sources, like PNL reports, journal articles,

those sorts of things. Those are not in the administrative record. Those are copywrited but those, you should be able to find those on the web.

PRIVATE CITIZEN: Well, I'm not having any trouble with those but for some reason River Corridor documents are really hard to find in general. And for instance I'm interested in what can I get on the measurements.

MIKE THOMPSON: If you can send me a list of those we'll do a search and see where they're at and try to fix that.

PRIVATE CITIZEN: I'll let you know right offhand what I have found and that's the P&O.

MICHAEL TURNER: Was there a question on this side?

PRIVATE CITIZEN: Mike, you mentioned that some work is continuing by the site contractor on facilities and some surplus cleanup activities in the 300 Area. On that last map that you showed, I can't see what number slide it is, it shows like the focus area where there's some additional stabilization of uranium. Right at the end of your talk. A little round rectangle.

MIKE THOMPSON: That would be the last slide right here, number 19.

PRIVATE CITIZEN: What I was wondering and it might be helpful to some of this topic, could you point out

want work remains to be done by the site contractor that might involve excavating some soil that's contaminated that hasn't been completed yet?

MIKE THOMPSON: This map is basically those liquid waste disposal areas that were part of the 300-FF-1 operable unit. Now that's jargon, right? So the waste that came out of the 300 Area that contained the uranium that is the source of the uranium plume virtually all went out through pipelines to the south process pond, the north process pond, and these trenches. So the primary actors in terms of where the uranium went and what had to be dug up were these two ponds and these trenches here.

Early in the process we decided to dig those up. Bechtel was the contractor at the time. We went through and we excavated those and removed, treat, and dispose in accordance with the record of decision for interim action down to about 15 feet down to what was then the cleanup levels for uranium. It was about 281,000 cubic yards of uranium-contaminated material. And it was the vast majority of the uranium mass that was put into the environment. That work was done a long time ago. This has all been regraded, backfilled, regraded, and is vegetated at this point in time.

Under the preferred alternative we would address what we think is a hotspot here. Under the fifth

alternative, the one massive dig it up, you're virtually digging all of this up down to groundwater. So it's this massive, big excavation that goes down at least to groundwater for this whole area. It's huge. It's a billion to a billion and a half dollars worth of work. It would also put more uranium into the river than if we did nothing because to excavate it you have to control the dust. Controlling the dust means putting water on it which means driving the uranium into the groundwater. You're doing more harm than good. So in my mind that would not even pass the threshold criteria very well or the CERCLA decision criteria. And in number four we would go in and find hotspots in here and selectively dig out hotspots and apply sequestration around that.

So in the alternatives there's some evaluation of more digging but the preferred alternative we would not dig any of this again. We would try to take what little residual uranium is left and bind it up in place in the soil.

Did I miss your question?

PRIVATE CITIZEN: No, thank you. But one additional aspect of it. What amount of excavation work would be done before this new record of decision would be in place? What amount of excavation is still left in the Washington enclosure?

MIKE THOMPSON: How much is left in the Washington enclosure.

LARRY GADBOIS: Let me take a look at that. Can you go back a few slides to one of those burial pictures? Either one of these.

MIKE THOMPSON: Yeah, right there.

LARRY GADBOIS: Okay. This is roughly current. Again, the liquid waste disposal facilities out here that is the origin of the uranium plume that we've been talking a lot about, there were waste sites all through -- there were buildings here with waste sites under and around them. Those have by and large been completed as well as -- I need to step back to see this well. This is gone. We're finishing up the 340 building here so that will be gone. Battelle continues to occupy this facility. That's on its way to coming down. This is gone. So with a few exceptions we have a FITA station that's necessary to do response for this building. Homeland Security building. This is our 324 building with soil that -- it's in DCH's contract. There's one more aquatic lab over here that Battelle is using and will for quite awhile. But most of this other we're working on taking out.

MIKE THOMPSON: 618-10 and 11.

LARRY GADBOIS: Way up the road. Around the curve is 618-10. We've been in the process of remediating that

for three years or so. We've got a few more years to go. 618-11 way up by Energy Northwest, we haven't started there yet.

