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Public Comments Received on the Proposed Plan for the 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units.

All public comments in their entirety.

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Commenter #1:

Pam Larson Brown

Comment:

MS. LARSEN: So I just want to clarify that I'm just speaking for myself and making some comments here, not the people that I represent. This decision troubles me more than the decisions that I've seen in 18 years of Hanford cleanup. Just fundamentally it troubles me. The half-life of cesium I'm pretty comfortable with. The stuff is going to go away in a reasonable time frame that we can have some confidence of institutional controls. The plutonium is not going away. I don't care if you deal with it now or 10 years from now or 15 years from now when you've got the money to do it right.

But when you take a look at threats in the world we're not worried about digging up enough plutonium to make a bomb. We're thinking about a dirty bomb and what the consequences of that are. And we have what I characterize as a plutonium mine out there for somebody to go after. And not in our lifetime maybe but in some lifetime in the future. I don't think we should be making this decision based on budget. And if it's a budget decision then put it off until a point in time. The PFP is your priority. I absolutely support that. That's where we need to go right now. Getting that done, getting it behind us is what we need. But when I think about the evolution of what the bad guys have been going after in the last ten years it's changed so much. We were worried about people stealing plutonium and making a bomb. Then we realized they didn't need to steal it. They could do something with it right there. And that changed our whole scenario. We had an analysis where the bad guys got in and blew it up. Never thought about that before. They thought they would steal it.

So as we evolve in terms of the bad guys and what they might want to do with this material we need to make the most cautious, the most protected decision for us and future generations. And you may not be in a position to do that now. But I just think this is one of the most strategic, one of the most important decisions on the Hanford site and you need to go cautious. It scares me.

Commenter #2

Dale Engstrom

Comment:

MR. ENGSTROM: Once again I'm Dale Engstrom and I'm from Oregon. And I'm not speaking for Oregon. I'm speaking for myself. As a citizen of Oregon we worry about what comes down the river and what comes down the river comes from Hanford in terms of groundwater. And J. D. was absolutely right that Dirk and I who work together do worry a lot about the mobility of plutonium. And that's a question that hasn't been answered very well and we need to look some more at it and I'm going to provide you with a citation list. But let's go to this project, this problem, and talk about our concerns.

First of all it's divided basically into those three groups that we talked about in the first place. And the PW-3 which is the cesium sites and the PW-6 and the CW-5 are not really a concern because there's not a lot of material there. There's not a lot of plutonium to worry about. The real one to worry about is the high-salt plutonium waste disposal sites. The reason they are a problem is because a lot more plutonium ended up there. As an example I see on the chart over here for the Z-1 field that there's 57 kilograms of plutonium in there. And in the Z-9 trench there's 48 kilograms of plutonium in there. And

Dirk tells me it only takes four to build a bomb. Now, you're right, it has to be refined and it has to be made into a better product but there's the beginning of something there just for an idea of what we're talking about.

So what I would like to propose, what I would like to make a comment on is I don't think you're going far enough. I again reiterate the idea that you're taking out just two feet at the bottom of the trench. You're going to get about 48 to 50 percent of what's in there but we're talking about Z-9 in that case. And you can go just a few more feet as Dick Smith was saying and you could get maybe 89 percent of what is in there. And while you're already there this could be done with an observational approach. And one of the problems you're going to run into with places like Z-9 is when the water ran down the trench there was places that plutonium was being deposited and there were other places where it wasn't. And so it's going to be a very almost mining sort of method moving through the trench cleaning up the stuff that's in there. And as you run into the stuff that you run into in terms of plutonium that would be a good time to extract it and remove it.

One of the things that I would like to suggest to you is the plutonium as Susan said is forever. It is one of those really bad actors. You said we're going to be around here for the long term. Well, the half-life of plutonium is something like 24,000 years. You're going to be around for 240,000 years, sir? I don't think so. So one of the problems is that you can't project that it into the future. You can't guarantee that that's going to happen as a safeguard for human health. So the real safeguard is to get it away from the surface. It's only 15 feet down. To put it somewhere where it will be safe which is deep geologic disposal and to get it out of where it is now. Thank you.

Commenter #3

Susan Leckband

Comment:

MS. LECKBAND: I don't think I need the microphone. I've got a pretty loud voice. I'm speaking for myself now, not the Hanford Advisory Board. I struggled with the slide that J. D. presented with the curve. I really struggled with that because it is predicated on the assumption that plutonium isn't mobile. And I guess I'm not a scientist and I'm not so convinced that that's absolute. I absolutely believe that we need to go farther. I just think there is a better risk reduction. There is more safety. There's more permanence. The waste load on this site is already extraordinary. And if we can get the plutonium which does have a huge half-life, get it in a deep geological repository I believe that's where it belongs. Thank you.

Commenter #4:

Tom Carpenter

Comment:

MR. CARPENTER: So, again, my name is Tom Carpenter, and I'm the director of Hanford Challenge. Put a lot of thought into Hanford over the years, and this really seems like an easy one to me. As U.S. taxpayers, we spent, according to the Brookings Institution, about $5.5 trillion to make nuclear warheads. A lot of that money went to Hanford. Hanford made the plutonium from our nuclear arsenal in about a 45-year period, and in that time frame also left us this legacy of contamination. These --these waste sites are dangerous for many, many years, as we've been hearing.

I want to put some perspective on this -- on this plutonium. It's acknowledged that very small amounts of plutonium, if it gets into our system, can cause a cancer. A spec, a microscopic quantity. And 15,000 years ago, the Hanford site was 200 feet under water because of glacial flooding, the Great Walluki [sic] flood.

Well, it turns out that that event of Ice Age, the retreat of the glaciers, big glacial floods follow, that -- that cycle repeats in Eastern Washington hundreds of times as far as geologists know. They're huge, massive floods, and there are water rings in the hills and mountains around the Hanford site and all over Eastern Washington way up from that event happening. In other words, it's not a stable geological area. It's going to be inundated again.

We are overdue for one of those ice ages coming up. And we can expect to see, maybe not in our lifetimes or our kids' lifetimes, but the profile -- geological profile of the Hanford site changed from what it is today.

So based on 30 years of studies, we know that plutonium won't move. I don't buy it. And I think it's absurd to think that we have institutions that will last dozens of years or hundreds of years or thousands of years that will be there to make sure that nobody goes in there or that it's protected from flooding or that we can stop an earthquake or a volcano or whatever can happen to that area. So I think Hanford is simply a very poor candidate for the long-term storage of nuclear waste of any kind and of any quantity.

Therefore, there needs to be a very rigorous effort to make sure that all the plutonium that we can remove from that site is taken from that site and processed and treated and put into a deep geological repository even if it costs a lot of money. It is not the most important thing. This stuff is dangerous for a quarter of a million years. And there's nothing we know about how to do – how to neutralize that except let it decay away somewhere far away from us.

So I think that we need to take a longer view of this, less of a, gee, this is driven by money; we gotta balance this against our budget. Look at the $5.5 trillion that we spent on nuclear weapons and do the right thing here.

I'm going to be submitting written comments that are much more extensive and a bit more technical than this, but those -- those are my major comments. And Gerry alluded to the fact that the Hanford Advisory Board had an excellent set of comments which we also helped develop and are part of and think are a great set of comments as well. And they're on the back table over there if folks want to see that. Thank you.

Commenter #5:
Lindsay O'Brien

Comment:

MS. O'BRIEN: Hello. Okay. Awesome. My name's Lindsay O'Brien. I am an intern with Heart of America Northwest. Gerry's my supervisor.

I just started the externship, so I'm fairly new to what's going on to the issues that have arised [sic] with Hanford. But when I review the proposed plan, I basically focused on the settling tanks. Those are located, if you guys look at the map, on the proposed plan on the northwest side of the -- of the map.

And, basically, I have two main issues which I've -- actually, I have several issues, but the main issues are with the proposed plan which I hope will be addressed is, first, the information provided about the contaminants present in the settling tanks is either lacking, outdated, or just simply confusing. So, for example, the primary contaminants described to be found or supposedly found on the settling tanks are plutonium and americium.

What about other contaminants? There is nothing in the proposed plan stating what other contaminants, what other might either are there or might be found. Just because a contaminant's not primary does not mean that it's not harmful, does not mean that it does not pose a risk.

And, also, according to all the information that I've read, and I did a lot of research these last few days, there's no testing, at least no proper testing has been done, at least nothing in the research and the paperwork does it state that any testing has been done of the settling tanks currently to let us know what contaminants are there. The only testing that I found out about was a characterization -- and I'm not sure exactly what that means-- of one of the tanks in 1984. 1984. I was born in 1983. I'm 28. 27 years. Three decades. Trust me, that's -- every birthday I realize how long that is.

Technology has changed drastically. I think I believe that today we have better technology to do testing. Therefore, the only testing that has been done is just not sufficient and not sufficient to basically really tell us what's going on, what is present there and, also, what remedies we should look for in dealing with it.

So, for example, if we found out there's other contaminants, what remedies are we going to -- what remedies are we going to apply here?

I actually had a slide this morning, but I had a little fight with PowerPoint, and PowerPoint won, and – so I will pass that around if you guys want to take a look. It's basically a little chart that I did which lists the primary contaminants which are listed on the proposed plan. And next to them, like the three columns to the right, there are other contaminants which I believe, according to the information on the proposed plan, which is all over the place, that are likely to be found in the tanks.

So, for example, one of the tanks -- one of the settling tanks, waste used to go through that tank prior to being discharged into one of the low-salt cribs. So since those contaminants have been found to be in those cribs, I don't think it's unreasonable to expect them to be present in the tanks as well.

Also -- excuse me. My second issue is that due to the lack of information due to the lack of testing, basically, new remedies need to be come up with. New remedies need to be analyzed. Excuse me.

One of the remedies that was listed on the Power-- actually, the only remedy that was listed for the tanks on the proposed plan was that, quote/unquote, "The remedy proposed for tanks is to remove sludge from tanks and backfill the -- backfill the empty tanks."

That's the only remedy that's given, or referred to at least. The problem with that is, so, okay, we're removing all of the chemicals from the tanks. What about the tanks themselves? They're contaminated. We haven't done any testing in the last 28, 27 years, so we can't really determine

whether the tanks have leaked into the soil around it, so we don't even have any information as to whether the soil right below the tanks or surrounding the tanks are contaminated.

By leaving the tanks there -- I understand that they're supposed to be encased. Or routed, excuse me. I think that was the language in the proposed plan -- we're still making ourselves vulnerable to the risk that that contamination in those tanks can still spread.

So in conclusion, Hanford -- excuse me – my nonprofit organization and myself and especially Gerry, we ask that prior to reviewing these -- the proposed plan prior to coming to finalizing it, that proper testing be done on the tanks to figure out what the contaminants are, whether there has been leakage, and also test the area below the tanks, surrounding the tanks, and, finally, to remove the tanks.

You can do this by basically breaking the tanks apart. You will have to encase them before disposing them in a different landfill, but at least that way -- at least most of the danger will be removed.

And somebody mentioned the standards that have been used. Just one final thought. I noticed that on the proposed plan, it kind of keeps going back and forth between the Superfund and then RICCA. And I don't know how many of you guys know this, I was actually just informed, that as of 1985, RICCA is the one that's supposed to be applied.

So the usage of any Superfund standards are just not enough and are actually not the ones that are required by law. So my final request is to make sure that RICCA is being followed, as it's supposed to. Thank you very much.

Commenter #6:
Jucinta Heath

Comment:

JUCINTA: My name's JUCINTA. I go to University of Washington. I'm actually doing my honors thesis on the Hanford site, particularly the public participation aspect of your guys's plan.

What I'd really like to see is more easily accessible information about your alternatives and all the other operations at Hanford, just, you know, so the people can gain -- you know, can know about it through -- I've looked at all of your websites and there's just kind of surface information. It's not easy to get, like, really detailed things that are actually going on.

Also, I was thinking maybe changing the format of the meetings and increasing outreach because I've gone to a lot of these and seen a lot of similar faces, same messages being given, like, it seems like the communication between different parties isn't quite as effective as it should be or could be.

Commenter #7:
Alera Walker

Comment:

MS. WALKER: Hello. My name is Alera Walker, and I live in Seattle. I'm here to say that the EPA and Washington Ecology should insist that plutonium, cesium, and other chemicals are dug up and removed at all of these sites, and they should have a cleanup standard for plutonium on Hanford's Central Plateau which is just as protective as the level of the cleanup being used at Lawrence

Livermore National Lab because that shows that it is possible, or even the same -- the same strictness as they have for the Hanford sites that are closer to the river.

And I think also plutonium, when they dig it up, it should be sent to a geologic repository instead of just leaving it near the surface because it will spread.

And, also, I have something to say to the representatives from the EPA. It is interesting to hear this evening that this proposal isn't designed to protect the public, but rather it's to protect the workers. And so that was -- that was great that that came out here. But I thought that the EPA was supposed to be concerned with groundwater contamination and concerned with the people who have to live around here in the future. The reason why I thought so is because it's not just called the Environmental Agency. It's the Environmental Protection Agency. And so that's why you guys at the EPA, the people depend on you to protect us when something terrible happens to our environment, and we trust you to make decisions that are a matter of life and death.

And we're counting on you right now to insist on the highest possible cleanup standards because anything less would be putting lives at risk. And so that's why we're holding you accountable for that.

And I guess, also, if you people at the EPA really enjoy having have this power over life and death, you might want to consider leaving the Environmental Protection Agency and joining the military instead because, in the military, you can kill people legally.

Commenter #8:
Nancy Morris

Comment:

MS. MORRIS: My name's Nancy Morris, and I just wanted to add a few points to what others have already said because I want us all to get out tonight here.

First of all, I feel there is a great need for better remedies and actual attitudes towards removal of this waste. And what I mean by "attitudes" is that you might say, sir, that your grandchild might be trying to deal with this legacy, and I think that is a very -- I don't know -- it's kind of a talk that doesn't really set well with me because you can also easily leave the area once you realize that all is lost and go with your retirement that's been supported by the taxpayers.

And, however, if we were all required to meet certain standards where it's not just dependent on a few individuals or their -- their stakes in all this, I think we'd all be better off and that we had a better citizen committee involved with this that included nonpartisan scientists and so on. There are definitely remedies out there currently being researched about the geological chambers being dug.

I don't even know at this point if you've reached glassification in any of the waste. There's not even a standard stability across the board at this point with the waste of plutonium. And the kind of energy that's being expended doesn't even equal the kind that was exhibited for the Manhattan Project that gave us the weapons of mass destruction that left us with this nightmare legacy. And that should be changed and recognized that we have nuclear power plants all around the United States, around the world, and plutonium is ever-present with us.

We have to be able to deal with this in some fashion within our immediate generation and be realistic that we may not be available to answer questions a hundred years from now.

And I'd like to end with one quote. This is from Dr. Kathleen Dean Moore who's an ethics professor at OSU. "We have an affirmative moral responsibility, individual and collectively, to leave the future of world rich in life- giving possibilities as a world we inherited." Thank you.

Commenter #9:
Margaret Swartzman

Comment:

Again, my name is Margaret Swartzman, and I just want to say how impressed I am with Tom's comments and various other people here. Definitely Hanford is a disaster, and we're all trying to deal with it. And I hope -- I really do want to put my trust in you, and I have great doubts because the problem is so huge. And -- but our intent must be to go beyond what we think we can do, to do as much as we possibly can to put the plutonium and other materials in geological stable environments.

We have -- we've learned through other places the tremendous human cost of our nuclear idiocy. I mean, we can look at Chernobyl and all of the horrors of the people in Russia that -- that live with, for generations for – none of their -- I mean, forests that cannot be entered for, what, five generations, maybe more. I mean, we don't want that to be happening in Portland, along the Columbia River.

We must -- it's not a roof on a house that we're suddenly having to find the money to put on the house in order to preserve it. It's -- it's greater than that. And we mustn't lose sight of that no matter the difficulty of our financial times, no matter the difficulty of our political times. This is too central to our humanity. And that's all I can say. I mean, you know what I'm referring to. And you know that -- that this is unborn children we haven't even -- we can't even imagine them yet.

Commenter #10:
Jacqueline Sorkin

Comment:

MS. SORKIN: My name is Jacqueline Sorkin, and Gerry asked me to put a face to the word cancer. And I'm -- I'm hearing a lot of things about how we're putting carcinogenics into the groundwater, and it scares the hell out of me because I've been living with cancer for over 30 years. And I probably will not be around when this all comes to a head, and that's okay too. But the groundwater will be contaminated, and there will be truck route exposures, too, and there will be carcinogens at the truck routes, you know, if we make a repository.

Anyway, cancer risks from radiation are higher, especially for children and women, than previously estimated. 15 millirem of annual dose is now projected to cause eight fatal cancers for every 10,000 adult males exposed. The risk to children is three to ten times higher. The fatal risk to children using the groundwater, including Native Americans exercising their treaty rights to live and use the resources at Hanford, will be over 2 percent.

If the Department of Energy goes ahead with its plan, there'll be an increase in cancer risk to future generations using the groundwater tenfold. Exposure to even an extra one millirem per day would be

expected to cause an increase in fatal cancers of about 2 percent for an exposed adult male and three to ten times that risk for a child.

Commenter #11:
Eric Rosenfeld

Comment:

MR. ROSENFELD: Hi. I'm Eric Rosenfeld. I'm an intern at Hanford Challenge. I'd just like to follow up with what JUCINTA was saying about the difficulty of the -- understanding the proposed plan. I have started working on it about two weeks ago, and it wasn't until yesterday at about 4 o'clock that I finally finished just making a simple fact sheet just fully grasping everything. Like I was -- the Operable Units, all that stuff is just very confusing. And if -- I was actually, like, tasked to work on it, and I feel like for someone who is not given that job, it's incredibly difficult to grasp anything that is being proposed in the plan that's 360 pages and that is, what I'm told, a very short plan. And so just I would like to see a bit more accessibility for the public.

Commenter #12:
Gerry Pollet

Comment:

MR. POLLET: First off, I'd like to ask that the formal record include what went before the formal record began because I think there was a lot of really terrific discussion and points being made from the public, and people are always hesitant and feel like, Well, I already said that; I don't need to say it again. And so we'd like to ask that everything all of you said earlier be in the record and be responded to formally later.

And, secondly, I think it is really important to build on the point that was just made that the proposed plan is pretty -- not only incomprehensible, but the materials sent out, while there was nice effort at making a guide, anyone who looked at an e-mail that said "proposed plan for CW-5" is going to go back to sleep and not have a clue what this is about.

The agencies were urged by the Hanford Advisory Board Public Involvement Committee and by the stakeholder groups to put out a notice that said "proposed plan for cleanup of the plutonium liquid waste discharge sites." That would be understandable. It would be English. And you need to take this to heart. It's disheartening to me that, because of the lack
of time, we didn't have -- we didn't -- these meetings were not set with 45 days notice, per the public involvement plan, so we couldn't do a mailing in time to tell thousands of people about it. We had to rely on e-mail. And that's very difficult to get people to turn out to. And your mailings and e-mail basically talked about this proposed plan that was incomprehensible.

If people want to look further and review the comments, as we discovered in the last 24 hours, the link was actually broken. If you search for the remedial investigation in the administrative record, you're faced with a search result of 600 documents, and you can't figure out which remedial investigation was actually the one relied upon for this proposed plan. Same with the feasibility studies. It's ridiculous.

What would make sense is why not put out a document that says Here's the link to the primary documents so you can actually read it and review it and see did they actually report when they characterized the sites and what was in the sites.

And that brings us to the difference between state hazardous waste law and the balancing act on the high-wire of CERCLA Superfund which doesn't have strict criteria, but we're fortunate because state law's also supposed to apply. And in this ase, and I'll turn over and walk over to John Price from Ecology, hazardous waste law applies to every hazardous waste stored, treated, or disposed after 1985 on the Hanford site. We've had this conversation many times. Those storage tanks that Lindsay O'Brian was talking about still have waste in them. Over a thousand liters or 2,000 liters in one of them. I forget what quantity is in the other. It's still storing waste; therefore, it's under your jurisdiction at Ecology as a RCRA storage tank. And it
is subject to the more stringent standards that say you have to actually find out what the heck is in it. And if those are extremely hazardous wastes, you have to remove the tank. And, actually, there's no legal place to even landfill it in the state of Washington.

Instead, we have a plan that says we're going to remove the contents, put them in a landfill that -- where it might be illegal to put them in, and leave the tank which might be illegal.

For the cesium sites, we have a similar situation. For ditches, we have some of the ditches that took hazardous waste all the way till the year 1995. Now, the Energy Department, for the goodness of their hearts, didn't end dumping waste in these unlined ditches without treatment in 1995 because it was just out of the goodness of their heart,about 30 years after everyone else stopped dumping liquid wastes without treatment in unlined ditches. They did it because they were sued and forced to stop in 1995. That's the point of having institutional memory. They're not very good at keeping commitments or following the law. And, again, the hazardous waste law for state and federal hazardous waste law, and our state rule says you have to characterize what is actually in a trench and the aerial extent of the contamination that is spread from it
under our federal and state hazardous waste law, not just relying on characterization from 1970.
In 1970, the Energy Department didn't believe -- well, there wasn't a hazardous waste law for it to follow. In 1985, it still wasn't willing to say it was subject to that federal and state hazardous waste law. It fought it tooth and nail. So even if the data was collected in 1985, they wouldn't have done characterization of what the chemical hazardous wastes were. 1970 they certainly didn't. They didn't try to identify which of these were corrosives, acidic, flammable, which of these need to be treated in what fashion and removed. We're talking about plutonium digging up two feet. But that same waste site has, I think -- I won't go back and look it up -- I think it's 300,000 liters of carbon tetrachloride in it and hundred thousand liters of dibutyl phosphate, tributyl phosphate. And we don't even know how much hydroxylamine nitrate was put into these trenches. They haven't reported it. Just failed to characterize for it. But we know it was used and discharged.

If we're following our federal and state hazardous waste law, we need to go back and recharacterize these sites properly and find out what is actually in them and then apply the state law that says. For instance, on PCBs, the Energy Department says they won't move; we don't need a groundwater protection standard. Just like for plutonium; it won't move; we don't need a groundwater protection standard. Well, we need a standard, and the state has a standard for those chemical wastes, and it says essentially, roughly, if you got level X, if the groundwater standard level is Y, you have to -- you can't be more than ten times it in the soil. We know we're way above that for these chemical contaminants and yet they're saying we'll just dig up two feet of soil or we'll just cover up the cesium sites. That's not cleanup; that's a coverup. We urge you to go back to the drawing board one more time. Once more it's in the breach, dear J.D.

Commenter #13:

Dee Frankforth

Comment:

MS. FRANKFORTH: Is this on? Hi. My name is Dee Frankforth. I'm a resident here in Seattle. Six hours ago I was not planning on being here this evening, but I found myself here and, frankly, quite riveted for three hours because it's really clear to me that the federal and state employees are here, are trying to do the best job that they can, but there have been a plethora of numbers thrown around tonight. Five and a half trillion dollars from Tom. 240,000 years by a number of people. Twenty-one sites. Twenty-one sites out of -- I forget, John Price, out of 300 or 600 -- 800? 21 sites out of 800. This is barely the surface of what has to be addressed.

Twenty-one sites, by my calculation at best, we had 21 nonpaid people here tonight to talk. How in the world, how in the world can you expect the public to be able to comprehend, let alone respond, to something of this magnitude? It is appalling.

And I can only say with five and a half trillion dollars spent to create this issue, there has to be a commensurate amount of will and money to clean it up.

Commenter #14:

Jurgen Hess

Comment:

I want to thank the turnout tonight, thank everybody for coming. It is wonderful. It is really neat to see so many interested people. It is great.

Just a day ago there was a big gasoline tanker that overturned east of Multnomah Falls. The state was required 100 percent cleanup even if they have to remove all the soil. And I think we should apply that same principle to the cleanup here. Two years ago when DOE and EPA came to Hood River, that was the overwhelming comment, 100 percent cleanup, don't leave anything.

I think there are too many unknowns, particularly with transference of plutonium. We just don't know enough about it yet, and I don't know my spirit will still be here 24,000 years from now, but I hope -- you know, we don't know enough about this stuff. It is too new. So I think be cautious. Take the low risk, and the low-risk approach here is to do the complete removal. You have a Hanford advisory board that recommended that. That is a cross-balanced group from all different interests.

I think that's the best thing to do. I strongly recommend you do that. I defer a lot to Ken and the State of Oregon about the cesium. I don't know enough about that, but I think certainly for the plutonium take the cautious approach. Excavate it all, bring it to the salt caves in New Mexico. Thank you.

Commenter #15

Dave Berger

Comment:

Thanks for the time to do this. First of all, I mean as there is many comments I want to make, and I will make them as brief as I can.

But regarding the sampling data, even though you have thousands of pages of data, there is only less than 300 elements in the periodic table last I looked. It would be fairly easy to present the data for these four sites based on ranges of, you know, a range of plutonium based on depth and a range for cesium based on depth and a range for carbon tet based on depth, you know, with statistical stuff like highs and lows.

I don't think that would be very difficult. I don't think we need to go through thousands of pages of data to see that. And that would make our understanding of the process a lot better.

Secondly, regarding the curve that you presented when Darrell asked the question about how you decided to go to two feet down. When I saw on that curve, and I may have misinterpreted that, but there was a lot of data points way down low but one or two data points where you made the two-foot decision. That doesn't seem like a sound way to make a decision if that is correct. So I wonder about that, and I wonder if there is not a better way to present that data, too.

Thirdly, as far as the cleanup is concerned, I think that we should go to the California standard, at least, for the plutonium cleanup, and perhaps, you know, as far as any cleanup we should be looking at something like a 99 percent removal.

And I know that realistically and economically you are not going to probably end up going to some of these places, but if you don't go to those places, whatever is left in place should simply not just be kept. There should be monitoring wells surrounding the area. They should be guaranteed to monitor for an indefinite period of time because you don't know what is going to leach when.

And, thirdly, a cap isn't sufficient. With lateral movement of water, there should be trenched walls going down to stop the lateral movement of water in your engineering design.

Let's see. Oh, yes. My name. I forgot. Dave Berger, Washington. I apologize.

And, perhaps, you know, once you get to the point that it seems like you are going to have to pull a lot of that stuff out regardless of what that decision is, you know, this is also a great jobs program. Finally we are at same page with the people in tri cities. We are want them all working.

But in the meantime, when you decide what you are pulling out, we should have a second meeting to determine where it is going and what we see regarding the acceptability of that decision.

And, lastly, I will end with a joke. Okay? When I was in Tibet, the old saying was that the Tibetan monks around the monastery feed the dogs because they are afraid that bad monks will come back as dogs. It is sort of an insurance policy. Well, I sure as hell don't want to come back as an ant at Hanford.

Commenter #16

Kathy Carlson

Comment:

My name it Kathy Carlson. I am a resident here in Hood River. I have been coming to these meetings for more than 20 years, and I remember some stuff that was said at previous meetings.

One of the things that I recall pretty strongly was that the site would be left in a state -- the goal was for the site to be left in a condition where the public could use it. And then they are talking about here today about putting stuff over other stuff, and it is going to be an industrial site and it is going to be maintained for 10,000 years. And then plutonium is like around for 24,000 and half life can go to 40,000 years. I don't even think anything we engineer is going to last for 10,000 years. It will probably last for, you know, the life of a car, 20 years or whatever, you know.

I think that -- and I heard a lot today about -- oh, the other thing the lady brought up about the seismic. Nothing was done to put into the thing about seismic conditions. I don't see anything about floods. They are having a flood in the Midwest. You know, Fort Calhoun is in great jeopardy because they didn't look at floods.

And so Hanford is on the river. I don't see why they would not look at floods as part of their conditioning to make -- I heard a lot of things saying: Our assumptions. We are assuming. We are assuming. "We felt. We feel. We are confident." And none of this stuff is backed up by scientific data.

And then the other things were, comments that I heard here from you folks was, oh, "We are transparent. We want to be clear." Not. There is nothing here that is clear, and it is not transparent.

And then another term I heard here tonight was long-term stewardship. Again, we are going back to 24,000 to 240,000 to 10,000, even to a hundred years. I mean we are always going to maintain that site. It seems like there is enough plutonium in these -- in the ground if you left what you want to leave in there that they could still be build 35 nuclear bombs. Seems like a great terrorist site to me.

So, anyway, those are my comments. Thank you.

Commenter #17:

Hafiz Heartsun

Comment:

My name is Hafiz Heartsun. I live here in Hood River.

I guess I will say in my own words something I have heard from other people, but I found your assumption that DOE will safeguard this area for some number of years, hundreds, thousands, tens of thousands of years, to be absurd. It breaks the strains of credulity. How many years ago was the pyramids built? It was like 5,000 years ago, a mere half of that period. Where is the Pharaohs? Where are they guarding their pyramids? And where is any country that has been around for a thousand years? Is there a single country on the plant that has had a consistent government for 1,000 years? 500 years? No. It is just not in the historical record to believe that America, and let alone the DOE, will be around this long, is just absurd. It is ludicrous. It is arrogant beyond belief. I mean right now we are looking at, you know, the government may default next week.

What is the DOE going to do when nobody in this department has any money? Are you going to stand out there and guard it for the rest of your lives and set up camps so all of your generations forever will guard, never leave, because my ancestors 10,000 years ago were employed by DOE. It is our sacred mission to stay here. It is like, come on, guys. You really got to clean it up so it becomes the no-action alternative that you are thinking, that it requires no action because that it is the only realistic thing that you can sustain over the period of time necessary.

I mean sure, yeah, we love science, but this is like science fiction crap. You just got to give -- I mean you have got to give us a believable story. You are not going to be here for 10,000 years. That is just absurd. It insults our intelligence, really. I am serious. This is not scientific. You have no scientific basis to say we will be here 10,000 years. Thank you.

Commenter #18:

Joe Still

Comment:

First I want to say thank you to the federal representatives, state representatives for coming. I appreciate it.

Of all the comments I have heard tonight, I would just like to focus on one, and it was a woman in the back -- I don't know who it was -- who mentioned about the seismic. And I know something about CERCLA SuperFund Model Toxics Control Act. I actually work in the Tri-Cities. So I am somewhat familiar with that.

On May 18, 1980 I was hiking in a place called Randal, Washington and there was a little event that day if you remember. Mt. St. Helens lost half of itself, and I am standing here right now, and I remember watching rocks the size of cars fly horizontally through the air, and I hope that you go through your decision-making processes, that you will reconsider and evaluate the seismic components of all these decisions.

We are in the ring of fire. All it takes is slight tectonic plate movement, and we could have a problem of gigantic proportions, and I hope that state and federal officials do not make a decision about considering seismic based on what judges, legislators and attorneys have decided is the right thing to do because there is no do-over. Thank you.

Commenter #19:

Corey Water

Comment:

Hello. Corey Water, Moser, Oregon.

I understand everybody is working under a budget regime, but I consider it a waste -- okay. So more thorough options in cleaning up the plutonium specifically in these sites was rejected on the basis of being too expensive, but I consider it a waste of our money to only do two feet. So that is -- that is where the waste lies. Yeah, just talking budget here.

Commenter #20:

Robbie

Comment:

I have a little scar in my throat. I am able to talk. I have thyroid cancer. The only known cause of thyroid cancer is radiation.

Plutonium is not a friendly element in its form there, and saying we are going to go down two feet and get 50 percent of the plutonium is not cleaning up. I think it is like spelling. I used to get every letter right except one, and I still missed the word for knowing how to spell it.

Leaving 50 percent of the plutonium in the ground is not cleaning it up. I don't know a lot about running the operational. So it is an operational model. Instead we are going to do two feet, we are going to dig until it's, you know, only a certain percentage of what's come up would be much better. To go after 99 percent of it is just more realistic.

Covering something with 15 feet of soil, I presume that in Hanford they have winds, and there is water erosion. And 15 feet of soil for 10,000 years or for what is -- for -- anyway it is not enough. And it needs to be -- what needs to be required is to have it sent to New Mexico. That's my bottom line, and I am glad that we know a lot more about radiation and it's gift and limitations.

I will say that in Japan all of the nuclear power plants had to be renegotiated with how safe they are because of the just upping the earthquake to a 9.0 earthquake. They had to be reevaluated. So I think evaluating this for seismic activity is an excellent idea to make it safer. Thank you.

Commenter #21:

Keith Harding

Comment:

I am Keith Harding. I live in the upper Hood River valley.

Hanford is our father's curse on us, and how we deal with it or don't deal with it is our curse on our kids and grand kids.

If you are a student of history, you will find a lot of stuff written down that passed generations of humans didn't care much about future generations. They said things like: What the hell did the future ever do for us? Or they will deal with it when they get here. And you will also find comments such as Thomas Jefferson in his first inaugural address of 1801 where he said: All their actions at that time should be -- the impact on the thousandth generation into the future should be considered. What they do in 1801 should be considered a thousand generations into the future, and if that is 25 years per generation, that is 25,000 years.

I have been attending these meetings for over 20 years now, and nuclear science and chemical science is not my expertise at all. So I sit and listen and listen to the agency people, and the contractors speak, and a lot of the folks seem very sincere. JD, you sounded very sincere tonight. There has been some that did not sound so sincere. I do know that it is real easy, and I sit and think and listen. So I try to say something that might be a different twist on it that might be a way to get into the agency's mind.

And I do know there is a phenomenon of simply becoming a functionary in an agency -- I worked in government for 20 years. I know something about it -- to become a functionary and to pace yourself through it and get to the retirement. And we have seen several of the characters before you do exactly that, and now they are nicely retired with their benefits.

I want to really see it get drilled in, bolted and riveted into the agency because this agency and the AEC before DOE was the villain, and it still is. We need a real deep track record to develop.

Over these past 20 years, we have heard reclassification from a higher level to lower level. We have heard redefinitions of terms, and I don't understand hardly any of this stuff, but I have a feel for it, and especially listening to you great people out in the audience. And I totally agree with Hafiz when he says it is bloody arrogant to think this civilization is going to be around. I mean I can see it collapsing a lot sooner than 200 years more. It is very important to get a deep mind set into the agency, into human beings to get reconnected with the earth that gives us life.

The nuclear program in 1944 was wrong then, and it is still wrong, and you need to really clean it up, get really committed to it. I have got lovely young children, and I work with preschool kids all the way down to diapers, and I have to think about them.

All right. So do your best and don't schmooze on it. Thanks.

Commenter #22:

Chandra Radiance

Comment:

Chandra Radiance. I am a Hood River resident, and I, too, have been coming to these meetings for 20 years. Unfortunately, they go on and on.

I am going to keep my testimony brief, and I second the points made by Heart of America. So I am just going to put them down here. I demand a better approach than remove, treat and dispose. DOE's plan does not protect the public from long-term plutonium risks. Plutonium is one of the deadliest substances on the plant [planet].

Internal exposure to plutonium causes cancer. The DOE plans to leave large quantities of plutonium in the soil in the waste sites it has identified for cleanup in the central plateau. This is unacceptable. Simply put, DOE should dig deeper, remove as much plutonium as possible and send this long-lived waste to a deep geologic repository at the waste isolation pilot project in New Mexico.

Two: Given the extremely long half lives of plutonium of 24,000 years and other contaminates, DOE and EPA cannot assume that leaving this contamination is protected. DOE's plan rests on the false assumption that plutonium in the soil will remain immobile for thousands of years. Given the highly dynamic geology of the Columbia River basin over tens and thousands of years, DOE should not make this assumption.

Additionally, DOE's own sampling shows that plutonium has migrated deep into the soil. Clearly plutonium poses a long-term risk to groundwater and the Columbia River.

Three: DOE should consider a broader range of alternatives for cleaning up these waste sites. DOE's proposed plan stops short of an adequate cleanup, leaving waste below two feet under the bottom of its liquid waste disposal sites in place.

DOE argues that other alternatives such as digging down 37 feet will be too expensive. At the very least DOE should aim to remove 90 percent of the plutonium as it proposed to do in other areas such as the low-salt waste sites. Or DOE should remove rather than cap cesium waste sites.

DOE rejected an alternative that would have involved digging down 15 feet into cesium- polluted and highly-radioactive areas in the 200 east area. Instead DOE proposes to add a soil cap over these areas. We urge DOE to reconsider the more protective alternative of digging up the cesium waste sites.

And, five, focus on remove, treat, dispose.

The public has long advocated for a process of cleanup of the Hanford site by removing, treating and disposing of radioactive and chemical wastes in a manner that protects the public. DOE's proposal falls short of this goal. The Hanford advisory board summarized its concern with the proposed plan in the following statement: "The board advises the U.S. Department of Energy to get as much plutonium out of these waste sites as possible."

Thank you very much.

Commenter #23:

Bob Ruder

Comment:

My name is Bob Ruder. I live in White Salmon, Washington.

And I am just really encouraged by the desire to take advantage of this opportunity to make the Hanford site safe by everyone here, and I think that this is an unbelievable opportunity, and that we have come together at a time when we are making some real decisions about what is going to happen in realtime.

And I think that it is very difficult to take what we consider as realtime and try to make the leap to the dangers of plutonium over what is really unimaginable time as far as I am concerned, and that given those sets of constructs of what we think of as realtime and what we think of as unimaginable time, I think it really moves us to take advantage of this opportunity and to clean the site up completely because in the other imaginable period of time we don't know what will happen, you know.

People have highlighted many possibilities that would make the present proposal for cleanup completely a waste of time and energy and money and resources, and so to really clean the site up for all the future involves the complete removal and repository of the contaminated waste.

Commenter #24:

Karen Harding

Comment:

Karen Harding, Mt. Hood.

I vote that we clean it up 100 percent even if it takes a zillion dollars. The future deserves that from us.

Commenter #25:

Comment:

I would like to observe that in my lifetime nuclear power has gone from being too cheap to meter to too expensive to calculate.

These things you are talking about is all downstream costs of nuclear power, and you have been struggling with this problem with all of our scientific advancement. Apparently, you know, we are just on top of the world. We can do anything, and yet still there is no -- what is it -- approved disposal method. And there appears to be no approved disposal method in the near future. Now DOE, our wonderful steward, is proposing to bring thousands of truckloads of highly-radioactive waste to Hanford with no idea what they are going to do once they get it there. This doesn't sound like thousands years of stewardship to me.

Given the long-term failures of Hanford's tri-party agreement to realistically clean up what has gone before or plan for what will go on in the future, it seems to me that DOE should be giving us a break and you, a government agency, need to be taking the lead to the rest of the government to get off of their crazy crackpot idea and stop nuclear power. It is not sustainable. It gets more expensive every year. It is insanely expensive, and there is no end in sight for this. And for you to sit around and do your own little one box job -- my job description. I am not going farther -- is irresponsible and, to me, inhuman.