So roughly two-thirds of an area as well as two-thirds of the sites are done done, with a couple of exceptions. These facilities historically sent their radioactive liquid waste, the worst of the worst went to this facility. And if it was really bad we put it on rail cars and it became tank waste. If it wasn't that bad it went out to these disposal ponds. We've also sent waste up to this treated effluent disposal facility. And it would treat waste and then it had a discharge permit. More recently waste went there. It would be queued up. They would sample it. If it was clean they would send it down and put it through the Richland municipal wastewater system. So there's pipelines going out to that and coming back. They're no longer using that facility. We weren't able to remediate those pipelines while we were doing these waste sites. That's off the map now. That makes some of these pipelines available to go after. So in this area that's now largely remediated we have a few pieces of pipeline that we have to go back and get.

Is that getting to kind of your question?

PRIVATE CITIZEN: I just -- the question I would still ask is is there any excavation planned in the area

outlined as high priority for future treatment, treatment under the future RODs?

LARRY GADBOIS: Mostly no. A couple I believe -- Rudy, correct me if I'm wrong but there's a couple little fragments of pipeline in here that we need to take out.

PRIVATE CITIZEN: About a hundred feet of pipe right at the bottom end of the process trenches and the process pond.

LARRY GADBOIS: So largely no.

PRIVATE CITIZEN: Well, but the facilities that Rudy just mentioned would be excavated prior to this ROD. In other words, the work would be done under the existent interim action.

LARRY GADBOIS: At the point that we finish our public comment and go through and respond to comments and issue a ROD, at the time that we issue the ROD all of the interim actions that are underway right now basically flip over and they're now being done as part of a final action with whatever new cleanup levels come out of this process and any new other little requirements. But by and large the RTD part of the remedy isn't changing much. And really the new big thing on the table is, you know, going after the uranium plume and the best way to do that.

PRIVATE CITIZEN: Thank you.

PRIVATE CITIZEN: Is 327 gone?

LARRY GADBOIS: Yes.

PRIVATE CITIZEN: It's all gone?

LARRY GADBOIS: 327 was in here and it's gone. That was a chore.

MICHAEL TURNER: Okay. We've got public comment coming up so but we'll probably take a few more questions, of course including yours. So go ahead.

PRIVATE CITIZEN: Do I have to give you my name?

MICHAEL TURNER: No.

PRIVATE CITIZEN: Okay. I just need -- I just went through from the beginning so if you have this document you could go through it and maybe I can explain. You can follow my questions.

On page 2 you said everything except what's in the white is going to be cleaned up. And I don't believe -- I just need a yes or no. I just want a yes or no, okay? So is the FFTF included in this proposed plan to be cleaned up?

MIKE THOMPSON: The reactor itself is not part of the record of decision. The disposition of the--

(Cell phone ringing.)

PRIVATE CITIZEN: Sorry, we couldn't hear.

MIKE THOMPSON: Oh, I'm sorry. Yes, disposition of the reactor is not covered in this record of decision. It's known as a MEBA action, that waste sites in that general area are included. The Hanford Patrol Facility,

HAMMER, and of course Energy Northwest are specifically excluded from this decision.

PRIVATE CITIZEN: Okay. Then turning the page to page 5. I think this might help answer the last question. It says all the 34 of the 130 sites have been remediated. So I was wondering which operable unit specific number of waste sites come from because there's--

MIKE THOMPSON: 300-FF-2.

PRIVATE CITIZEN: So this is -- this is the FF-2?

MIKE THOMPSON: Yes.

PRIVATE CITIZEN: Okay. So there's 34 more sites that have to be cleaned up under the FF-2 that will just roll into the FF-1. Is that correct.

MIKE THOMPSON: Will role into the new record of decision. All the sites were evaluated in this record of decision.

PRIVATE CITIZEN: Okay.

MIKE THOMPSON: And the decision covers all of the waste sites in the 300 Area, all 130 I think is the number. Yes.

PRIVATE CITIZEN: Okay. So how many waste sites?

LARRY GADBOIS: 130 total.

PRIVATE CITIZEN: 130 total for?

LARRY GADBOIS: Waste sites are covered in this proposed plan.