The bigger picture is nuclear power is insane, and you with your expertise and your experience need to take a political stand and explain this to the political do-dos and those people who have fat pockets who are getting lined with more nuclear power plants and make it a no-go option. This is not a sustainable or scientifically -- not scientifically sustainable way to boil water and make electricity. It must stop.

There are much simpler, cheaper ways, and to continue on this path, just have our little meeting saying, "What should we do with this? What should we do with that," I mean you are just nickel- and-diming us death. You guys have the information to have the big picture.

Take it. Run with it. You are our employees. That is what I am challenging you to do.

Commenter #26:

Gerry Pollet

Comment:

I want to thank everyone for coming and sticking with us this evening.

Remember, the Energy Department wouldn't have even stopped dumping liquid waste into the soil trenches without treatment if it wasn't for some of you here coming to meetings 20 years ago and sticking with it. You really make a difference.

And one of my comments tonight is the fact that we had far less than 45 days to provide public notice of this. We were supposed to have 45 days under the Hanford cleanup publically involved in the plan called the new relations plan. And without 45 days, River Keeper and Hearts of America Northwest cannot do a mailing to you and everyone else who wanted to be here tonight.

And I know that many of you helped out making phone calls and forwarding E-mails and Facebook announcements. Thank you for doing that because we would have had an empty room otherwise, and it is totally wrong for the agencies to put out a proposal, and say we will not give you 45 days of advanced notice for public meetings. The agencies didn't really want to have public meetings. So public

involvement, advisory board and other people pushed hard, and they agreed to do public meetings, but they didn't really want you here. So they didn't give us 45 the days.

It is really important that we have 45 days so we can do mailings, and it is really important later this year they are going to come out with a proposed revision to public involvement plan.
I hope to see you all here with a lot of other people saying: If you don't give us 45 days, you don't get to go forward with your plan.

Secondly, if you don't give us access to the documents, public comment period doesn't start, and in this case if you look -- there was a proposed plan that is, frankly, a piece of garbage that was distributed if you went beyond the agencies' fact sheet, and then you wanted to see where was that real data, and you had a broken link to the administrative record. If you knew where the administrative record was, you received back a search query of 640 documents and versions like A through G of the feasibility study, and you are supposed to try to figure out which one was used.

I appreciate Dennis Falk's and the EPA's commitment that if we ask for it there will be an extension of the comment period, and we asked for it because, first off, you need to establish the principle that if the documents aren't available the comment period keeps going until you have had plenty of time to review them.

Secondly, in this case, for real, people trying to review these documents were reading the wrong damn documents because you didn't provide the right access to them. What did the documents say? Let's get to this.

I am just going to wrap up then.

If the Energy Department had obeyed the law after 1970, it would have stopped dumping liquid waste and untreated liquid waste into trenches, right? And it would have treated it and pulled out the plutonium, and the plutonium would have gone to WIPP eventually. Instead it is in the soil, and now the Energy Department should not be rewarded for having broken the law for 25 years by continuing to discharge it and then say, "We don't want to dig it up."

The Energy Department's proposed plan in a calculation we think is a gross underestimate says: Here is the lifetime cancer risk from these supposedly safe cesium sites that they are going to put 15 feet of dirt over or the Z-9 trench, which will only dig up two feet. If instead of an industrial worker, the area has subsistence farming, and the cancer risk from the Z-9 trench is 1.4 in 10 lifetime cancer risk. 14 percent of the people exposed, instead of the industrial worker, if it is farmed 14 percent die of cancer. If we look at the cesium trenches where we are only going to put 15 feet of dirt on top, if we have made a mistake the cancer risk is -- get this - - 65 percent. Now, do you think we should dig it up?
Thank you.

Commenter #27:

Jody Frank

Comment:

My name it Jody Frank, and I live in Hood River. And there has been some call for studies on seismic and floods and that sort of thing, but we live in the middle of the results of the Mazola floods. I think

we kind of know what those studies are going to say. Could we just spend the money on digging the stuff up on getting rid of it, please. Thank you.

Commenter #28:

Comment:

I implore the Oregon DOE to not just rubber stamp the data provided by the federal DOE. Just know that for you to rubber stamp and agree to decision to, you know, take care of two feet is just based on very poor data, and you need to look a little deeper..... We want it 100 percent cleaned up now. We are not going to be here in a hundred years, but our children and our children's will be. We want it cleaned up 100 percent.

Commenter #29:

Jade Sherrer

Comment:

Jade Sherrer, and I live here in Hood River, and I hearing the words protection and service a lot tonight, and I would just like to be a voice for the other-than-human world, for the more-than-human world, that also shares the environment and this planet and beg all of us to come to our senses to do everything, everything, everything possible to clean up this disaster now. Thank you.

Commenter #30:

Chandra Radiance

Comment:

Thank you. Chandra Radiance, Hood River.

I just wanted to make a second comment requesting that you would clean up the plutonium up to at least the standards that has been set by the Lawrence Livermore Lab in California which is a thousand times more protective level of plutonium than what Hanford is currently allowing. I don't remember the exact numbers, but I think you have knowledge of the 2.5 picocuries per gram instead of, whatever, 29,000 -- 2900.

Commenter #31:

Paige Knight

Comment:

I'm Paige Knight, President of the Hanford Watch here in town. And I will make my comments brief. The United States Department of Energy promised the citizens of the Pacific Northwest in 1989, that they would cleanup the vast contamination of the Hanford Nuclear Reservation which for the past half century has compromised the health safety of people who have lived in the region and who have relied on the great Columbia River to provide water for inhabitants and viable crops. We are over the sacrifices many have made in living with the production of plutonium as a deadly element. This plutonium has already entered the Columbia River and as evidenced in your reference guide is a continuing threat to the groundwater and Columbia River. Plutonium has a half-life of 24,000 years meaning it will take 240 years -- 240,000 years for it to decay. In the early days of cleanup of the site the public was told that it would take 1,000 or more years for the plutonium that contaminates this 10-square miles and more of the Hanford site to reach the Columbia. A few years later, and I remember this meeting clearly, it was the Oregon Hanford Cleanup Board Meeting, Ken, where the Department

of Energy informed us that they had discovered the plutonium was much more mobile than they thought and it was moving more quickly. So I want people to take note of that and most of you probably suspected it any way.

The simple fact is it must be cleaned up with due diligence. It must be done to the highest degree possible, with testing and removal of contaminants in hot spots, treatment of waste and safe disposal. The proposed evacuation of two feet below the crib zone is unacceptable. According to the Oregon Department of Energy's findings in these documents, contamination was found at up to 200 feet deep at some spots. Capping cesium or blending clean topsoil with contaminated soil is a sloppy and unconscionable approach. The serious waste needed to be disposed of at Waste Isolation Pilot Plant in New Mexico -- or they need to be disposed there. Saving pennies at the expense of present and future citizens is a pound foolish -- anyhow it's -- thank you. In here I have a parenthetical, note the increasing threats to our health and cost of healthcare right now. We, of the Pacific Northwest, have had to fight for every advancement in cleanup of the site. As we slowly move forward in the cleanup, new plans continually arise to bring more waste here and to do less than that which provides health safety and the future for the region and its inhabitants.

It is impossible to promise that no one will live in the Central Plateau area in the decades to come. That is not the answer. We want a "surgical approach," and there I am using the comment from the Oregonian today. Do this cleanup effort. We have been promised.

Commenter #32

Jan Castle

Comment:

My name is Jan Castle and I would second everything Paige just said. I think it is -- there is no reasonable expectation of being able to keep control of this site for as long as would be necessary. That's just impossible. Therefore, we are morally bound to get as much plutonium out of there as possible. The two foot limit does not sound like it will be adequate so I would like to see you continue to do the checking and continuing to go until you find that you've gotten it. I know it will be expensive but it is absolutely necessary. This is land that belongs to the tribes. To leave this here and expect that it will be an industrial site seems to me a violation of a promise long made and as we have violated all of our other treaties with tribes. So I think it's unreasonable to clean it up to the industrial standard. It needs to be cleaned up, period. And returned to reasonable use to the tribes as promised.

Commenter #33

Dvija Michael Bertish

Comment:

Hi, I'm Dvija Michael Bertish from the Rosemere Neighborhood Association in Vancouver -- sorry? I want to address the risk-based decision making which I understand is important regarding trying problem solve what steps you do first and in what order. However, I want to remind everybody that within the past century, some Japanese ancestors placed signage on the shores of Japan and said, "Don't build here," because of tsunami warnings and everybody forgot about that and built their reactors. And then, again, more modernly, they were told, if you do, bury them so nothing happens and those decisions were disregarded. So risk-based assessment planning long term failed in that regard and now we have contaminated oceans and food an uninhabitable areas and if you're going to pay those people $9,000 in total for lost property that is tragic.

So I think that long-term risk-based assessment planning needs to, therefore, increase soil depth removal to the best and the lowest known depth possible with the high salt wastes that have been determined to be 100 to 110 feet at present. So I think you have to go far deeper than what you're planning. The cost of doing this now is going to be nothing if something cataclysmic happens in the future. It's not viable to think that any barrier is going to be maintained in perpetuity. So in this regard, I think the cleanup standards that are being proposed here are arbitrary based on the long-term projections.

We need cleanup standards to be far more restrictive as applied to the site to go as low as possible to the standard that's already in the Hanford Reach at 35 microcuries. One other thing to consider here relative to soil study is that I haven't heard anything about seismic shift or frost heaving. So when you have vast swaths of solids that are being bored and/or remediated, are open to the general atmosphere and we have seasonal shifts from rain and front that causes soil undulation. And so the soil isn't going to stay in one place. So anything that's built is going to move and soil will fall and the residues that are beneath will rise up. I haven't heard anything that describes how that soil mobility will be controlled. Thanks.

Commenter #34:

Loren Paulson

Comment:

My name is Loren Paulson, I had a job once that allowed me to look into the future on an eerily similar situation as we have here. In World War II, the U.S. Government manufactured nerve gas in an obscure plain now known as Torrance, California. I worked for Shell Oil Company at the time and the federal government sold that site to Shell Oil Company to make pesticides. Pesticides is nothing more than nerve gas. Years followed and after 40 years of making nerve gas and pesticides on this sites, housing developments started to move in. And Shell Oil sold that site to Cadillac Fairview, a company that then decided to put in a high-end industrial site across the street from this housing development.

They bored a hole to make sure that foundations could be poured and covered it up and it is now one of the Superfund sites in California right across the street from a housing development. So as you look in the future with certainty about how this property is going to be used in the future, think about Torrance, California, Shell Oil Company, the U.S. government and nerve.

Commenter #35:

John Hallis

Comment:

My name is John Hallis. I'm with Oregon Physician's for Social Responsibility and I'd like to record that our physicians are in accordance with the position of Hanford Advisory Board and that of the Columbia Riverkeepers and that of the Heart of America Northwest. It is we support the removal, treat and dispose solution and we think that it is a great mistake to restrict the depth of the excavation. That the plutonium should be removed from whatever depth it is found and we also support removal of the cesium from these sites.

Commenter #36:

Chris

Comment:

My name is Chris and I'm a physician here, living First I'd like to speak for Mother Earth. I am very small. She's big. What a mess. You made it clean it up. Okay. Now, back to me the doctor. I'm psychiatrist. We have suffered tremendously from denial. Denial is caused by fear which leads to a disconnect with thinking and feeling and it leads to paralysis, lack of action. And have we not seen a lot of inaction in cleaning up Hanford. Now, it is so encouraging to me to see that denial appears to be wearing thin. It's wearing thin because people keep you know, nagging, and saying, you know, nothing is not okay. Maybe two feet is not okay if we went 18 feet. But anyway, it's helpful. It would helpful, I think, to have three-dimensional moving models shown. You can do this with computers now. It's not square miles we're dealing with, it's cubic miles. Okay. And it's moving things not static things. So I think putting models, three dimensional, moving them around like you can and then showing the stuff flowing might be really exciting and thrilling and if we could just overcome our fear it wouldn't lead to so much denial. The antidote to fear is love and respect for all life. So back to the Mother, could we all respect and love all life, taking into account that we are very small. We can only think ahead seven generations, maybe. For planning purposes, we can only think ahead two generations. There is no fence. What there can be is this. If we will educate two generations below us up to taking over our tasks when we die, we might be able to carry it through for the 10,000 generations we will need. But we will need the seven generations back, seven generations forward which our tribal friends suggest to us. Thank you.

Commenter #37:

Eric

Comment:

Hi, I'm Eric. I'm an intern at Hanford Challenge from Seattle. You talked about not having projection for flood area or something like that. I just feel it would be a lot better proposal if there were projections for something like that. It seems like building a house that is not prepared to take or sustain an earthquake and any reasonable person knows you ought to have that. And so I just feel it's as though somebody needs to go into the data for it to be effective.

Commenter #38:

Comment:

I have a few quick points. What I'd like you to define and educate us about the effects of all of this on us as it gets more in the Columbia. The health effects, the salmon, the river, can our kids swim in it, all that kind of stuff. What exactly are we looking at if we only do a minimum. And even if we do the maximum that people are asking and I would like to ask that it all be cleaned up. Also I think we should develop alternative energy and I'd like to request that we have at least 30 days notice, preferably 45 days for these meetings, but I'm glad to see the turn out.

Commenter #39:

Comment:

Obviously, I'm not qualified to adjudicate on the various scientific models around the migratability of plutonium, the soil or anything like that but all this being equal, given the sort of structure problem with DOE's inability to guarantee what's going to happen in 2 or 300 years, and that's fine. I totally understand that. That, I think, means that the DOE has a responsibility and that the parties involved

have a responsibility to default to the more conservative solution, the more small conservancy solution. The fact that we can't guarantee 2 or 300 years from now
I think is the driving force. The reason why people point that out so much, the driving force behind that is the idea that as a result, we need to focus on removal and safe storage because we can't guarantee that we'll be able to police the area and we won't be able to shield the area from people coming to harm a few hundred years in the future. And as a taxpayer, or rather as a future taxpayer, because I'm a poor college student, I think I would be comfortable supporting that in exchange for peace of mind even at the cost of greatest expense. Maybe not the full 18 feet, but I think at the margin, greater excavation and greater removal of plutonium from the site can better preserve the possibility of real harm coming to people in the future.

Commenter #40:

Margie

Comment:

I'm Margie from Vancouver, Washington. On the planet earth where I live, where Hanford is located, is a living breathing planet where life surges through it's veins. There's no stopping any exposed liquids, chemicals, solvents from getting into the soil, thereby contaminating all soil and groundwater as well being carried in the air. I do not want any covering up of those extremely toxic contaminants. It must all be completely cleaned up. And cleaned up to the standards comparable to the Johnson standards, our health depends on it. And one way that we can carry on the message is what the Native Americans do is they have words of mouth. They have their legends. It is something that we haven't done because certainly paper is going to be -- probably not lasting 24,000 years nor are DVDs. So we are going to have to tell our children our grandchildren and carry it on by word of mouth or petroglyphs.

Commenter #41:

Chuck Johnson

Comment:

I'm Chuck Johnson. I'm on the board of Columbia Riverkeeper and just to start out with I'd like to support the Oregon Department of Energy's position on the plutonium wastes that their proposal to continue to dig below two feet in the areas where the two foot limit was established, to discover how much additional plutonium could be removed to move in a measured way and to continue it until virtually all of it has been remediated. And secondly, to support our staff member, Dan Serres, position that the cesium waste should be removed and placed in at the ERDF facility, onsite, at that additional cost. It adds one less thing that we have to keep track of. And that's the main point that I'd like to make is that I asked during the question period Mr. Dowell from DOE, the following question, which is a more rational assumption, that the U.S. DOE will be able to guarantee that the Central Plateau will remain an industrial site without migration outside of the area for 23,000 or 230,000 years. Or if the U.S. Government finds the money to remove treat and dispose of the plutonium waste properly now and obviate the need to guard that site for a ridiculous number of years.

Mr. Dowell responded with the CERCLA process. In the CERCLA process if funding is one the considerations that led to the decision they made for only going two feet down talking out only half of the plutonium under their estimates. I mean it's immoral and extreme to make the preposterous claim that the Central Plateau can be kept an industrial zone in the foreseeable future and for tens of thousands or hundreds of thousands of years. And that it's our responsibility as the people who

generated that waste to protect future generations. And it would be immoral to do anything else other than to remove all that waste. Thank you.

Commenter #42:

Rob Pearson

Comment:

I'm Rob Pearson and I have a brief comment. I think everyone else has made some really good points. I'm more concerned at the testing in the CW-5 sites is inadequate. I know during the Q & A session we mentioned it. Other sites have been tested more recently in 2002 and 2006. But the fact remains that the CW-5 site most of it was tested before 1979, and a large portion of it has not been tested in the trenches since 1959. I'd like to see that change before you go any further. Thank you.

Commenter #43:

Lloyd Marbet

Comment:

I very much appreciate all the comments that have been made this evening. I understand and feel great sympathy for the people who are holding this hearing and asking for this input, when in fact, we have to confront you, unfortunately, with the insanity of this process. Three minute comments on 240,000 year decision is really not a great example of how to democracy should work. My name is Lloyd Marbet. I am Executive Director Oregon Conservancy Foundation and I have been a long-time anti-nuclear activist in the State of Oregon. I'm here representing myself, my family, and I'm speaking on behalf of the conservancy foundation. Risk-based decision making brought us Fukushima. It also is bringing us the clean up of Fukushima, unfortunately. What are they doing? Raising the standards exposure for the people, when, in fact, they should be removing people.

In fact, we even asked Japan to remove people, evacuate people beyond the areas of the contamination that we're now understanding is taking place from this accident. The majority of the waste that were produced at Hanford were produced in our lifetime. I mean, we are the ones that are responsible now for these wastes. And this contamination should not be pushed off to future generations. The buck needs to stop with us. It really does. It needs to stop with all of us. And it's, I think, immoral to make the kinds of arguments that you're making here this evening to pan off what you think is somehow an acceptable form of disposal on this reservation. From my perspective, it's a travesty. We deal with great unknowns and long time frames of impact. Yet, the unforeseen flaws in risk-based decision making grow great as you grow out into time. It's just been proven over and over again, especially with this particular technology and now we're experiencing climate change. I mean, give me a break. I just cannot see how you can with a straight face even talk about control in the uncontrollable situation that we're getting ourselves into. Thus I think, that we face a moral question here. We've always confronted this as a moral question. I'm disappointed in Oregon's new position now on Hanford's disposal of these wastes. Now is not the time to compromise on this. Not at all. Or sign off on our responsibly to either fully cleanup our mess now. I want, as a citizen of the United Sates of America, for us to take responsibility fully for what it is that we have done to this environment now. I don't want to hear about these variables that set up future generations to have no place to go for accountability. No matter how sincere your integrity, your coffin is not going to speak volumes to the people that demand accountability in the future for what we do here in this room and from this room. Anything less is betrayal of our moral responsibility to future generations.

Commenter #44:

Comment:

Specifically, about the upcoming record of decision, considerations to somehow figure out a way to make those million dollar tests much less expensive that we can have confidence in the data and really where we need to focus on. That's very concerning that it costs a million dollars just to get information that we can rely on. So invest in that technology. And specificallyabout the cesium and the deep waste. Some sort of robot or remote thing that will really go down there and get, you know, figure out something. Get really, really creative.

In that record of decision, I'm going to look for some really great options and details. I know that you're looking for some sort of details. Everyone wants -- we want it all cleaned up. You guys want to clean it up. We also all need to literally call our congressional representatives and that's where the money comes and that's where we can say, I need another half billion dollars to cleanup the plutonium there. And literally, very simple, quick statement that captures that summary for them. They're not tracking all of it but then they can go back and pass it along to their budget committee. So specifically about the record of decision creativity, inspiration. Thank you.

Commenter #45:

Laura Feldman

Comment:

My name is Laura Feldman. and I've come to a lot of these meetings. What I have continually perceived as a huge disconnect between the lay people who come, like myself, who don't really understand a lot of it, though I know more about this process than I ever did before. But still, I mean, I can say please dig up all the plutonium and take care of the cesium. And I have a zillion questions and I have a hard time visualizing it. As that woman said, a little bit of computer technology would help with that. But the bottom line for me is that I want to stress stewardship. I saw a Frontline program last night about the atomic artists in Japan. I was really inspired because these are young courageous artists who actually some of their pieces take place actually inside of Fukushima or Fuji, one of the plants. They're really courageous and what they are helping the Japanese people do is reconfigure a different way being on this planet. They're now faced with it. They have to figure it out. So you know, it's huge. It's just huge and the Japanese are having to learn how to live differently immediately, now, as we really do too. I mean, that's Fukushima times 50 -- I mean 100 miles up the river and I think it's an nuclear holocaust waiting to happen.

And actually, it's happening now and we need to engage people and not at these crappy hearings where I'm presented with information I can't possibly integrate really. Stewardship needs to be happening at all levels and I think artists and Shamans and psychologists and anybody who will step into this breach and help us connect with this issue. Help all of us connect with this issue so we take ownership. Become stewards. We all have to be together on this. And, you know, in terms of the government telling you what you're doing, I mean, we've been lied to and it's a very challenging process and we all need to take responsibility. But I highly suggest that you go and check out the Frontline program that aired last night about the atomic artists, Chim Pom, I think they're called. Thanks.

Commenter #46:

Sophia

Comment:

Hello, my name is Sophia and I'm here to share my views and those of my husband, Jeff. We did live for a short while -- is this too loud? Okay. We used to live in Zillah, Washington, which is close to the Hanford waste site and now we are homeowners here in Portland. And I'm no expert in all the confusing terminology and all the technology that you shared in presentations with us tonight. So what I can offer to you is the consequences of human exposure to radiation. When the Chernobyl accident happened, I was a very young girl in a children's theater group in Sweden. And we raised money to bring a few of the orphan children of Chernobyl to a lake for a weekend. Spending that weekend with those children of Chernobyl is never ever going to be something that will leave my memory. There was no way for us to tell who were boys and who were girls. These children were my age, at the time. They had no hair. They had no skin color. They looked like tiny, dying old men. And it is my expert opinion that no amount of dollars saving is worth the risk of reducing a hopeful child to ghost-like dying body. Removing two feet of the waste at the High- Salt cesium sites, is obviously not enough to avoid risk to human life for all future. And I believe that the plan that proposed for the two sites is based in cost savings objectives. And I want to remind the representatives of both federal and state agencies, and especially the EPA, that I'm ultimately the one that is paying your salary. Your task, what I'd like for you to do, is to protect human health and welfare from environmental degradation. You're not doing an adequate job with the mentioned two sites. And to put it simply, it is my opinion that you need to go back to your offices and do the job I'm paying you to do, which means RTD, I learned tonight, at the High-Salt and cesium sites. We made a huge mistake in designing these unsafe nuclear waste sites. And now we need to remedy that by fully and rigorously cleaning them. And I also want to add that you need to take into consideration climate change impacts and natural disasters in all planning for Hanford cleanup. Thank you.

Commenter #47:

Joel Garbin

Comment:

Hi, my name is Joel Garbin. I both work in the storm water industry and also I'm President of a non-profit called the New Energy Movement. We educate about what is going on behind the scenes in breaks for energy technologies that generally aren't reported on by the media. Our congress is inactive and ignorant of these things. And, you know, unfortunately, our own U.S. Department of Energy has been a blockade against the information release of a lot of these things, much less of active support. So we've seen it in a very recent case where an inventor of cold fusion based technology, has now been embraced by the Greek government who is actively building three new manufacturing facilities for that process that could have been embrace by the American government. Well, it was not because that particular inventor recognized that it's not welcome here. This has been going on, this type of lobbying industry based partnership that keeps disruptive technologies in a good way at bay has been really pathetic and a disservice to our citizens and it continues. So even though men and women of integrity with the highest intent, and I do respect, and I believe you that you're at work here. There are bad seeds much higher up in the U.S. Departments of Energy. In fact, there is a book out here that I encourage you to pick up about break through energy technologies.

I also work in the storm water field and anyone who has paid attention to these incredible storms that we've been seeing globally, recognizes the 100-year storm which is supposed to happen one time

every 100 years, in many places is happening year after year. And even a 500-year storm. So it was quite dismaying to hear that climate change modeling particularly rainfall intensity has not been factored into the clean up plan. That's inexcusable given the high level of attention that climate has on the front page of the newspaper everywhere. We see it. We see it in our climate, here in Portland. We see it everywhere. I do think, absolutely, the responsible thing to do for the present generations and those to come is to do a more thorough cleanup. Two feet does not get it done. We should be going as deep as needs to be done to get all the contaminants. And although we all recognize to economics based into these decisions, it's much cheaper to do it now before it becomes contaminated river cleanup and a devastating health and environment consequences afterwards. We cannot afford to cleanup at that point. We can afford to do it now. So let's make the right decision and take care of what's our responsibility. We know there's going to be changes political, economic, environmental that we're going to face here probably in very short order and we will not have the cultural memory in two generations to even know what the hell was World War II, what was the Cold War? I mean, let's face it. You know, our children aren't really right now good students of history, for whatever reason. I've got two of them. All right. So I know that's the case. So it's on us. We fouled it up. We've got to be responsible for cleaning it up. Let's do it now. Thank you.

Commenter #48:

Tom Comfort

Comment:

My name is Tom Comfort. I also want to see the cleanup complete and the two feet is not sufficient. I've done farming in years past and I can tell you that the earth is not a solid. A field that you plow one year and remove all the stones, the next year when you plow that field there will be more stones. The earth is moving. The earth is a vibrant alive entity. And to think that if you remove two feet of plutonium the rest is going remain stable for perpetuity is ridiculous. So I want to see more thorough cleanup, as thorough as possible. Thank you.

Commenter #49:

Katherine

Comment:

My name is Katherine and I live in Vancouver, Washington. I work in Portland with suicidal kids who are looking for adults to make right decisions so they can have hope for their future. Hearing this proposal makes my heart hurt because there is nothing I can find right in it. Balanced risk is a euphemism for selling them all out. I was initially encouraged to hear what Washington law requires but I'm appalled to hear the Washington Department of Ecology is buying into unreasonable assumptions. That incomplete cleanup is sufficient to meet the terms of Washington law. It isn't. The proposed plan is not thorough and not protective in spite of the effort being made here tonight to sell this plan under the guise of balanced risk. The EPA and Washington Ecology are obligated to dig up and remove all plutonium, cesium and other radionuclides and chemicals and safely place them in a repository. The right thing for human health and the environment is to do the most, not the least possible to protect us all. Thank you.

Commenter #50:

Kathleen Fitzgerald

Comment:

My name is Kathleen Fitzgerald and I'm a born and raised Pacific Northwestern. I'm a massage therapist. I'm the mother of son who is 27 who lives up in the Gorge. I have a lot of family up there. I've been up there. It's God's country. Hanford is built on an earthquake fault and if we have an earthquake, which we all know can happen and things are changing, there is really good chance that might happen and if it does, it's going to cause radiation, radioactive chemicals to spill in to the Columbia River and go all the way down through more of God's country into the ocean that would send a 500-mile radius all throughout that region will be pretty much uninhabitable. So that's a good chance that that could happen. I agree with what's going on here as far as complete cleanup, as far as we can get. I am really disappointed every time I come to one of these meetings -- sorry, I'm trying to keep emotion out of this.

Every time I come to one of these meetings, these people stand up here and speak and I want to like them. She's really nice. And the other guy's -- you're a pretty nice speaker but you talk really fast. There's no emotion. You're disconnected from what you're saying. You have no idea, really, what you're saying. You think you know what you're saying, and it sounds good, but yet here I am at a meeting we're talking about the most radioactive site in the Western hemisphere in the whole United States. And Hanford was decommissioned in 2000, but here we are still -- you guy's want to still truck in more nuclear waste, when you haven't even addressed what's happening in the current situation and you still want to do that and that's the way you always are. You say, "Oh, yeah. We're going to do this and we're going to do that," Blah- blah-blah. But now you want to cleanup half of what's there. You want cap stuff off. EPA talks about the High-Salt risk that's immediate -- that's the one that's immediate going into the water. Yeah. And you don't even want to clean that up correctly. Stuff is already leaking into the Columbia River. We already know that. I don't even want to buy fish out of there. Okay. So what I'm saying to you is as steward of this land. I love this place. The Columbia Gorge is my home. That's where I come from. The DOE and EPA need new samples. You did one in 2001, 2006, now it's time for another one in 2011. The plutonium could potentially move. How do we know is hasn't moved since 2006? How do we know where it currently is now, and how do we know how far to dig? I think two feet is not -- I mean, two 5 feet. You even said yourself that digging – the possibility of an animal to dig is maybe even 18 feet. That's what I think I heard you say. So I think you need to at least go down, maybe I'm wrong but I'm not sure, but it just sounded like it needed to be more than two feet. So I think you need to update the information so that you have more information to go on.

The long-term risk-based assessment plan is not an option. I agree with that. And I urge and demand the EPA and Washington Ecology to insist the plutonium, cesium and other radionuclides and all the chemicals and everything be completely cleaned up as much as possible. So here's just a little bit more. Right now as early May 19th, 2011, there was a letter sent out from a lot of people that represent us. And I think it was May 23rd, 2011, there was a public hearing about them trying to dump even more plutonium out there in Hanford. That was a couple months ago. So on the 23rd, what I was talking about, they shouldn't do that. So I don't trust you. I don't trust what's going on here. It doesn't matter the money. I think we should spend the money and get it cleaned up. I don't think that we should wait. I don't think it's good idea. Please, I'm begging you to clean it up right. Okay. Don't wait. Thank you.

Commenter #51:

Comment:

I just wanted to quickly register my opposition to the absolutely pitiful plan. I'm thinking about while still having decided against the 12,000 truckloads. I was floored that this even came up before that decision was even made. I wish I could give you suggestions but I'm the secretary of a hospital and I think I do my job okay. And I hope that you do your job okay, but clearly, clearly it is not. Two feet is pitiful and this being the hottest spot in the Western hemisphere, I can't imagine that you could show your faces at international conventions that address this sort of thing. I know in Sweden, they would laugh at us, I mean, we would be ran off this planet if we really, honestly looked at this. I tried to explain where I was going to my eight-year-old daughter before I came here, and even she clearly understood that this terrible, terrible idea. Thank you.

Commenter #52:

Comment:

I'm -- I guess the word is shocked that we're considering a remediation that is going to require care in perpetuity while you can't even find the resources to do as much as we can in the present to be adequately characterizing the site. And I've heard talk about, you know, vitrification and other futuristic technology that ten years might get there when we're limiting right now the resources that will provide towards doing removal and cleanup that we could do with the technology that we do now. So it's just struck me that -- that the promises that the same person is making and seems to be heartfelt is just crazy because in the next sentence you're saying what you're not doing what we could do. I'm concerned about the CERCLA process. It seems to me that leaving it in the state of deciding what the remediation will be and I was really glad to hear that there was some mitigation going on and some stabilization. But it was really reassuring from last year, but that as long as long as we characterize it as not yet cleanup, that the Navy can continue to bring things there. And I think that's -- I'm concerned that what I hear about leaving things in perpetuity in this site will mean that this is a site that by default will become a place that will become a repository. And that's all I've been hearing since I've been coming to these meetings. So I'm, once again, submitting that concern. And I want to recognize and honor the people who have already been harmed, the Downwinders, the tribal people and all of the people include my uncle who was based at Hanford during the Army and never told. And I just lost my nephew to a very rare disease that was probably generated by that and so the assurances that care and perpetuity will happen and the people who are already suffering have experienced no accountability to the harm that already happened. I just don't really understand what about taking it and cleaning it up you don't understand. I mean, this not reassuring. Thank you.

Commenter #53:

Jacob O'Brian

Comment:

Hello, my name is Jacob O'Brian. I'm 30 years old. I was born into this world and I didn't have a choice about the decisions that were made before my time, the mess that was created. To be honest, I'm pretty angry that we are in this situation that we are having this conversation right now. That we've been having this conversation and that the best you can propose is two feet. It's crazy. It's ridiculous. I have a 14-month-old son at home. Having him has changed my perspective of the legacy that we leave. And I don't want him to have this legacy. I don't want his children to have this legacy. I don't want any future generations to have this legacy. I don't know that I can be very articulate about this because I -- this is in many ways a new issue to me but one thing that I do know is that I work for a

small firm. We're a data visualization firm. I work with data all day long. I understand how difficult it is to get a clear picture of what's really going on when you do not have full and clear data sets. When you don't have information that fully tells the story and your'e trying to do models or project things based on the situations that you can't even account for but you don't control. It's inexcusable. You have absolutely no right to stand up there and say, "We're going to do the best we can." Not the best you can. You have to fix it. We have to fix it. I know that you'er human beings and you probably have good intentions. You're doing your job and I respect that, but your job is to listen to us. Your job is to make sure it gets done right. And I think it's absolutely disturbing. Think about your children. Think about your families. Think about our future and the legacies that we have to leave on this earth. It's -- you can't put a band-aid on it. You can't just say, "You know what, this is good enough." 3,000 years ago, we're like looking at pyramids and we're, like, trying to figure out languages that people used and communication forms that people used 3,000 years ago. We can't even figure that out. And your saying, yeah, 24,000 years from now we're going to be able to communicate, "Don't go here. Don't mess with this." No. That's insane. It's insane. Fix it now. It's your responsibility. We support you. And if you choose not to, you're going to have to live with that and you're going to have to die with that. We all are. Not just you, we are all. That's the issue here. That is the issue. So that's all I have to say. Thank you.

Commenter #54:

Gerry Pollet

Comment:

I want to thank you all for sticking with this tonight and for coming out, so many people who have children at home. My name is Jerry Pollet with Heart of America Northwest. There is no way that I can imagine that Mr. Dowell and the regulators can hear heartfelt testimony that given tonight and come back and not say they've changed their plans. At least they can't do that and say we're responsive to the public. Thank you for being here. Some of you got here tonight because someone else made a phone call to you. So please make sure you're on our list and maybe next time, if you have a chance, you can make some phone calls to other people you know to bring out to the next meeting. I want to talk on behalf of -- in terms of testimony, let me just start -- Mr. Dowell tonight said, we will achieve the drinking levels standard, "at all costs." We will achieve at all costs. 1977 the federal government passed the amended clean water act banning the untreated water waste discharges the same type of discharges that continue at Hanford illegally for another 18 years, making this problem far worse. At that time, and through the late 1980s, when we started demanding an end to these charges, because before that they were secret. The mantra was, "It's too damn expensive," for the federal government to transport the waste. At all costs meant making bombs at all costs to help the environment. Being angry about this, well we've heard it so many times. It's hard to just be here and say calmly. Oh, now we'll trust at all costs. When the U.S. Department of Energy refused to end dumping of liquid waste without treatment, making these problems far worse. 18 years after the cleanwater act amendment was made legal. And they continued until 2004 to dump solid radioactive waste for 43 miles, l1-mile soil trenches. Why? Because it was cheap. And why does the Energy Department say it's sitting with it's decision issued in 2004 to add about 20,000 truckloads or radioactive waste to the landfill right near where all these sites are. With chemical waste as well as radioactive because it's cheaper than treating and disposing the underground disposing somewhere else. Why do they want to dispose of that greater than Class C waste in Hanford? It's very clear. The documents that many of you came to the public hearing on laid it out. Hanford is the second cheapest place to dispose of that waste in near surface landfills. And the modeling for the first landfill we were just talking about shows, indeed, even with a liner it will leak and contaminate the groundwater. Chemicals and radionuclides. But trust us.

This stuff won't move. Has no liner, but it won't move. At all costs, we will achieve drinking water standards. The only way to achieve is to retrieve. The only way to achieve it is to retrieve it. The PCB's in some of these sites are 100 to 150 times Washington's cleanup level. The carbon tetrachloride at these sites is at astonishingly high levels. You can apply vapor extraction to that between now and eternity, and will still continue to contaminate the groundwater over and over and over again for 10,000 years. Same with the radioactive iodine and technetium and cesium will move -- these sites were located in places where the energy department also discharged hundreds of thousands of liters of really, incredibly good solvents from moving plutonium and cesium. And now that we are finally able to assess a feasibility study, which for most of this time period you couldn't even access and I appreciate that EPA last night said that the comment period would be extended to accommodate being able to review the studies. On that, one of the documents relied upon had this to say –Okay. Unexpected high migration of plutonium in the past suggests possible unexpected exposures in the future. Plutonium americium have migrated to unexpected depths due to primarily to the unique features of the organic wastes disposed. The only way to protect the groundwater, the only way to achieve protection of the groundwater is to retrieve. Thank you very much.

Commenter #55:
Sam Dechter

Comment:

I lean heavily in favor of removing more of the Pu in the ground with money available today & deferring the Cs & other stuff until later. My fear is that money in the future will be extremely difficult to come by & when we finally decide to remove up to 90% of the Pu the money won't be there. There are extreme pressures on the federal budget & reduced spending coupled with increased social welfare needs will make cleanup funding all the more difficult to maintain.

So, let's do the Pu now. Eventually, we'll capitulate & go for 90%, but it will be too late!

Commenter #56:

Comment:

I believe that for the 216-Z-Tile field, DOE should dig the 22 feet an attempt to get 84% of the waste.

I believe that the plans for 200-PW-1 and 200-PW-6 are good. Leaving tanks is the best option. Removing them & taking the "parts" to ERDF is a waste of time & money and is a risk to the workforce.

Commenter # 57:
Iliar Walker

Comment:

The E.P.A. and Wa. Dept of Ecology should insist that plutonium, cesium, and other dangerous chemicals are dug up and removed at all sites. They should adopt a cleanup standard for plutonium on Hanford's central plateau which is as protective as Lawrence Livermore National Lab, or for Hanford's near river sites. The plutonium should be sent to a repository, because if it's left near the surface it will spread, as it has in the 200-PW-1 sites, where already plutonium has been found 100 ft. deep.

Commenter #58:
J. Sherer

Comment:

First of all, a thorough & effective clean up is mandatory, not discretional. We are talking about lives... our, our children & all being's lives far out, thousands of years into the future. I hear the words "protection" & "service the public", and I wonder if we all define that the same way. To me, service and protecting, means the following:

- DIG IT UP, don't cover it up. REMOVE, TREAT, DISPOSE.
- Let's follow California's standards at least!
- Think geological time perspective
- It is unacceptable & a crime to leave any plutonium in the ground
- Remove, DO NOT CAP, cesium waste sites
- REMOVE, TREAT, DISPOSE. → TO WIPP in New Mexico
- NO NEW WASTE SHIPPED IN – HANFORD DOES SIMPLY NOT HAVE APPROPRIATE WASTE CAPABILITIES
- WE MUST DO EVERYTHING HUMANLY POSSIBLE TO PROTECT OUR RIVERS.
- TAKE SEISMIC Activity into Account – Rowena plateau
- DO NOT LEAVE PLUTONIUM, other radionuclides & chemicals in near surface soils
- D.O.E should excavate more plutonium, no matter the cost
- Don't wait to bring a focus in on the Uranium on the Hanford Site.

I am incensed & horrified that anything less than EVERYTHING is being acted upon!

This is death sentence as it is & with the current plans of DOE & EPA. 100% CLEAN UP!

*I do not "use" the river, it is our life blood. Without our rivers, healthy, life will fail on Earth.

*Please reconsider the assumptions you've made. They may be myopic from an earth-time perspective.

*Consider 1000 & 10,000 year flood.

Commenter #59:
Sarah Brooks

Comment:

DOE has a moral responsibility to enforce and enact a thorough, effective clean up of all radioactive contamination at the Hanford Site. Re the "high salt waste areas", digging only 2 feet is inadequate! Digging until there is not trace is more responsible and moral for future generations. As the ground water is already being affected, it is urgent to get as much as possible out of the ground. If you're going to do a job, why give it 30-50%? Nothing less than 100% effort is acceptable to the health of the beautiful Columbia River Gorge, and future generations & wildlife! Plutonium is not "stable" but depends on earthquakes, & vast geological change possibilities. Also- just soil capping cesium waste sites is not effective! Digging deeper again is crucial until no radioactive waste remains! We demand a better approach!

Commenter #60:
Sofia Gidlund/Geoff Guillory

Comment:

I gave a verbal comment but would like to add my disappointment with the transparency and public outreach efforts. The documents and presentations you are "sharing" with the public are incomprehensive and that is not ok.

You need to do a much better job letting people know of hearings in a timely manner. You should inform all state and municipal channels and request the share the information widely. You should also be required to inform media and put out ads.

You need to make the documents and presentation easy to understand and test them on a sample group of average Americans before releasing them to the public. Currently you need a phd in nuclear physics to understand what is proposed for the future of my life and my fellow northwesterners.

You must "RTD" the "high salt" and only "cesium" sites you are currently proposing 2 ft removal at.

Commenter #61:

Comment:

All of the charts (show & tell) were not included in the handout to the public.

It is disturbing to have & public interest group presentation in the room with displays & staff who can answer questions.

JD's answers got too long – justification.

Commenter #62:
Comment intentionally skipped by request.

Commenter #63:
Lynn Ford

Comment:

Follow the law. Bury the plutonium according to the 1970 standards. Follow your own PCWMEIS. Follow the established standards. That is why they are called standards.

Further more, all exposure levels from Hanford materials must be adjusted DOWNWARD to compensate for THE MAXIMUM PROJECTED EXPOSURE FROM THE RECENT AND CONTINUING IRRADIATION OF THE PACIFIC NORTHWEST BY THE JAPANESE REACTORS.

WE ARE ALL AWARE OF THE MISINFORMATION AND DISTORTIONS BY THE MEDIA, REACTOR OWNERS, AND JAPANESE & US GOVERNMENTS REGARDING RADIOLOGICAL IMPACTS OF THE JAPANESE DISASTER. US DOE & CONTRACTORS ARE PART OF THE SAME INDUSTRIES, SO YOUR CREDIBILITIE IS NOT ENHANCED.

THE "MIX & SPREAD PROPOSAL ALSO VIOLATES NATIVE TREATY RIGHTS.

Commenter #64:
Nancy Murray

Comment:
Caps/barriers do not have a track record of effective longevity. While some areas are not appropriate to complete RTD, I think we are penny-wise/ pound foolish to rely so often on caps. I strongly feel RTD should be the default.

Commenter #65:
Aaron Baker

Comment:
I think given the DOE's inability to guarantee the Hanford site will remain off-limits for the foreseeable future provides a powerful incentive for a more comprehensive solution of waste removal and treatment. The nature of risk mitigation is that we do not necessarily know what impacts and long-term effects we are talking about. Obviously, I am not qualified to arbitrate on the truth of the scientific models involved in predicting plutonium migration, but I know that an unfortunate Feature of science is that it can never prove a proposition (or a model), and only disprove it.

Given that, I feel that a more cautious approach is not only justified, it is necessary.

Also, I think a lot of the moralizing rhetoric around the scale of the cleanup is overblown. I think the CERCLA process is well laid-out and I wanted to thank the DOE for doing the best they can with a difficult situation, although I disagree with the substance of their decision.

Commenter #66:
Chris Pew

Comment:
Calling the "Inner Area" an "Industrial zone", as the EPA and DOE do, seems to me to be an arbitrary label signifying a part of the waste that you don't want to clean up.

The fact is that Pu and other harmful toxins are mobile – now or in the future -- and present a threat to human health and the environment.

It should be the goal of the DOE to find a way to work within its constraints (ie. budgetery, scientific, etc..) to clean up the site, dispose and treat the harmful toxins; to ensure that this land will pose NO threat to humans or the environment, NOW or in the FUTURE.

<u>THANKS</u>

Commenter #67:

Comment:
What's "appropriate disposal" of contaminated soil? (WHIP + YUCCA) N.M.

Where is material from waste disposed proposal intended to go? How will it be disposed

"Guarenteed Presence" of DOE for 100s of years. What happens if US goes bankrupt or USD crashes? Need an ultimate "No Action needed" state because oversight cannot be assured over 1000s of years, let alone decades.

Commenter #68:

Comment:

You are Proposing DOE will keep a protective presence for 100s of year, even thousands! This is not believable considering DOE's recent activity in DUMPING all this waste! Also – how will DOE fulfill their 1000's year mission if USA goes bankrupt? What about extreme climate change? (torrential rains, extreme drought, extreme heat, cataclysmic flood & storms, How many nations have had a stable government for, say, 1000 years? Or 500 years? I don't know of any. Assuming USA will go on forever is not a rational assumption.

Commenter #69:

Comment:

Please provide Plain Language Titles on Plan – Not big numbers. You propose "RTD" yet you have NO "Appropriate Disposal" method only sending to repository in N.M. "RTD" is ineffective if there is no "D" There is no plan for how to dispose of the additional 1000's of truckloads you are proposing.

Toxic "forever"
Volume too much
Long – Dist – to NM –endangers life to move it
DOE must advocate elimination of Nuclear Power & Weapons

Commenter #70:
Patrick Wicks

Comment:

What is ET in the term "physical ET barrier" in the subject message today?

Commenter #71:
Richard Smith

Comment:

The document seems well-put-together, with nice graphics, tables, etc. The plan purpose is clearly presented, and the various remediation alternatives are well-described and presented clearly. The authors understood that one size of solution does not fit all waste sites, and their choices of alternatives and options reflect that understanding. For the material presented, the alternatives and options within those alternatives selected as preferred actions are reasonable. However, there does

not appear to be any data on contamination concentrations as a function of depth below ground surface (bgs) presented to support the various choices that are made.

As an example, I searched the proposed plan, the feasibility study, and the remedial investigation documents for any data that showed the concentration profile for plutonium as a function of depth beneath the floor of the Z-9 trench. The only information I could find was in Table B-3 of DOE/RL-2006-51 REV 0, which was from Vertical Borehole C3426. The data point nearest to the trench floor was at (47.5 – 50) ft bgs, about 30 ft beneath the floor. Subsequent data points were at much deeper depths. These data are not useful for characterizing the plutonium concentrations within the first few feet beneath the trench floor. There must be other more detailed data available that specifically illustrate the concentration profile over the first 5-10 feet beneath the trench floor, but I could not find any such information in the documents I examined. As a result, the choice to excavate only 2 ft of contaminated soil from the bottom of the Z-9 trench is totally unsupported. The reader is given no idea of how much plutonium is actually in that region of soil, and saying that removing the additional 2 ft of soil from the bottom of the trench will remove over 50% of the remaining plutonium appears to be pure conjecture on the part of DOE.

Such detailed concentration profile data are essential to doing calculations of the dose and risk arising from residual contaminants left behind after remediation. It is not clear how the risk analyses could be properly conducted with such a lack of detailed information. Similarly, not knowing the concentrations versus depth profiles makes it impossible to know how deep the excavations will need to be, and what the cost of those excavations, waste packaging, transport, and disposal will be. Thus, the cost comparisons between alternatives and options may be highly suspect.

These concerns could be resolved by including the concentration versus depth profiles in this document (and in the preceding RI/FS documents). A convenient place to display such information would be on the figures that show the structural characteristics of the individual waste sites. Such a combined display would be very helpful to the reader in understanding the physical difficulties, potential cost, and possible benefits of contaminant removal to various depths.

Commenter #72:
Don Meyers

Comment:
Paula Call, DOE Richland Operations Office

I have chosen to comment on the Central Plateau Inner Area cleanup levels using some of my past Hanford Cleanup comments. Since 1989 when Hanford's first tank waste retrieval required **removal of 99.9%** of radioactive waste content, I have suggested alternate approaches for isolating radioactive waste during the Hanford Cleanup effort. The alternate approaches would save considerable time, money and risk to workers, while minimizing the risk of contaminating the river, groundwater and public throughout the Columbia River Corridor.

During past years, I have transmitted my comments on this approach to Hanford Cleanup Contractors, DOE Richland Operations, Wash. State DOE, State of Wash state and national political leaders, Hanford Advisory Council, National DOE Secretary, Atomic Heritage of Manhattan Project, and the National Park Service. Over those past 22 years, the main resistance to my comments was that the Alternate Approach would not meet the requirements of the Tri Party Agreement. Requests to revisit the TPA and reconsider how its strict requirements should be applied were not heeded. Reconsidering musts be based on lessons learned from attempted cleanup methods used to date. Much is learned from the hazardous/radiological characteristics of retrieved waste, and the procedures and equipment used during those efforts.

Optimization of the Hanford Cleanup would save time and thereby less risk to public and environment, and reduce cost that could be used to operate Hanford Site historical monuments for public tours. The monuments would be isolated from the touring public, who could learn the history of Hanford's role in the Manhattan Project. An example is the B Reactor Museum, already in place and thoroughly enjoyed by public on DOE tours. Other sites and facilities have been visited by public on DOE Hanford Site tours.

A few of my comment transmittals follow as examples of **optimizing cleanup** and generating more monuments, thereby **preserving the history** of the Hanford Site for Public visits, possibly as a "Hanford Nuclear National Park. I plan to mail you two other comments that pertain to our Long Term Stewardsip of the Hanford. Sorry for the lengthy and repetitive nature of these transmittals.
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~May, 2007

Hi Doc Hastings,

I have been commenting on the Hanford Cleanup approach and progress now for about 18 years (since I left the Tank Waste Retrieval group in 1989). My comments have been to simplify the cleanup approach which would considerably reduce the cost and expedite the highest risk part of cleanup effort. <u>My alternate approach has been rejected all those years because constituent reviewers say, "the Tri Party Agreement (TPA) requirements/guidelines cannot be changed</u>". **I always take offense to this reasoning** since DOE has spent all this time and taxpayers' money trying to cleanup **<u>exactly</u> as the TPA requirements read**. All they talk about in the Tri City Herald is DOE/constituents revisiting the TPA to <u>change milestone</u> <u>dates to those that can be met!</u>

From experience gained through the past 18 years of cleanup effort, it must be obvious by now to DOE, Wash. State Politicians, Hanford Contractors, Hanford Advisory Board, Tribes and other Stakeholders of the Columbia River Corridor, that **we can and must <u>technically</u> revisit the TPA requirements.** The inefficiencies and lessons learned from Hanford Cleanup to date (due to worker radiation exposure, added R/A waste generated, characteristics of retrieved waste, and physical difficulties, space constraints and equipment development problems) must be applied to the TPA . **We should not have to restore the Hanford site to its natural state!** Maybe Congress would be quicker to

approve Hanford Cleanup's funding needs, if needs are more realistically based on results of a technical revisit of TPA requirements?

Furthermore, Cleanup should leave one complete set of support facilities as monuments to compliment the B Reactor Museum National Landmark, and tell all of Hanford's part in the Manhattan Project. This would support our government's effort to preserve that Atomic Heritage!

I am resubmitting the summarized comments which I presented at the meeting of several nuclear site advisory board representatives held in Richland (April 2008). Thank you for any consideration you can provide to hopefully expedite and optimize the Hanford Cleanup effort.

Don Meyers Ph: 509-586-4244

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Don Meyers

4/24/08

HANFORD CLEANUP / TPA / DOE / CONGRESS

The Hanford Cleanup has progressed for nearly 20 years now, under the requirements of the Tri Party Agreement. The original 1940s Hanford effort to perform Plutonium production and processing of radioactive waste had to be accomplished by rules established and agreed-on by governmental, nuclear regulatory, engineering, construction, and operating contractor organizations working together. They surely took into consideration the safety of public, groundwater and Columbia River to the best technical knowledge in those years. Now, some 45 years later, the start of Hanford Cleanup effort was upgraded to meet environmental safety rules of the new TPA requirements, mainly to restore the Hanford reservation to its original natural state. This has required the retrieving, handling and repackaging of previously disposed waste while generating more waste and subjecting workers to more danger and radiation exposure. The cost of this approach is astronomical and both cost and schedule are growing at a faster rate each year.

It appears Congress/DOE hesitates to approve "required" funding levels and schedule, because of doubt that Hanford Cleanup is being accomplished in an expedient manner to realistic requirements which are consistent with safety of our Public and Environment. Revisiting the TPA requirements now and applying "lessons learned" can show what true and realistic extent of cleanup is required. This would reassure DOE/Congress to expedite approval of funding, especially for the crucial River Protection portion of the Cleanup. The true needs of the Vitrification Plant capability must also be verified in the same manner, and considering any redirection of the cleanup approach. Right now, we must convincingly sell the DOE/Congress that cleanup at the Site is done safely, cost effectively, and timely as

its honest basis for our funding requests. Revisiting the TPA requirements to ensure a realistic extent of cleanup with possible redirection of approach would convince DOE/Congress that we are doing it the best way it can be done!

Back in the early 1990s, an Alternate Approach was suggested to expedite especially the River Protection cleanup aspects by removing liquid/slurry wastes from Radioactive storage tanks, basins, trenches, cribs, etc. by proven processes using established procedures and equipment. That retrieved waste would be processed at the Vit Plant or at existing evaporator facilities used in past years. The remaining solid waste would be dried, and other radioactive and contaminated equipment, scrap, soil and aggregate added to fill up the voided volumes. Each filled waste storage volume would be isolated from the public, groundwater, and environment with protective caps and fenced in as "Cleanup Monuments". Reactor Buildings would be cleaned of highly radioactive solid and liquid wastes, and isolated from the public and environment in that similar way. The Cleanup Monuments would be visited by the public on clean roads and grounds all over the Site. Tourists and visitors could learn from activated speakers, just what role each monument played in the Hanford Plutonium Production effort. What a great way to preserve the Hanford Project history and share it with the national public.

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Don Meyers

April 25, 2008

PROPOSED HANFORD CLEANUP PLAN OF ACTION

The Hanford Cleanup effort needs to do a "selling job" to Congress/DOE that convinces our Government we **are doing cleanup the best way for Our Country and the Columbia River Corridor.** Then getting our required funding and priority from DOE and Congress will happen in the best interest for all. This Sell can be done by:

1. Looking closely at how/why 1940's Project designed/disposed of R/A waste
2. Looking at Lessons Learned during first 20 years of Hanford Cleanup
3. Considering the New Knowledge/Experience that has been established
4. Looking/analyzing Sampling Data and trends in Public exposure limits
5. Revisit strict Tri Party Agreement for more realistic application or changes
6. Look at various Alternative Approaches with proven methods/equipment
7. Agreeing on and updating TPA for expedited "best way for all" Cleanup
8. Completing Hanford Cleanup with River/Groundwater protection top priority
9. Establishing Cleanup Monuments isolated from, but visited/enjoyed by Public

10. Preserving the overall Hanford History and Manhattan Project Heritage by establishing a "Hanford Nuclear National Park"

The Hanford Cleanup must result as an excellent effort like most other past projects carried out at Hanford for the DOE and U.S. Government. The Hanford effort must provide the example of proven methods for use at other cleanup sites. It's not a matter of fewer jobs and losing workers, but of using all our experienced workers to get done right and expeditiously! When our Cleanup is done right, we'll protect the Public, our Environment and our Country by Reducing Risk, and both Saving Time and Reducing Cost **significantly**. As in the past, Hanford Site will be awarded new Energy Projects from DOE, to do right here where the Public accepts having nuclear work done.

With recent talk of building new nuclear power reactors again, Hanford might even get some full scale power producing plants. That could result in a regional "Nuclear Power Park" here after all, since losing that chance 25 years ago?

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Commenter #73:
John Ritter

Comment:

Amazing, This has been going on for just too long.....It is time to clean -up the mess at Hanford completely as promised.

Commenter #74:
Oregon Dept of Energy

Comment:

Dear Mr. McCormick, Mr. Faulk and Ms. Hedges:

Oregon appreciates the opportunity to review and comment on the *Draft Proposed Plan for the Remediation of the 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units,* DOE/RL-2009-117, Revision 0. Oregon has provided formal comments related to these waste sites for the past four and a half years, beginning with the *Remedial Investigation Report* (Draft A and Rev. 0) on December 14, 2006 and November 15, 2007, and continuing with the *Feasibility Study* (Draft B, Reissue) on July 10, 2009. Our previous comments focused in large part on objections to the U.S. Department of Energy's (DOE) findings that leaving all wastes in these waste sites beneath engineered caps would be protective. Oregon was and is joined by many stakeholders in this view. We urge the Tri-Parties to revisit and consider our earlier written comments as the Tri-Parties finalize the *Proposed Plan* and develop a Record of Decision.

Oregon Position on Preferred Remedial Alternatives

High-Salt Waste Group

We are pleased that the Tri-Party agencies have taken previous comments into consideration and the *draft Proposed Plan* includes proposals to excavate contaminated soil and debris from a number of the waste sites. In the case of the "High-Salt Waste Group," limiting the proposed excavation to "up to two feet" is

inadequate and insufficient to ensure long-term protectiveness. In addition, the logic that the Tri-Party agencies provide in the *draft Proposed Plan* to support this proposed action is flawed. Further comments on this waste group are provided below.

Z-Ditches and the Low-Salt Waste Groups.
We support the Tri-Parties' preferred remedial alternatives for the "Z-Ditches Waste Group" (Remove-Treat-Dispose (RTD)) and the "Low-Salt Waste Group" (RTD Option C).

Settling Tanks Waste Group
For the "Settling Tanks Waste Group," we support the preferred remedial alternative, but request clarification. The preferred alternative indicates only removal of the sludge, followed by stabilization of the tanks. No mention is made of the 210 gallons of contaminated plutonium-laden liquid waste in the Z-361 Settling Tank. We presume the liquid would be removed and treated with the sludge (especially since it would not be possible to stabilize the tank if it contained liquid). The *final Proposed Plan* should specifically detail the proposed removal, processing and disposition of this liquid.

Pipelines Waste Group
We support the preferred alternative (RTD) for the "Pipelines Waste Group," provided this includes the entire extent of the pipelines from the originating facilities to termination. The preferred alternative says that pipelines "outside the footprint of the selected remedy" would be excavated and disposed. The Tri-Parties should clarify the language in the final *Proposed Plan* to encompass all of the pipelines as indicated above.

Cesium-137 Waste Group
For the "Cesium 137 Waste Group," the *draft Proposed Plan* proposes adding additional soil to achieve a 15-foot thick "cap" with the intent for it to be protective of human health for 300-400 years of institutional control. We acknowledge that barriers and caps will have an important role in isolating wastes from workers, the public and the environment at a number of locations at Hanford (as examples, at the Environmental Restoration Disposal Facility (ERDF), the Canyon facilities and the two licensed mixed low-level waste disposal trenches). For liquid waste disposal sites, capping alone is not an approach that Oregon would typically support as it is not a substitute for actual cleanup.

Oregon has long argued that the chemical interactions between contaminants and Hanford's soil are a key factor that needs to be considered when deciding on a remedy. In the case of plutonium, as we have explained many times in the past, we believe that Hanford's soil chemistry can and does result in mobility of certain forms of plutonium. Conversely, cesium generally binds well to Hanford's soil, so we therefore believe the cesium waste sites are unlikely to threaten Hanford groundwater.
The 15-foot barrier and a DOE presence at the Central Plateau for the next several hundred years would likely provide adequate protection from surface intrusion. If DOE cannot commit to a continuing presence within the Central Plateau until the cesium sites have decayed to a safe level, then RTD should be the option selected. The remedy design should include specific detailed provisions to prevent the future application of irrigation and most especially the use of fertilizers. These could mobilize the cesium, invalidate the remedial decision, and threaten the groundwater.
We note that the projected cost differences for the RTD options for these waste sites are not significant, especially if complete life-cycle costs are included as part of the "barrier" option.

Further Discussion of the High-Salt Waste Group

By proposing to remove up to two feet of contaminated soil at the bottom of these waste sites, the Tri-Parties acknowledge that large amounts of plutonium in the near surface pose a risk that must be addressed. The *draft Proposed Plan* points out that "because (plutonium) wastes have longer half-lives, it is disposed of more cautiously than other radioactive wastes," a reference to deep geologic disposal at the Waste Isolation Pilot Plant (WIPP).

The Tri-Parties presume that an arbitrary depth of two additional feet will excavate the "highest concentrations of contaminated soils." The *draft Proposed Plan* does not provide sufficient characterization data to support that assertion. The *Feasibility Study* points out that plutonium was detected up to 121 feet below both the Z-9 Trench and the Z-1 A Tile Field and in significant concentrations well below the two foot mark. We believe that excavating as little as two additional feet within these waste sites, as well as in the Z-18 Crib, will leave substantial amounts of plutonium in relatively shallow burial (the *Feasibility Study* estimates as much as 128 kilograms of plutonium remain in these three waste sites).

The *draft Proposed Plan* provides no assurances or explanation for what criteria would be used to assess whether the proposed cleanup action in these waste sites is protective. For the "Z Ditches," the *draft Proposed Plan* proposes that "sampling would be conducted to verify the remediation meets cleanup standards." There is no comparable language or explanation for the "High-Salt Waste Group." Depth alone – a physical measurement – neither defines nor provides an assessment of risk or compliance with cleanup standards. Depth in inches or feet is an inadequate way to gauge risk reduction or adequacy of cleanup. The remedial plan should be based instead on specific contaminant concentrations as measures of when additional removal is – or is not – required.

Oregon's disagreements with DOE's position that plutonium does not move in the Hanford subsurface have been long documented through correspondence and meetings over the past several years. We will not repeat those arguments here, other than to point out that even if DOE's position was accurate, given the very long 24,000 year half-life of plutonium 239, there is no way to ensure that soil conditions, climatic conditions, and future surface land use will not change such that it might remobilize the plutonium or move the plutonium containing soil to the surface. Removing the plutonium and disposing of it in WIPP, one-half mile below the surface in an ancient salt formation, does provide that long-term protectiveness.

Oregon strongly advises the Tri-Parties to implement an Observational Approach (as has been applied elsewhere at Hanford) for the "High-Salt Waste Group" sites. We do not know what the sufficient depth of retrieval would be to ensure the bulk of the plutonium is removed, but the Observational Approach will help to answer that question.

The Observational Approach method should be used as the waste sites are exposed to determine the locations of plutonium deposits that require RTD. The adaptive nature of this RTD approach will allow for identification and removal of higher concentrations of plutonium in some soil locations, as well as identification of insignificant contamination in other parts of the waste sites. It appears from the *draft Proposed Plan* that characterization of the trench and crib floors is incomplete, although it has been reported that more concentrated "pockets" of plutonium deposition did occur. The Observational Approach of RTD provides a more effective and efficient process than conducting more extensive characterization prior to remediation. Excavation of each of the waste sites should continue until cleanup verification data show that the plutonium concentrations in remaining soils are below the concentrations necessary to define transuranic waste and are at a permissibly low level in terms of risk, as has been routinely done for other contaminants at 100-Area and 300-Area waste sites.

The *draft Proposed Plan* proposes to apply the RTD approach through ordinary excavation methods which would, as a part of these methods, mix (or blend) clean adjacent soil with layers containing concentrated plutonium such that the waste may qualify for disposal at ERDF rather than at WIPP. Oregon strongly recommends that DOE utilize a more "surgical removal" methodology, being careful to avoid dilution of the plutonium deposited layer. This would maximize the amount of plutonium shipped to WIPP, while minimizing the amount of material that needs to be disposed. Placing this waste in geologic disposal is consistent with WIPP's mission and would permanently remove it from the near-surface environment. We do not believe that WIPP's statutory limitations on waste volume and curie content will limit acceptance of additional waste excavated from the "High-Salt Waste Group." In addition, DOE should work with WIPP to gain approval on classifying this waste stream as "homogenous," to reduce characterization and documentation costs related to disposal at WIPP.

We support continued operation of the soil vapor extraction system to treat carbon tetrachloride contaminated soils within these Operable Units.

Oregon shares the goal of protective and cost effective cleanup of Hanford, and welcomes the opportunity to help craft this important plan with our comments. Please contact Dale Engstrom, of my staff (503-378-5584), with any questions or comments.

Sincerely,

Ken Niles
Nuclear Safety Division Administrator

Commenter #75:

John Ritter

Comment:

IT HAS BEEN PROMISED FOR TOO LONG----------IT IS TIME TO CLEAN-UP HANFORD, AND STOP THE RISK OF A SEVERE ACCIDENT WHICH WOULD DESTROY THE COLUMBIA RIVER GORGE------OUR NATION'S LARGEST NATIONAL SCENIC AREA.....

Commenter #76:

Ross Pearson,

Comment:

We would like to bring to your attention that the web address for the Administrative Record and accessing the RI/FS for the Plutonium Cleanup Sites Proposed Plan is either incorrect or broken. This is limiting and delaying our ability to review and prepare a presentation for the hearings tomorrow. See page 46 of the Proposed Plan, and page 4 of the TPA Fact Sheet

Thanks,

Ross Pearson
Legal Intern
Heart of America Northwest

Commenter #77:
Comment intentionally skipped by request.

Commenter #78:
Gerry Pollet

Comment:
For the record, this is very poor access to records and has wasted a lot of time and effort and delayed our review... others would most likely have simply given up when confronted with a broken link.

It is not just the wrong url that is the problem.

The links to the actual documents should have been provided. Because they were not, hours were wasted searching the Admin Record for each waste site. The Admin Record search is abysmal, as has been discussed before. How were we to know that the documents that we pulled up from the Admin Record were not the RI document actually relied upon, or the correct version of the FS for each unit?

The CRP / Public Involvement Plan needs to rectify this permanently by specifying that there will be timely access to all referenced and relied upon documents with links provided, not sending people to search through hundreds of documents for a unit in the AR.

The comment period for this Proposed Plan should be extended to provide for the days spent without appropriate access to the correct records.

Under NEPA, agencies must provide access to all referenced documents during the comment period. The same rule should be applied for TPA documents. Just having them in the AR is NOT adequate.

This comment should be placed in the official record and responded to. In addition, we ask that the agencies respond to our request that the proper links to the documents be sent out and the comment period extended day for day during the time that we have not been able to review the correct documents.

Gerry Pollet, JD;
Executive Director,
Heart of America Northwest
"The Public's Voice for Hanford Clean-Up"
(206)382-1014
gerry@hoanw.org

Commenter #79:
Richard Smith

Comment:

Additional Comments on DOE/RL-2009-117,

Proposed Plan for the Remediation of

The 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units

Richard I Smith, P.E.

July 25, 2011

After much reading and searching through the PP and the FS, and after listening to the presentation at the public meeting held in Richland, I have developed additional comments on the Proposed Plan and its predecessor documents.

Important bits of information are missing from the PP. First, there is no information presented on the total mass of plutonium presently residing in the subject waste sites. Second, there is no information presented on the total mass of plutonium expected to be remaining in those waste sites after remediation. The inventory data are contained within the FS, but are hidden in the text for the sites in Chapter 2 and displayed in very small print on Figures 2-3 through 2-9. They are not presented in any summary tables, either in the FS or in the PP, where they could readily be seen by the reader. While the calculated risks for these sites after remediation are low (based on the chosen residential farmer with one well drilled), the public is entitled to see the whole story on the amounts of plutonium involved, and I suspect that the public perception about leaving that much plutonium in the near-surface soil will be very unfavorable.

I could not find any explicit development of the rationale for removing only 2 ft. of soil from Z-9 trench in either the FS or the PP. While some interesting data displays of plutonium concentration as a function of depth are presented in Appendix F of the FS, no documentation of an analysis of these data for Z-9 for the purpose of selecting an acceptable excavation depth is presented in either the FS or the PP. Without some analyses in the FS to support the preferred 2 ft. removal choice, that choice appears to be rather arbitrary. Lack of any data displays in the PP that could provide bases for the remediation choices make it impossible for the reader to understand and evaluate the efficacy of the preferred remediation choices

The manner in which the costs for each of the waste site groups are presented make it impossible for the reader to examine the estimated cost to remediate any given waste site via any of the possible options. The estimated costs for remediation via the preferred option for the individual waste sites within each of the groupings (high salt, low salt, cesium, etc.) are collapsed into one set of numbers for each group so the reader cannot see the estimated cost of cleanup for any individual site, nor are costs

for the options not preferred presented. The way in which the costs for each of the waste site groups are presented make it impossible for the reader to determine what the individual cost elements (incremental cost per ft. of excavation, the volumes of material packaged for either WIPP or ERDF disposal, and the disposal costs for those volumes) are estimated to be at each waste site The numbers are presented this way in the FS, so the individual waste site information is not presented anywhere

Displaying the estimated costs in terms of present worth of future expenditures is very misleading, when attempting to compare remediation alternatives and options. The total cost of an alternative or option (including on-going costs far into the future) should be presented in terms of constant dollars. Otherwise, choices that have large cumulative costs over a very long time will appear to be less expensive than choices that cost more now and have no long-term future costs. Thus, comparisons based on present worth analyses bias selection toward solutions that cost less today, but can have very large long-term costs.

Overall, the proposed plan provides neither the appropriate/sufficient information in the appropriate structure to permit the reader to conclude that the most appropriate remediation actions have been selected.

Commenter #80:
John H Herbert

Comment:
You, our federal government, made all the mess. You clean it all up.

No dishonest dilutions, which foils cleanup and containment. No leaving the deeper stuff. No leaving the chemicals or the Plutonium, Americium, and other radioactive wastes that are inconvenient to get to because you or your predecessors were irresponsible and still are.

You need to extract all the radioactive wastes and encase it in safe containers that will last hundreds of thousands of years, given half-lives as long as 24,000 years.

Commenter #81:
Emily Herbert

Comment:
I urge you to insist that Plutonium, Cesium other radionuclides and chemicals be dug up and removed at all sites, not stopping at 2' or 15'. Pu especially should be sent to a geologic repository. Having these wastes leech into ground water and the Columbia River is not acceptable. After the Japanese disaster, we are just waiting for earth disturbances to make this matter far worse. the time to act is NOW.

Commenter #82:
Ed Martiszus

Comment:

PW136PP, The radioactive contamination in Hanford's soil will need to be removed, no matter the financial cost. Pu has such a long half life and can form compounds with so many elements, that it will move through the ecosystem exposing many species, sickening and killing them. The talk of enough Pu in the ground to make 70 nuclear bombs means would mean that 70 x8kg would equal 560 kg, which could cause 140,000,000-560,000,000 cases of cancer over 250,000 years. That would be at a dose of 1 micron to 4 microns. The cost of treating the cancers and other debilitating diseases, costs of travel to be treated, stress on patients and families, loss of income, would be more than the cost of cleaning up the Pu, Cs, other radionuclides and solvents. We also have human rights issues of violation of due processm, that is being exposed and sickened and subjected to suffering and death without any arrest for any crime, court decision or sentencing. The issue of genocide against the Yakama Nation, in relation to the lands and waters of the Columbia River also must not be ignored. I must disagree with the US DOE position in interspecies solidarity with the salmon. elk, lamprey, tules, eagles, ospreys and all the other plants and animals that had a nice uncontaminated life before the Hanford crime was perpetrated on the Columbia River valley. To walk away from radioactive and chemical contamination is not only poor environmental and fiscal policy but would be criminally negligent. Thank you for letting me post my opinion. Ed Martiszus, RN

Commenter #83:
Kathy McCullough

Comment:

I could not attend last night's meeting, but I want my voice heard.

Speaking for my neighbors in Sherman County and all along the Columbia Gorge, we are all incredibly worried about Hanford and the waste stored there. We have already lost loved ones due to the contamination as "downwinders," and we shouldn't have to plead our case. It just makes good sense to clean up **everything, to the best of our capability**. This is a priority - not a case of waiting until the unforeseen happens. It is scary to most of us to know that our groundwater is already contaminated.

But apparently, common sense is not prevailing. Since when does putting topsoil over nuclear waste count as cleanup. Ten square miles with enough waste for 70 nuclear bombs? Seriously? Enough is enough. Please don't make us protest something this obvious.

All three of my dads died of service connected deaths, including leukemia from the early bomb tests. This cleanup is the least the government can do for their survivors. To me, this is very personal. I don't want my children and grandchildren threatened by nuclear waste.

Our fathers paid the ultimate price - please do the right thing for their future generations.

Commenter #84:

Shannon Knapp

Comment:

As a member of the Hood River community I am deeply concerned about the plutonium issue at Hanford - it is surprising to me that I even need to be writing this letter as it is well known that plutonium is highly toxic and has a 24,000 year half life. Please do what's right and clean up ALL of it, not just 2 feet down and not even just 15 feet down - all of it!

Commenter #85:

Tom Comfort

Comment:

My name is Thomas Comfort, I live in Portland, Oregon. I attended a public hearing about the proposed cleanup of radioactive waste at Hanford, Washington at Portland State University. It is my opinion that while there are many good results being achieved in the cleanup process, there is at present flawed thinking with regard to the standard set with regard to plutonium and cesium at Hanford. At present the proposal calls for removal of contamination only two feet below the bottom of the trench or drain in high salt waste sites, even though it is known that the contamination has penetrated far deeper. This in unacceptable. It is common knowledge that plutonium is one of the most poisonous substances known, and that it remains poisonous for hundreds of thousands of years. To leave this time bomb in the ground for future generations to contend with is ethically wrong. These substances were created within my lifetime, we should be responsible for the cleanup. Not only is this imperative from an ethical standpoint, but it is necessary in order to assess the true cost of any large scale nuclear weapons or nuclear industry projects in the future. The cost of cleanup and storage of nuclear waste must be known and taken into consideration by those who would propose a weapons manufacturing, or nuclear power generating facility.

We must clean up all of the nuclear contamination at Hanford, not cover it up, and we must stop accepting nuclear waste at Hanford until such time as it can be stored safely without threatening the health and safety of the public.

The recent political and economic issues facing this country underscore the urgency of the situation. We must clean up now against the real possibility that political or economic expediency in the future will threaten to de-emphasize the necessity to protect the site. If not now, when will we be able to finish what we have begun?

Thank You

Commenter #86:

Hafiz Heartsun

Comment:

I attended the public hearing last night in Hood River. I made oral comments, and I have further comments now:

I understand that RTD is the preferred treatment alternative for the most contaminated sites. However, I asked what the "approved disposal" method was and received vague answers. It appeared to me that there was no disposal method.
I went to talk to "JD" from DOE afterwards to clarify. He said that the less concentrated waste will be buried in a gigantic landfill at Hanford, supposedly securely lined to prevent leeching into the ground. More concentrated waste will be sent to WIPP in N.M.

I inquired about DOE's other recent proposal to ship GTCC waste to Hanford from existing and planned nuclear power plants. I have heard the proposed volume of waste will equal 2 semi-truck loads every day for 20 years, and an equal amount of less than class C waste. I asked how would this vast volume of high level waste would be disposed of if high level waste is now being sent offsite to WIPP. Furthermore WIPP is for defense related waste only and not commercially produced. JD had no answer and nervously indicated that it was out of his department. He could not offer me someplace to find out.

During the introduction to the public hearing, JD said that the decisions were based on effective clean up, not on cost.. However, when I talked to him "off-the-record" afterward and pressed for details about disposal methods he reverted to a position that he was rather powerless to affect how waste was disposed of and that ultimately all the decisions were made on the basis of money. Apparently, there is NO deep geological repository for high level commercial waste and none is forthcoming soon, perhaps ever.

JD assured us in his presentation that the DOE would guard the site from trespass, and thus exposing people to the ongoing radiation hazard, even after this proposed clean up, for 10,000 years or even more; "as long as necessary". Written in the proposed plan I find;
"Institutional controls, long-term monitoring, and maintenance will be required under all alternatives because
they do not meet standards that would allow unrestricted use and unlimited exposure."
I cannot find any specific definition of "long-term" in the proposed plan.
I find the arrogance of the assumption of "long-term monitoring and maintenance" to be astounding. To assume that DOE is going to maintain a mission for 10,000 years is total sci-fi fantasy. It is possible the US government will be bankrupt within a few weeks. Even if the hyper-inflating dollar stands for a few more years, it is inevitable that DOE's long term missions will soon be dramatically curtailed as USA becomes subject to our years of exorbitant debt accumulation.
The only acceptable alternative to dealing with long lived radioactive elements is to ultimately arrive at a "no action" state at the completion of clean up, because "no action" is the only option that can be reasonable maintained for the period of time necessary.

Other assumptions (about the long term climate, rainfall, erosion, flooding, temperature, storms, earthquakes, volcanos, as well as animal activities and human habitation, etc.) are faulted by their narrow thinking. "Global warming" is a scientific fact. That it remains controversial in political and

social arenas should have no influence in DOE's science-based plan. The changes are only going to increase. To not include the possibility of radical events that have not occurred for 1000's of years is only reasonable with what we know is coming.

Thank You for your thoughtful consideration of these issues. I want to hear how your plan is modified in response to my, and others, public comments.
Sincerely,
Hafiz Heartsun

Commenter #87:
Paige Knight

Comment:
*COMMENTS ON THE PROPOSED **PLAN** FOR THE REMEDIATION OF WASTE SITES IN ** HANFORD**'S CENTRAL PLATEAU*
The United States Department of Energy promised the citizens of the Pacific Northwest, in 1989, that they would clean up the vast contamination of the Hanford Nuclear Reservation which, for the past half century has compromised the health and safety of people who have lived in the region and who have relied on the great Columbia River to provide water for inhabitants, animals, biota and crops. We are owed this after the sacrifices many have made in living with the production of plutonium, a deadly element.

This plutonium has already entered the Columbia River and, as evidenced in your reference guide, is a continuing threat to the ground water and Columbia River. Plutonium has a half life of 24, 000 years, meaning it will take 240,000 years for it to decay. *In the early days of clean up of the site the public was told that it would take 1,000 or more years for the plutonium that contaminates this 10 square miles and more of the Hanford site to reach the Columbia. A few years later, we were informed that new samples and studies indicated it was moving far more quickly than that. ** *

The Central Plateau must be cleaned up with due diligence. It must be done to the highest degree possible through the testing and removal of contaminants in hot spots, treatment of waste and safe disposal.