MIKE THOMPSON: We evaluated all the waste sites against all the new criteria that were developed in this record of decision to assure that the protectiveness of this decision would cover previous work.

PRIVATE CITIZEN: Okay. So I'm still confused. So in this proposed plan there will be a total of 130 waste sites from both the FF-2 and the FF-1 that are being remediated.

MIKE THOMPSON: That are being evaluated as to -- if they've already been remediated they're being evaluated to be sure that the remediation that was done in the past meets the current requirement.

PRIVATE CITIZEN: Okay. But there will be some continued remediation.

MIKE THOMPSON: Yes.

PRIVATE CITIZEN: And it will be those 34 waste sites.

MIKE THOMPSON: Yes.

PRIVATE CITIZEN: Okay. Does that help you because it helps me. Okay. The one at the bottom which is persistent and dynamic uranium plume. The statement was made that -- can you go to that slide? It's on page 5.

MIKE THOMPSON: Yes, I have to apologize for that. I didn't know it would be so light when we threw it up on the wall. A little further. That one.

PRIVATE CITIZEN: The comment was made that the plume in the left diagram was 125 acres. And I think it's just clarification because on the -- for the northern one. Is that correct?

MIKE THOMPSON: The total amount of the plume that exceeds drinking water standards, 30 micrograms per liter, in any one time averages about half of a square kilometer, which in our English background is about 125 acres.

PRIVATE CITIZEN: Okay. The total.

MIKE THOMPSON: Now, there is variability around that depending on the time of year and how high the river gets but it generally is about that. There's a table in the RIFS report that goes back year by year by year for a number of years and gives you the mass of uranium that's in the plume, the area of the plume for all the years back. So if you want to look at the variability it's actually quite stable in terms of total amount of size but the shape is like an amoeba that varies in accordance with what the river is doing.

PRIVATE CITIZEN: Yeah, I can see that in the diagram, the slide that's on the right.

MIKE THOMPSON: Yes, to the right. When the water levels go down that uranium plume tends to go towards the river but it's anchored at that place where we want to do our remediation.

PRIVATE CITIZEN: And that is three acres.

MIKE THOMPSON: And that's approximately three acres, correct. The characterization activities and the dynamics of the plume we believe is the most important spot to deal with.

PRIVATE CITIZEN: On page 6 there is a spike listed on page 6. The second slide on the bottom.

MIKE THOMPSON: This is my favorite slide. Okay.

PRIVATE CITIZEN: Well, when I compare the groundwater which is the blue line.

MIKE THOMPSON: Yes, ma'am.

PRIVATE CITIZEN: All the way across I do see that there are exceedances like in 1997 area that went up. And then I see it went down and you said that was because you had remediation of the ponds. And that's great. Then it really spiked high on the end, higher even though the water level in general when compared to other high level marks is pretty much average for those high level marks. So my question was is that spike or could that spike be due to a new uranium source or some new remediation that was done?

MIKE THOMPSON: I believe it's a combination. It's primarily because the river stage went up dramatically and we picked up uranium out of here. But there were a lot of activities that occurred back here in those liquid waste disposal areas where when they dug out that 281,000 cubic

yards of contaminated soil they put a lot of water on that. And if you look at the uranium a little more than half of the uranium that's down there is moved. And if you put water on top of it you're going to move it down into the system. Okay? And you didn't see it in this well very much in here because we were dumping river water into that trench and river water tends to -- it has a lot less bicarbonate in it so the uranium tends to bind. But when groundwater hits it with bicarbonates in it it tends to mobilize it, okay?

So this masked a lot of things that were going on here. So these activities I believe helped move some of that uranium that was underneath the dig and went a little further deeper. Okay? And when the river came up here you had a large spike in the stage up here but I think maybe some of the uranium got pushed deeper and picked up right here. So that's why I don't want to do any more dig work out there because we're going to push that to groundwater and that's going to create more of a problem than if we do nothing.

MICHAEL TURNER: Brief interruption, sorry. I just want to get the public comment at some point and then possibly come back. We have three public commenters. And to be fair to you folks would you like to continue the Q&A? Or should be go to public comment and then go back to Q&A?