- The proposed excavation of 2 ft below the cribs is unacceptable.
According to the Oregon Department of Energy contamination was found up to 121 feet deep at some spots.
- Capping cesium, or blending "clean" top soil with contaminated soil is a sloppy and unconscionable approach.
- The serious wastes need to be disposed at the Waste Isolation Pilot

Project in New Mexico—saving pennies at the expense of present and future citizens is pound foolish. (Note the increasing threats to our health and the costs of health care.)

We in the Pacific Northwest have had to fight for every advancement in clean up of the site. As we slowly move forward in the cleanup, new plans continually arise to bring more waste here, to cap the site, to do less than that which provides health, safety and a future for the region and its inhabitants. It is impossible to promise that no one will live in the central plateau area in the decades to come. That is not the answer. We want a "surgical" approach to this cleanup effort. We have been promised.

Sincerely,
Paige Knight, President of Hanford Watch

Commenter #88:
Lynn Bergeron

Comment:

RE: USDOE's proposed plan for cleanup @ Hanford Nuclear Waste site

THIS IS ONE OF THE SEVERAL ISSUES I LOSE SLEEP OVER. WE'RE ALL SITTING DUCKS. NEVER, IN THIS COUNTRY IN MY LIFETIME, HAVE WE HAD TO WORRY ABOUT BOMBING RAIDS. BUT THE FACT IS, WE LIVE WITH SEVERAL TICKING BOMBS - HANFORD IS ONE. ANYONE WHO DOESN'T HAVE HIS HEAD IN THE SAND LIVES WITH THE CONSTANT BACKGROUND STRESS OF THE ROULETTE GAME NONE OF US ENTERED AT WILL.

ANYTHING LESS THAN TOTAL CLEANUP OF THE HANFORD SITE IS UNACCEPTABLE - REGARDLESS OF THE COST. (PERHAPS WE COULD BUILD A FEW LESS WAR MACHINES TO PAY FOR THE CLEANUP -- NOW THERE'S AN IDEA.)

Commenter #89:
Lyrik Pitzman

Comment:

Paula Call and Emerald Laija,
I am an environmental scientist and a resident of Beaverton Oregon. I am also a user of the Columbia river for recreational purposes. I have reviewed the entire Proposal for remediation of the operable units.The biggest issue for me is it seems you have not properly estimated the potential risks to groundwater contamination. It is apparent you did not calculate impact from plutonium-239-240, americium-241, cesium-137, radium-226, strontium-90, PCBs, boron, and mercury (see Table 5 on page 28 of the Proposal plan). Given the close proximity of the location to the Columbia river and all the users downstream, none of these substances should be covered up and allowed to remain as a potential toxic pollutant based on "screening values and fate and transport modeling". If history shows us anything our best predictions today can be drastically wrong in 10 years.

I strongly encourage you to reconsider your plan to leave so much potentially toxic materials in place. These materials should be removed and disposed of in a proper facility (far away from the largest river in the pacific northwest).

Best Regards,

Lyrik Pitzman
Peak Combustion
503-686-8795
www.peakcombustion.com

Commenter #90:

Margaret Comfort

Comment:

The presenters, J.D. Dowell and Emerald Laija, at the Wednesday July, 27th public forum for the Proposed Clean Up Actions at Hanford Waste Sites indicated that vitrification is a currently available procedure for containing radiation waste at that site. The toxic waste there is currently "contained" in earthen trenches that are very much at very high risk for leaking into the Columbia River. The vitrification option is the only one that contains the waste and allows it to be removed to a "safer" site. Vitrify it now, do not wait for mythical "future technology" to clean up a current crisis. Do this now. Do not wait.

A nuclear disaster of greater proportions than any the world has yet seen will be the result when this toxic waste enters the greatest river in north America. The current "containment" is not enough to protect the health and safety people or any living thing from the harm that lurks there. The site exists in earth quake and flood zones and climate change is also a real factor that have not even been considered. Those of us who live down river from Hanford are all at risk and so is our world's largest ocean. The oceans all connect, so, the viability of our world is at risk. Vitrify the deadly waste now. Do not wait for "technology in the future" that may become available. Use what we have now. Get started right away and begin by vitrifying the most toxic substances first. Contain all of it. Eliminate the risk now with the most effective available technology.

Stop importing more toxic waste to Hanford, military waste or civilian. This is a site way too near to a huge river that flows into a huge water basin that reaches deep into the states of Washington and Oregon. Ultimately this water then carries what hasn't been deposited on the banks of these basins, to the oceans of our world. Safe water is life. Without safe water the world cannot live. Do not waste time with charts and cheaper choices that pretend to reduce the risks. Cheaper choices are unacceptable for the health and safety of the tax payers you pretend to protect from the fear of nuclear poisoning.

Vitrify the toxins now. We are told this technology is in place. This toxic waste is way more dangerous to all of us than the bombs created by our government to "protect" us from an enemy. This waste is the enemy within. Do not sweep it under the dirt where it is impossible to contain it. Your job is to securely and completely contain toxic waste "at all costs to protect human health and safety".

Simple logic and long known information must be respected and acted upon with swiftness and prudence to remove the threat carefully and completely. Are we still so primitive a civilization that we consciously foul our own water and pretend not to know the consequences?

Commenter #91:
Daniel Dancer

Comment:
Dear Folks,

Please do absolutely everything to safeguard the future from 24,000 yr half life plutonium leaking into the groundwater in theses old trenches. Dealing with only the top 2 feet of soil and leaving the rest is a slap in the face to future generations of humans and wildlife. Please sent all plutonium to a geologic repository. It does not belong near the surface where it spreads so easily. And finally, please perform a full investigation of
the chemicals and radionuclides in and under all
of the waste sites—not rely on data from 40 years
ago!

Thanks for this opportunity to comment,

Commenter #92:
Jim Stringfellow

Comment:
Hello,

My name is Jim Stringfellow. I spend a considerable amount of recreational time in the Columbia River down in the Columbia River Gorge.

I am concerned with what I have heard with the cleanup at Hanford in regards to Z trenches. I know there are other issues to worry about with cleanups there, but a friend had recently brought this one to my attention. How can I be sure myself and my family are not at risk playing in the waters of the Columbia River?

Commenter #93:
John Howieson

Comment:
These comments refer to the proposed cleanup actions for remediation of Hanford Waste Sites (200-CW-5, 200-PW-1, 200 PW-3, and 200-PW-6 Operable Units.

Oregon Physicians for Social Responsibility supports the positions taken by the Hanford Advisory Board, Columbia Riverkeepers, and Heart of America Northwest, namely that a Remove, Treat and Dispose approach should be directed toward disposal of both Plutonium and Cesium Wastes, both of which pose significant health hazards. We agree with the Oregon Department of Energy position that the greater health hazard resides with the "high salt" deposits of Plutonium because these wastes are

judged to be more mobile than the Cesium waste. Recovery of these wastes should not be limited to 2 feet below the bottom of cribs and/or trenches, but retrieval should extend as deep as necessary to access significant concentrations of the contaminants at whatever depth they are found.

Commenter #94:
Intentionally blank.

Commenter #95:
Jeanne Raymond

Comment:
Public comment on Hanford Waste Clean UP

To all concerned:

I was among those residents of Portland, Vancouver, and cities located along the Columbia River who were first concerned about radioactive nuclear waste at Hanford. We were most concerned with the highly rdiaoactive trenches and with the leakage of radioactive wastes reaching the Columbia River from ground water contamination.

The original intent of citizens in Oregon and Washington states, and Washington DC, was for clean up, NOT storage, refinement, or acceptance of nuclear wastes from any off-site area.

All clean up should be in compliance with these agreed upon goals.

Sincerely,

Jeanne Raymond

Commenter #96:
Kris Gann

Comment:
I have been unable to get through using my business email program and so I am trying both email addresses using our yahoo email. I hope this makes it.

To Whom It May Concern,

I urge DOE, EPA and WA Ecology to see to it that ALL of the plutonium, cesium and other radio nuclides be dug up and removed from the Hanford site.

Digging to 2 ft or 15 ft is not sufficient. The Tri-Parties Agreement should be honored as it was intended and the public should be protected.

Anything short of this is a breach of faith. The Columbia River is the most important natural resource in the Northwest and should be protected. I enjoy recreation on and in the river and so do my grandchildren.

It must be protected and Hanford cleaned up. I have been coming to Hanford meetings since 2003 when I moved to the area. Please clean it ALL UP.

Commenter #97:
Stan Miller

Comment:
Dear USDOE,

I write to urge the federal Energy Department to cleanup - not coverupwith dirt - the Plutonium in the Soil at Hanford's Liquid Waste Discharge Sites, (which is enough to Make 70 Nuclear Weapons). I urge USDOE to remove, not coverup, the Plutonium and other wastes, to cleanup of the Plutonium, Cesium, other radiactive and chemical wastes - not coverup or limit diging to 2 feet.

Thank you for your consideration,

Commenter #98:
Jane Boyajian

Comment:
Please clean up the Plutonium and other hazardous at Hanford. That means digging to a far deeper extent than proposed and disposing of the waste in other than shallow landfill on site.

Commenter #99:
Maridale Moore

Comment:
I urge that the strictest methods possible be used to clean up this dangerous and disgraceful nuclear waste dump.

I heard about this site in the early '70's from a neighbor whose husband was ordered to bury the containers in the '40's. She said he worried until the day he died about what would happen when the containers inevitably deteriorated and leaked into the Columbia River. Since my family roots are in Hood River, it is an issue I feel strongly about! I have family, including great grandchildren, living in the Portland area. This could be another ecological disaster!

Perhaps it could be considered part of the creating jobs program! I can't think of anything more important.

Please I implore you, **take action!!**

Commenter #100:
Genny Kortes

Comment:
I fully agree with Heart of America and thank them for all their efforts to keep us and the environment freer from nuclear wastes. I want all elements cleaned up, down to 40 feet and to have them removed to some other safe repository. I do not want them hauled on our nation's highways.

Commenter #101:

Stacey Stockton

Comment:

To the members of the USPO and USDOE,
I'm writing to oppose your irresponsible and misguided plan for clean up of nuclear waste at Hanford.
I want to urge you to do the following:
1. Plutonium, needs to be dug up and then buried in deep underground repositories and not covered up or mixed with other soil to dilute the concentration (Half live of 24,000. years are you kidding me ?) These contaminants need to be isolated from the environment.
2. Enforce digging 40 to 100 feet to remove up to 90% of plutonium
3. Cesium and other radioactive wastes (half life of 300 years- are you kidding me ?) You need to "unobject" to deeper digging for the safety of our environment and the people of this region.

Please listen to the people. We want to remain safe and free to enjoy our beautiful area.

Commenter #102:

Comment:

At least 30 years ago, a nuclear scientist friend of mine said he was appalled at the low standard of protection the DOE had used when nuclear waste from the reactors that made our atomic bombs was being thrown into minimally prepared ditches. The situation can only have gotten worse. As a global citizen, the known threat to people downwind, and the now documented cases of "radioactive" rabbits in the area, alarms me greatly. The potential tragedy of inadequate cleanup can only make things worse. Please use the strictest standards available to avoid poisoning the Columbia River to save both jobs and endangered salmon runs. I often ponder how the USA first used the Atomic bomb in WWII, but has been unwilling to put this terrifying genie back into the ground properly.

As kids we were always told to put away our toys neatly. This is a classic example of the kid who just stuffed his stuff under his bed and hoped his mother wouldn't notice. We can't afford to let mother earth not notice this time.

Commenter #103:

Mike Conlan

Comment:

US Department of Energy, WA Department of Ecology;

ALL radioactive & chemical liquid waste need to be removed NOT down to 2 feet or 15 feet - ALL of it.

NO more radioactive or chemical waste added to the Hanford mess !!!

HOW CAN YOU EVEN THINK ABOUT MORE NUCLEAR PLANTS ???

Commenter #104:
Karen Axell

Comment:
To: US Department of Energy
RE: Clean Up at Hanford

I am writing to urge you to clean-up NOT just cover-up the waste at Hanford.

There is radioactive waste known to be at least 100 feet down which is already in the groundwater moving toward the river.

There is enough Plutonium buried in the soil at Hanford to make 70 nuclear bombs. Plutonium is what made Fukushima so dangerous. Plutonium, Cesium and other radioactive and chemical wastes should be dug up, digging down 40 or more feet where needed to meet standards to protect both groundwater and future excavation exposure not left under a dirt cover. Digging foundations deeper than 40, or even 100, feet is common. For the DOE to dig no deeper than 2 (or even 15 feet) is inexcusable and dangerously inadequate.

EPA needs to apply a Plutonium soil cleanup standard equal to the one USDOE has to meet at its Lawrence Livermore Lab (2pCi/gm, and 10 pCi/gm where future use is proposed to be industrial) and Johnson Atoll cleanups. Those standards are 1,000 times lower than USDOE proposed guidance or goal for Hanford's Central Plateau (2,900 pCi/gm).

Soil cleanup standards to protect ground water should be applied for PCBs, and all other radioactive and chemical contaminants.

I do not believe DOE claims that it will prevent any non-industrial use and all excavation activity in the core area of Hanford's Central Plateau for even 100 years, much less 250,000 years!

Finally, all Plutonium that is dug up should go to a deep underground repository, not reburied in a shallow landfill at Hanford.

Commenter #105:
Bob Johannsen

Comment:
Suggestions: Clean up all Plutonium and TRU elements, not just the first 2 feet. Hire an independent auditor to confirm status and progress of all actions taken.

Commenter #106:
Jack Lunden

Comment:
I recently attended the public hearing in Hood River regarding proposed cleanup actions @ Hanford's Central Plateau/ 200 Areas. Hanford is the curse of my father's generation placed upon us all. I <u>strongly</u> <u>recommend</u> and <u>believe</u> that the cleanup actions need to go much further than proposed.

Concerning the half-life of plutonium, as much of this material as possible needs to be removed, treated, and stored in a deep geological repository. The same goes for the cesium sites and the "mystery" trenches. In regard to transporting "GTCC" wastes for storage @ Hanford, this is simply unacceptable. These wastes need to go to a deep geological repository. Considering the vast amount of time these wastes remain hazardous and a threat to groundwater and the Columbia River, the DOE's claims to providing 'stewardship" over that amount of time is quite frankly, absurd. The possibility (or probability) of earthquakes, flooding, the next ice age, the collapse of the U.S. Government over that amount of time requires the best possible job that can be done with the cleanup.

Commenter #107:
Marshall Goldberg

Comment:
I do not believe the DOE proposal to remove contamination only to the two foot level below trench & drain sites ("high salt") is sufficient (50% of plutonium left behind). 90% would be removed by deeper excavation (10 feet) and is essential

Cesium contaminated soil should be removed (at least to 15 feet), treated, and disposed of in a safe long-term secure manner.

All cleanup removals should be accompanied by constant monitoring of radioactive and toxic chemical levels to assure adequate remediation. Levels of excavation should not be finitely determined ahead of removal in an arbitrary fashion based on uncertain projections.

Commenter #108:
Mike Conlan,

Comment:
Please EPA and WA Ecology insist that Plutonium, Cesium other radionuclides and chemicals be dug up and removed at all sites, not stopping at 2' or 15'. Insist that Pu be sent to a geologic repository.

Mike Conlan
Redmond WA 98052

Commenter #109:
Dvija Michael Bertish

Comment:
Submitted by: Dvija Michael Bertish, Director of Environment & Conservation, Rosemere Neighborhood Association

Members of the Rosemere Neighborhood Association [Rosemere] attended the public hearing on the proposed cleanup actions for Plutonium/Cesium waste sites on July 27, 2011 in Portland.

The cleanup action proposed by the Department of Energy is to remove plutonium and cesium from only the top two feet of soil in trenches or burial pits, then backfiill with different soil.

Rosemere offers the following comments:

1) Removal of only the top two feet of soil to retrieve the noted contaminants is insufficient in that the contaminants have already sunk well below that level and have contaminated deep soils and groundwater. To achieve drinking water standards in the waste site area, then remediation must include deep soil removal. Plutonium/cesium are present as far down as 100 feet below surface soil levels, and remediation must remove all known contaiminants, not just surface level contaminants. Removing only the first two feet of soil is dangerous, irresponsible, and negligent. The cleanup standard for the noted radioactive contaminants should be far more restrictive than outlined in the proposal. The cleanup standards offered in the current proposal are based on old baseline data, and new site characterization is required, including additional bore samples, to provide adequate protections and long term planning.

2) Any and all removal actions of the noted radioactive contaminants must be relocated to a licensed deep underground repository such as WIPP. Rosemere objects vehemently to any proposal where radioactive contaminants are retrieved and then burned or reburied in pits, even if they are lined and capped.

3) Cleanup of noted contaminants must be accelerated in order to achieve deadlines and thresholds for storage at facilities such as WIPP. If proper deep soil cleanup cannot be achieved due to timing or deep underground storage limitations, then DOE must identify these problems to the public immediately.

4) The cleanup action plan for these contaminants must include provisions for seismic shift, frost heave, and alternate climate potentialities.

5) With only 2 feet of removal proposed, DOE proposes the reliance on institutional controls and institutional memory to protect the site in the distant future. Rosemere contents that institutional controls will not be sufficient to protect the public and natural resources from the spread of radioactive contamination in the long term, and thus purposeful and complete removal of the contamination is required under the greatest amount of care available, as with deep underground storage.

6) The radioactive half life of the contaminated materials will outlast any man-made barriers. Thus soil backfill and capping, or other minimal attempts at constraint of contamination will be insufficient methods of control. Deep geologic storage is the only viable answer to this problem that could be present for tens of thousands of years.

7) Rosemere rejects DOE's assertion the plutonium does not migrate through soils. The presence of plutonium already in deep soils points to this faulty assumption. Geologic shifts and other climate events could potentially exacertbate the spread of radioactive waste at the site, therefore complete removal is required.

8) DOE proposes that the Hanford site is being designed as a national park and recreation area, and topical cosmetic cleanup actions have been planned to facilitate this goal. Rosemere requests that these cosmetic plans be shelved, and that all resources be attributed to accelerated and complete cleanup of any and all contaminants at the site.

Commenter #110:
Don Meyers
Comment:

Watch for my Email Comments too!

7/12/11
Hi Paula, these are other two comments I wanted Gary Petersen and you to have. Gary has seen some of this before? I can't attend the 7/19 session. Thanks, Don Mayes 586-4244

Subj: Comments to Chris Smith's Request for Public Comments
Date: 3/3/03 10:30:37 PM Pacific Standard Time
From: Bogeyandbobby@aol.com
To: jodi.giles@co.benton.wa.us, jroberson@doehq.gov, JeffMarkey@mail.house.gov, senator_murray@murray.senate.gov, emailago@atg.wa.gov, Secretary@hq.doe.gov, Rost461@ecy.wa.gov, Jennifer_L_Sands@rl.gov, governor.locke@wa.gov, pmabie@enviroissues.cp, Hanford_Advisory_Board@rl.gov, Richard_A_Holten@RL.gov, GRogers522, Julie_A_Goeckner@rl.gov, DavidM4@atg.wa.gov, Bryan_L_Foley@rl.gov, gwen@crehst.org, hale_pa@leg.wa.gov, longterm_stewardship[@rl.gov, holdercarl@hotmail.com
CC: Bogeyandbobby

To Distribution,

My following comments to Chris Smith on "Changes to Cleanup Decisions on the Columbia River Corridor", are transmitted to you Representatives of the Hanford Cleanup Effort for your consideration and information. I strongly believe there are some very good overall ideas for Hanford Site restoration in my comments. They are based on my strong interest in this latest "Changes to Cleanup Decisions", and my past Email transmittals to you that suggested an Alternate Approach be considered. That Approach would expedite cleanup of River Corridor to minimize risk of contamination of the groundwater or the Columbia River.

Chris Smith,

Sorry for the overall lenghthy nate=ure of my comments, gur I have been very interested in the total Hanford Cleanup for the last 15 years or so!

In response to the DOE/ROO request for Public Comment on "Changes to Cleanup Decisions on the Columbia River Corridor", my enthusiasm for this approach is apparent from my comments as below. The Tri Party Agencies have taken a big step toward a more realistic cleanup approach (i.e. level of risk vs: extent of effort).

The proposed "significant change to the scope, schedule or cost of cleanup" appears to be a genuine effort to revisit applicable Regulatory Requirements now specified in the Tri Party Agreement. For now, this only applies to the extent of cleaning up the 100-N Area land, and with the added proposal that all future irrigation of that land be prohibited. It follows that any other reactor/processing site cleanup efforts that pose an "extensive effort with no additional protection to the Groundwater or the Columbia River" (or Public or Environment) would also justify revisiting appropriate Regulatory Requirements. Any other extensive cleanup efforts with no additional protection to the Columbia River, Public or Environment would also justify the same consideration.

In the past, I have often proposed that DOE, Hanford Contractors, Wash. State Ecology, Tribes and Stakeholders revisit the Nuclear Regulatory Requirements for Environmental Cleanup as applicable to the Hanford Site. The purpose being to finalize cleanup of Hanford Land, not to "Original Condition"(for unlimited Public use) as stated in the Tri Party Agreement, but to perform the Cleanup to extent there is no realistic hazard to our water, the public and the environment. The remaining "No Risk Contamination" would be disposed of in-place and isolated from the Public as fenced-in sites. All Fenced Cleanup Sites would be included as Monuments in a proposed "Hanford Nuclear National Park", which would also include the Hanford Reach Monument, B Reactor Museum, CREHST, and FFTF (either operational or cleaned up). The remaining part of Hanford land would be available for Public uses either irrigated or not as determined by Tri Party Agencies. This approach would optimize the Vitrification Plant facility scope and processing effort to only that for readily retrievable, high risk waste. Overall, this would result in very significant savings in Time, Risk and Cost to the United States Government! This savings would be realized many times based our large number of national cleanup sites.

It seems we will bankrupt our country in trying to cleanup Hanford, then repeat the process at all other national and commercial reactor cleanup sites in the same costly manner! All stakeholders should be most interested in spending otherwise wasted cleanup funds on important national issues regarding our citizens needs. As Cleanup progresses, it is obvious that removing all waste from tanks, basins, burial grounds and structures is no longer feasible. We must review the in-storage waste forms as they now exist, then be sure the Tri Party Agreement and Nuclear Regulatory Requirements still apply for safe storage and removal. Also:

1. How realistic are the risks to the environment, river corridor and the public in its present state?
2. How difficult is removal of all non-pumpable waste from each tank with the existing physical and radiological properties?
3. How feasible to leave waste in-situ in some existing storage/disposal sites?
4. What words of the TPA and/or Regulatory Reqmts need to be re-interpreted or changed to ensure low risk, timely and cost effective cleanup?

My views on overall Hanford Site Preservation cover environmentally safe cleanup, historical preservation and future utilization of land and facilities. That proposed approach is to ensure cost effective efforts on FFTF, Hanford Cleanup and Hanford Museums/National Parks. My general comments above are based on the following information – hopefully to be read and taken into consideration for this current "Changes" effort. This proposed Hanford Nuclear National Park approach applies to the Overall Hanford Cleanup and "Long Term Stewardship Program".

D. MEYERS' COMMENTS ON LONG TERM STEWARDSHIP PROGRAM

Great title for effort to ensure Hanford's facilities are demolished, secured and further utilized while preserving the overall Atomic History of Hanford! This being accomplished without endangering our water, the public and the environment, while fully utilizing existing facilities to benefit the Tri City Area, Washington State, and our National Government. My comments on the 3 points of Approach for Long Term Stewardship are addressed as follows:

1. Management of Leftover Contamination

A. Concentrate cleanup effort and funding completely on the River Protection Part of Hanford Cleanup. Do it RIGHT NOW! -- at considerably lower total cost, elapsed time, and risk to the Public and Environment. Could probably complete for only **$5 to 10 BILLION and in 5 to 10 YEARS!!** --- Let development of the Vitrification Plant be a parallel effort -- **Vit Plant problems must not delay the River Protection part of Hanford Cleanup!!**

B. Ensure all Radioactive Waste is DRIED UP

1. Forget about total clean out of tank waste -- remove liquid and leave solids.
2. Stir tank liquid/sludge waste into slurry in a safe manner using proven, standard, existing equipment/procedures
3. Pump tank slurry to Evaporator and process, dry out remaining sludge/mud and leave in tank
4. Stir, transfer and process basin liquid/sludge, in proven manner similar to tank waste in (2) above
5. Dryout basin sludge/mud/trash items and leave in basin -- cover to confine contamination
6. Remove liquid waste from cribs/other holding areas in manner similar to tanks/basins.
7. Dispose of Hanford Site contaminated structural and equipment items by placing in dried-out waste tanks, basins and old process buildings (canyons, reactors), while filling voids with contaminated soil, etc.

3. Reuse of the Hanford Site's Assets

It is apparent that combining the B Reactor Museum, CREHST, and Hanford Reach National Monument efforts, with the upcoming "Hanford Cleanup Monuments" into one overall Hanford Nuclear National Park could result in great savings. Presently our Hanford Site Projects continue to compete for DOE funding and priority which results in increased time, cost and risk.

The total Cleaned-Up Hanford Site would consist of the Cleanup Monuments, with clean roads and lands accessible to the Public. The Cleanup Monuments, B Reactor Museum, CREHST, the Hanford Reach and the FFTF could combine to make up the Hanford Nuclear National Park with all historical aspects preserved. That history would span from initial Hanford construction days to present energy and medical research capability provided by the FFTF Fast Breeder Research Facility. Tourists could visit all these Monuments and Museums to view and hear the overall Hanford Atomic History.

It was bad enough to lose our Hanford Nuclear Power Park when the successful Fast Breeder Reactor Program was terminated in the 1980's. That started with cancellation of the Clinch River Breeder Reactor Plant, then the planned Full Scale Demonstration plants in New England states and our four Fast Breeder Power Production Plants here at Hanford. We could have furnished electrical power to whole Pacific Northwest – possibly even the West Coast! For just bringing Enriched Uranium into the Nuclear Power Park, recycling the spent fast breeder fuel, and processing the radioactive waste (all within the Power Park site!) and sending clean electrical power out of the Park. A series of about 5 or 6 Nuclear Parks across the U.S. could have provided most of our national electrical energy needs – without depending on foreign supplies!

Let's not lose this chance for an Economical Hanford Cleanup and National Monument to preserve the atomic age history at Hanford for our Nation.

Nuclear Energy is good – we just need to deal realistically with processing the radioactive waste products. We can take pride in displaying such a successful and high quality facility as the FFTF, and still use it as an important medical, materials, and energy research tool!

Tuesday, April 26, 2005 America Online: Bogeyandbobby

Commenter # 111

Confederated Tribes and Bands of the Yakama Nation ERWM

Confederated Tribes and Bands
of the Yakama Nation ERWM

Established by the
Treaty of June 9, 1855

August 3, 2011

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Re: Review Comments on the *Proposed Plan for the Remediation of the 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units, DOE/RL-2009-117, Revision 0.*

Dear Mr. Holten:

The Yakama Nation ERWM Program appreciates the opportunity to review and provide comments on the *Proposed Plan for the Remediation of the 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units, DOE/RL-2009-117, Rev 0.*

The Confederated Tribes and Bands of the Yakama Nation is a federally recognized sovereign pursuant of the Treaty of June 9, 1855 made with the United States of America (12Stat. 951). .

There is no issue of greater importance to the Yakama Nation than protection of, and respect for the treaty-reserved rights. The Hanford Site lies within ceded area of the Confederated Tribes & Bands of the Yakama Nation. Within this ceded area, the Yakama Nation retains the rights to natural and cultural resources including but not limited to areas of ancestral use, archaeological sites and burial grounds. These resources are sacred and sensitive to the Yakama Nation, and must be managed to preserve, protect and perpetuate the resources that are inseparable from our way of life. Our concerns were previously identified in our March 2011 letter to DOE on this subject. These concerns remain valid. The ERWM Program identified several areas that have significant concerns.

Mixed Low-Level and Transuranic Mixed Waste Cleanup: Most of the waste sites in the 200-PW-1 and 200-PW-6 OUs have transuranic contaminants (or transuranic constituents) in the soil at various depths. The contaminated soil and debris excavated from these sites that contain alpha-emitting transuranic isotopes with half-lives exceeding 20 years in concentrations that exceed 100 nCi/g require disposal offsite at WIPP. Remedies that may generate transuranic waste must be planned and implemented in coordination with the Hanford Transuranic Waste Certification Program – a step that should be documented during the remedial design phase. The ERWM Program does not support construction of waste storage facilities that are in violation of USDOE Orders or RCRA or CERCLA regulatory obligations and/or will result in long-term/permanent storage of such wastes on the Hanford site. The ERWM Program considers removal of a significant portion to be at least 90% to 96% waste removal. We request USDOE edit RTD options to reflect a more stringent risk level and to define 'remove significant portion' as *removal of at least 90% of waste.* We request all structural and piping components to be similarly remediated along with their associated waste sites.

Sampling and Modeling: Migration of contaminants, including plutonium, from the waste sites to groundwater should be considered and addressed in the proposed plan. Data acquired within the last 5 years indicate that significant plutonium contamination remains within the 200 Area and, in particular, in the vicinity of the 216-Z-9 covered trench. In less than 50 years, plutonium has migrated to depths of approximately one hundred and twenty (120) feet at concentrations that exceed EPA standards for geologic disposal (100 nCi/g). Such data provide strong evidence for the need to include plutonium as a contaminant of concern in the vadose zone and groundwater at these Operable Units (OUs). Moreover, DOE's draft Tank Waste EIS (Appendix U, Table U-2) indicates that plutonium migration in groundwater from the Central Plateau will reach the near shore of the Columbia River at levels more than three times the EPA drinking water limits.

Institutional Controls: The FS makes statements about USDOE retaining institutional controls over these waste sites for 1,000 years (High and Low Salt Waste Sites) and 350 years (Cs-137) Waste Sites), where residual risks would remain above acceptable levels. IC may be feasible in the short-term, but to assume long-term institutional control (over 1000 years) is in conflict with U.S. Nuclear Regulatory Commission regulations in 10 CFR 61.59 which limit reliance upon ICs to 100 years after transfer of radioactive disposal facility property to a new owner.

Cancer Risk: USDOE indicates excess cancer risk is unacceptable if it is greater than the CERCLA risk range of $1x10^{-4}$ to $1x10^{-6}$ and continues on to say cumulative excess lifetime cancer risk from non-radiological carcinogens greater than $1x10^{-5}$. The ERWM Program requests clarification as to why there is not a more stringent cancer risk used for radionuclides given that it is unacceptable to have a risk greater than $1x10^{-5}$ for multiple non-radiological contaminants.

- Proposed RTD Options 3A & 3B: Ecological direct-contact exposure to non-radionuclides is to be evaluated at fifteen (15) feet below ground surface unless Ecology grants permission (in compliance with WAC 173-340 regulations). Neither of these options reflects this requirement nor was a complete baseline risk assessment conducted. Post-ROD confirmatory sampling does not substitute for a complete ecological assessment. Delay of sampling until development of a Work Plan is inconsistent with the CERCLA process which requires a baseline risk assessment (human health and environmental receptors) during the Remedial Investigation phase.

- ELCR of 1 X 10^{-4} is for individual and is presented as EPA's target risk threshold; however EPA uses the general 10^{-4} to 10^{-6} risk range within which the Agency strives to manage risks as a part of a CERCLA cleanup, with a preference for cleanups achieving the more protective end of the range (i.e., the point of departure, 10^{-6}). Human health direct-contact exposure to non-radionuclides within fifteen (15) feet of ground surface risk to multiple carcinogens cannot exceed 1 X 10^{-5} in compliance with WAC 173-340. The more stringent values should be used.
- Table 5: Human Health (Industrial Exposure Scenario) does not include Carbon Tetrachloride, Methylene Chloride, Technetium-99, or Nitrate. We do not support USDOE's use of risk threshold of 10^{-4} for these contaminants.

Summary of Remedial Alternatives (disposal costs): The disposal costs at WIPP and ERDF are listed as $44,000 per cubic meter and $100 per cubic meter, respectively. There is no backup for these unit costs, but it seems that the substantial difference presumably introduces a strong bias to disposing of contaminated material onsite. The basis of the costs should be presented to demonstrate that a reasonable comparison can be made. The Yakama Nation supports disposal of TRU waste at WIPP or a similar offsite, deep disposal facility.

Evaluation of Remedial Alternatives (cost estimates): The cost estimates presented in Tables 7 through 10 are confusing and problematic. In all cases, the O&M costs are discounted to present worth values, which, while typical for FS-level evaluations, are problematic for a 1,000-year assumed time frame for O&M activities. Due to the long time period, costs past 100 years have a net present value near zero. For example, the difference between 100 years and 1,000 years of O&M, assuming an equal annual outlay, is only 5 percent. Conceptually, this introduces a bias into the alternative evaluation process to select long-term "low-cost" alternatives that require essentially no financial commitment beyond 100 years. This characteristic has the tendency to mislead decision makers and the public into selecting an alternative that may in fact be less protective over time (decades and centuries) as the collective memory of the waste location fades and DOE's mission focus shifts elsewhere.

The cost tables are also very difficult to understand. In some cases the total cost is less than the capital cost (see the RTD alternative on Table 7); in other cases the total cost exceeds the capital cost when the O&M cost is zero (see Table 11). The FS reports, where these costs are developed, are not particularly helpful in understanding how the costs were built up. Detailed cost documentation should be provided.

The Yakama Nation ERWM Program looks forward to dialog on these concerns and comments. If you have any questions, please contact me at (509) 945-6741, or Dave Rowland at (509) 582-3466 or (509) 945-4488.

Sincerely,

Russell Jim, Manager
Yakama Nation
ERWM Program

Attachments 1 & 2:

3

cc: Paula Call, U. S. Department of Energy
Ken Niles, Oregon Department of Energy
Gabriel Bohnee, NPT
Stuart Harris, CTUIR
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Dave Rowland, Yakama Nation ERWM
Jean Vanni, Yakama Nation ERWM
John Beckstrom, Yakama Nation ERWM
Marlene Shavehead, Yakama Nation ERWM
Kristian Callahan, Ridolfi Engineering, Inc.
Administrative Record

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Attachment 1: Review Comments on the *Feasibility Study for the Remediation of the 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units, DOE/RL-2009-117, Draft A*

The Yakama Nation ERWM Program identified several areas that have significant concerns.

Characterization: There is considerable uncertainty associated with how sampling and data represents contaminant conditions in the vadose zone. Issues include:

- Assumption of similar and/or maximum future concentration values and lack of quantification and uncertainties in estimations.
- Spatial and temporal difference may have influenced sample bias.
- Plutonium and Americium radionuclides have been located at depths below 37 meters, indicating mobility not clearly defined.
- Limited or no data identified regarding the concentration or distribution of nonradiological contaminants in soils at some waste sites. The quantity of nitrate received some sites suggest it probably contributed in the past, and could have future impacts, to nitrate contamination in the unconfined aquifer.
- It is suggested that, rather than attempt to reduce uncertainties through design of alternatives which include groundwater impact mitigation efforts, efforts should focus on additional post-ROD site-specific vadose zone sampling with adjustments to the selected alternative. This is over-simplistic. Changes to alternatives cannot simply be done using this approach. Should decisions regarding whether the soil is protective of groundwater require changes be made to the chosen remedy, is USDOE going to follow the CERCLA modification process with an ESD or ROD amendment? Both would require Tribal/public review opportunities. The ERWM Program requests clarification on this issue.
- Sampling and Modeling: Generally stated, there appears to be a reliance on professional judgments to decide on the need for action that will be refined with additional characterization (confirmatory sampling) activities planned during remedial design and implementation of chosen alternative. Additional post-ROD sampling for mobile contaminants is suggested to improve the approximations of the distribution of these contaminants in the vadose zone and to improve estimates of the potential threat to groundwater.
    - Use of the 'analogous site' approach is only appropriate when the representative sites have been thoroughly characterized. Admittedly, the 216-Z-9 Trench did not have complete sampling.

To reduce uncertainties regarding the long-term reliability of management controls (including ICs) for providing continued protection from residuals, the ERWM Program requests USDOE perform necessary soil sampling within this Feasibility Study's activities.

The ERWM Program requests USDOE conduct sampling at waste sites where none were done and that analysis include Technetium-99, nitrate, PCBs, boron, mercury, TCE, hexavalent chromium as well as carbon tetrachloride and methylene chloride.

Groundwater: The RI and FS evaluations concluded that the majority of the waste sites pose a current or potential risk to human health and the environment (plants, animals, or groundwater) via direct contact or contaminant migration into the underlying groundwater from

unrestricted land use. The National Contingency Plan expectation for groundwater is that usable groundwater will be returned to the highest beneficial use (i.e., drinking water) "...wherever practicable, within a timeframe that is reasonable given the particular circumstances of the site" (40 CFR 300.430[a][1][iii][F]).

- It was stated that the majority of sampling and data uncertainties stem from the estimation of source term amounts, from sparse data, difficulties in understanding contaminant release/retention in the vadose zone, and/or data bias resulting from the tendency for preferential sampling of the more contaminated portions of contaminant plumes and associated sampling and measurement frequency bias.
- Statements are made that some remediation of some contaminates (i.e. Nitrate and Technetium-99) will be addressed under the Deep Vadose Zone OU, 200-DV-1.
- Clarification needed as to why soil concentration value for Carbon Tetrachloride (.0031 mg/kg) was not used in place of less stringent groundwater values of 3.4ug/L.
- Borehole C3427 (DOE/RL-2006-51, 2007, Rev. 0) was drilled adjacent to the 216-Z-9 covered trench from February to May of 2006. At the time of construction, a maximum concentration of 254,000 pCi/g plutonium-239/240 was measured in Borehole C3427 at a depth of seventy (70) to seventy-two (72) feet below the ground surface. In less than fifty (50) years, plutonium has migrated to depths of approximately one hundred and twenty (120) feet at concentrations that exceed EPA standards for geologic disposal (100 nCi/g). Such data provide strong evidence for the need to include plutonium as a contaminant of concern in the vadose zone and groundwater at these Operable Units (OUs).

The ERWM Program requests USDOE perform additional groundwater site-specific sampling on the 200-PW-1, -3, -6, and 200-CW-5 waste sites under current Feasibility Study actions. Additionally, as filtered data for metals potentially underestimates the concentrations present in the groundwater, the ERWM Program requests USDOE perform unfiltered groundwater sampling to reflect a more accurate risk assessment.

The ERWM Program does not support deferral of remediation of contaminates to the Deep Vadose Zone OU. We request USDOE include remediation of all contaminates associated with the 200-PW-1, -3, and -6 OUs within the same decision document (DOE/RL-2009-117, Draft A).

We reiterate our concern that USDOE still lacks a comprehensive, integrated approach to the vadose zone. We believe that USDOE should perform interim and concurrent actions concerning the groundwater and the vadose zone to ensure that the cleanup of the source sites reduces risks to levels that are protective of Tribal subsistence uses without relying on long-term stewardship and permanent institutional controls.

We reiterate our recommendation that USDOE consider the following in developing a systematic approach to vadose zone cleanup:

- Potential future impacts from the deep vadose zone to groundwater and to the confined aquifer in 200 areas
- Use of more publically available and advanced models for doing modeling to determine potential level of risk to human health and the environment.
- Pursue an independent review of treatability technologies to apply to the deep vadose zone contamination problem.

- DOE should ensure that sufficient and additional funding is directed to address the vadose zone contamination problem.

  Human Health Risk: Risks to Native American populations from both soil and groundwater exposure indicates exceedances. Results indicate Yakama Nation non-cancer hazards would remain above 1HQ for the tap water and produce pathways due to hexavalent chromium and TCE, and risks would remain above 10^{-4} for the produce pathway due to technetium-99.
- The contaminant of potential concern list is too limited, and requires further explanation as to the process for how they were selected.
- Native American exposure scenarios should be applied to the development of Preliminary Remediation Goals (PRGs). The proposed plan provides no indication that Native Americans are factored into the decision-making process.
- Irrigation should be included in the evaluation, as the irrigation scenario will affect contamination in soil and groundwater beneath the waste sites.
- Particulate inhalation and dermal contact should be included for the soil pathway, not just ingestion.
- 100% risk to the Yakama Nation from waste sites, soils, and groundwater, is unacceptable and should be addressed in the proposed plan. Appendix G, Native American Human Health Risk Assessment, from the Feasibility Study for the 200 Area Process Water (DOE/RL-2007-27, Draft C) concluded (page G-vii) that *"Risks to Native American populations are at the maximum risk possible (approaching 1, or 100 percent), indicating that exposures to soil at the two waste sites and groundwater beneath the waste sites represent a significant risk should they occur in the future."*

  Cancer Risk: USDOE indicates excess cancer risk is unacceptable if it is greater than the CERCLA risk range of $1x10^{-4}$ to $1x10^{-6}$ and continues on to say cumulative excess lifetime cancer risk from non-radiological carcinogens greater than $1x10^{-5}$. Why isn't there a more stringent CERCLA cancer risk value for radiological contaminants given that it is unacceptable to have a risk greater than $1x10^{-5}$ for total excess cancer risks for non-radiological contaminants?

- Proposed RTD Options 3A & 3B: Ecological direct-contact exposure to non-radionuclides is evaluated at 15 ft below ground surface unless Ecology grants permission (in compliance with WAC 173-340 regulations). Neither of these options reflects this requirement nor was a complete baseline risk assessment conducted. Post-ROD confirmatory sampling does not substitute for a complete ecological assessment. Delay until development of a Work Plan is inconsistent with the CERCLA process.
- ELCR of $1 X 10^{-4}$ is for individual and is presented as EPA's target risk threshold; however EPA uses the general 10^{-4} to 10^{-6} risk range within which the Agency strives to manage risks as a part of a CERCLA cleanup, with a preference for cleanups achieving the more protective end of the range (i.e., the point of departure, 10^{-6}). Human health direct-contact exposure to non-radionuclides within fifteen (15) feet of ground surface cumulative risk to carcinogens cannot exceed 10^{-6} in compliance with WAC 173-340. The more stringent values should be used.

  The ERWM Program disagrees with the statement that there are no significant differences in risks or hazards between the subsistence farmer and the two Native American exposure scenarios. They have unique exposure pathways and exposure rates, and much higher risks (as shown in DOE/RL-2007-27, Draft C, Appendix G). Furthermore we disagree with the statement

'Although not quantified, future concentration reductions will be significant for all contaminants due to the planned groundwater remediation activities.'

A disconnect appears between industrial worker and future subsistence farmer scenario exposure durations. Text states industrial worker scenario long-term duration is from 25-70 years and future subsistence farmer scenario occurs in 150 years. The ERWM Program requests USDOE recalculated future subsistence farmer scenario risks as occurring in 50 years. Include the inhalation pathway along with direct contact and ingestion.

Ecological Risk: The Executive Summary states that there is no identified or projected ecological risk. Other text states a screening level ecological risk assessment (SLERA) ruled out further consideration of sites with regard to ecological risk potential; therefore no final COPCs were identified by the ecological risk assessment process. Yet, discussion in Section 3.3 states ecological exposures are likely present at twelve of the sixteen waste sites.

- The working hypothesis for the purposes of the SLERA is that biological activity at these 200-PW-1, -3, and -6 waste sites are limited largely to the top eight (8) to ten (10) feet. This is an erroneous assumption. We do not agree that the biologically active zone is limited to ten (10) feet below ground surface or to an alternate point of compliance for protection of human health or the environment. Ecological direct-contact exposure to non-radionuclides is to be evaluated at fifteen (15) feet below ground surface unless Ecology grants permission (in compliance with WAC 173-340 regulations).
- Statements are made that at least one of the remedial alternatives would address contaminants potentially posing a threat to ecological receptors (i.e., RTD of soils to a depth of 4.6 meters [15feet] for protection of human health or groundwater) and that demonstration that remediation will also protect ecological receptors will be addressed as a part of the remedial design/remedial actions post-ROD. Unless USDOE intends to RTD soils to at least fifteen (15) feet at each waste site, this assumption is invalid.
- Furthermore, delay of sampling until development of a Work Plan is inconsistent with the CERCLA process which requires a baseline risk assessment (human health and ecological receptors) during the Remedial Investigation phase. Identifying ecological screening values or preliminary remediation goals (PRGs) in the Work Plan is unacceptable.
- We also request USDOE clarify the decision-making process and what is the screening level for Tc-99.

The ERWM Program requests USDOE perform a complete ecological risk assessment, identify all pathways, and characterize current and potential threats to the environment and ecological receptors, and include results in this Feasibility Study. Consider animals consuming contaminated plants in the assessment. Note Federal maximum contaminant levels (MCLs) are NOT risk levels. Although an evaluation of how MCLs compare to risk levels can be made (and MCLs may be used for screening) they are not the same as risk levels.

Cost Analysis: Costs are not fully represented. Several proposed alternatives will include post-ROD sampling activities. These costs are not included. Uncertainty regarding the extent of contamination at each waste site is so high; impact is expected to affect both costs and duration of remedial alternatives. The ERWM Program requests USDOE revise cost analysis to include sampling activity costs where alternatives state they would be required. We would like to see a realistic life-cycle cost analysis (1000 years) which includes IC failures.

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Remedial Alternatives: Statements that implementation of remedy(s) will require careful planning due to waste site location or infer that some technologies will have additional implementability issues is mute. Please provide just the facts. Issues of concern include:

- Use of terminology of *'remove significant portion of plutonium based on an evaluation of soil contaminant concentration with depth'* is misleading. It appears that USDOE has decided removal of a significant portion can be only 51% waste removal.
- Piping components are presented as separate waste site groups.
- None of the RTD options presented clearly identifies excavation depths to meet requirement of no cumulative excess lifetime cancer risk from multiple non-radiological carcinogens greater than $1x10^{-5}$ risk levels.
- Transuranic Waste Cleanup: We note that the SVE system would continue to operate at present waste sites containing transuranic wastes (216-Z-1A Tile Field, 216-Z-9 Trench, and 216-Z-18 Crib) yet RTD activities would not commence until after completion of SVE.
- Preliminary Remediation Goals: It is not adequate to calculate PRGs based only an industrial worker exposure scenario. PRGs should also be determined for Native American and other residential scenarios to properly factor these groups into the decision-making process.
- What is an individual HQ? Does that refer to an individual species, contaminant, etc.?
- It is not clear when screening or background concentrations are used; these may be very different values. Clarify the usage and be explicit about the uncertainty associated with selecting these values.
- The calculation of PRGs is inadequate. It is not appropriate that certain contaminants are not calculated / presented (Table 5) because they were either not detected, not above screening levels, or did not exceed EPA's less-protective target risk threshold of 10^{-4} for the subsistence farmer scenario because:
    - This does not represent (and therefore) protect Native Americans.
    - Some contaminants were not even evaluated at certain sites.
    - It is not clear whether detection limits were below screening levels.

The ERWM Program considers removal of a significant portion to be at least 90% to 96% waste removal. We request USDOE edit RTD options to reflect a more stringent risk level and to define 'remove significant portion' as *removal of at least 90% of waste.* We request all structural and piping components to be similarly remediated along with their associated waste sites. Additionally, we request USDOE use an observational approach to sampling and removal contaminated soils with greater than a 10^{-6} risk level for individual hazardous substances.

It is not acceptable to the ERWM Program that RDT activities would not commence until after completion of SVE as this could jeopardize completion of the M-16 milestone requirements.

The preferred alternatives for this feasibility study should place little or no reliance on evapotranspiration barriers or institutional controls for long term protection. In some instances, barrier components would include impossible to replace components (i.e., physical concrete component). It is unclear how there can be any reliance on the long-term effectiveness and performance of maintaining an alternative which requires institutional controls for a thousand 1000 years. The five (5) year CERCLA reviews should be conducted to evaluate the effectiveness of the remedy selected not simply to evaluate the need for continued ICs as implied.

The ERWM Program requests any future land use decisions will need to assume that the Yakama Nation ERWM will exercise its treaty rights on the land.

NEPA Evaluation: The Feasibility Study for the 200- PW- 1, -3, -6 waste sites for which this evaluation was performed is incomplete. Whether there are significant impacts remains questionable. The ERWM Program does not believe sections 6.6.2.3 *Natural, Cultural, and Historical Resources* and 6.6.2.7 *Irreversible and Irretrievable Commitment of Resources* have adequately met the NHPA (and other Acts) or NEPA requirements. There is no discussion provided in previous sections which detail how compliance with ARARs will be met or source of backfill soils. The ERWM Program requests USDOE prepare an Environmental Assessment on these actions to assist decision-making.

Waste Groups Specific Comments:

216-Z-Ditches Waste Group: The ERWM Program requests the preferred alternative be RTD of all shallow zone contaminated soils. We support and encourage USDOE to dig below fifteen (15) feet in places where deeper excavation completely or nearly eliminates (90% or more) of waste site residuals by removing them.
216-Z-1D Ditch (Northern Portion): Our review of the *Feasibility Study for the 200-CW-5 Cooling Water Operable Unit*-DOE/RL-2004-24, Draft C, REISSUE, found high values near the northern head wall of the ditches which may indicate that Plutonium metal particles were included in one or more of the area's accidental releases. Figure 6-2 from the Feasibility Study (DOE/RL-2004-24, REV 0), shows a significant quantity of plutonium and/or americium at the north end of the Z-Ditches. The remedy should include these soils in the RTD remedy. The plutonium and americium concentrations shown on the figure indicate that this material should be transported to WIPP for disposal as TRU waste. Figure 6-2 also summarizes sample results that exceed the ERDF disposal criteria of 100 nCi/g, and reference "statistical outliers" that are orders of magnitude above the ERDF criteria. Rather than dismiss these sample results as outliers, DOE should resample these areas to investigate the nature and extent of the highly contaminated material. Additionally, Figure 2-4 in the FS (DOE/RL-2004-24, REV 0) shows borehole C3808 and describes releases that may have traveled vertically to the Cold Creek unit and moved laterally on that unit. The nature and extent of such contamination should be further evaluated so that an appropriate remedy can be developed.

The proposed No Action alternative for this portion of the 216-Z Ditches does not support unrestricted use and unlimited exposure; IC would be required to ensure this. Combine this with concerns regarding the incompleteness of chemical contaminate data and USDOE's stated need for confirmatory sampling, the ERWM Program requests the preferred alternative be RTD of all shallow contaminated soils should confirmatory sampling indicate exceedances of industrial cleanup levels.

Remediation of the U-Pond is unclear. The ERWM Program requests clarification. The ERWM Program requests RTD of shallow zone contaminated soils. We support and encourage USDOE to dig below fifteen (15) feet in places where deeper excavation completely or nearly eliminates (90% or more) of waste site residuals by removing them.

Cesium-137 Waste Group: The USDOE preferred alternative, is a modified barrier as the remedy for the Cesium-137 waste sites, leaving contamination in place. The ERWM Program does not

support this alternative The ERWM Program requests the preferred alternative be RTD of all shallow contaminated soils. We support and encourage USDOE to dig below fifteen (15) feet in places where deeper excavation completely or nearly eliminates (90% or more) of waste site residuals by removing them.

High-Salt Waste Group: The USDOE preferred alternative is RTD Option A, removal of the highest concentration of contaminated soils two (2) feet below the base of the waste site and a barrier. Characterization information presented in DOE/RL-2007-27, DRAFT C indicates excavation of the 'mass' source of long-lived radionuclide wastes to a depth of forty (40) feet removes approximately ninety-six (96) percent of wastes. The ERWM Program requests the RTD Option 3C-removal (to at least forty (40) feet below ground surface) of contaminated soils. We anticipate removal of structures associated with these waste sites, placement of an appropriately designed soil barrier, and continuation, as needed, of the SVE system will be included in this option.

Low-Salt Waste Group: The USDOE preferred alternative is RTD Option C, which removes a significant portion of plutonium contamination, two (2) feet beyond that for Option A.

No soil characterization was performed for some of the cribs. Given this uncertainty, the ERWM Program does not support this alternative. We request the preferred alternative is Option 3C with modification, i.e., removal to at least forty (40) feet below ground surface of contaminated soils. We request USDOE conduct soil sampling within the crib boundaries to identify the type, concentration and extent of the contaminants. We anticipate removal of structures associated with these waste sites, placement of an appropriately designed soil barrier, and as needed, a SVE system will be included in this option.

Settling Tanks Waste Group: Investigation information identified no significant contamination in the soil column, suggesting that no leaks occurred. However, this remains uncertain. The preferred alternative only removes contaminated tank contents but would require long-term IC to prevent intrusions. The ERWM Program does not support any actions (i.e. tank stabilization) which preclude decontamination and removal of tanks on the Hanford Facility. The ERWM Program supports characterization and removal of tank contents and its disposal either at WIPP or in ERDF. We request subsequent tank(s) removal(s) (including associated tank systems equipment) with soil sampling beneath the tanks to confirm no leaks.

Other Waste Sites Group: Although there are no direct measurements of plutonium concentrations available, the 216-Z-10 Injection/Reverse Well received significant amounts of plutonium containing liquids. The 216-Z-8 French Drain received several magnitudes less volume of plutonium. Characterization data indicates the transuranic constituents are located within sixteen (16) feet of the bottom of the drain structure. The preferred No Action Alternative ignores requirements that the implementations of remedies that eliminate, reduce, or control the risks to human health and the environment. The ERWM Program requests removal, treatment, and disposal of the 216-Z-8 French Drain and associated structures and pipeline. The ERWM Program recommends further technical evaluations of reverse well closure alternatives and plutonium stabilization (e.g. jet grouting)

Attachment 2: Yakama Nation Comments on the *Native American Human Health Risk Assessment* for the 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units (Appendix G of DOE/RL-2007-27 Revision 0, Feasibility Study, as cited in DOE/RL-2009-117 Revision 0, Proposed Plan)

As part of the Yakama Nation's review of the *Proposed Plan for the Remediation of the 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units* (DOE/RL-2009-117 Revision 0), the Yakama Nation reviewed the *Feasibility Study for the Plutonium/Organic-Rich Process Condensate/Process Waste Group Operable Unit* (DOE/RL-2007-27, Draft C) Appendix G, which is the *Native American Human Health Risk Assessment*, and offers the following comments. These issues ultimately affect conclusions made in the Feasibility Study, which are carried forward into the Proposed Plan (DOE/RL-2009-117 Revision 0).

GENERAL COMMENTS

1. The assumption that the target risk level (10^{-4}) is the only important factor to be derived from a risk assessment is misleading. To fully inform decision makers, it is important to characterize risks for all users, including Native Americans and the general public, from all chemicals, all pathways, and all routes of exposure in a clear and transparent manner. The authors conclude that eliminating contaminants from the risk assessment would not change the "risk assessment conclusions." This is not entirely appropriate since preliminary remedial goals will be set for clean up based on cumulative chemical exposure from all pathways. These chemicals may be in areas that do not include the "risk drivers." The authors are making risk management decisions which should not be included in the baseline risk assessment.

2. Native American risks are not just a reflection of exposures. The risks to Native Americans from contamination and physical disturbances as a result of hazardous substances at the Hanford Site include lifestyle losses that may not be quantified. This is not a "hypothetical" Native American population. DOE was provided data on tribal lifeways that are specific to the Yakama Nation. The statement that "cleanup concentration goals and decisions will not be based on potential Native American future exposure, consistent with the current industrial nature of the site" should be deleted. The statement reflects a risk management decision and not appropriate for the risk assessment.

3. The use of subjective and value-laden language in describing the risk estimates is misleading and misrepresents the state of knowledge regarding risks to Native American populations from exposure to contaminants at the Hanford Site. When there is little knowledge of the processes being assessed, risk assessors cannot state whether risks have been over- or underestimated. The risk assessors should discuss the relative merits of each of the assumptions and parameters with a qualitative or quantitative statement of confidence in the measured or modeled value.

   The risks for Native American exposures are estimated to exceed 1/100 or 0.01 probability. These high risks that are projected for the Native American exposures require the risk assessor to use an alternative model. The linear multistage model that is normally used for estimating carcinogenic risks is not appropriate for risks that exceed

a probability of 0.01. The authors of this assessment paraphrase the EPA guidance incorrectly. They should quote the exact language from the guidance:

> "However, this linear equation is valid only at low risk levels (i.e., below estimated risks of 0.01). For sites where chemical intakes might be high (i.e., risk above 0.01), an alternate calculation equation should be used. The one-hit equation, which is consistent with the linear low-dose model ... should be used instead" (*Risk Assessment Guidance for Superfund Volume1 Human Health Evaluation Manual (Part A): Interim Final* [EPA/540/1-89/002]).

4. The outcome of a risk assessment is strongly influenced by the site characterization. In this case the weaknesses in the site characterization greatly exceed the uncertainties in the Native American data on exposure patterns. Some of the weaknesses in site characterization, discussed below, are:

   - Selection of Chemicals of Concern
   - High detection limits
   - Inadequate sampling and data analysis of soil (and soil gas)
   - Inadequate sampling and analysis of groundwater
   - Elimination of exposure pathways without adequate documentation

   Selection of Chemicals of Concern. The authors acknowledge that the screening methodology used to select chemicals of concern may not have been adequately protective for Native American exposures. Certain chemicals may have been eliminated from the risk assessments that are relevant to Native American exposures.

   a. Discussions in the uncertainty section do not include the list of chemicals that were eliminated. Therefore, it is not possible to ascertain the impact on the risks to Native Americans from these additional exposures. The authors state that "safety factors" in the screening criteria should protect Native Americans. However, this is not known. These factors were included to address limitations in toxicity or exposure but not with respect to alternative scenarios. The authors should have calculated screening factors with the Native American exposures that were provided to them. They could then state with some certainty what chemicals were eliminated that may be relevant to risks to Tribal members.

   b. All groundwater target levels should be risk-based. Use of MCLs, other regulatory limits, or proposed cleanup levels is not appropriate for risk assessment. MCLs and/or MTCA cleanup levels are not appropriate for screening in the risk assessment. Risk-based screening levels should be used for screening.

   c. Background concentrations should not be used for screening out contaminants. All contaminants should be evaluated in the risk assessment. The discussion of appropriate actions relevant to background concentrations may be discussed in the uncertainty section and in the RI/FS.

High detection limits. Detection limits should have been based on risk-based screening values for exposure. Thus, they would have been designed to assure that the measured concentrations were adequate for estimating risks.

Inadequate sampling and data analysis of soil and soil gas. Sampling is inadequate because of biased soil sampling, the lack of soil gas data, and incomplete vapor migration considerations.

a. Biased soil sampling: Risk estimates were based on small areas specific to operations or perhaps clean up decisions; however they do not address the likely exposure that should be considered in a baseline risk assessment. Stating that soil sampling locations were biased is a true statement. However, the conjecture that health risks have not been underestimated is misleading. The contaminant distribution will vary depending on a number of factors, including but not limited to known sources.

   The authors state that "selected waste sites were too small to support significant amounts of wild game or plants..." Thus, they acknowledge the weakness in the risk estimates for populations that may inhabit this site (people, animals, or plants). Tribal people do not rely on small management units for their quality of life. They rely on the natural habitats that will remain after this site is "cleaned up." These site boundaries are not realistic for evaluating ecological or human health risks. A site-wide cumulative assessment is more appropriate. Thus, the risk estimates do not provide an accurate assessment of risks to Native peoples or anyone who may move about this site. Without addressing all of waste sites with broad area exposure point concentrations, this is not a complete assessment. Cleanup levels cannot be set for areas where samples were not collected. This risk assessment is not an assessment of Native American peoples since it was limited to small management units.

   Since shallow soil characterization was limited, it is not clear whether data showed lower concentrations in the surface soils, or the assumption was made that surface soils had "not been impacted," or the assumption was made due to early removal of contaminated surface soil. Please explain how you interpolate samples for depths that were not sampled. Explain why the excavated soil concentrations were modified by mixing. Use the soil concentration at maximum exposure since this provides the best estimate of how much needs to be treated.

b. The lack of soil gas data is a serious weakness in the risk assessment. This would suggest that risks may be underestimated for Native Americans who may inhabit this site.

c. The vapor migration section is very confusing. There is a soil vapor extraction system operating, so there must have been significant concentrations that needed to be removed or reduced. If a soil vapor extraction system has been operating, how were the operating parameters determined for the extraction

system? How is the vapor extraction system operating without determining a level of protection?
How did you calculate the vaporization rate for non-volatile contaminants? This is inconsistent with previous discussions of the difficulty of calculating the vaporization rate

Inadequate sampling and analysis of groundwater. The authors state that the groundwater data are robust because of the number of samples. However, they do not address the sample locations, sample frequency, quality of wells, and other factors that affect the groundwater measurements.

Using filtered data for groundwater is a major weakness in the risk assessment. The estimates of risk for people who drink the water cannot exclude chemicals that may adhere to particulate matter. Thus, the risk assessors cannot state that the risks are overestimated for the drinking water pathway.

The exposure point concentration for groundwater is expressed as a percentile rather than the 95% upper confidence limit (UCL). The data should have been characterized with the 95% UCL estimate. The percentiles may be used to illustrate the variability in the data, but they are not the appropriate measure for risk assessment.

Elimination of exposure pathways without adequate documentation. The risk assessors determined that certain exposure pathways were insignificant (e.g., irrigation, dust inhalation, inhalation during showering). However, there are no data or evidence to support this conclusion. Unless there is supporting documentation, all pathways should have been included in the risk assessment.

There is uncertainty in the risk estimate based on exposure to contaminants during sweatlodge activity. Discuss the relative merits of each of the assumptions and parameters with a qualitative or quantitative measure of confidence in the measured or modeled value. When you have little knowledge of the processes that you are assessing, you cannot state whether you have over- or underestimated the risks. If you specifically exclude a pathway (e.g., non-volatile inhalation) you may be underestimating risks.

5. A presumption of remediation is not appropriate for a baseline risk assessment. Importantly:

    a. Institutional controls are not a remedy and should not be referenced in a baseline risk assessment (according to EPA's definition of baseline risk).

    b. Natural degradation is not a remedy. Remediation should not be discussed in the baseline risk assessment. The assumption that groundwater will be treated and, therefore, the risks will be reduced is not appropriate. Eventually, remedial actions will ultimately reduce risks from all possible pathways. Groundwater should not be treated any differently than other pathways in the baseline risk assessment. The purpose of a baseline risk assessment is to provide decision makers and the public with information

regarding risks from exposure to contaminants at the site under current and future non-remediated conditions.

SPECIFIC COMMENTS

1. Page G-v, lines 2-5. Explain the in detail how soil gas data were evaluated "semi-quantitatively".
   "In addition to soil data, screening-level soil gas data collected from the subsurface of the 216-Z-1A Tile Field were evaluated semi-quantitatively ...."

2. Page G-vi, lines 6-7 and Page G-20, lines 38-40. Explain "minimally exposed" related to native plants and animals. The site should be assumed to be open to residential exposures throughout the contaminated areas. This restriction to "minimal exposure" is not consistent with the presence of contamination.
   "...were assumed to be minimally exposed...."

3. Page G-xiii, lines 17-26. This statement regarding the need to use an alternative model to estimate risks from exposure to carcinogens at very high doses is very important. It is also illustrates the extremely high exposures that Native Americans may experience at this site.

4. Page G-11, lines 42-43. Describe and give the reference for the uranium "health-based levels" that were compared to concentrations detected in groundwater.
   "...radioactive isotopes of uranium have either not been detected in recent groundwater monitoring rounds or have been detected at concentrations well below health-based levels..."

5. Page G-20, lines 3-4. Describe in detail the assumptions and parameters that were used to model the groundwater plumes that may reach the Columbia River.
   "...conservative modeling indicates that groundwater plumes may reach the Columbia River in 75 years..."

6. Page G-20, lines 12-13. The size of the site cannot act as a buffer. Contamination may spread to the edge and beyond the Hanford facility, such as into the Columbia River.
   "The large overall size of the Hanford Site...provides a buffer..."

7. Page G-21, line 41. Give the justification for using Oregon and Alaska State documents (ODEQ 2000 and ADEC 2005) as references for surface soil horizons.

8. Page G-23 lines 22-23. Describe the evidence supporting the conclusion that cattle would not be exposed to contaminated soil.
   "...cattle are not pastured on impacted soil but do eat fodder that has been watered with groundwater."

9. Page G-27 lines 17-18. Regarding use of half the MRL for non-detects, what about the previous discussion of the model for estimating non-detects provided on Page G-24? Connect the two discussions.

10. Page G-30, lines 34-35. Expand on the concept of Henry's Law not holding true to a sweatlodge, including an explanation of the assumptions that are needed for calculating the vaporization rate for non-volatile chemicals.
    "...Henry's Law approach does not hold true in a sweatlodge. A large portion of the humidity is likely due to aerosols."

11. Page G-31, lines 40-42. The data for this exposure scenario were provided by the Yakama Nation based on the survey of their people. You cannot dispute this value in this Native American risk assessment.
    "...7 hours/day does not appear to be a reasonable maximum over a 70-year exposure time, but more likely represents more of a worst-case value."

12. Page G-32, lines 32-33. Since there was no percentage given for the fraction of fruits and vegetables from the site, it is more appropriate to create a range, whereby an understanding of the affect of 100% vs. 50% could be described; 50% is probably too low.

13. Page G-33, lines 1-7. Since the CTUIR did not report a fraction of beef ingestion from the site; a range of rates should be used to reflect uncertainty.

14. Page G-93, lines 15-25. Define "conservative." The terminology used to describe the uncertainty in the risk estimates is confusing. The "type I error" is usually discussed when describing statistical inferences.

15. Page G-94 line 2-3. The authors assume the data from 1992 and 1993 are adequate for a risk assessment in 2010. Explain the uncertainty in the sampling and analytical methods employed during the 1992 and 1993 sampling events.

16. Page G-94 line 6. Sampling just for "known sources of constituents" limits the adequacy of the data. There may be break-down products or other compounds that were used at the site. It is important to do a full characterization of all possible contaminants (e.g., contract lab priority pollutants).

17. Page G-95 lines 1-3. One detected value in a small sample size is significant. Aroclor and thorium data cannot be excluded from the risk estimates.
    "...would not significantly change the cumulative risk totals."
    "... the total sample numbers are only 10 and 4..."

18. Page G-103 lines 28-29. Describe the data that exceed the 90th percentile. The risk estimates are not complete without addressing these high end values.
    "Because only 10 percent of the data exceed the 90th percentile values, these very high concentrations are few and represent a very limited areal extent."

19. Page G-104, lines 31-32. The statement that "...the greater the UFs and tendency to overestimate the toxicity..." is misleading. Uncertainty factors are designed to recognize a lack of knowledge or variability in toxicity estimates. They are not designed as an overestimate of toxicity. The guidance states:

> These uncertainty factors take into account the variability and uncertainty that are reflected in possible differences between test animals and humans (generally 10-fold or 10x) and variability within the human population (generally another 10x); the UFs are multiplied together: 10 x 10 = 100x. If a LOAEL is used, another uncertainty factor, generally 10x, is also used. In the absence of key toxicity data (duration or key effects), an extra uncertainty factor(s) may also be employed (EPA, IRIS).

20. Page G-105, lines 3-5. Provide the complete references for Health Canada and the Netherlands.
    "...through a genotoxic mechanism (e.g., Health Canada and the Netherlands)."

21. Page G-106, lines 32-34. The risk assessment is not a decision-maker. This decision should have been vetted through EPA since the authors are deviating from the EPA recommended value. The assessment should include estimates with CalEPA and EPA recommended values.
    "because of the criticisms that the health assessment document has received, this risk assessment has selected the CalEPA SF values as more appropriate..."

22. Page G-109, line 41. This paragraph should be deleted: *"...a third consideration regarding large dose estimates is the effect of multiple contaminants..."* It is judgmental and not based on an objective review of the uncertainty of multiple chemical exposures. There is justification for summing chemicals with similar mechanisms of action or disease outcomes, such as carcinogenesis and neurotoxicity (EPA/630/R-00/002August 2000 Supplementary Guidance for Conducting Health Risk Assessment of Chemical Mixtures).

23. Page G-129, line 32. Explain in detail how the list of chemicals derived in the Remedial Investigation was refined in the risk assessment.
    "The risk assessment refined the RI list using only the last 5 years of data (2001 through 2005) to represent current conditions..."

Commenter #112
Deb Muhlbeier

Comment:
I urge the EPA and WA Ecology to insist on the plutonium and cesium be dug up and removed at all sites and be sent to a geologic repository site.

Commenter #113
Heather Flanagan

Comment:
Thank you for extending the comment period regarding the Hanford Liquid Waste cleanup requirements. I have read through the issues, and very much support the following thoughts:

- Plutonium, Cesium and other radioactive and chemical wastes should be dug up at ALL sites, digging down 40 or more feet where needed to meet standards to protect both groundwater and future excavation exposure - not left under a shallow (2-15 feet) dirt cover.
- The EPA needs to apply a Plutonium soil cleanup standard equal to the one USDOE has to meet at its Lawrence Livermore Lab (2pCi/gm, and 10 pCi/gm where future use is proposed to be industrial) and Johnson Atoll cleanups. Those standards are 1,000 times lower than USDOE proposed guidance or goal for Hanford's Central Plateau (2,900 pCi/gm).
- Soil cleanup standards to protect ground water should be applied for PCBs, and all other radioactive and chemical contaminants.
- The dug up Plutonium should all go to a deep underground repository, not reburied in a shallow landfill at Hanford.

With all due respect, I do not believe the USDOE can prevent any non-industrial use and all excavation activity in the core area of Hanford's Central Plateau for the extended period of time necessary.

Commenter #114
Robert Watkins

Comment:
I attended the public meeting in Richland on the Proposed Plan for Remediation of Waste Sites in Hanford's Central Plateau, and have the following comment:

I disagree with the selection of "Option A" as the preferred alternative for remediation of the High Salt Waste Group (216-Z-1A Tile Field). Option A proposes to excavate only to a depth of 20 feet below ground, or 2 feet below the bottom of the tile field. As shown on one of the backup slides from the public meeting, excavation to this depth will only remove about 51% of the Plutonium inventory in the soil. Extending the excavation by only another 6 feet (26 feet below ground) would remove 90% of the PU contamination. I urge DOE to consider going at least another 6 feet deeper in order to cleanup an additional 40% of the contamination.

I realize this is a difficult decision as to where to "draw the line". Some people would argue to go deeper yet and remove 95% of the Pu, or even 99%, but the depth increases rapidly for each additional percentage after you pass the "knuckle" of the curve at about 26 feet. The incremental cost of going 6 feet deeper is relatively small compared to the base cost of excavating the waste site to 20 feet. This extra depth could probably be removed using small backhoes, without removing additional overburden.

This same argument may be applicable to other waste sites in the Central Plateau, but I do not have the other contamination distribution curves by depth for comparison. If the same situation does exist for other preferred alternatives, I urge DOE to reconsider the proposed final depths of these excavations also. The amount of contamination to be removed by excavation should be optimized for each waste site, as balanced with the cost of going deeper.

In general, I agree with the remediation alternatives proposed. I simply wish to increase the amount of contamination that could be removed at a small additional cost.

Commenter #115
Hanford Advisory Board

Comment:

Dear Messrs. Samuelson, McCormick and Faulk,

Background

The draft "Proposed Plan for the Remediation of the 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units" (Draft Plan) discusses the proposed remediation of 22 waste sites within the 200 Area of the Central Plateau. The 200-PW-3 Operable Unit (Cesium Sites) includes four Plutonium Uranium Extraction Plant cribs and one unplanned release, all containing primarily cesium-137 in the 200 East Area. The remaining 17 waste sites (PW-1, PW-6) are cribs, ditches, and other miscellaneous release sites associated with the plutonium recovery activities in the 200 West Area. The nature and extent of the nitrate plume and technetium-99 contamination is not understood.

The Hanford Advisory Board (Board) adopted Advice #207 outlining criteria for development of this Draft Plan. The Board's commitment to the values, considerations and criteria in that advice is unchanged.

The Draft Plan proposes to cover the cesium waste sites in 200-PW-3 with additional soil to achieve a 15-foot thick "cap" thought to be protective of human health for 300-400 years of institutional control. The Board disagrees with this solution. Use of the Remove/Treat/Dispose (RTD) approach for this waste is consistent with the Board's Central Plateau Remedial Action Values Flowsheet (Advice #173).

In the case of the five Cesium Sites, most of the cesium-137 appears to be accessible within the top 15 feet of the disposal site, which would make these sites a good candidate for RTD. The configuration of these waste sites provides an excellent opportunity to remove the clean top soil in order to access the concentrated layer of radionuclides.

In addition, the Draft Plan proposes to apply the RTD approach to the Z ditches in the 200 West Area by mixing clean top soil with lower layers of soil containing concentrated plutonium (blending) to qualify for disposal at the Environmental Restoration Disposal Facility (ERDF), rather than the Waste Isolation Pilot Plant (WIPP). The Board strongly disagrees with this approach.

In Advice #207, the Board specifically advised sending as much plutonium to WIPP as possible. Plutonium is "forever." The high salt waste sites typically contain high plutonium concentrations in the near surface, making them candidates for the RTD remedy. Employing RTD for shipment to WIPP is the approach that would remove the plutonium (and the risks associated with that plutonium) from Hanford forever, and would result in a cleaner remediated site with substantially less plutonium permanently disposed in ERDF.

Advice

The Board advises the U.S. Department of Energy (DOE) to get as much plutonium out of these waste sites as possible.

The Board advises DOE to implement a RTD policy for plutonium that emphasizes remediation of plutonium disposal sites. DOE policy should opt to ship eligible plutonium-contaminated soil to WIPP for geological disposal, permanently removing it from Hanford.

The Board advises DOE to utilize a RTD approach when a high concentration of a radionuclide exists. This approach is consistent with established Board values.

The Board advises basing remedial design for cleanup of technetium and nitrates upon increased characterization. Extensive sampling is needed to determine the location and extent of technetium and nitrate contamination. This characterization should coincide with remediation efforts.

The Board advises a policy to conduct RTD concurrently with vapor extraction efforts to ensure meeting Tri-Party Agreement milestones.

The Board advises the proximity of cesium-137 to the surface necessitates implementing an RTD approach in order to dispose of cesium into the ERDF burial ground.

The Board advises the Tri-Party agencies to hold public meetings to discuss the draft "Proposed Plan for the Remediation of the 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units.

Sincerely,
Susan Leckband, Chair
Hanford Advisory Board

This advice represents Board consensus for this specific topic. It should not be taken out of context to extrapolate Board agreement on other subject matters.

HAB Consensus Advice # 247 Subject: PW-1/3/6 & CW-5 Operable Units Adopted: April 1, 2011 Page 3

Commenter #116

Nez Perce Tribal Executive Committ

Comment: (see next page)

americium-241 remaining underneath the waste sites are slowly converting to more highly mobile isotopes such as neptunuim-237.

* Use of surface barriers may impede carbon tetrachloride removal from the vadose soil using new soil vapor extractions wells and DNAPL from the aquifer using bio-remediation. Surface remediation should be planned with consideration of all subsurface remediation.
* When surface barriers are employed, we expect subsurface barriers to be employed to retard the lateral movement of moisture in the subsurface, and we expect a robust vadose zone and groundwater monitoring program to ensure that the barrier is fulfilling the expectations.
* NPT doesn't believe that using in-situ vitrification is a practical approach to the remediation of these waste sites due to the depth and volume of contamination underneath the waste site, and the state of development of the technology.
* NPT supports the remove, treat and dispose approach to remediating these waste sites. We believe that the contaminated soil underneath these wastes sites can be safely exhumed in a cost efficient manner using a dragline.
* We expect that actinides with activities greater 100 nanoCi/g will ultimately be transferred to the Waste Isolation Pilot Project (WIPP) in New Mexico.
* The risk scenarios should include a section on neutron and neutron-gamma ray activation exposure before a final remedy is selected.
* The 216-Z-9 Trench and the 216-Z-18 Crib will require additional characterization before remediation activities can proceed.
* Our specific comments on each individual waste site are listed in Attachment A.

ERWM would appreciate timely inclusion in the development of the remediation activities in these Operable Units. Please contact John Stanfill of our staff, at (208) 621-3748, or johns@nezperce.org for inclusion into an open decision-making process and close coordination to expedite the work needed to remediate the 200 West Area to protect the Nez Perce Tribe's reserved treaty rights and the Columbia River.

Sincerely,

Brooklyn Baptiste
Chairman

Cc: Scott Samuelson, DOE-ORP
Stuart Harris, CTUIR
Russell Jim, YIN
Ken Niles, Oregon
Dennis Faulk, EPA
Jane Hedges, Ecology

Attachment A

Specific Comments on the Proposed Plan for the Remediation of the 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units, DOE/RL-2009-117, DRAFT A and Feasibility Study for the Plutonium/Organic-Rich Process Waste Group Operable Unit: Includes the 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units, DOE/RL-2007-27, Draft C.

216-Z-1, Z-2, Z-3 Cribs and Z-1A Tile Field

We believe that there was substantially more plutonium released at the 216-Z-1A Crib and tile field than has been reported. The Feasibility Study and RHO-SA-131 indicate that 57 kg of plutonium and 1 kg of Am-241 were released at this site. Based on our kriging of the area that encompasses only the B and C sections of the 216-Z-1A tile field, we estimate that the vadose zone contains 71 kg of plutonium (Figure A-1). RHO-SA-113 reported that a total of 27.4 kg of plutonium was discharged in the "B" and "C" sections. It is worthy of note that our kriging estimate for Am-241 for the whole tile field is approximately 0.5 kg (Figure A-2).