PRIVATE CITIZEN: Public comment.

PRIVATE CITIZEN: Public comment.

PRIVATE CITIZEN: Public comment.

MIKE THOMPSON: Okay. Are you all right with that? Do you have one more follow-up from this slide?

MIKE THOMPSON: We can come back. I promise.

PRIVATE CITIZEN: I don't -- your response to this question about the spike is not clear to me because the water spike is not that out of the ordinary with the other high water spikes but the contaminant level is. But since people want to go to public comment I can come back to this question.

MICHAEL TURNER: Thank you. Public comment, we have a court reporter on hand. We just kindly ask that you state your name. Give your comment. Keep it, you know, reasonably brief. If you can do it within three minutes that's great. That's the parameter. We'll do our public comment and then as we said we'll go back to the questions. The first commenter I have was Susan. Are you ready to go, Susan?

SUSAN LECKBAND: I'm going to enter in the two pieces of advice that the Hanford Advisory Board has issued on the 300 Area RFS as public comment. And I will provide that.

MICHAEL TURNER: Thanks, Susan. Next we have Rick McCain.

RICK MCCAIN: Thank you all. My name is obviously Rick McCain. My comment concerns the 324 building again. There's a lot of talk about groundwater remediation as a major component of this proposed plan at one time or another. And from what I've been able to determine so far I think you've got a gap in your groundwater remediation, specifically with respect to this building. And what I mean by that is there's one well shown on the PNL web page, Phoenix, has about 130 feet from the 324 building. And that well in the past has shown strontium which is attributed to a number of sites including B cell. But that wasn't to be decommissioned. You have no other wells in that area. So what are your plans or what, you know, what are you going to do about this in terms of monitoring wells on sites like 324 which are small, localized contamination that's close to the groundwater and yet right now your nearest monitoring well is about 800 feet away? That's my comment.

MICHAEL TURNER: Thank you. Last we have Larry Fulstrom please.

LARRY FULSTROM: I'm wasn't sure I was going to make a comment.

MICHAEL TURNER: I had you down. I'm sorry. You didn't want to?

LARRY FULSTROM: I provided the comments in the e-mail.

MICHAEL TURNER: Okay. Anybody else want to make a public comment?

All right. That concludes the formal portion of our meeting but as I said we will stay and take all your questions. So if you wanted to leave feel free. If not, stick around and we'll continue the questions.

PRIVATE CITIZEN: Can I ask my questions?

MICHAEL TURNER: Yes.

PRIVATE CITIZEN: Okay. I'm still on the slide. So I don't know what your slide is. Ours is number seven.

MIKE THOMPSON: This one?

PRIVATE CITIZEN: I will talk to Mike about this for a follow-up because I would like to move on if that's all right.

MIKE THOMPSON: Yes.

PRIVATE CITIZEN: So the next slide for us is on page 7. That one. And it indicates here that the primary source of uranium to the groundwater is in the kind of purple zone there?

MIKE THOMPSON: Yes, that area that gets rewetted as the groundwater comes up.

PRIVATE CITIZEN: So that means 70--

MIKE THOMPSON: There's a couple things that are going on there. When the river rises the groundwater is essentially damned. It wants, to use anthropomorphic terms,

it wants to go to the river but it gets damned up so it backs up. And that uranium has bicarbonates in it which tends to dissolve the uranium that's in the soil column. So it's a combination of both rising and then also the bicarbonates in the groundwater that release the mobile fraction and gets it down in. And then as it moves towards the river and it starts getting into more of a mixture of river water and groundwater or river water and bicarbonates it tends to go away and it tends to precipitate out as it moves towards the river. So there's not only a physical but also a geophysical and geochemistry things going on there.

PRIVATE CITIZEN: That's very helpful because I didn't want to ask the question but I was confused about the bicarbonate influences so that was helpful. But my question is that the vadose zone, which is soil and is not saturated with groundwater, has 70 percent of the remaining primary source of the groundwater because it's -- so you're not doing -- are you doing anything at all for vadose zone remediation?