We recommend soil excavation to a maximum depth of 55 ft below ground surface (bgs) which should remove all actinides with activities greater than 100 nanoCi/g. After treatment to reduce volume, these actinides should be disposed at WIPP.

Figure A-1: Visualization of the plutonium underneath the 216-Z-1, Z-2, Z-3 Cribs and Z-1A Tile Field viewed from the west.

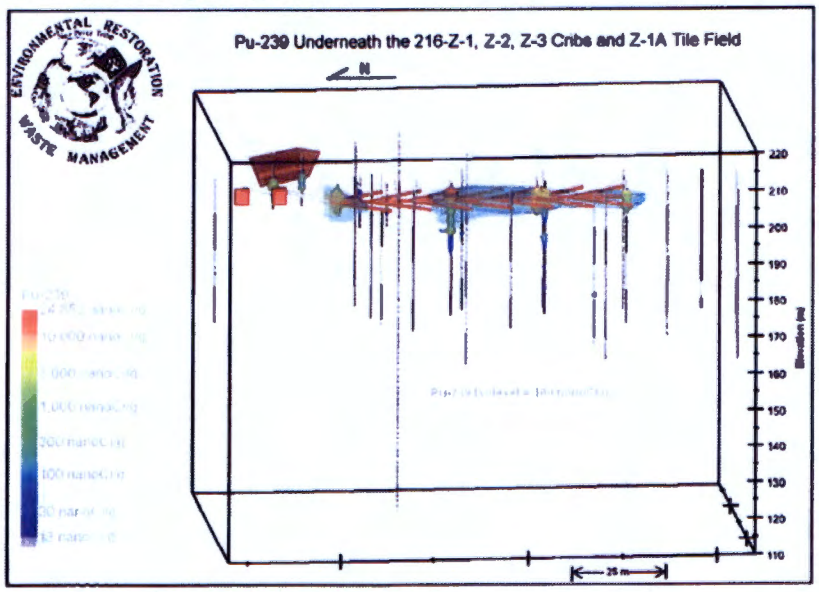
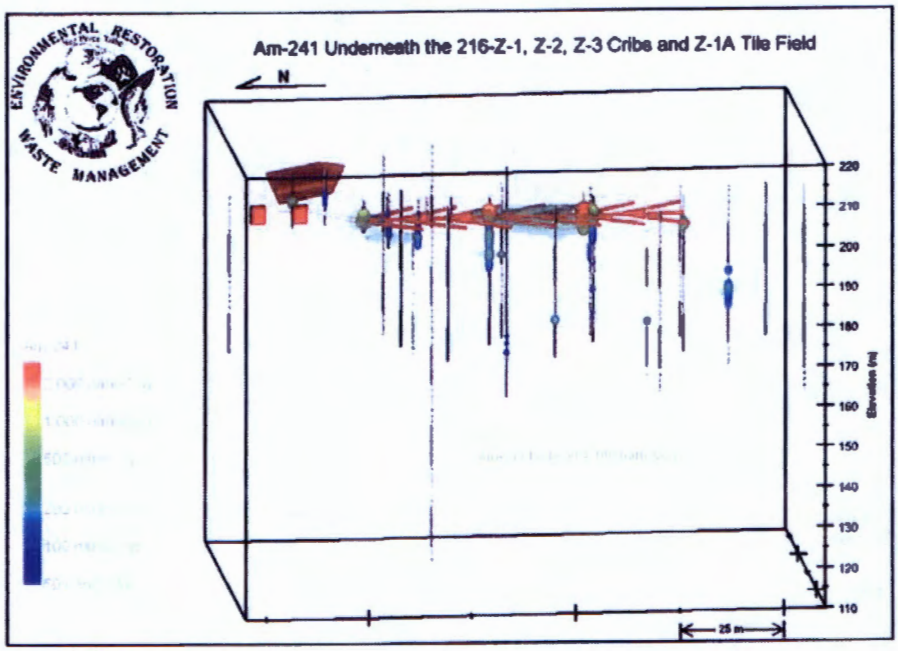
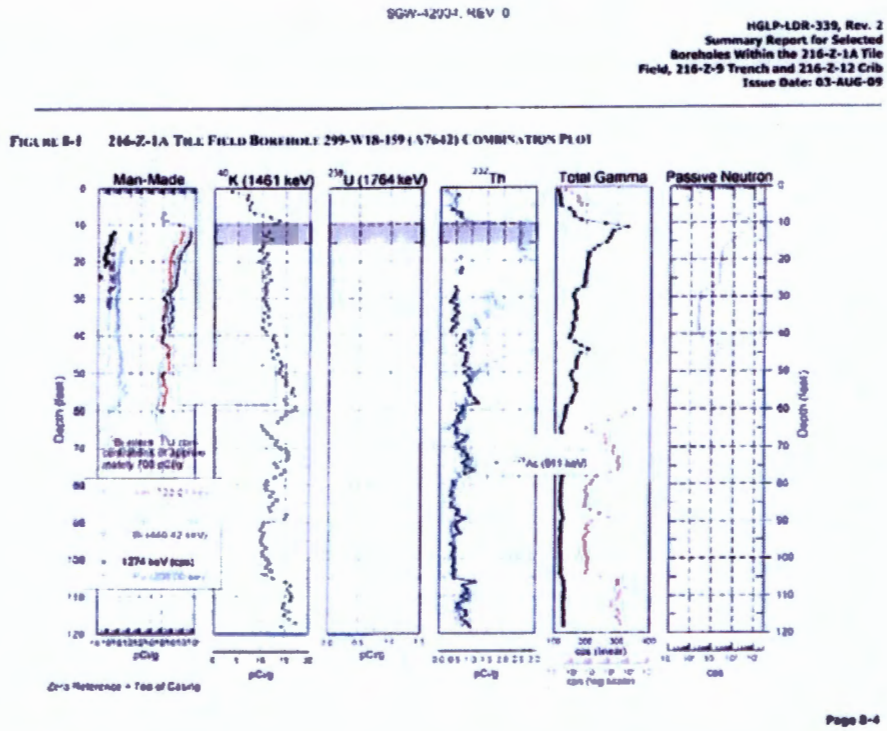


Figure A-2: Visualization of the americium-241 underneath the 216-Z-1, Z-2, Z-3 Cribs and Z-1A Tile Field viewed from the west.



Logging results at the 299-W18-159 borehole (Figure A-3), which is located near the central distributor pipe, indicate neutron count rates greater than 1,000 per second at ten feet below the surface. Neutrons have a relatively high relative biological effectiveness, and are roughly ten times more effective at causing cancers compared to photon or beta radiation of equivalent radiation exposure. The risk scenarios should include a section on neutron and neutron-gamma ray activation exposure before a final remedy is selected.

Figure A-3: Logging results for borehole 299-W18-159 from SGW-42004.



216-Z-9 Trench

The distribution of actinides underneath the 216-Z-9 Trench needs additional characterization (Figures A-4, A-5 and A-6). Actinides have migrated to the southwest beyond the footprint of the 216-Z-9 Trench. In the vadose zone, the highest values for Am-241 and Np-237 were detected at well 299-W15-46, deep in the vadose zone and near the top of the caliche within the Cold Creek unit. Actinides have migrated further and deeper at this trench than the other waste sites in the 200-PW-1 Operable Unit. While the highest levels of plutonium were detected at slant hole 299-W15-48 underneath the trench, the highest levels of Am-241 and Np-237 are detected significantly deeper than plutonium in the vadose zone at well 299-W15-46. At well 299-W15-46, Am-241 and Np-237 were detected at depths of 116 ft and 118 ft at 400 nanoCi/g and 29 pCi/g, respectively. Although actinides haven't been detected below the caliche, the full extent of the actinide migration is unknown. Actinides may have migrated into the Ringold formation through an erosional window in the caliche located to the southwest of the trench.

Figure A-4: Visualization of the americium-241 underneath the 216-Z-9 Trench viewed from the southeast.

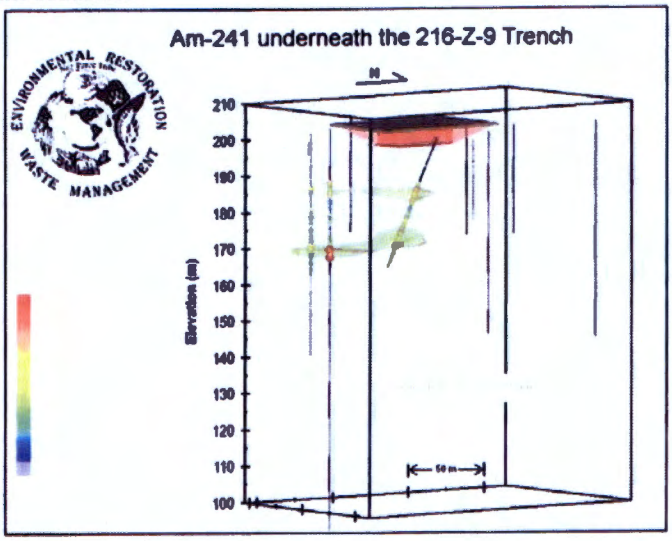


Figure A-5: Visualization of the neptunium-237 underneath the 216-Z-9 Trench and the top of the Cold Creek carbonate unit (caliche) viewed from the southwest. Geologic contacts are from PNNL-16103.

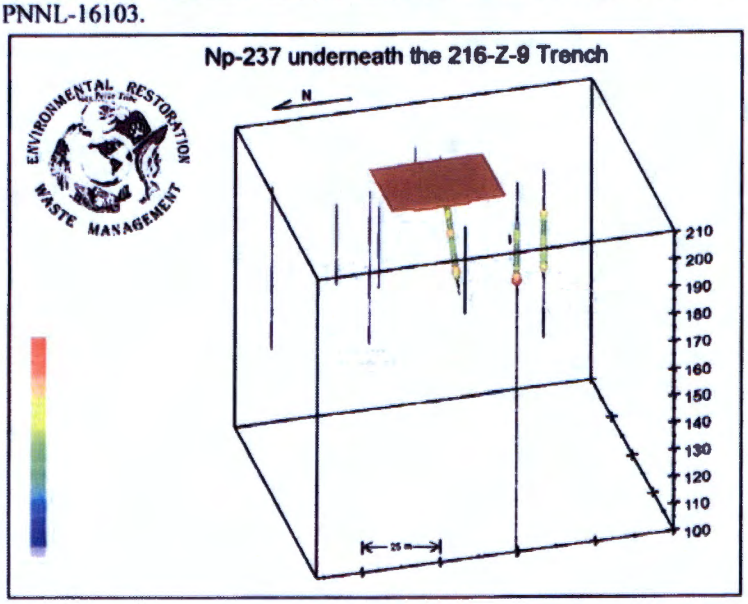
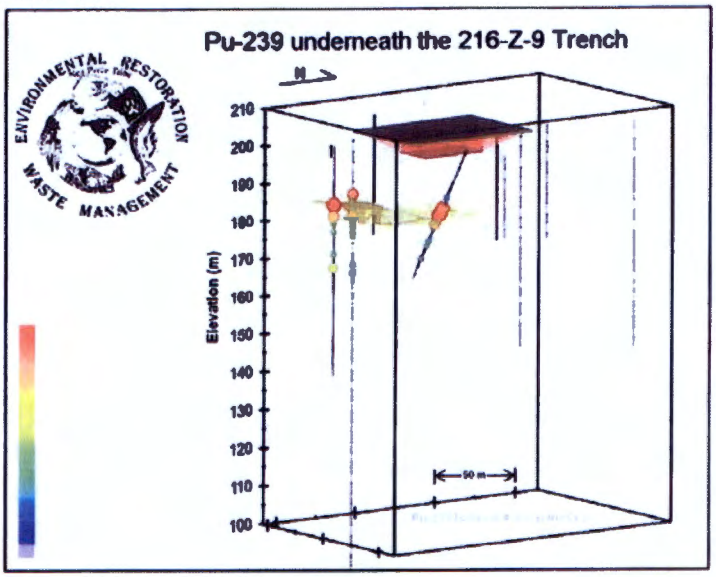


Figure A-6: Visualization of the plutonium-239 underneath the 216-Z-9 Trench viewed from the southeast.



Carbon tetrachloride dense non-aqueous phase liquid (DNAPL) is likely present in the aquifer below 216-Z-9 trench. 216-Z-9 site modeling shows between 0 and 135,000 kg of carbon tetrachloride DNAPL in the aquifer below 216-Z-9 in 1993. Although this range is large it is considered valid by the EM-22 Remediation System Evaluation of the 200-ZP-1/PW-1 groundwater pump and treat system, Review Report: Feasibility Study Strategies and Remedial System Performance Improvement for the 200-ZP-1/PW-1 Operable Units at Hanford. The upper end of the large range is supported by inclusion of all surfactant like chemical components (DBBP and TBP) that were disposed with carbon tetrachloride in the Z complex. These additives increase the initial infiltration rate in the soil/trench bottom and reduce lateral spreading once in the vadose zone (Nellis, S.R. et al. 2009).

In addition, the rapid evaporation (20-80%) of the large amount of carbon tetrachloride suggested in DOE/RL-2007-22 is not computed correctly due to the lack of consideration of accelerated organic infiltration and by the incorrect assumption that the heavier carbon tetrachloride phase would float on the lighter water phase in the trench allowing more evaporation. The vast majority of the prompt carbon tetrachloride evaporation losses are minimized due to the DBBP and TBP components of the process discharges since these components enhance the organic phase's ability to wet water saturated soil.

The likely presence of significant carbon tetrachloride DNAPL in the aquifer would require the extensive use of subsurface bio-remediation in addition to the pump and treat system. A test plan for this type of remediation is outlined in SWG-48064 (2010). Bio-remediation for aquifer

DNAPL should be incorporated into surface and near surface remediation plans to minimize interference in deployment.

216-Z-12 Crib

Unlike other Z waste sites, the plutonium-239 (activities greater than 25 nanoCi/g) underneath the 216-Z-12 Crib appears to be located within 10 ft of the distribution pipe (Figure A-7). The distribution of plutonium underneath the crib supports DOE's contention that in some cases plutonium is relatively immobile since this crib released more than 74 million gallons of waste to the vadose zone.

The assertion that 100% of the plutonium with activities greater than 100 pCi/g underneath the 216-Z-12 Crib is within 24 ft of the surface, on page 5-19 (Figure5-5) of the Feasibility Study, is incorrect. Logging results from borehole 299-W18-181 (Figure A-8) indicate that plutionium-239 at activities of 100 nanoCi/g has reached 32 ft bgs (35 ft log depth). Thus, the cost of the remove, treat and dispose options 3D and 3E need to be recalculated to account for the plutonium below 24 ft bgs.

Figure A-7: Visualization of the plutonium-239 underneath the 216-Z-12 Crib viewed from the west.

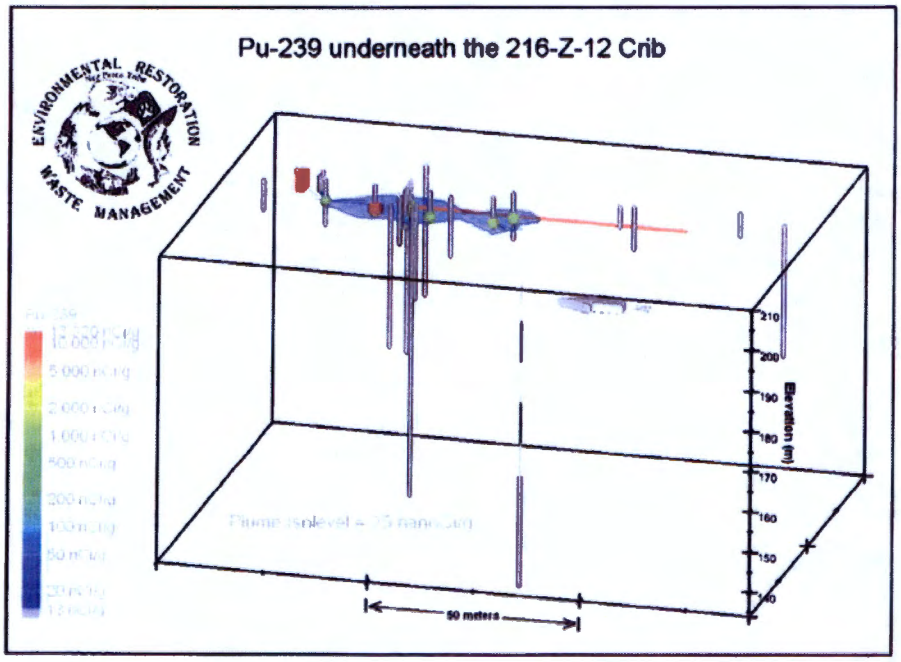
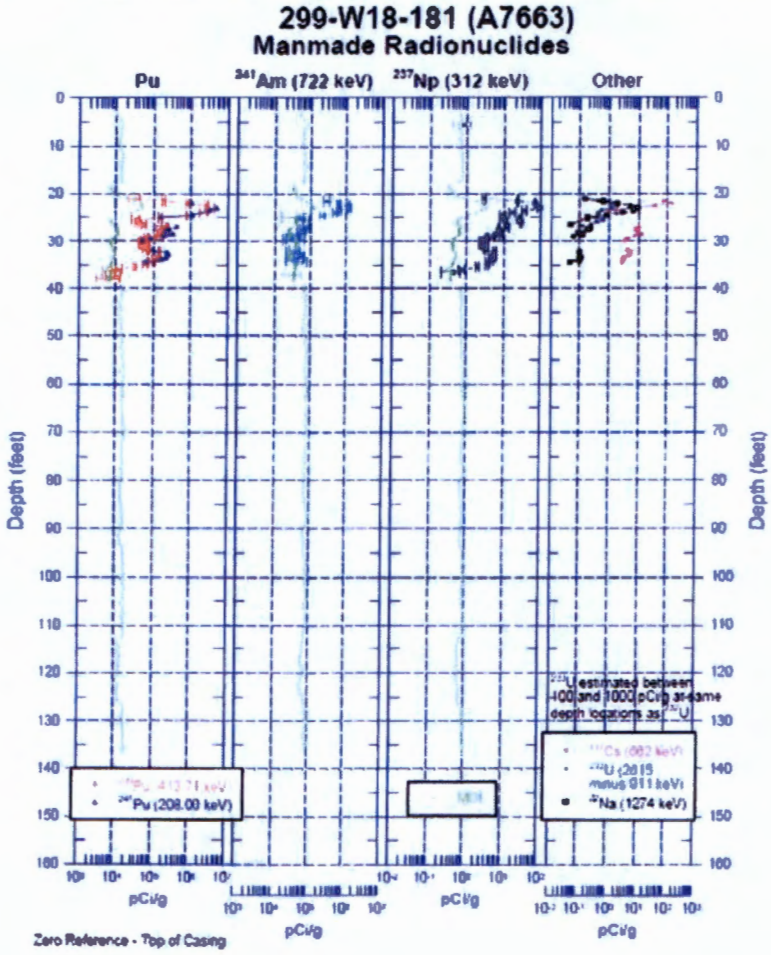
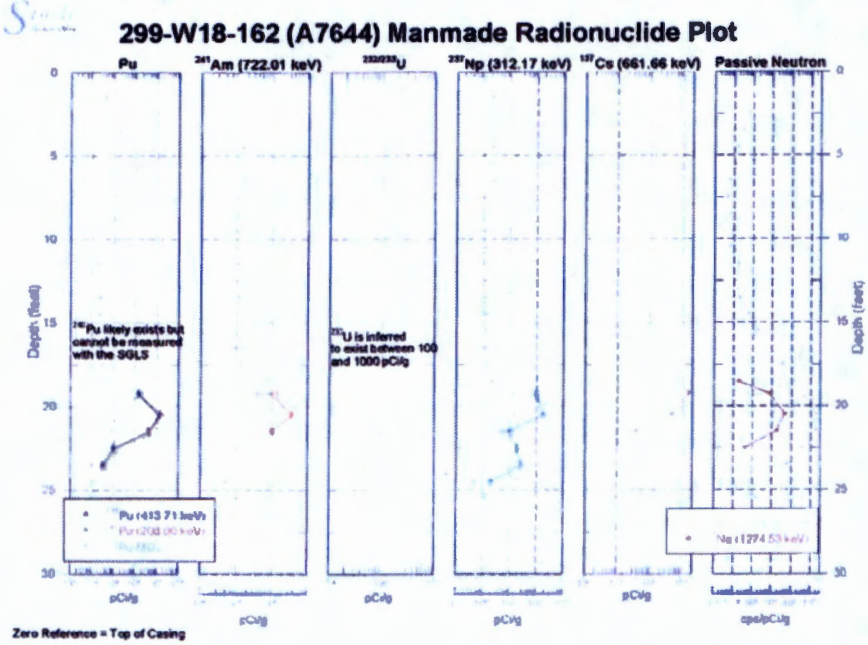


Figure A-8: Logging results for borehole 299-W18-181 from HGLP-LDR-084, Rev. 0



Logging results at the 299-W18-162 borehole (Figure A-9), which is located near the waste distribution pipe, indicate neutron count rates greater than 1,000 per second at 21 ft log depth. Neutrons have a relatively high relative biological effectiveness, and are roughly ten times more effective at causing cancers compared to photon or beta radiation of equivalent radiation exposure. The risk scenarios should include a section on neutron and neutron-gamma ray activation exposure before a final remedy is selected.

Figure A-9: Logging results for borehole 299-W18-162 from HGLP-LDR-211, Rev. 0



216-Z-18 Crib

The distribution of actinides underneath the 216-Z-18 Crib needs additional characterization. Over one million gallons of waste was released at this crib, which drove actinides deep into the vadose zone and to the south and east beyond the footprint of the 216-Z-18 Crib (FigureA-10). In addition to boreholes 299-W18-9 and -10, which were reported in the Feasibility Study (p. 2-59), boreholes 299-W18-11, -93, -94, and -96 detected radiation above background as shown in Figure A-9 (DOE/RL-91-58).

Pending the outcome of additional characterization, we recommend soil excavation to a maximum depth of 61 ft bgs, which should remove all actinides with activities greater than 100 nanoCi/g. After treatment to reduce volume, these actinides should be disposed at WIPP.

Figure A-10: Elevated gamma radiation isopach map of the 216-Z-18 Crib from DOE/RL-91-58.

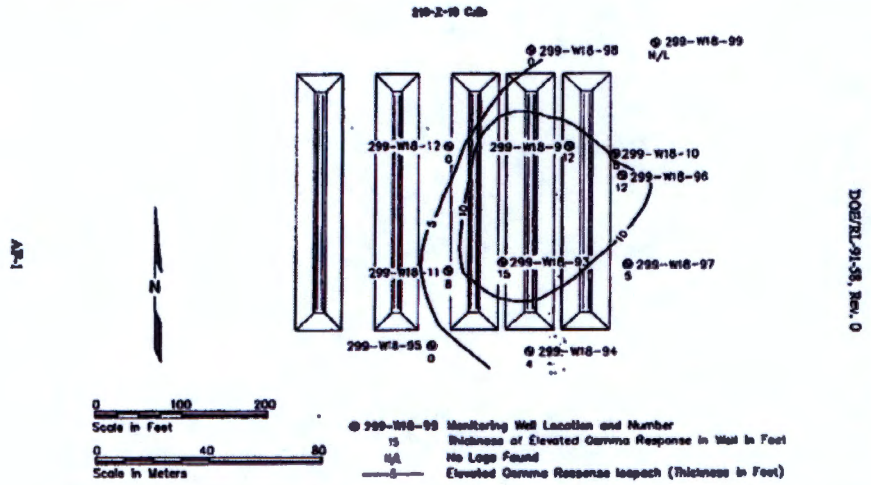


Figure A-1. Elevated Gamma Radiation Isopach Map of the 216-Z-18 Crib.

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Commenter # 117

Columbia Riverkeeper

Comment:

RE: Public Comments on the Proposed Plan for the Remediation of 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units

Dear U.S. DOE Manager Matt McCormick, Paula Call, and U.S. DOE RL,

On behalf of Columbia Riverkeeper, please accept the following public comments on the proposed plan for the remediation of the PW-1,3,6 and CW-5 waste sites in Hanford's 200 Area.

I. COLUMBIA RIVERKEEPER'S COMMITMENT TO PROMPT, EFFECTIVE CLEANUP AT HANFORD

Columbia Riverkeeper is a 501(c)(3) nonprofit organization with thousands of members in Washington and Oregon. Our mission is to protect and restore the Columbia River, from its headwaters to the Pacific Ocean. Since 1989, Columbia Riverkeeper has played an active role in monitoring and improving cleanup activities at the Hanford Nuclear Reservation (Hanford). A legacy of the Cold War, the Hanford site continues to leach radioactive pollution into the Columbia River. Hanford's legacy is not a local issue. Nuclear contamination from Hanford threatens the Pacific Northwest's people, a world-renowned salmon fishery, and countless other cultural and natural resources. Hanford's contamination will pose a risk to the public and the environment for thousands of years.

Each summer Columbia Riverkeeper leads a series of kayak trips on the Hanford Reach of the Columbia River. During these trips, Columbia Riverkeeper's staff and members tour areas of the Hanford Reach that are currently being polluted by excessive levels of radioactive contaminants. The Hanford Reach is particularly unique because it is the last free-flowing stretch of the Columbia River. For example, during trips in 2010 and 2011, Riverkeeper's staff and members observed salmon &/or steelhead while kayaking past the Hanford site. On these educational tours, our members learn about the Endangered Species Act-listed salmon and steelhead that spawn, rear, and migrate in the Hanford Reach. Columbia Riverkeeper and its members recognize that soil pollution at the Hanford site poses a long-term threat to the Columbia River for future generations.

Columbia Riverkeeper's staff and members are dedicated to a long-term solution for Hanford cleanup, and we strongly urge U.S. DOE and the other Tri-Party agencies to withdraw and rework the proposed plan for the cleanup of the PW-1,3,6 & CW-5 waste sites in the 200 Area. Simply put, Riverkeeper urges the U.S. DOE to remove as much cesium and plutonium from these waste sites as possible. The proposed plan fails to protect the public, the environment, and the long-term health of the Columbia River by leaving large quantities of plutonium, cesium, and other pollutants in the soil.

II. PROPOSED U.S. DEPARTMENT OF ENERGY ACTION

A. The U.S. Department of Energy's Proposal.

U.S. DOE is considering alternatives for the removal and immobilization of radioactive and chemical contamination in four waste sites in Hanford's 200 Area. For decades, U.S. DOE disposed of large volumes of liquid radioactive and chemical waste that were generated from the production and processing of plutonium. Liquid wastes were discharged into ditches, cribs, French drains, and tanks that allowed contamination to directly enter soils in the 200 Area. Contamination has penetrated deep into the soils in some areas, and some pollutants have reached groundwater.

The Proposed Plan (—plan||) is based on U.S. DOE's Remedial Investigation Report from 2006 & 2007, and the ensuing Feasibility Study from July, 2009. The U.S. DOE has received many comments in previous discussions and hearings about the proposed remediation of these waste sites, and the agency has identified preferred alternatives for six different waste groups: Z Ditches, High-Salt, Low-Salt, Settling Tanks, Cesium-137, and Other Sites. Our comments are largely focused on the High-Salt and Cesium-137 sites, areas where the Tri-Parties have already received extensive input from the public, the Hanford Advisory Board, and other agencies.

The high-salt waste sites include three subsurface engineered waste sites: 216-Z-9 Trench, 216-Z-1A Tile Field, and 216-Z-18 Crib. The high-salt waste sites received highly acidic aqueous waste streams from Recovery of Uranium and Plutonium by Extraction (RECUPLEX) facility or the Plutonium Reclamation Facility solvent extraction system, and their primary contaminants include plutonium, americium, and carbon tetrachloride.

In these high-salt waste sites, U.S. DOE has proposed to remove, treat, and dispose (RTD) the structures that were used to convey liquid radioactive and chemicalwaste into the soil. The Plan also proposes to continue the operation of the soil vapor extraction system for a key chemical contaminant, carbon tetrachloride. In addition to this RTD and soil vapor extraction effort, U.S. DOE proposes to excavate only 2 feet of soil beneath the waste structure. U.S. DOE proposes to cap the high-salt waste sites with evapotranspiration (ET) barriers.

In public hearings on the proposed plan, U.S. EPA estimated that this proposal will leave roughly 50 percent of the plutonium contamination in the soil.i U.S. DOE estimates that excavation to a depth of 2 feet will remove the —highest concentrations of contaminated soils.|| U.S. DOE and the other Tri-Party agencies additionally argue that the deployment of ET barriers will prevent infiltration and deprive the contamination of a motive force to drive contamination deeper in the soil towards groundwater and ultimately the Columbia River. Furthermore, U.S. DOE and other Tri-Party agencies propose to control access and use of the site —in perpetuity,|| to avoid deep excavation, irrigation, or any other non-industrial uses of the Central Plateau's Inner Area.ii

U.S. DOE proposes to take a novel approach to the remediation of the cesium-137 waste group. The cesium group of waste sites received process water from Plutonium and Uranium Extraction (PUREX) Plant operations. On these sites, U.S. DOE and other Tri-Party agencies propose to —maintain and enhance|| soil cover to achieve a 15-foot depth of soil protection. Again, the Tri-Party agencies rely on long-term institutional controls over the access and use of the cesium sites for a period of 300 years or more, after which most of the cesium-137 will have undergone radioactive decay. In essence, U.S. DOE proposes to heap soil over cesium-contaminated areas, a —new approach||, according to the U.S. EPA.iii

B. Threats Posed by Contaminants in Proposed Cleanup Areas

Large amounts of plutonium, cesium, carbon tetrachloride, PCB's, americium, radium and other contaminants are present in many areas that are proposed for cleanup. These radionuclides and chemicals pose a long-term risk to the environment and human health. Plutonium has a half-life of 24,000 years. A minimum of ten half-lives must transpire in order for contamination to undergo sufficient radioactive decay to adequately ensure that the pollutant is essentially gone. In the case of plutonium, the contamination in these waste sites will remain dangerous for 240,000 years. Americium, another contaminant of concern in multiple waste sites discussed in the proposed plan, has a half-life of 7,400 years.

Plutonium is an extremely hazardous carcinogen, one of the most dangerous substances on the planet to human health. Plutonium's carcinogenicity arises from alpha radiation that, when emitted from plutonium particles that have been ingested or inhaled into the human body, does enormous damage to neighboring cells. Once inside the body, plutonium can harm the liver, bone surfaces, bone marrow, and other soft tissues. Plutonium is also dangerous to non-human animal life. Because of plutonium's long half-life and the danger it poses to human health and the environment, plutonium is designated for disposal as transuranic (TRU) waste in a deep geologic repository when it is present in elevated concentrations in the soil (100 nCi/g). The current available destination for TRU waste is the Waste Isolation Pilot Project (WIPP) in New Mexico.

Plutonium has already penetrated deep into the soil at Hanford. For example, plutonium has been detected at depths exceeding 120 feet in soils beneath the high-salt waste areas. Additionally, the U.S. DOE's Tank Closure & Waste Management EIS (TC/WM EIS) identifies plutonium as a high-risk contaminant that could impact human health and the environment for thousands of years. Indeed, the TC/WM EIS estimated that peak risk from plutonium contamination to American Indian resident/farmers living in the River corridor could approach 1/100 cancer deaths.iv

Radioactive cesium has a half-life of 30 years. Cesium behaves similarly to potassium in the human body, and so it becomes widely distributed if ingested and can cause extensive cell damage and cancer. Cesium can also become incorporated into plant and non-human animal life, as evidenced by the discovery of a highly cesium-contaminated rabbit on the Hanford site in late 2010.v Although cesium is much less long-lived than americium and plutonium, radiation from cesium wastes is more externally dangerous than the aforementioned transuranic elements. For this reason, the proposed

plan assumes the efficacy of institutional controls (denying any people or animals access below a 15' soil depth). To remain protective, institutional control of the site will have to remain effective for over 300 years. A loss of control of these sites could result in exposure of humans to radioactive cesium and the release of this radionuclide into the surrounding environment.

Chemical contamination of the PW-1,3,6 and CW-5 waste sites presents a long-term threat to human health and the environment, in addition to the radioactive pollution risk from cesium, plutonium, and other radionuclides. For example, large quantities of carbon tetrachloride are present in these liquid waste sites because carbon tetrachloride was used in a mixture of other organic compounds in order to extract plutonium.

Carbon tetrachloride is the most widespread organic contaminant at the Hanford site.vi Over four square miles of groundwater at the Hanford site are already contaminated by carbon tetrachloride at levels that exceed drinking water standards.vii Carbon tetrachloride is acutely toxic to humans, and it can cause cancer after more prolonged exposure. U.S. DOE proposes to continue its vapor extraction effort. U.S. DOE's own modeling shows that, if this is ineffective, CCl4 will pose a major risk to the Columbia River for over 100 years. (See graphic above from TC/WM EIS).viii

III. COMMENTS ON MAJOR FLAWS IN PROPOSED PLAN TO REMEDIATE LIQUID WASTE DISPOSAL SITES IN HANFORD'S 200 AREA

Columbia Riverkeeper opposes the limited cleanup described in U.S. DOE's preferred alternative because it is not protective of human health and the environment. In particular, Columbia Riverkeeper does not support U.S. DOE's plan to leave large quantities of plutonium, cesium, and chemical contaminants in soils at Hanford.

A. U.S. DOE's plan falsely assumes that plutonium is "stable", or "immobile."

The U.S. DOE and its partner Tri-Party agencies have proposed a plan that relies on multiple assumptions that are highly disputed by Columbia Riverkeeper, the Hanford Advisory Board (HAB), Oregon Department of Energy, and the vast majority of the public comments during hearings in July 2011. The first and most glaring error is U.S. DOE's assumption that plutonium is not mobile in the soil at Hanford. Columbia Riverkeeper urges U.S. DOE to revise its analysis and acknowledge that, over the 240,000 years that it will take for radioactive decay to eliminate most of the plutonium, the plutonium remaining in the 200 Area could be mobilized through soil, into groundwater, and into the Columbia River.

U.S. DOE fails to incorporate the best available science in asserting that plutonium will remain stable in Hanford's soil. First, U.S. DOE's analysis does not present a reasonable picture of the geologic variability that may impact Hanford's 200 area in the coming 240,000 years. Hanford's soil and its geologic formations could be altered in the coming eons by catastrophic geologic events.

For example, roughly 14,000 years ago, glacial dams upstream of the Hanford site repeatedly failed, releasing massive flows of water through the Hanford site. These events, known as the Missoula floods, are known to have shaped large areas of the Hanford site. Given the dynamic recent history Source. WA Dept. of Ecology of the Hanford site, U.S. DOE must assume that the geology and hydrology of the Hanford site is highly likely to shift over the next 240,000 years. As a result, U.S. DOE must evaluate the durability of its proposed remedies over a wide range of potential climatic conditions.

During the July 27th Portland hearing on the proposed plan, a member of the public asked U.S. DOE and U.S. EPA if shfts in climate had been incorporated into their analysis. U.S. EPA gave a direct response, stating that climate change was not factored into its selection of the preferred alternative. The proposed plan and supporting materials simply do not evaluate a reasonable range of climate conditions. The Tri-Parties cannot make a conclusion about the protectiveness of the proposed alternative without considering a broader range of climatic conditions. Changes in precipitation, Columbia River flows, and temperature are absolutely guaranteed to occur over the 240,000 years that plutonium on the site will remain dangerous. In terms of the proposed plan, the U.S. DOE cannot assume that evapo-transpiration barriers and other barriers that are designed to operate in our current climate regime will remain effective. Given the 24,000-year half-life of plutonium and the historic variabliity of Hanford's climate, the DOE must address the durability of its proposed plan in a range of future climate scenarios. This analysis is wholly lackinCog in U.S. DOE's proposal.

In addition to failing to evaluate the long-term geologic and climatic variability of the high-salt waste sites in the proposed plan, U.S. DOE dramatically understates the potential for subsurface transport of plutonium. The U.S. DOE does not fully evaluate whether chemical conditions in soils and soil-water on the Hanford will promote transport of plutoniumix during the 240,000 years during which the plutonium will remain dangerous. Indeed, recent studies suggest that sub-surface transport of plutonium is possiblex. Moreover, the presence of plutonium at depths of over 100 feet in the soil demonstrates that plutonium, under some conditions, is mobile. Hence, DOE's fate and transport modeling for Pu is contradicted by the recent migration of plutonium in the soil column.
U.S. DOE falsely concludes that Pu will remain stable in the soil because the groundwater and soil transport models in its analysis are inadequate. The fate and transport models that underpin U.S. DOE's conclusions for groundwater protection extend for only 1000 years, and they fail to incorporate the long-lived threat of Pu-239 and the long-term instability of the Hanford site.xi As a result of its limited fate and transport model for groundwater, the proposed plan does not include preliminary remediation goals (PRG's) for groundwater for several long-lived contaminants, including Pu-239/240. This analysis fails to incorporate long-term risks to the public and the environment. U.S. DOE must evaluate the chemical and physical conditions that would promote plutonium transport and make a reasonable judgment about whether these conditions might occur in the next 240,000 years. 1000 years is not an adequate timeframe for assessing the risks of Pu transport in soils and groundwater.

We urge U.S. DOE to re-evaluate the fundamental assumption that Pu-239/240 will remain stable in the soils for the next 240,000 years. We concur with the Oregon Department of Energy, the Hanford Advisory Board, and hundreds of people who have commented that plutonium poses a long-term risk to human health and the environment. Because U.S. DOE makes the flawed assumption that Pu will remain stable in soils for 240,000 years, and because Pu is demonstrably mobile under some conditions that may occur over that timeframe, U.S. DOE must revise its plan for cleanup of plutonium-laden high-salt waste sites.

B. U.S. DOE's plan relies on surface barriers and institutional controls that will not remain effective for the length of time required for dangerous wastes to decay away

Fundamentally, U.S. DOE's conclusion that Pu will remain stable in the soil in Hanford's 200 Area rests on the assumption that surface barriers will be effective in preventing moisture from promoting plutonium transport for over 240,000 years. According to the proposed plan, —Because residual contamination would be left in place after the RTD remedial action was completed, an evapotranspiration barrier would be constructed over the waste sites to control the amount of precipitation that infiltrates into the contaminated media, thereby reducing the potential migration of contaminants to groundwater.|| Notably, U.S. DOE states that the ET barrier would —reduce|| the potential migration of contaminants , but it cannot conclude that the potential is eliminated. U.S. DOE provides no evidence that an engineered ET barrier will provide a durable impediment to infiltration of precipitation for the 240,000 year timeframe during which Pu will remain a danger. Indeed, as noted above, U.S. DOE modeled the fate and transport of Pu for 1000 years for groundwater. Because U.S. DOE overstates the efficacy of surface barriers and thus underestimates the risk of plutonium transport, U.S. DOE must re-evaluate its proposed plan.