MIKE THOMPSON: Yes, we removed 281,000 cubic yards of contaminated soil down to levels that were predicted to be protective of groundwater down below it. And that's based on meteoric recharged through the soil column. That soil cleanup level did not, in the interim record of decision, incorporate that issue of the groundwater rising.

So the remedial actions looked at what could be left behind based on, you know, rainwater, snowmelt, that sort of thing moving down and still not impacting the ground water above standards, whereas the new numbers we've looked at is a combination of the chemistry, the river going up and down, and that small complement of what's going down.

If you look at the response virtually all the response we see in the aquifer out there, if you look at each well everything can be attributed to the operation of the groundwater stage and that geochemistry of the bicarbonates. There is not one incident in the record that I can see that's a result of the natural infiltration. There are examples of where we put too much water on the soil when we excavated and we drove contaminants, the uranium down into the groundwater. Especially at 618-7 burial ground. We created a new groundwater plume there that will dissipate away but it's very clear that that groundwater plume is a result of putting water on the excavation as you're digging.

PRIVATE CITIZEN: So are you telling me that the seven percent of what's left of the vadose zone is not going to eventually move into the periodically rewetted zone?

MIKE THOMPSON: No, I'm not telling you that. What I'm saying is that that rate of transfer is very, very slow because the only way you're going to get down there is through water. And the amount of water that moves through

the dry part of the soil column, by the time you put seven inches of rain on it and abotransporation takes the majority of that away, that little wet that's left moves down. There will be some component moving into the periodically rewetted zone but it's a small trickle compared to what's going on with the ground removal.

PRIVATE CITIZEN: Okay.

PRIVATE CITIZEN: Can I add to your comment? I want to ask a quick question. Isn't something else going to lead into this? I mean do we have any records of subsonic or whatever, subsurface earthquakes or the level of waterfall we've had the past two, three years in the Pacific Northwest. Are some of these other attributes listed in this?

MIKE THOMPSON: We cannot observe any response from snowmelt or rainfall that I can pluck out of the record. But what I do see is when the river responds to those things and the groundwater responds in turn it's very dramatic. It's so overwhelmed by this river groundwater interaction.

PRIVATE CITIZEN: Right. Well, the two variables that we have is the release and then we have the groundwater. Those are two variables. The other variable that aren't accounted for are shifts in tectonic plates, groundwater up north of us. I'm asking.

MIKE THOMPSON: None of that is in the conceptual model because we don't think those activities bear any direct bearing on the levels.

PRIVATE CITIZEN: Okay.

PRIVATE CITIZEN: So that was difficult to hear your question but, you know, I think I understand. If you could talk to me afterwards that would be helpful and I think there are some of us here that couldn't hear your response.

If you would go to page 9. The bottom slide on page 9. I don't know what it is.

MIKE THOMPSON: Slide 18.

PRIVATE CITIZEN: The very last bullet there says that the attenuations of the uranium plume, and that is not for the entire plume. That's only for the three acres of the source plume. Is that correct?

MIKE THOMPSON: No, that's not correct. The plume itself should clean itself up within a matter of decades, 30, 40, 50 years. There may be some hotspots out there where, you know, at some time because of high water it may spike above the drinking water standard. We think within 200 years even that will be away. But in terms of meeting the restoration of the aquifer across the aquifer we believe that will happen like you see here maybe 30 to 40 years. The model says 28 so there's uncertainty.

PRIVATE CITIZEN: That just seems like a conflicting statement because -- and maybe you need to clarify that in the proposed plan and clarify the numbers in the proposed plan because some of the information presented here is not in the proposed plan. And so you might want to do a check on that. But because to say it will be, it will make the proposed cleanup levels in 30 or 40 years, but then to also put a caveat on it that says oh, but it may take 200 years to achieve it in all the wells that's--

MIKE THOMPSON: You may have a well that goes for a long period of time. Then when you get one of those really, really odd years it may spike up above drinking water standard. And that's okay. But the plume itself, the aquifer itself will be available -- it will be considered restored.

PRIVATE CITIZEN: But it may be that you will have to have institutional controls for at least 200 years and that is not stated in the proposed plan because -- and that's incorrect. I mean you should cover the full extent of your institutional controls in your proposed plan.

LARRY GADBOIS: Right. The institutional controls for all of the groundwater plumes, we talked about soil already in industrial review, but for all groundwater plumes institutional controls will be required until it's meeting standards. Now, is the 30 or 40 years from now or something

sooner if we choose an enhanced attenuation, if at that point we're most of the time meeting the standard that's what the criteria are to be able to lift it.

You know, drinking water standards are set for if somebody is drinking this water every day of the year, you know, for year after year after year what's a safe level. And 30 parts per billion is the drinking water standard for uranium. That doesn't mean that you can't have occasional excursions over that. And I think that's what Mike's referring to is, you know, if you look 200 years out there should never be an occasional excursion over that.

PRIVATE CITIZEN: Then you need to clarify that in your proposed plan because that's not stated.

LARRY GADBOIS: I don't think the 200-year idea is in the proposed plan.

PRIVATE CITIZEN: No, it is not. Can you go to the next slide because I know everybody is tired of listening to me. Okay. The first slide says ICs are used to control access as long as they exceed. And my question was, well, how long is that potentially possible. And my answer that I get today is at least up to 200 years is the potential possible. So how long is IC controls going to be because -- is it 30, 40 years or is it 200 years?

LARRY GADBOIS: Let's talk of -- you really have to talk about the different plumes. Tritium up around 618-

11, that plays out in 18, 19 years, something like that. So we'll need ICs for that plume that long. Nitrate, it's coming from off site and moving to the southern part of Hanford. We need ICs in place until those activities aren't generating that plume and it's no longer impacting our groundwater. So I can't put a time on that because I don't know how long those off-site activities are going to continue to generate nitric. Who knows. That's not Hanford but it's coming through Hanford so we need to respond to that to be safe and a remedy.

Uranium which we've been talking about, again, natural conditions might play out in 28 years, give or take, depending upon what the river does. At the point that we're consistently meeting standards at that point we lift institutional controls. And actually EPA is working on real specific guidance on how to set that. But right now it's basically just -- if you've been trending and you're now below the standard and you continue to be below standard for a reasonable amount of time, and that's sort of based on the data, institutional controls will be lifted.

PRIVATE CITIZEN: Okay. The last side -- well, it's not on the last slide but the question was there was a comment that was made. Restrictions for necessary institutional controls would be codified, I think was the word you used, codified -- I don't know how to say that --

in any transferred documents. So is there any process on how that's going to occur because once the land is sold DOE has no more obligations to it but the restrictions need to stay in place.

LARRY GADBOIS: Right. The obligations run, in a sense they run with the land. The DOE is responsible to make that happen. So while DOE owns the land, manages the land, DOE is responsible for all of those controls. If they lease the land to somebody else or they let another federal agency come and do something with it so it's not exactly a lease but the same idea, if there's another tenant activity DOE needs to make sure that that other activity is complying with those restrictions. If DOE ends up selling or giving away or, you know, relinquishes title at that point, you know, a deed would be generated. I don't believe federal land has a deed per se but if it transfers out of that a title is generated and the land-use restrictions would go onto that title. So there's -- property law covers this and there's, you know, some of us may have deed restrictions on our property. That's normal procedure in property law.

PRIVATE CITIZEN: Because I represent the Yakima -- my job is to work for the Yakima Nation. And the plan does not protect most of our treaty rights with regard to unrestricted use of the shoreline. And we are concerned about if the land were sold who deals with our treaty

rights. We don't have a treaty right with, you know, Ted down the street. We have a treaty right with DOE. So that's a concern and those components are not identified in this proposed plan and -- so that's kind of part of the background and I don't know if you have a response for how that's going to be dealt with.

LARRY GADBOIS: That would be dealt with outside of this. Again, this is a CERCLA cleanup document identifying the cleanup that needs to be done. It's not a property management sort of thing. I mean we look at future uses. And, you know, try to set a cleanup that's supportive of that. But the nuances of land transfer and treaty rights associated with that is beyond the CERCLA cleanup planning. That's intergovernmental agencies sort of.