Additionally, the U.S. DOE cannot realistically claim that institutional controls will prevent access to plutonium-laden waste sites at Hanford. Given the 24,000-year half-life of plutonium, U.S. DOE would have to ensure that the site is restricted for 240,000 years. In the words of the Hanford Advisory Board's advice on this proposed plan, —plutonium is forever.|| Because of the staggering timeframes involved with managing plutonium waste, U.S. DOE's reliance on institutional controls is inappropriate and poses a severe long-term risk and cost to the public and the environment.

Because U.S. DOE cannot rely on the efficacy of surface barriers and institutional controls for the 240,000 years during which plutonium in high-salt waste areas will present a risk, we support RTD Option C or E. These alternatives would remove much more of the plutonium from the soil at Hanford. U.S. DOE has argued that these options are excessively expensive. Given the estimated $115 billion cost of Hanford's cleanupxii, the up-front cost of removing as much plutonium as possible from the highly contaminated high-salt waste sites would not significantly increase the total cost of cleanup. Moreover, U.S. DOE's analysis does not reflect an accurate analysis of how RTD of high-salt waste sites would reduce long-term (i.e. thousands of years) costs for institutional controls.

Similarly, rather than employing a remove-treat-dispose strategy for cesium waste sites, U.S. DOE concludes that a combination of institutional controls and soil caps will be a cheaper, protective option. However, U.S. DOE draws this conclusion based on the assumption that the public will be prevented from accessing the subsurface of highly radioactive cesium-polluted liquid waste sites. The Hanford Advisory Board encouraged U.S. DOE to adopt a more protective approach by digging up cesium-contaminated sites in Hanford's 200 area. In part, the HAB encouraged removal of contaminated soil in cesium sites because the depth of contamination is relatively shallow and accessible, making these sites suitable for an RTD approach. Again, U.S. DOE should evaluate how a more aggressive RTD approach might diminish the costs of institutional controls over the next 300 years.
U.S. DOE's proposal to heap soil on top of waste sites, rather than to excavate radioactive cesium, is a —novel approach|| according to the U.S. EPA. In determining that the proposed alternative will be protective of the environment, U.S. DOE concluded that 15' of soil cover would be maintained for the 300 years needed for the cesium to decay to safe levels. While 300 years is a more reasonable timeframe for institutional control than 240,000 years, the overwhelming majority of public comments and the advice of the HAB note that the risk of failures in institutional controls should prompt U.S. DOE to dig up cesium wastes that are relatively shallow and readily accessible.

In summary, the U.S. DOE's reliance on surface barriers and institutional controls for high-salt waste sites and cesium sites does not protect the public and the environment. Additionally, the analysis and assumptions that form the basis of U.S. DOE's plan severely underestimate the risk of these measures failing, particularly for plutonium. U.S. DOE must withdraw and re-work its plan.

C. U.S. DOE does not present an adequate range of alternatives for cleanup of high-salt plutonium-laden waste sites.

U.S. DOE must present a reasonable range of alternatives for its proposed cleanup of highly contaminated waste sites in Hanford's 200 area. The public has identified, and U.S. DOE has not evaluated, reasonable alternatives that U.S. DOE should evaluate before proceeding with its proposed plan. The U.S. DOE presents more thorough RTD approaches as excessively expensive, and states that the —balancing criteria|| of cleanup cost allows U.S. DOE to select alternatives that leave large amounts of plutonium and cesium contamination in place. Yet, the U.S. DOE fails to look at RTD approaches at soil depths that exceed 2 feet but are less than RTD Option C.

Specifically, the U.S. DOE proposes to excavate only 2 feet of soil beneath the bottom of high-salt plutonium waste sites. As noted above, U.S. EPA estimates that this will leave large quantities of plutonium in the soils at these waste sites – roughly half of the plutonium in these waste sites. While RTD Option C & E present the best available alternatives for excavating plutonium-laden soils, they involve RTD to a depth of dozens of feet. The U.S. DOE analysis jumps from 2 feet to dozens of feet of excavation without explaining how excavation of the intervening depths might be effective. U.S. DOE must provide the public with a reasonable explanation for stopping at 2 feet. Does digging 5 feet, 10 feet, or at other intermediate depths achieve a much higher level of plutonium retrieval? If so, U.S. DOE must seriously evaluate these alternatives.

Unfortunately, the proposed plan does not provide the public with adequate detail on where plutonium remains in the soil column. To justify leaving many pounds of highly dangerous plutonium in the soil, U.S. DOE must provide the public with an iron-clad case for why incremental RTD (an —observational approach||) is unworkable. The analysis that underlies U.S. DOE's conclusion does not rest on adequate characterization of the soils beneath high-salt waste sites. Because the U.S. DOE has not provided a profile of contamination at different depths, characterization data to support this profile, and the costs associated with excavating at depths between 2 feet and 20 feet, the analysis is arbitrary. The plan and its underlying documents do not support U.S. DOE's conclusion that the 2' excavation is adequate or that the benefit of plutonium removal from digging deeper would not be worth the incremental addition in cost.

D. U.S. DOE's plan does not disclose the impacts of leaving waste in the soil near the Columbia River.

The proposed plan acknowledges that the proposed actions in high-salt waste sites will leave significant amounts of long-lived radionuclides in the soil at Hanford. Contamination in Hanford's soil can move into Hanford's groundwater. That groundwater, in turn, enters the Columbia River. Because of the extremely long-lived nature of plutonium and other radionuclides in the areas addressed by the proposed plan, the migration of these contaminants could reach the Columbia River. The U.S. DOE dismisses the transport of plutonium in groundwater, using models with short timeframes (1,000

years) and excessive confidence in surface barriers. This fundamental flaw in U.S. DOE's analysis requires that the proposed plan be withdrawn and revised.

The vast majority of comments submitted to U.S. DOE and U.S. EPA during public hearings rejected the assumption that plutonium and other contaminants would remain stable and immobile in Hanford's soil. Multiple scientific studies submitted to U.S. DOE indicate that plutonium may be transported through the subsurface in colloids and other chemical complexes. The best available science does not support U.S. DOE's umbrella assumption of plutonium immobility.xiii Ultimately, if U.S. DOE implements its plan and this assumption proves false, plutonium will move through groundwater into the Columbia River and the surrounding environment. Because the best available science demonstrates that plutonium is not stable in the soil at Hanfordxiv, U.S. DOE must evaluate the impacts of plutonium from the 200 Area entering the Columbia River in hundreds, thousands, and potentially tens of thousands of years into the future.

Lastly, U.S. DOE acknowledges that it has an incomplete knowledge of other contaminants of concern, such as nitrates and Tc-99. U.S. DOE wrote,

> —Two other contaminants at the 200-PW-1 and 200-PW-6 waste sites, technetium-99 and nitrate, had a high level of uncertainty as potential threats to groundwater.
> These contaminants are not expected to pose an unacceptable risk based on fate and transport modeling results and process knowledge of the type of liquid waste discharged at these waste sites. Additional sampling will be conducted to confirm contaminant levels as part of the remedial design.||xv

Additionally, U.S. DOE's proposal for vapor extraction of carbon tetrachloride is unlikely to adequate volumes of this dangerous chemical to prevent future risks to the Columbia River and the surrounding environment. As shown in the TC/WM EIS, Tc-99 and carbon tetrachloride present a serious long-term risk to the Columbia River. By failing to implement an aggressive RTD approach, U.S. DOE falls short of addressing contaminants that pose a risk to human health and the environment. Pictured above, Appendix U of U.S. DOE's TC/WM EIS demonstrate that dangerous levels of nitrate and Tc-99 will persist in groundwater near the Columbia River for hundreds of years. The nitrate plume shown above represents the possible plume in 2135, over 100 years from now. Disturbingly, even in year 3890, Tc-99 concentrations will continue to be increasing in Hanford's Central Plateau groundwater.

E. Failure to Consult Under Section 7 of the Endangered Species Act.

USDOE is excessively confident that plutonium, cesium and other chemical and radiological pollution will be isolated from the environment under the proposed plan. U.S. DOE's preferred alternative will leave highly dangerous contamination in the soil, and rely on a combination of surface barriers and institutional controls to prevent the contamination from entering the environment. If mobilized in groundwater or excavated by humans, animals, or geologic events, contamination in the soil at Hanford could cause dramatic harm to federally protected species. In particular, because of the extremely long-lived nature of plutonium and the known issues with carbon tetrachloride in groundwater, Columbia River salmon species – which are federally protected – will likely be impacted by U.S. DOE's plan.

As Columbia Riverkeeper has noted in many previous comments, USDOE is required to consult with the federal expert agencies when a federal action at Hanford may affect federally-listed endangered or threatened species. *See* Columbia Riverkeeper Comment on USDOE Mercury Storage at Hanford (Aug. 2009); Columbia Riverkeeper Comment to USDOE on Tri-Party Agreement Proposed Changes and Consent Decree (Dec. 2009); Columbia Riverkeeper Comment on USDOE Tank Closure Waste Management Environmental Impact Statement (May 2010). Pursuant to Section 7 of the Endangered Species Act (ESA), USDOE must consult with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) to determine how the proposed action may affect any threatened or endangered species in the Hanford Reach of the Columbia River.

i. Endangered and Threatened Salmon and Steelhead in the Hanford Reach.

Among the forty-three species of fish present in the Hanford Reach are several endangered species, including the Upper Columbia River spring-run Chinook salmon and steelhead ESUs. For thousands of years, the Columbia River supported the most abundant salmon runs on Earth.xvi Beginning in the late 1990s, the National Marine Fisheries Services listed thirteen stocks of migratory salmonids as threatened or endangered under the Endangered Species Act. These fish

spend part of their life-cycle in the Columbia River and its tributaries and part of their life in the Pacific Ocean, eventually returning to the Columbia to reproduce and die.

The Hanford Reach is well documented as the only remaining significant spawning ground for the fall run Chinook salmon on the mainstem of the Columbia River.xvii According to the U.S. Fish and Wildlife Service, "[t]he [Hanford] Reach contains islands, riffles, gravel bars, oxbow ponds, and backwater sloughs that support some of the most productive spawning areas in the Northwest, including the largest remaining stock of wild fall Chinook salmon in the Columbia River."xviii The fall Chinook salmon that spawn and rear throughout the Hanford Reach support in-river commercial and tribal fisheries, commercial fisheries in the North Pacific Ocean, and sport fisheries.xix

In addition to fall run Chinook salmon, the Hanford Reach also supports over forty other species of fish, including sturgeon, steelhead, and bull trout. The prevalence of endangered and threatened fish in the Hanford Reach raises serious questions about the current and future impacts of Hanford's pollution legacy and USDOE's decisions that impact how much pollution will enter the Columbia for generations. Importantly, strontium-90, uranium, chromium and other contaminants are documented entering salmon spawning grounds along the Hanford Reach.xx By leaving significant quantities of highly dangerous contamination like plutonium in the soil at Hanford, and making the false assumption that these pollutants will remain immobile, U.S. DOE is exacerbating the risk to Columbia River fish.

ii. USDOE Must Consult Under ESA § 7.

Section 7 of the Endangered Species Act (ESA), the heart of the ESA's requirements for federal actions, imposes strict substantive and procedural duties on federal agencies to ensure that their activities do not cause jeopardy to listed species or adverse modification to their critical habitat. 16 U.S.C. § 1536(a)(2). Not satisfied that federal agencies possessed the requisite expertise, Congress added a strict procedural requirement: that the determination of whether any federal action would be likely to result in jeopardy or adverse modification would be made —in consultation with and withthe assistance of [the Services].|| *Id.* This mandatory consultation is the key to section 7; in fact, Congress titled Section 7, —Interagency Cooperation.||

Section 7 embodies another safeguard to protect against substantive jeopardy. Section 7 requires federal agencies—action and expert agencies alike—to use the best available scientific information in meeting their section 7 obligations. The agencies are generally the repositories of the best scientific evidence given their role in listing threatened and endangered species, in conducting section 7 consultations, in issuing incidental take permits and statements, and in developing recovery plans.

The ESA mandates consultations to ensure that an agency action —is not likely to jeopardize the continued existence of any|| listed species or adversely modify critical habitat. 16 U.S.C. § 1536(a)(2). Regulations require such consultations whenever an action —may affect|| a listed species. *See* 50 C.F.R. § 402.14. Where an action is —likely to adversely effect|| a listed species, the agency must conduct formal consultation with the National Marine Fisheries Service (NMFS) and/or the U.S. Fish and Wildlife Service (USFWS) (collectively —the Services||). The end product of formal consultation is a biological opinion in which the Services determine whether the action will cause jeopardy to the species or adversely modify designated critical habitat. 16 U.S.C. § 1536(b).

In their joint consultation regulations, NMFS and the FWS established a preliminary review that can be used to sidestep formal consultation in limited situations. For all actions that —may affect|| a listed species, the action agency must determine whether the action is —likely to adversely affect|| or —not likely to adversely affect|| the listed species. 50 C.F.R. § 402.14(a)–(b). An action that is —likely to adversely affect|| a listed species or its critical habitat must undergo formal consultation that culminates with the services' issuance of a biological opinion that complies with the ESA and regulatory requirements. *Id.* §§ 402.02, 402.14(a).

Under the joint regulations, a —not likely to adversely affect|| determination can lead instead to an informal consultation, which consists of all discussions and communications between the agencies and ends with the Services' written concurrence in that determination. *Id.* § 402.13. If the expert agency does not concur, the action is deemed —likely to adversely affect|| and the agencies must conduct a formal consultation. *Id.* §§ 402.02, 402.14(a). Use of informal consultation is optional in those instances where it is available.

An agency may avoid —consultation only when it has determined the proposed action is unlikely to adversely affect the protected species or habitat and the [expert agency] concurs with that determination.|| *Tinoqui-Chalola Council of Kitanemuk v. U.S. Dept. of Energy*, 232 F.3d 1300, 1306 (9th Cir. 2000) (citing 50 C.F.R. § 402.14(b)). In this case, because of the highly dangerous, potentially mobile, and long-lived nature of contaminants in the PW-1,3,6 and CW-5 sites, U.S. DOE should consult with the USFWS and NMFS about the potential impacts on federally protected species.

i U.S. EPA presentation. PW 1,3,6 and CW-5 public hearing. 7/27/11. Portland, OR.
ii U.S. DOE presentation. PW-1,3,6 and CW-5 public hearings. 7/21/11 in Seattle, 7/26/11 in Hood River, and 7/27/11 in Portland. Video of the Seattle hearing is available at http://www.youtube.com/watch?v=3KlxoxXo8xs.
iii U.S. EPA presentation. PW-1,3,6 & CW-5 public hearing. 7/27/11. Portland, OR.
iv U.S. DOE. 2010. Tank Closure & Waste Management EIS. Appendix U, Table U-4, page 53.
v —Radioactive Rabbit Trapped Near Hanford.|| Tri-City Herald. 11/5/10. http://www.tri-cityherald.com/2010/11/05/1238751/radioactive-rabbit-trapped-near.html
vi Hanford Groundwater Monitoring Report. 2008. P. 10.69.
vii Hanford Groundwater Monitoring Report. 2008. P. 10.71.
viii U.S. DOE. 2009. TC/WM EIS. Appendix U. page U-31.
ix Abdel-Fattah et al. 2009. Transport of Pu(VI) in natural alluvium by natural calcite colloids. Los Alamos National Labs. *Migration*, 2009.

> ***Question 1:*** Has USDOE initiated Section 7 consultation with NMFS and/or the USFWS regarding the proposed action?
> ***Question 2:*** If USDOE has not initiated Section 7 consultation, does USDOE intend to initiate Section 7 consultation? Please explain.
> ***Question 3:*** If USDOE has not and does not intend to initiate Section 7 consultation, please explain the agency's rationale for not consulting with the Services under the ESA.

III. CONCLUSION: USDOE MUST SIGNIFICANTLY REVISE AND IMPROVE ITS PLAN FOR REMEDIATION OF THE PW-1,3,6 AND CW-5 WASTE SITES IN HANFORD'S CENTRAL PLATEAU.

Thank you in advance for considering Columbia Riverkeeper's comments on the proposed plan for remediation of liquid waste disposal sites in the Central Plateau. We strongly urge USDOE and the other Tri-Party agencies to proceed with a remove-treat-dispose approach for plutonium and cesium-polluted sites and to rework its plan for cleanup of high-salt waste sites and cesium waste sites. If the Tri-Party agencies have any questions or would like to discuss these public comments, please contact Columbia Riverkeeper at dan@columbiariverkeeper.org or (503) 890-2441 to arrange a meeting.

Sincerely,
/s/ Dan Serres
Dan Serres
Columbia Riverkeeper
Conservation Director

Commenter #118

Ruth Williams

Comment:

Dear People:

I have been reading about your plan to skim a couple of feet of toxic waste from the bottom of these storage sites and leave most of the waste mixed into the soil. According to your own science the remaining toxins will seep in the ground water, poison the river, and cause illnesses including cancer, and death, plus the environmental damage to fish and wildlife. The National Academy of Science has spoken out against this plan with far more authority than I can.

However, as a tax-paying, voting, responsible American I need an explanation for this. Every day we do things, some mandated by law, to protect our environment. We sort our trash and keep toxic substances out, we drive cleaner cars, we avoid garden chemicals, we don't pour any chemicals down the drain, we conserve resources, etc., etc. Communities across the country are spending billions on ecological conservation and restoration and cleaner
construction practices. But meanwhile, our own US DOE intends to poison
Hanford the Columbia River for the foreseeable future. This is mind boggling!

Please do it right: clean it up! As you well know, transuranic wastes must be sealed in a deep underground repository. PCB's, Strontium, Cesium, and Carbon Tetrachloride must be contained and isolated from groundwater. You have done a much better job at other sites, so why skimp here? Sure it will cost more, but we need a jobs program anyway. For the sake of jobs today and a healthy environment for future generations, please clean it up!

I await your response. Thank you for your consideration.

Sincerely,

Ruth Williams
1219 NE 107th St.
Seattle, WA

Tel. 206-930-8965

Commenter #119

Oregon Department of Energy

Comment:

On July 19, 2011, Oregon submitted written comments on the *Draft Proposed Plan for the Remediation of the 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units,* DOE/RL-2009-117, Revision 0. This letter provides additional formal comments on Oregon's behalf.

Our July 19 comments expressed strong concerns with the *draft Proposed Plan* for proposing to leave potentially large amounts of plutonium in the three waste sites that make up the High-Salt Waste Group. The *draft Proposed Plan* contends this would be protective because plutonium will not move in the Hanford subsurface and therefore will pose no threat to people or the environment.

Our July letter referenced Oregon's disagreements with the U.S. Department of Energy's (DOE) position that plutonium does not move in the Hanford subsurface. Those disagreements have been well documented through correspondence and meetings over the past several years. Through this additional comment letter, we wish to further emphasize our concern that plutonium in the subsurface at Hanford is likely mobile. We are attaching a summary of recent literature on this topic, including extensive bibliographic material, to support our argument. We hope that DOE and Hanford regulators will review these materials and will seriously consider a more protective remedy for the High-Salt Group waste sites.

During the more than 20 years that Oregon staff have been involved in the Hanford cleanup, we have observed tremendous growth in the scientific understanding of the environmental chemistry of plutonium. The chemistry of plutonium and other actinides in the soil has been shown to be tremendously complex, and the improvements in understanding this chemistry have been significant. The attached materials provide an overview of recent research on the environmental geochemistry of plutonium. Among key findings noted in the attached discussion, with regard to the fate and transport of plutonium:

- The solution chemistry of plutonium is complex, and is strongly affected by three major factors – redox conditions, pH and carbonate concentration.
- Plutonium commonly exists in equilibrium in more than one valence state. No single valence dominates for long, as valence changes with subtle changes in soil conditions.
- Plutonium readily forms stable complexes with carbonate and hydroxyl ions, especially in high pH, carbonate-rich environments like those that occur in Hanford soils and groundwater. Complexes can be soluble at concentrations well above water quality standards.
- The complexes may be dissolved or colloidal, with colloids ranging from nanometer- to micron-sized particles. Complexes and colloids can be very mobile in water; transport in soils over distances greater than one kilometer has been observed at several locations.

There remains considerable uncertainty regarding the precise mechanisms that control the movement of plutonium in any individual soil environment, and in the resulting rate and amount of movement. There is, however, virtually no debate in the scientific community about the fact that plutonium is mobile in soil and groundwater environments. The issue is not whether plutonium moves in soil and groundwater, but rather how much, and how fast, it is moving.

Given the complexities of plutonium aqueous chemistry, it should be recognized that simplistic tools that have been used in the past to predict plutonium mobility, such as K_ds, are not adequate for predicting plutonium dynamics in the complex environments of soils and waste sites or for predicting protectiveness. It is therefore essential to develop better quantitative tools to estimate the rate and amount of movement, in order to support a sound assessment of the protectiveness of any proposed remedial action at Hanford for waste sites with a significant inventory of plutonium.
The science and chemistry described in the attached discussion and citations directly challenge the assertions that plutonium is not mobile, and that leaving substantial amounts of plutonium in the Hanford subsurface is protective. We strongly urge DOE as the Site owner, and the U.S. Environmental Protection Agency as lead regulator for the waste sites considered in the *draft Proposed Plan*, to carefully review these materials and to reconsider the proposed remedies for waste sites in the High-Salt Waste group.

Please contact Dale Engstrom of my staff (503-378-5584), with any questions or comments.
Sincerely,
Ken Niles
Nuclear Safety Division Administrator

ATTACHMENT

Discussion of research related to the movement of plutonium in the environment

Research conducted by the U.S. Department of Energy (DOE), its national laboratories, and by others mostly outside of Hanford note there is great uncertainty associated with plutonium mobility. The following documents raise questions about previous assertions that plutonium in the subsurface is not mobile. The range of authors includes many of the principal experts in the United States and in the world in this field of chemistry, variously called "actinide chemistry," "f-element chemistry," "transuranic chemistry" and other names.

With regard to *Plutonium Chemistry:*

As noted by Contardi et al.[6] "even in situations where plutonium transport has been documented it is often difficult to determine what mechanism was responsible." Duff said in her summary in 2001[7] that "sorption, co-precipitation and oxidation state speciation behavior of Pu on geologic materials is poorly understood." Also noted by Duff[7] was that "a once highly stable form of Pu contamination may eventually become a very active source-term to the surrounding environment."

Plutonium released to the environment continues to be a major concern at a number of DOE facilities. Los Alamos National Laboratories[2] found that the fate and transport of plutonium in the subsurface is strongly influenced by "coupled physical and biogeochemical processes" present at these contaminated sites. Under groundwater conditions, Pu(IV), Pu(V)and Pu(VI) are the most available and stable oxidation states, with Pu(V) and Pu(VI) fractions generally remaining in solution and Pu(IV) usually present in the solid phase as sparingly-soluble oxyhydroxides and surface sorbed species. However, plutonium nearly always exists in many valence states in equilibrium at the same time. No single valence dominates the valence mix for long except under very controlled conditions that do not exist in the natural environment. Plutonium equilibrates under natural conditions in several valence states, changing from one valence to another in reaction to subtle changes in soil conditions and location. Oxidized plutonium species Pu(V) and Pu(VI) are present in solutions at low concentrations under oxic environmental conditions, but are highly soluble and play an important role in defining overall transport behavior of plutonium."[1]

Given the importance of plutonium's oxidation state to its mobility, workers at EPA[27] and others find it necessary for risk assessments to carefully consider all of the factors that may influence oxidation state at a given site. This task is complicated by the fact that the oxidation state of plutonium depends both on how the contaminant was originally formed and released to the environment, as well as on the environmental conditions it is exposed to following placement.[8,9,14,19,20,24,26,27]

Most major plutonium mobility research has found that, in addition to adsorption, a number of other processes are known to be important to determine plutonium mobility. These processes include such things as changes in the oxidative state of the plutonium through redox transformations[10], transport of plutonium on or in at least seven different types of colloidal particles[25], formation of charged and neutral chemical complexes with even greater mobility, and precipitation or co-precipitation of solid contaminant phases.[10,17,25]

According to Clark, et. al.[4,5], plutonium chemistry is extremely complex. Clark et als found that the dominant aspects of plutonium mobility usually involve carbonate and other complexes that are soluble at levels well above standards, that are mobile and that contribute to movement of plutonium. Plutonium electrochemistry likewise plays an important role resulting in negatively and positively charged complexes[10].

"For example, as discussed in the article "The Chemical Interactions of Actinides in the Environment" (Runde (2000)[20], beginning on page 392) if plutonium is accidentally released into the environment, its chemical properties will determine to a large extent whether its transport will be retarded by precipitation from solution or sorption to a mineral surface or whether it will migrate freely as a soluble molecular species."

More about the importance of the Redox State:
Choppin and Morgenstern[3] conclude that "in most natural systems plutonium is always found in the +4 and +5 oxidation states." And that, "while dissolved plutonium can be in either the +4 or +5 redox state, most adsorbed plutonium is found to be in the +4 redox state. The most important property of plutonium with respect to its environmental behavior (mobility) is its oxidation state because solubility, hydrolysis, complexation, sorption and colloid formation reactions differ significantly from one oxidation state to another."

The +5 and +6 oxidation states have been found to typically be more mobile in groundwater than the +3 or +4 redox states. For example, an 11 year study at the Savannah River Site[10] found that, if the oxidation of plutonium in the environment was not considered, the mobility of the radionuclide would be underestimated by approximately three and a half times. The electrochemistry of plutonium ensures that there will nearly always be several valance states present in equilibrium, resulting in a large fraction of the plutonium being in more mobile valence forms.

Carbonate complexes:
The EPA[27] notes that, "at pH values above 7, the mobility of plutonium can be influenced by concentrations of dissolved carbonate and hydroxyl ions" and that the "hydroxy-carbonate complexes are among the strongest complexes of plutonium known to exist in the environment. These complexes can inhibit the adsorption of plutonium, and thus increase its mobility in the +4 and +5 oxidation states". The EPA concludes that "These data suggest that plutonium would be most mobile in high pH carbonate-rich ground waters (like Hanford)."[27]

Carbonate and bicarbonate are common anions present in significant concentrations in many natural water environments (Clark et al. 1995[5]). They are exceptionally strong complexing agents for plutonium and the actinide ions in general. Ions (plutonium) that normally exhibit quite low solubilities in near-neutral solutions can be complexed by carbonate ligands and, through the formation of anionic complexes, become much more soluble. Carbonate complexes have an important role in the migration of plutonium ions from a nuclear waste repository or an unplanned release contamination.

The plutonyl-carbonate system can also be quite complicated in that it consists of several different complex ions in equilibrium with one another and with the aqeous ion or hydrolyzed species, depending on solution conditions. Under dilute solution conditions, compounds of composition $PuO_2(CO_3)_{0(aq)}$, $PuO_2(CO_3)_2^{2-}$, and $PuO_2(CO_3)_3^{4-}$ have all been reported (Clark 2000[4]). These reported compounds all have varying amounts of solubility and mobility in the natural environment.

Organic complexes:
Dissolved plutonium also forms complexes with many naturally occurring organic ligands such as acetate, citrate, formate, fulvate, humate, lactate, oxalate, and tartrate; as well as with synthetic organic ligands

such as EDTA and 8-hydroxyquinoline derivatives.[5] Though the naturally occurring ligands, humate and fulvate are mildly acidic, their principal impact on plutonium mobility is through complexation resulting in neutral or mildly charged dissolved complexes or organic colloids.[4]
Rai, Serne and Moore[18] suggested that the degradation of organic agents originally in the waste will have changed the environmental chemistry of plutonium, probably resulting in inhomogeneous migration of plutonium over time.

About nano-particles and colloidal mobilization:
Thorsten Schafer[22] reported at the MIGRATION 2009 conference in Kennewick, Washington that it has been demonstrated at several hydrogeological sites in Europe and North America that the mobility of natural or artificially introduced strongly sorbing radionuclides can be enhanced under certain hydrogeochemical conditions by the presence of mobile colloids or the more *en vogue* nanoparticles. Wilson and Soderholm[29] of the Argonne National Laboratory said "Colloidal metal oxide phases are known to have significant roles in transport and migration of metal contaminants in the environment. Recently published studies have demonstrated the association of plutonium with geochemical colloidal phases is responsible for enhanced transport of plutonium in groundwater systems. Much less understood is the role that eigencolloids (or nanoparticles) of plutonium oxide have in subsurface water transport."

Soderholm et al[25] also report that plutonium and other light actinides (thorium, uranium and neptunium) naturally and spontaneously form nanometer scale clusters which are negatively charged, stable, fairly soluble, and very mobile. These form the basis of what was formerly called "plutonium polymer" when formed in high concentration from disposed strong acid solutions.
Work at Lawrence Livermore National Laboratory[28] demonstrates that colloid-like nanoparticles in groundwater have been shown to facilitate migration of several radionuclides: plutonium, Cesium, Europium and Cobalt. However, the exact type of nanoparticles and the speciation of the associated radionuclides have remained unknown. These chemical associations with nano-scale particles in the size range <100nm may facilitate transport, and may be responsible for the migration of fissiogenic and actinide elements in groundwater.[18]

Laboratory batch and column experiments at Los Alamos National Laboratory[2] evaluating the generation of calcite colloids and the transport of Pu(VI) by such colloids through saturated alluvium revealed that colloid generation is strongly influenced by flow transects. During the first ~60 days of flushing, as the flow rate increased by a factor of 12, colloid generation increased by a factor of ~6, while increasing the flow rate by a factor of ~3 doubled the colloid generation rate. Results of these experiments indicated that Pu(VI) sorption onto the calcite colloids is strong and almost instantaneous. This in turn suggests a significant potential for colloidal-facilitated transport of Pu(VI) under the hydrogeochemical conditions investigated so far.

Recent field studies by Lawrence Livermore National Laboratories[28] have demonstrated subsurface transport of plutonium over kilometer length scales where the plutonium is associated with colloidal particles and not with the dissolved fraction. Yet, despite these observations and a body of experimental and modeling studies, a comprehensive understanding of the mechanism of colloid-facilitated transport of plutonium remains elusive.

Penrose et al. in a study published in 1990[15] at Los Alamos National Laboratory as part of the DOE's Subsurface Science Program found that colloidal transport of plutonium was important. Plutonium and

americium were found in samples drawn from wells as far as 3.39 kilometers down gradient from the point at which waste was discharged into Mortandad Canyon.

The potential for colloidal transport to affect the mobility of contaminants like plutonium was recognized more than 50 years ago. While the colloid transport pathway has been known for some time, the interest of researchers in the ability for colloids to enhance the mobility of plutonium in the environment was heightened by the discovery that plutonium from at least one nuclear weapons test at the Nevada Test Site had migrated as much as 1.3 kilometers in approximately 30 years[11,12]. Kersting et al., the researchers who reported this discovery, concluded that "models that either predict limited transport or do not allow for colloid-facilitated transport significantly underestimate the extent of radionuclide migration." Additional experiments have affirmed the conclusion that the mobility of plutonium and other transuranic elements could be much higher than earlier models would have predicted due to adsorption on colloids.[1,6,13,16,21,22,23,25,28,29]

In addition to the findings of Kersting et al. at the Nevada Test Site, Santschi et al.[21] at Rocky Flats found that most of the ^{239}Pu, ^{240}Pu and ^{241}Am transported from contaminated soils to streams occurred in the particulate and colloidal phases. They went on to conclude that colloidal plutonium formation can be one of the most important vectors for enhancing plutonium dispersion at Rocky Flats. Santschi et al.[21] found that at Rocky Flats the mobile plutonium was associated with organic (humic or fulvic) rather than with the more abundant inorganic (iron oxide and clay) colloids and that remobilization of colloid-bound plutonium during soil erosion events was enhanced by the presence of humic and fulvic acids.
The U.S. EPA noted that the oxidation state of dissolved plutonium has itself been found to be dependent on the colloidal organic carbon content in the system.[27]

Choppin and Morgenstern[3] note that the mechanism of the formation of actinide associative colloids has been shown to be closely related to the hydrolysis of the actinide ions" and the strong tendency for plutonium in the +4 oxidation state to undergo hydrolysis thus favors its sorption onto colloidal particles. Additionally, under the environmental conditions present in Hanford soil waters (circa a pH of 8.5 and redox of 0.5 with substantial carbonate), the expected dominant valence state for plutonium is the more mobile pentavalent V state, rather than the less mobile tetravalent IV state. This increases the proportion of plutonium in the environment that would be expected to be in sparingly soluble anionic carbonate complex forms at solution concentrations well above the appropriate health protection and environmental standards.[10,17,20]

The findings presented above are but a selected few of the many articles and thoughts available from DOE National Laboratories, U.S. University researchers and respected actinide chemists from around the world. The overall opinion that is repeatedly articulated is that plutonium, whether by chemical-compound, valence changes, or attachment to colloids and nanoparticles, is mobile in the natural environment.

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Commenter #120
Hanford Challenge

Comment:
Comments of
Hanford Challenge
Plutonium and Cesium Cleanup on Hanford's Central Plateau
Background:
Hanford is a 586 square mile nuclear waste site in southeastern Washington. Hanford's contamination is a remnant of WWII and Cold War plutonium production for atomic weapons. The U.S. taxpayer has spent an estimated $5.5 trillion to produce its nuclear arsenal, according to the Brookings Institute.[1]

[1] *Atomic Audit, TheCosts and Consequences of U.S. Nuclear Weapons Since 1940*, Stephen I. Schwartz, Brookings Institution Press, 1998.

This comment is in response to the Department Of Energy's (DOE) proposal that outlines the cleanup options for 22 waste sites that are within the boundaries of 4 "operable units" in the 200 area of the Hanford Site. The operable units are called PW – 1, 3, and 6 and CW-5. The 22 waste sites are grouped into 6 waste groups based on the type of liquid waste they received. The proposal shows different options for cleaning up these waste sites and the preferences of DOE's favorites. These options are listed by waste group.

The draft "Proposed Plan for the Remediation of the 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units" (Draft Plan) discusses the proposed remediation of 22 waste sites within the 200 Area of the Central Plateau. The 200-PW-3 Operable Unit (Cesium Sites) includes four Plutonium Uranium Extraction Plant cribs and one unplanned release, all containing primarily cesium-137 in the 200 East Area.

The contamination came from liquid waste that was generated during plutonium production in various buildings on the Central Plateau. The contamination contains both plutonium and radioactive cesium. Plutonium-239 has a half-life of 24,100 years, and will be dangerous for 240,000 years. Cesium-137 has a half-life of 30 years, and will be dangerous for 300 years.

Hanford Challenge is concerned about the health dangers of plutonium and cesium, both of which present health concerns when people are exposed to these elements, even in microscopic quantities. As for plutonium-229, a quarter of a million years may as well be "forever." We need to ensure that future generations are protected from these contaminants. Picking the most protective cleanup option and putting the contamination in a location that is isolated from the biosphere is the only ethical and defensible option. For a point of reference, what is now known as the Hanford Site was under 200 feet of water resulting from glacial flooding 14,000 years ago. These incidents of glacial flooding are historical events that have occurred hundreds of times in the past hundreds of thousands of years. We therefore can fully anticipate that within the foreseeable future, an episode of glacial flooding will occur again, likely mobilizing whatever contaminants remain on the Hanford site. The U.S. Geological Service website states,

"The glacial lake, at its maximum height and extent, contained more than 500 cubic miles of water. When Glacial Lake Missoula burst through the ice dam and exploded downstream, it did so at a rate 10 times the combined flow of all the rivers of the world. This towering mass of water and ice literally shook the ground as it thundered towards the Pacific Ocean, stripping away thick soils and cutting deep canyons in the underlying bedrock. With flood waters roaring across the landscape at speeds approaching 65 miles per hour, the lake would have drained in as little as 48 hours."

DOE's Proposal Outlines the Following Cleanup Options:
No Action: *Leave the waste where it lies. Do nothing.*
Maintain and Enhance the Existing Soil Cover: *Add more soil and plants. Landscape the top of the waste site.*

Engineered Safety Barrier*: Leave the contamination where it is, but with a barrier of basalt rock at least 15ft deep separating the contaminated soil from the surface soil.*
In Situ Vitrification: *Melt the contaminated soil together with glass and put it back in the ground and cover it with clean soil.*

Removal Treatment and Disposal (RTD): *Remove a portion of the waste*, treat it when necessary, and dispose of it at either Hanford's Environmental Restoration Disposal Facility, which is a large lined landfill on the Central Plateau, or send it to New Mexico's Waste Isolation Pilot Project where deep salt caverns are used to store plutonium contaminated waste. Removing a portion of the waste is defined in the 4 following ways:*
- *removal of the top 2ft of contaminated soil,*
- *removal of the top 15ft of contaminated soil,*
- *removing soil until a certain concentration of the plutonium is gone,*
- *removing soil with concentrations resulting in a direct contact risk greater than a one cancer per one thousand exposure risk level.*

DOE's Preferred Alternative:
***Z-Ditches**: Remove, Treat and Dispose (RTD) of waste and dispose of it at Hanford's lined landfill (ERDF).*

***High-Salt**: Remove, Treat and Dispose (RTD) 2ft of contaminated soil and send it to New Mexico's salt caverns at WIPP.*

***Low-Salt:** Remove, Treat and Dispose (RTD) what DOE estimates will be 90% of the plutonium and send it to New Mexico's salt caverns at WIPP.*

***Cesium-137: Maintain and Enhance the Existing Soil Cover,** expensive landscaping.*
***Settling Tanks**: **Remove, Treat and Dispose (RTD)** of sludge from the tanks send to WIPP or ERDF depending on what they find. Stabilize the tanks.*

***Pipelines: Remove, Treat and Dispose (RTD)** Dig them up and assess the soil underneath the pipes to see if they have leaked.*

DOE's Preferred Alternative Scenario Would:
Leave more than 50% of the plutonium in the soil.
Leave the Cesium and put a dirt cap over the sites containing Cesium.

Hanford Challenge Comments
Hanford Challenge disagrees with the preferred alternatives chosen by DOE. At the public hearings on these matters, agency representatives attempted to assure the public that these sites would be safeguarded for "as long as the plutonium is dangerous." It is a considerable stretch to base a cleanup decision based upon the predicted institutional presence for a period exceeding one hundred years, and downright ludicrous to postulate a governmental presence for thousands of years. A quarter of a million years ago, there were no humans on the planet. Language itself is a few thousand years old.

The goals of this cleanup are sometimes difficult to understand. On the one hand, making Hanford safe for future generations is obviously important, but it seems like short term monetary concerns and time constraints get in the way of truly cleaning up Hanford. It may be a lot easier to dump the nuclear waste in a ditch on site, and for some of the waste that will probably be fine. But with waste like plutonium, which will in all likelihood outlive any man made safety features, a different solution, like moving it to the Waste Isolation Pilot Project, should be given a higher priority, even if it is more expensive.