PRIVATE CITIZEN: It's just -- okay. Well, that is -- this was just questions on this presentation. We do have lots of other concerns and, you know, we'll submit them as additional comments, so. But I just wanted to get a better understanding. Thank you.

MICHAEL TURNER: All right. We have a question over here.

PRIVATE CITIZEN: Yes. I was curious of the timeline for option five, the least favorable one as far as-

-

MIKE THOMPSON: Yes, that is a very good question

because if option five were chosen it is a price tag that is a billion to a billion and a half dollars. So to be able to allocate that much of the federal budget that's allocated to Hanford it would be a very long and extended cleanup effort because we would not allocate the full, you know, budget that comes to Hanford for this cleanup activity. So while we look at the time to meet standards there's a couple of issues with option five and that's the big dig. It is my professional opinion that if we do massive excavation out there we will actually mobilize more uranium to the groundwater in the river than if we did nothing. So you have to ask yourself why would you want to do that. The other is that it's a billion to a billion and a half dollar price tag which takes away from other activities which are probably more risk producing than this is. And then the third is that if you did decide to do that the ability to execute something with that big of a budget would have to be open for a very, very long time which would leave these excavations over a very, very, very long time.

So the short answer to your question is depending on the allocation budget. And at Hanford I wouldn't think it would be big enough to do it in a short time. It would be a very long extended time. And I think the unintended consequences would be not what you would want.

PRIVATE CITIZEN: Your assumption of the 28 years,

the underlying assumption is that the 70 percent that's in the vadose zone stays in the vadose zone, right?

LARRY GADBOIS: No. The assumption is it moves slowly. And it doesn't move quickly enough to sustain a groundwater plume above standards.

PRIVATE CITIZEN: So it's more correct to say that in 28 years whatever the model says is gone and not just separated from the.

LARRY GADBOIS: No. I think the correct would be at 70 percent up in the vadose zone 28 years from now a little bit of that will have moved into the rewetted zone and gotten into the aquifer. And the rest of it is still mostly there. And over a very long period of time that dribbles in. Protracted enough that it's not -- it can't sustain.

PRIVATE CITIZEN: Okay.

MICHAEL TURNER: Any other questions?

PRIVATE CITIZEN: Just one more.

MICHAEL TURNER: Go ahead. No, we're here.

PRIVATE CITIZEN: Have the cleanup standards changed since Bechtel, the 15 feet down in the trenches versus what they are now?

PRIVATE CITIZEN: Could you repeat your question?

PRIVATE CITIZEN: I was just curious if the cleanup levels have changed from when Bechtel did the

trenches to where we are now as far as what is acceptable.

LARRY GADBOIS: I'll start with uranium since that seems to be the biggest topic. The original cleanup levels that they started digging was 300 parts per billion. I'm sorry, in the soil it was 300 parts per billion in the soil. But when they made that decision they said, you know, we need to do a little more leach testing and see if that's -- and that was based on the technicals they were drawing on. So that was the decision but part of that decision included doing that test to confirm that that's the right number.

When they did the test, the leach ability rating, they decided no, 300 is not the right number. I believe 257 is what they determined was the right number. So that's what they've been using for 15 years roughly.

Looking at it now, like Mike said we're adding in the idea of the fluctuating river. We know more about the geochemical behavior of uranium. And what's in our plan now that we're proposing is I believe it's 157 parts per billion for the soil.

PRIVATE CITIZEN: In the soil.

LARRY GADBOIS: And that's in a soil to be protective of groundwater. In a soil to be protective of direct exposure to humans can be a high number -- a higher number. So it's really protecting of the groundwater is the driver for the uranium cleanup. There's a lot of other

contaminants in the soil out there. Those have changed a little bit. Not dramatically. The radionuclides we're using a new standard. It's a risk base rather than a dose base. And that's lowered the cleanup level for quite a few of the radionuclides a little bit, not enough to have changed what we did in the past but it's, you know, a little bit. A whole bunch of the numbers have changed a little bit. The state standards that we've been using for chemicals they've shuffled a little bit as well.

PRIVATE CITIZEN: Just FYI for your information. If you want I can give you little memo that was sent to me by EPA Region 10 recommending 10 micrograms per liter. I believe that's it, being used as a standard for cleanup for the groundwater -- for the drinking water standard instead of 30. And it's specifically for the Hanford site.

There's been a lot of resistance from EPA here and DOE here and Ecology here to follow the recommendation of Region 10. So we're going to make that comment as to why you're choosing to use the, you know, NCL level just because the database hasn't been updated when EPA clearly made a determination to be.

PRIVATE CITIZEN: What's the argument EPA puts forth in their more stringent standards needed for Hanford?

PRIVATE CITIZEN: I can show you the memo.

PRIVATE CITIZEN: No, I'm just curious what was in

the memo.

PRIVATE CITIZEN: I'm sure it has to do with the quantity and the types of and volumes of uranium. I'm sure it's all in there. They had an actual -- they actually included it in the Federal Register and published it. They just haven't updated their database since 1989.

PRIVATE CITIZEN: You really don't know what their argument is compared to (inaudible) and things like that, other uranium contaminated sites with much more uranium than here.

PRIVATE CITIZEN: Well, I can certainly look it up for you. All I'm doing is telling you this is a proposed and it's -- Ecology staff has noted it back in 2008 and it has been ignored, so.

PRIVATE CITIZEN: No, I'm just curious what the argument is, not the--

PRIVATE CITIZEN: Well, I will provide it to you if you just give me your name and your e-mail.

LARRY GADBOIS: Last Monday or Tuesday I was talking to the person in Region 10 who generated this guidance and we communicate a lot. He's a very good human health risk assessor. Kind of the issue is EPA at the national level has our high-risk database, integrated risk information system. And it takes the accepted risk information that's gone through peer review and EPA has

decided this is the best science that we should go with and it goes into this national database. Our Region 10 people had questioned the uranium toxicity number in there. If you use this national database, and EPA has a default approach for generating uranium sort of cleanup levels. If you take that number and you compare it with what we've generated on site were three times more conservative than that national number. So we've got significant safety in there.

PRIVATE CITIZEN: We're talking soil cleanup levels versus groundwater.

LARRY GADBOIS: Yes. And it's the soil cleanup level that ends up being protective of groundwater and ends up being the driver. That's why we're ending up being more conservative than nationally when EPA would say we're three times more conservative in the residential and restrictive use and we're much more conservative in the industrial area.

PRIVATE CITIZEN: But the recommended -- but this memo still recommends 10 for the groundwater, not the NCL level of 30.

LARRY GADBOIS: I would like to see that because I've read that multiple times and I haven't seen the 10. I don't know what that comes from. And I talked with Mark about 10 and he doesn't know where it comes from, so. We can talk online about that.

PRIVATE CITIZEN: It comes from changes in a

parameter that they use.

LARRY GADBOIS: A slope factor.

PRIVATE CITIZEN: A slope factor that's used in the calculation and so. And that slope factor is what was promulgated and the calculation has not been updated.

MIKE THOMPSON: Well, my understanding the current calculation for risk if we use what's available the number is actually pretty close.

PRIVATE CITIZEN: The response that Mark sent me I can certainly share with everyone but he said "Until the database is actually updated it's an adequate number to use. However, the full memo states the fact that this database wasn't updated and despite that it is recommended that it is used." I don't want to get into a political discussion about this. If anybody wants the memo just let me know and I will send you the memo and you can make your own decision.

MICHAEL TURNER: Okay. Let's leave it at that then. Any other questions?

PRIVATE CITIZEN: Whoever is talking about the 324 building if you would like to talk with me I have some additional concerns that I can just share with you on that because that is one piece of information that is in the proposed plan. And it talks about a memo that indicates how it's going to be cleaned up under the FF-2 and that is not available on the administrative record. I cannot find it

anywhere.

MICHAEL TURNER: Well, we have this room until at least 8:30 so if there is more discussion we would be happy to certainly do that. I want to thank everybody for coming out tonight and giving up their evening for this. Public involvement is key to Hanford cleanup and we really appreciate your time and the good talk that we have had. Thank you.

(The proceedings were concluded at 8:10 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 8th day of August, 2013.

/S/ Kathleen M. McKee

B

F

N

Q