Hanford Challenge urges the government to remove, treat and dispose of as much of the plutonium and cesium contamination as possible contained in the 21 burial grounds, regardless of how deep the contamination is found.

Hanford Challenge is a member of the Hanford Advisory Board, and as such agrees with and supports the advice to the Department of Energy as stated in its June 3, 2011 letter to the Department, which states on pages 2 and 3:
"Advice

• The Board advises the U.S. Department of Energy (DOE) to get as much plutonium out of these waste sites as possible.

• The Board advises DOE to implement a RTD policy for plutonium that emphasizes remediation of plutonium disposal sites. DOE policy should opt to ship eligible plutonium-contaminated soil to WIPP for geological disposal, permanently removing it from Hanford.

• The Board advises DOE to utilize a RTD approach when a high concentration of a radionuclide exists. This approach is consistent with established Board values.

• The Board advises basing remedial design for cleanup of technetium and nitrates upon increased characterization. Extensive sampling is needed to determine the location and extent of technetium and nitrate contamination. This characterization should coincide with remediation efforts.

• The Board advises a policy to conduct RTD concurrently with vapor extraction efforts to ensure meeting Tri-Party Agreement milestones.

• The Board advises the proximity of cesium-137 to the surface necessitates implementing an RTD approach in order to dispose of cesium into the ERDF burial ground.

• The Board advises the Tri-Party agencies to hold public meetings to discuss the draft "Proposed Plan for the Remediation of the 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units."

Hanford Challenge adopts and repeats these sound pieces of advice as our own, and incorporates this advice into our comments.

Sincerely yours,

Tom Carpenter, Executive Director
Hanford Challenge
September 6, 2011

Commenter #121
Heart of America Northwest and Heart of America Northwest Research Center
Comment:

Heart of America Northwest

The Public's Voice for Hanford Cleanup

1314 NE 56th St Suite 100 - Seattle, Wa 98105

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"Clean-Up, Not Cover-Up" Hanford's Plutonium Liquid Waste Discharge Sites on the Central Plateau

Sites have enough Plutonium to make 70 Nuclear Weapons!

Comments of Heart of America Northwest and Heart of America Northwest Research Center Submitted to USDOE, USEPA, WA Ecology (Tri-Party Agreement [TPA] agencies) September 6, 2011 on the USDOE's *"Proposed Plan for the Remediation of the 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units."*

We urge in summary:

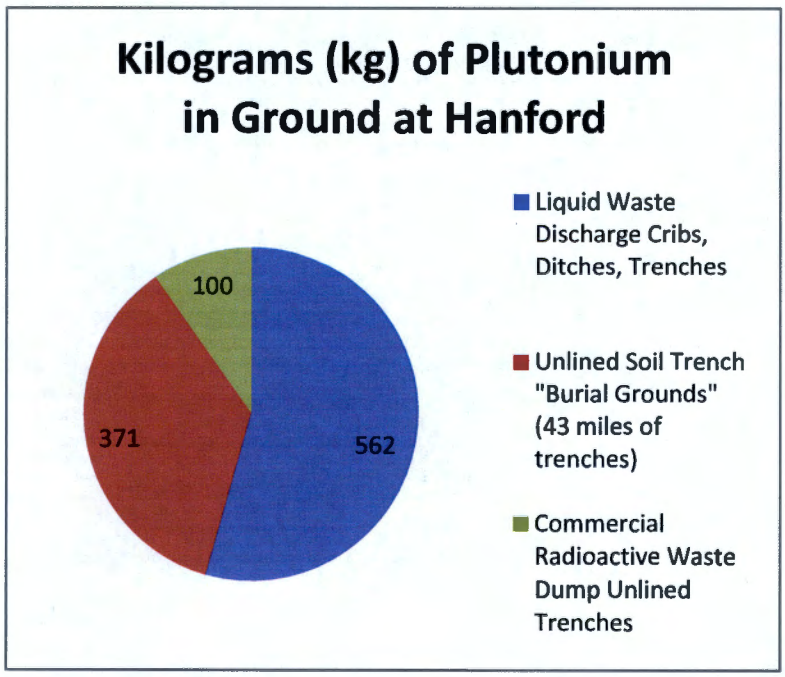
- *EPA and WA Ecology require that Plutonium, Cesium other radionuclides and chemicals be dug up and removed at all sites, not stopping at 2' or 15'.*
- *Plutonium which is dug up should be sent to a geologic repository.*
- *EPA apply the same cleanup standard to the Plutonium in the soil at Hanford as USDOE is required to meet at Lawrence Livermore National Lab in California and at Johnson Atoll in the Pacific. USDOE proposes to use a cleanup "guide" level that would leave 1,000 times more Plutonium in the soil than these other sites!*
- *Washington State and federal hazardous waste laws must be met, including for retrieval of hazardous wastes (not abandonment under caps) and "closure" with removal of settling tanks*
- *That the serious public involvement and notice inadequacies in this comment period provide a guide to revising the Hanford Cleanup Public Involvement Plan to ensure these barriers to public review and comment are not repeated.*

Background:

Starting in the 1940's, the federal Energy Department (USDOE) created tremendous volumes of liquid waste from the production of plutonium at various plants on Hanford's Central Plateau for our nation's nuclear weapons program. These liquid waste discharges were billions of gallons – equal to days of flow of the Columbia River. The Central Plateau is where long-term waste management and cleanup has and will undoubtedly last for decades. The proposed plan covers just 21 waste sites on the Central Plateau. Soil and groundwater have been contaminated at Hanford and the overall health of humans and the environment is at risk. The plan provides cleanup options for the waste sites and lists the preferred plan from the Energy Department for the waste sites.

In sum, the proposed plan would "cover-up" with dirt, rather than clean-up, massive amounts of Plutonium, highly radioactive Cesium, and a slew of toxic chemicals.

The proposed plan also fails to consider the combined ("cumulative") impact of numerous other waste sites and landfills on the Central Plateau with similar wastes. In total, all the different types of waste sites on the Central Plateau have enough Plutonium to make 130 nuclear weapons. Thus, whatever is decided for these liquid waste discharge sites, will set a precedent for future decisions... The total cumulative impact and risk will be far greater than just the risk from these waste sites if USDOE is allowed to leave half of the Plutonium and all of the Cesium and chemicals at many of these waste sites:



Quantity of Plutonium (Pu) required to make one nuclear weapon: 8 Kg[i]

The liquid waste discharge "cribs", ditches, "French drains" & trenches on Hanford's Central Plateau have enough Plutonium (Pu) to make 70 nuclear weapons.[ii]

43 miles of unlined soil trenches ("burial grounds") into which "solid" radioactive & chemical wastes were dumped have enough Plutonium to make another 46 nuclear weapons. USDOE is supposed to submit a cleanup plan for the trenches in 2017.

The leaking, unlined commercial radioactive waste dump, run by "US Ecology, Inc.") for WA State, has 12 A-Bombs' worth of Plutonium. WA State has also proposed leaving wastes under a dirt cap, instead of finding where wastes are and removing.

USDOE's proposed cleanup plans:

Plutonium Discharge cribs and trenches:
- Remove only contamination 2' below the bottom of the trench or drain in "High Salt" waste sites with chemicals as well as Pu. *Would leave more than 50% of the Pu in the soil below.* The Pu left below is the more mobile Pu which has already shown it will move through soil due to solvents and "preferential pathways". At "low salt" (low chemical solvent) sites, 90% of Pu would be removed by digging deeper.

PW-3 Cesium (highly radioactive) Sites in 200 East Area (see map, over):
- *leave the Cesium and put a dirt cap over the sites.* Cs137 has a 30 year half-life. Most radioactivity will be gone in 300 years. Organic chemicals, other radionuclides would remain. Rejected alternative to remove 15' deep.

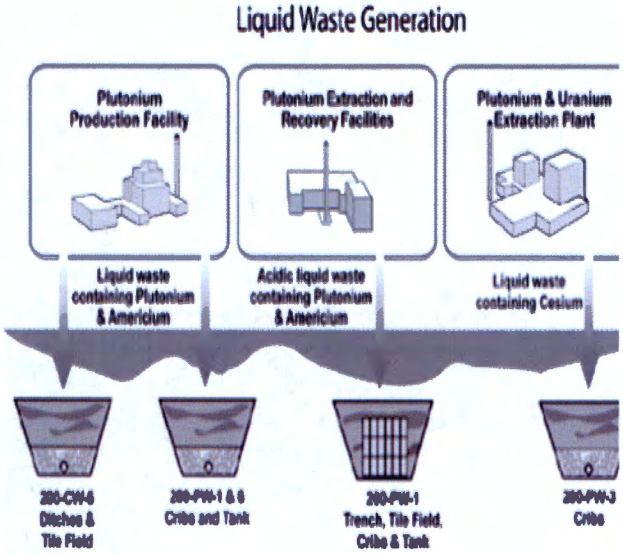
Tanks with Plutonium, Americium and chemical sludges:
- remove contents, leave tanks in place and redispose waste without treatment. Leaving tanks or landfilling wastes designated "extremely hazardous waste" violates WA State hazardous waste law. Agencies seek to circumvent using federal Superfund rules rather than closing with cleanup under WA and federal hazardous waste laws. State hazardous waste laws require characterizing wastes remaining, monitoring, and removal of waste to extent practicable as remedy.

Heart of America Northwest and Heart of America Northwest Research Center (HoANW) along with the Hanford Advisory Board (6-3-2011) strongly urge adoption of Remove, Treat and Dispose remedies – not leaving Plutonium, other radionuclides and chemicals in near surface soils. *This decision will also be a precedent for the 43 miles of unlined trench "burial grounds."*

Despite inadequate public notice, increasingly large numbers of concerned people came to the public hearings as HoANW increased public awareness of the proposal and its impacts. In Portland, the final hearing, the crowd overflowed the meeting room – and, the public called for real cleanup and overwhelmingly(indeed, unanimously) called for the

regulators to reject the Energy Department's plans, even after hearing the Energy Department fully explain and seek to justify those plans.

These comments are accompanied by a PowerPoint presentation, which is an integral part of our comments for the agencies to consider and respond to.



200-CW-5, 200-PW-1, and 200-PW-6 are located in the 200 West Area and 200-PW-3 is located in the 200 East Area. The 200 Area contains approximately 800 waste sites and includes waste management facilities and inactive processing and finishing plants used during plutonium production. (TPA agency description and graphics). The 43 miles of unlined ditches with another 371 Kg of Plutonium are located along the western side of the 200W area and the northern sides of 200 W and 200E. The leaking, unlined soil trenches of the commercial radioactive waste dump, with another 100 kg of Pu, are in the corridor between the 200 E and W areas

The Notice and Public Comment Period Were Inadequate, and the Comment Period Should Continue With Renewed Notice and Additional Information – and the Hanford Public Involvement Plan (Community Relations Plan) should be revised to prevent his from recurring.

1. The TPA agencies failed to provide the minimum thirty days of public notice of when and where hearings / meetings will be as prescribed in the TPA Community Relations Plan (CRP at Page 4). The CRP is a legally binding public involvement plan, and can not be blithely ignored for the convenience of agencies.

The need for giving 30 to 45 days of minimum notice was well illustrated for this comment period.

The agencies provided less than 19 days from their announcement that they would hold meetings. Indeed, the TPA email announcement was only sent on July 5, 2011 for the first meeting on July 19th.

Without 30 to 45 days of notice of the hearings, it was impossible for HoANW to prepare and mail one of our highly regarded Citizens" Guides to the public informing people how their values would be affected by the proposal and informing people of the results of any independent analyses.

The majority of all public attendance at these hearings, and other recent hearings, has been due to the combination of HoANW and HoANWRC's efforts with mailed Citizens' Guides, emailed versions of our Guides, phone banking, social media (with links to Guides), pre-meeting workshops, and media outreach.

The attendance increased dramatically from the first hearings in Richland and Seattle to the latter ones in Hood River and Portland (with over 80 overflowing the room), because we were able to do more of these notice and involvement efforts, including phoning and mailing (first class due to the time it takes to send bulk mailings would have meant that our Guide would not have arrived before the hearings).

Not providing at least 30 days of advance notice before the hearings is inexcusable. The comment period should be extended for this reason, as well as due to the legally inadequate opportunity to review key documents.

It takes longer than 30 days to review thousands of pages of documents and prepare a Citizens' Guide and workshops for the public.

As discussed below, key documents were not made available until AFTER the public meetings were half over. This prevented us from providing the public with the full information that the public deserved to have access to and summarized in workshops, Citizens' Guides and opening presentations at the hearings / meetings.

2. No one in the public should be expected to take note of, or comment upon, notices about: *"Proposed Plan for the Remediation of the 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units."*

By insisting on keeping the waste sites organized for public comment based on arcane designations, even extremely knowledgeable Hanford cleanup advocates could

not track which units and sites were described from which alternative. There was no reason not to have the public comment on waste sites by practical description, e.g., settling tanks; Cesium discharge sites; Plutonium discharge trenches. The agencies should take comments based on the practical descriptions, not the artificially imposed groupings of alternatives by "unit".

3. The extension given at our request due to USDOE's failure to provide access to the key documents with the proposed plan, study of alternatives ("Feasibility Studies") and results of the so-called "investigations" was inadequate and did not make up for the fact that we were deprived of access to the key records before the hearings.

This prevented us from fully exposing to the public and news media how the proposal is built upon characterization of sites that was done decades ago, and did not conform to modern era hazardous waste laws regarding investigation, characterization and designation of wastes.

All key documents should be provided to the public with easy access on line prior to the start of the formal comment period. This should be firmly established in the Community Relations Plan, when it is updated this year.

For this comment period, the link provided to access the key documents in the TPA Fact Sheet was broken or mistyped. However, even with the link to the Administrative Record, the formal Administrative Record is so poorly maintained by USDOE that finding documents is a herculean task. Indeed, it appears that USDOE has no interest in providing simple searchable indices for each unit.

Thus, we were deprived until recently of the opportunity to review the key Remedial Investigation and Feasibility Study documents, which do not support the Proposed Plan

and do not meet minimal legal requirements. Only with EPA's personal assistance (which we appreciated) was one of our legal interns able to find and obtain access to the sampling report for the Settling Tanks, which are a key part of the Proposed Plan. (Indeed, the pipeline characterization report for the pipelines which fed the tanks, which was stated to be attached, was not attached and we have been unable to review it to review what was actually sent into the tanks).

The Sampling Report could not have been found by anyone looking for it if they did not know exactly when it was issued and what it was entitled. This is not surprising, because, as our comments detail below, the report on the settling tanks reveals that USDOE's claims of characterization of the tanks in recent years was misleading at best; the settling tanks should be subject to formal legal closure pursuant to RCRA and HWMA (federal and state hazardous waste laws applicable to any tank or unit in which wastes were stored, managed, treated or disposed after 1985 at the latest); and, that the characterization fails to meet those hazardous waste law and CERCLA standards.

4. What's in these liquid waste discharge sites? You won't find this info by reading the agencies' guide or the "Proposed Plan" prepared by USDOE

Again, the notice and information were seriously inadequate.

Information about the contaminants was not provided in a manner understandable to the public:

- The liquid waste discharge "cribs", ditches, "French drains" & trenches on Hanford's Central Plateau have enough Plutonium (Pu) to make 70 nuclear weapons
- Plutonium 239 half-life... 24,000 years... Pu is forever

- Highly radioactive Cesium (half-life 30 years)
- Chemicals… metals, carcinogens, neurotoxins, poisons, solvents which are very good at moving Plutonium and other contaminants

5. The public is legally entitled to a cumulative impact analysis of the total cumulative impacts from all the wastes sites in these units and related, similar waste sites on the Central Plateau – this has not been provided.

USDOE issued a draft Tank Closure and Waste Management EIS, which cost $50 million to prepare, in 2010. The draft included a cumulative impact analysis extending out ten thousand years, but it had serious holes and flaws which were commented upon. The Final TCWMEIS has yet to be issued. If it fixes these flaws, it would provide the public and decision makers with the critical information needed to understand if capping and leaving wastes as proposed in this Plan would have unacceptably high impacts in conjunction with similar waste sites.

Without the TCWMEIS, this plan can not legally proceed. Although EPA has interpreted Superfund, CERCLA, as allowing decisions to proceed based on RIFSes being considered as a replacement to the NEPA EIS, the CERCLA documents lack the cumulative impact analyses required, and lack the long term examination of impacts to human health and the environment over ten thousand years.

But we do not need to resolve the dispute over whether CERCLA allows the agencies to replace an EIS with a CERCLA RIFS to have a legal requirement for an EIS apply to these units and waste sites.

These units are subject to formal legal closure under both Washington's Hazardous Waste Management Act (HWMA, RCW Chapte.105) and the federal RCRA hazardous waste law. Many of these units stored and managed hazardous wastes after 1985 subjecting them to RCRA permitting for closure, including the requirements for an EIS under State SEPA (RCW Chapter 43.21C)– indeed, some still store and manage hazardous wastes; e.g., the settling tanks.

The Settling Tanks Should be Removed and Their Removal and "Closure" is Legally Subject to Federal and State Hazardous Waste Laws (RCRA and HWMA), which USDOE's Plan Ignores and Fails to Meet the Standards For:

There are two Settling tanks in the units being considered: 241-Z-361 and 241-Z-8.

The Z-361 tank served as the primary solids settling tank for Low-Salt liquid waste from 1949-1973. Prior to discharge to the tank, the effluent was neutralized in sump tanks by adding fly ash, and later sodium hydroxide. (Pg 104, Remedial Investigation and Feasibility Study [RI-FS])

The Z-8 Tank received wastes from 1955 to 1962, receiving pH neutral effluent waste from back flushes of the RECUPLEX feed filters. Silica gel was added to the waste stream as a settling agent, and the effluent was flushed to the tank with nitric acid. These two tanks played a vital role in the waste management of highly hazardous waste during their operations. (Pg 116, RI-FS)

Proposed Remediation for Settling Tanks:

-Remove the sludge, then grout and backfill the empty tanks

*****Formal Comment: Because these tanks continue to store waste, they are legally subject to formal closure under RCRA.**

This triggers requirements for permitting and an environmental impact statement, including analyses of alternatives and mitigation requirements; as well as subjecting the tanks to formal requirements that they be removed and treated prior to re-disposal.

241-Z-361 Settling Tank

- Last characterized in 1999-2001
- Tank integrity called into question upon inspection in 2000[1]
- There are some cracks in the tank top and some of the reinforcing bar has been damaged
    - No leaks have been reported
- The tank structural integrity cannot be assumed to last indefinitely[2]
- Waste meets definition of a principal threat waste[3]
- Estimated to contain 75m^3 of highly toxic sludge[4]

241-Z-8 Settling Tank

- Last Characterized in 1974 while pumping out majority of waste[5]
- In 1974 approximately 7,285 gallons of waste expected to be in the tank were not accounted for[6]
    - No leak is said to exist, faulty numbers were blamed
- No data on tank integrity
- Estimated to contain 500 gallons of highly toxic sludge[7]

[1]Pg 28 of TPA MILESTONE M-15-37B - Validated Data Packages and Recommendation for Regulatory Path Forward For Remediation of Tank 241-Z-361
[2]IBID
[3]Pg 40 of TPA MILESTONE M-15-37B - Validated Data Packages and Recommendation for Regulatory Path Forward For Remediation of Tank 241-Z-361
[4]Pg 104 of Feasibility Study for the Plutonium/Organic-Rich Process Condensate/Process Waste Group Operable Unit: Includes the 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units
[5]Pg 85 of Feasibility Study for the Plutonium/Organic-Rich Process Condensate/Process Waste Group Operable Unit: Includes the 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units
[6] IBID
[7] IBID

The USDOE has failed to take into account the impact of leaving two highly contaminated settling tanks in the ground at Hanford. The inability to even consider the implications of leaving these tanks in our soil is inexcusable. The FS and RI provide no information as to how a structurally unsound tank will interact with human health and the environment.

In 2000, the waste in the Z-361 tank was characterized as meeting "the definition of a principal threat waste as a highly toxic material in a buried tank, based on the measured plutonium content of the sludge," (Pg 43, TPA) but has remained in the tank since the time of this characterization. Also, the structural integrity of the tank was expected to "remain stable in the near term (less than 5 years), but the continued tank stability in the long term (5-10 years) is uncertain" (Pg 40, TPA). Ten years has passed since this report was written and the waste remains in the tank – with NO FURTHER characterization to base cleanup decisions upon!

The proposed remediation is to remove the sludge and backfill the "empty tank." This seems like a cost driven measure rather than a smart decision. **The tank's integrity has been called into question by the 2000 report and needs to be removed from the ground as soon as possible *ALONG WITH* the sludge.** The tank has been compromised by having high-level nuclear waste and cannot be allowed to stay buried inside the soil at Hanford.

The other Settling tank, Z-8, was **last characterized in 1974** when the tank was initially being emptied of waste. The use of 37 year old characterization reports is not, and should not be, an acceptable standard for the USDOE. The tank's contents need to

be characterized and removed in a timely fashion along with the tank itself. The structural integrity of the tank was not stated in 1974, continues to be unknown, and cannot be assumed. The tank has approximately 500 gallons of highly toxic sludge remaining according to the 1974 records. A large portion of the sludge was shown "to contain 38 grams of plutonium (WIDS) to as much as 1.5 kilograms of plutonium" (Pg 85, FS). This seems to qualify it as a highly toxic material in a buried tank like the sludge in Z-361.

The fact – which USDOE tried to hide from the public by not providing early access to the characterization reports – that the tank was only "characterized" in 1974 means that *the tank has never been characterized for hazardous wastes pursuant to RCRA and the HWMA*. Storing uncharacterized wastes in an unpermitted tank is illegal – and, **these comments provide the agencies with notice of our intent to sue USDOE and its contractors for storing wastes without permits under RCRA and the HWMA, and without characterization, as well as for closure without a permit and meeting closure standards** (if the Plan proceeds to leave the tanks in place and if there is no RCRA compliant characterization and closure performance standards under HWMA are not met).

The remediation focuses solely on the sludge in the tanks and *OMITS THE ENVIRONMENTAL IMPACT* of leaving structurally unsound highly toxic tanks in the soil. The TPA Milestone report admits that "the scope of the milestone is for the sludge only" (Pg 48 TPA). The proposed solution to grout and backfill the empty tank has not been properly researched and therefore cannot be accepted as an option for remediation.

The tanks were not characterized for Washington State Extremely Hazardous Wastes, which are illegal to landfill bury or leave in place under the HWMA.

The fact that wastes remain in the tanks and have continued to be managed, subjects the waste and the tanks to full closure requirements under RCRA and HWMA. These include characterization of the tanks for designation as hazardous wastes, characterization of the quantity and location of all releases, and removal and treatment of both the wastes and the tanks (including subjecting the waste and tanks to Washington's requirements to utilize a permanent remedy, rather than leaving wastes or a tank in the ground).

Washington Law Applies to Closure of the 200-CW-5 Operating Unit as well as the settling tanks in the 200-PW-1 and 6 units:

Washington State's hazardous waste law (HWMA, through which Washington Ecology has delegated authority from EPA to ensure that federal Resource Conservation and Recovery Act (RCRA) standards are met), applies to sites that treat, store, or dispose dangerous wastes after "July 26, 1982, for wastes regulated by 40 CFR Part 261;" or, "October 31, 1984 for wastes designated only by this chapter and not regulated by 40 CFR Part 261...." WAC 173-303-040. Clearly, RCRA applies to the 216-Z-20 Tile Field, into which USDOE disposed dangerous wastes from 1981-1995.

Additionally, RCRA applies to the other Z-Ditches in the 200-CW-5 Operating Unit. Admittedly, the other trenches ceased operation in 1981. However,

70.105D.020 facility: (5) "Facility" means (a) any building, structure, installation, equipment, pipe or pipeline (including any pipe into a sewer or publicly owned treatment works), well, pit, pond, lagoon, impoundment, ditch, landfill, storage container, motor vehicle, rolling stock, vessel, or aircraft, or (b) any site or area where a hazardous substance, other than a consumer product in consumer use, has been deposited, stored, disposed of, or placed, or otherwise come to be located.

Thus, the trenches are facilities subject to RCRA and HWMA closure.

Testing on the 200-CW-5 OU Ditches, as with the Settling Tanks, is Inadequate under Washington Law

A Remedial Investigation must "adequately characterize the areal and vertical distribution and concentrations of hazardous substances in the soil." WAC 170-340-350(7)(c)(iii)(B). However, USDOE has not adequately characterized the soil in the 200-CW-5 OU area — except for one borehole in the two-miles of trenches, USDOE has not collected any data since 1979, as illustrated by Figure 1 (below).

Figure 1: Testing of 200-CW-5 by Year – the trenches are approximately two miles long:

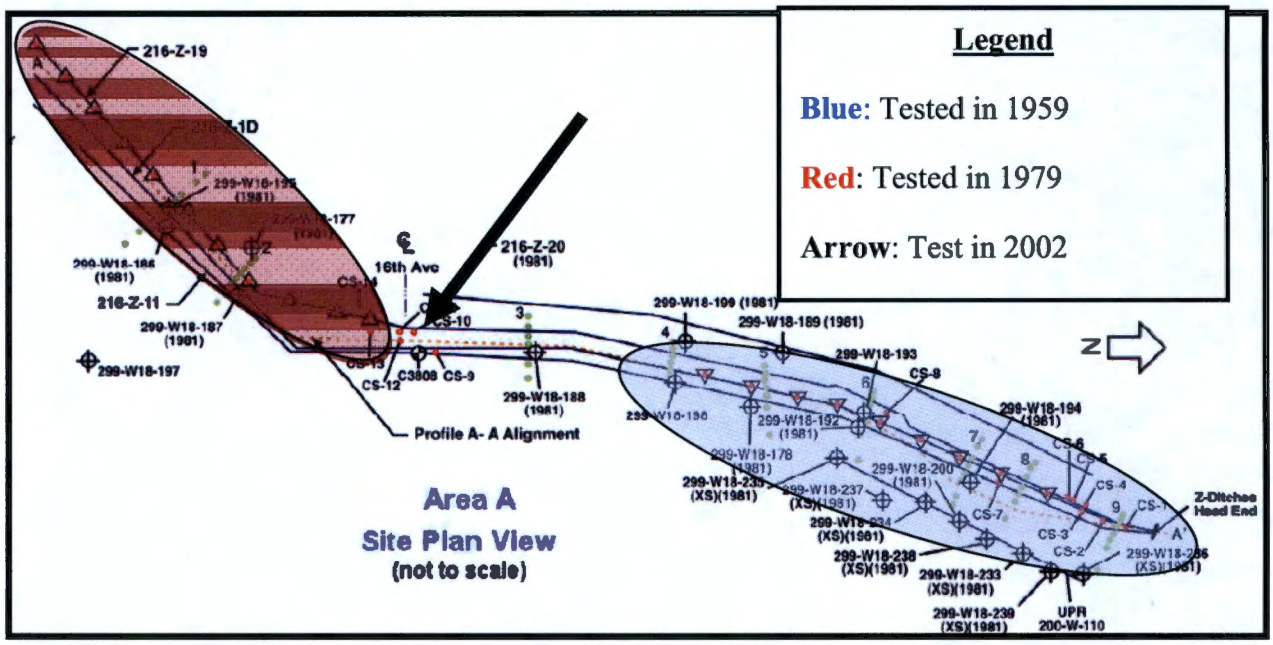


Chart from Feasibility Study for the 200-CW-5 Cooling Water Operating Unit, 2-23

Therefore, while USDOE's characterization of the substances in these ditches states, "Contamination now 1 to 0.6 m (2 ft) deeper at locations sampled before 1981 due to addition of stabilization material," it has no recent data to support this presumption. Feasibility Study for the 200-CW-5 Cooling Water Operating Unit 2-21, Table 2-3. Rather, the testing fails to "characterize the areal and vertical distribution" of the hazardous substances, in violation of WAC 170-340-350(7)(c)(iii)(B).

The fact that Plutonium migrated to 40 to 140 feet beneath the Plutonium cribs, trenches and ditches defeats the claim that Plutonium does not migrate and will not be

subject to "colloidal" transport. The chemicals which assisted in mobilizing the Plutonium to move deeply in the soil within 20 to 30 years of disposal are still there, e.g., Carbon tetrachloride, Tributyl phosphate, TCE....

There is no basis for the claims that the Plutonium has not moved deeper beneath the Z Ditches, and it is irresponsible for USDOE to make such claims without any testing!

- 1959, 1976, and 1979 testing was *only for radionuclides*
- 2002 testing limited to only one "worst case site" along the 2 miles of trenches for radionuclides
- BUT, maximum concentrations for radionuclides all came from 1970s testing – 2002 borehole not worst case at all.

USDOE's own recent draft Tank Closure and Waste Management Environmental Impact Statement (TCWMEIS) is being ignored. For the EIS, USDOE was required to analyze the total cumulative impact to groundwater from all waste sites on Hanford's Central Plateau – and the health of the people who will drink the groundwater for thousands of years.

USDOE projected Plutonium concentration levels in groundwater will rise to 2,660 pCi/L at the edge of the Central Plateau – 177 times the Drinking Water Standard (set at a level projected to cause 1 fatal cancer for every 10,000 adults drinking the water), and nearly 300 times the standard along the Columbia River shore.[iii] Plutonium does move through soil and contaminate groundwater – contrary to the assertions in USDOE's proposed plan. PCBs, Strontium, Cesium, and Carbon Tetrachloride will all spread through soil and to the water. USDOE's response to this concern that the TCWMEIS only projected movement for Plutonium where other contaminants mobilizing Plutonium would be present applies in spades to the units in question.

5 Highly Radioactive Cesium Sites (200-PW-3 in 200 East Area)

- USDOE's proposed cleanup plan:

  Cover-up, not clean-up

- Cover with 15 feet of soil

- "maintenance and/or enhancement of the existing soil cover to ensure that the potential exposure pathways are broken… provide a minimum of 4.6 m (15 ft) of cover over the waste…"
- Cesium in tank farms has migrated all the way to groundwater…
- So why would USDOE or regulators believe the Cesium in these sites won't migrate?
- Why do they believe no one will excavate? The maximum reasonable exposure scenario for all of these units should include the high likelihood that construction excavation, e.g., for utility lines, will breach the unit and go down twenty to thirty feet.

We urge that the Cesium sites be retrieved and wastes treated, not covered up with fifteen feet of dirt!

Plan Ignores State Cleanup Standards

The federal Superfund law allows states to set more rigorous standards, and requires that a federal cleanup plan meet those state standards.

- Washington hazardous waste law applies to hazardous waste dumped or stored after 1985

  Settling Tanks still store waste
- BUT, Proposed Plan only meets federal cleanup standards. The Plan ignores Washington State's requirements that a cleanup plan must choose the most permanent remedy, e.g. removal with treatment, over a remedy that relies on institutional controls and engineering barriers, e.g., the dirt cap.
- The Proposed Plan Falls Magnitudes short of meeting Washington's Cancer Risk standard for wastes that remain at a Superfund site based on the maximum reasonable exposure scenario. For radionuclides, such as Plutonium, Uranium. Strontium 90 and Cesium, the Proposed Plan will not even meet the CERCLA maximum cancer risk of one additional fatal cancer for every 10,000 persons exposed under the maximum reasonable exposure scenario. The Plan misses this even for adult workers in an industrial setting, which is NOT the maximum reasonable exposure scenario for thousands of years. Further, this standard is

supposed to be applied for all potential exposures to all carcinogens – summing the risks from each of the contaminants, rather than just meeting the standard for one at a time.

- For the Z-9 Plutonium ditches, the CW-5 Feasibility Study bases its proposed action on an industrial worker exposure scenario even though the document itself only projects that this is safe or reasonable to assume to be the maximum exposure scenario for the next fifty years:

  "This land use can be reasonably predicted to be the same for the next 50 years, given DOE's current commitment to vitrify waste in the tank farms, and is assumed to remain industrial..." FS at 95.

- Where is the analysis of exposure when Native American tribes exercise treaty rights to utilize the areas immediately adjoining the currently fenced portions of the 200 Area or when future agricultural development or other development comes to the fence line (e.g., air borne transport due to erosion, fire, excavation, animal and plant intrusion...)???

Washington State's standard for all carcinogens is more than ten times as protective as the federal Superfund CERCLA standard. Without applying a numerical standard for Plutonium and numerous other chemicals and radionuclides, the Proposed Plan fails both Washington State and federal Superfund standards. Incredibly, not only does the Proposed Plan fail to set a cleanup level to be met for Plutonium, it does not even propose one for such mobile contaminants which threaten groundwater such as PCBs.

FEDERAL LAW **(Superfund)**		**STATE LAW** **(RCRA/HWMA)**
1 in 10,000	**Maximum Acceptable Cancer Risk** **(# cancers for exposed # people)**	1 in 100,000
No	**RCRA Permit?** **(Permit includes more rigorous public review and comment on changes, and an EIS)**	Yes
No	**Required Reporting of Chemical Quantities, and location / extent of contaminants?**	Yes
Depends on Cost and Other Values	**Permanent Cleanup to the Extent Practicable**	Yes
Less Strict	**Groundwater Monitoring**	Stricter

EPA and Washington State Should Impose the Same Plutonium Cleanup Standard for Soil on Hanford's Central Plateau as USDOE is Required to Meet at Other Sites:

USDOE proposes not to cleanup Plutonium 239 at concentrations below 2,900 pCi/gm (This is called a PRG, or a remediation goal, but it is not even proposed as a standard which is required to be met).

- At Lawrence Livermore National Lab, USDOE is being required to cleanup to levels of 2.5 and 10 pCi/gm… more than 1,000 times more protective than proposed for Hanford's Central Plateau!!!!
- The 2.5 pCi/gm standard is for areas with a reasonably foreseeable public exposure (e.g., residential or Tribal), and the 10 pCi.gm is for areas where USDOE says the maximum reasonable exposure scenario is for adult workers in an industrial zone. USDOE claims that the Hanford Central Plateau can be foreseen to be kept industrial with only adult worker exposures for the next 24,000 years. This is NOT Reasonable!

Site	Johnson Atoll	Rocky Flats (CO) (1996)	Rocky Flats (2002)	Lawrence Livermore National Lab (CA)	Hanford (1997 plan along River)	Hanford's USDOE Proposal 2011 for Central Plateau
Clean-Up Level in pCi/gm soil	2.1 to 210	252	116	2.5 Or 10	35	2,900

Basis	10-6 to 10-4 risk to wildlife researcher (1 in 1 million to 1 in 10,000 risk of fatal cancer)	15 mrem/yr dose to resident	10-5 risk to refuge worker	Resident (2.5); Industrial/office worker (10)	15 mrem/yr dose to resident (8 in 10,000 risk of fatal cancer in adults)	Industrial worker

- Source for columns 1,2,3,5: Carl Spreng, CO Dept. of Public Health and Environment http://www.nga.org/files/live/sites/NGA/files/pdf/1105FFTFSPRENG.PDF;jsessionid=1406BF3A0765CE479D4BF1FAC53D1E83_National Governors' Association 2011 Spring Meeting

Under USDOE's proposed plan there would be no true Plutonium cleanup standard applied at all for these units. Rather than meet any numeric standard, USDOE would only be required to dig up to the proposed depth or leave waste under dirt (although if Plutonium is at the surface, the lack of a standard will lead to a fight over whether and to what degree it would have to be cleaned up)).

- Proposed Plan claims that Plutonium is not a threat to groundwater, so has no cleanup level based on protecting groundwater and the people who will drink the groundwater for thousands of years.
- Same for Cesium, Strontium, PCBs
- (see Table 5, Proposed Plan, Preliminary Remediation Goals, ftnte a)
- Ignores fact that Plutonium is already 100 feet deep beneath some sites

"Data on how readily plutonium sorbs to the surface of soil particles (the partition coefficient or Kd value) is an essential element in understanding its long-term migration.

The higher the Kd value the more readily plutonium is held up. 53 DOE's site model uses a Kd value of 150 even though most of the Kd values measured at Hanford are below 10. 54 The model also does not account for the different chemical states of plutonium in the soil, lateral movement..." Alvarez Analysis (2010).

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We Urge that the same standard for cleanup of Plutonium be adopted at Hanford as is being used at Lawrence Livermore National Lab, and that groundwater protective cleanup standards be applied to all soil contamination for Cesium, Strontium, PCBs and all chemicals and radionuclides, including Uranium as a toxic metal.

We urge that USDOE be required to perform a full investigation of the chemicals and radionuclides in and under all of the waste sites—not rely on data from 40 years ago!

Every waste site needs actual characterization of the quantity and extent of contaminants, unless USDOE is agreeing to move in to retrieve the wastes to meet numeric cleanup levels which are protective of human health and the environment (e.g., the same Plutonium cleanup level being applied at Lawrence Livermore National Lab). Cost is not an excuse, as USDOE was able to cleanup to a Plutonium cleanup level of 35 pCi.gm in the 100 Areas along the River Corridor at reasonable cost.

How should Plutonium (Pu) be disposed?

Plutonium should not be "mixed" with other dirt to be reburied in the ERDF cleanup landfill at Hanford (shown on map above in corridor between 200 E and W areas). Plutonium 239, with a half-life of 24,000 years, **needs to be buried in deep underground repositories,** where it can be isolated from the environment for tens of thousands of years. Starting in 1970, federal rules said all Plutonium and other long-lived "Transuranic" (TRU) elements (e.g., Americium) should go to a deep underground repository. USDOE operates such a repository in salt mines near Carlsbad, NM (the WIPP site). However, the quantity of TRU and Pu wastes in the soils at Hanford and

other USDOE sites far exceed WIPP's legal capacity limit. Instead of considering another repository, USDOE wants to either abandon Pu and TRU in the soil or mix it with other soil so it is below the legal limit for removal to WIPP and then rebury it in the cleanup landfill (ERDF) in the center of Hanford. In USDOE's proposed cleanup decision, the cost of removal and burial to WIPP and the lack of capacity at WIPP are major factors driving USDOE and EPA to propose leaving Plutonium in the soil at Hanford or mixing it and reburying it in the central Hanford ERDF landfill. The cost comparison – for purposes of decision making in the RI/FS and CERCLA process should include the costs of cleanup alternatives at Hanford, NOT including the fully burdened costs of disposal of TRU waste in the WIPP repository. Those costs are borne by a separate USDOE program and the sunk / capital costs are incurred regardless of whether or not the Plutonium in these units is exhumed and sent to WIPP or another hypothetical repository.

Bottom Line: Plutonium does not belong in surface landfills any more than it belongs in the old Plutonium cribs and ditches.

"In 2000, the National Academy of Science challenged the DOE's approach to leaving Plutonium under caps or in surface landfills, and concluded that:

> **'Institutional controls will fail [emphasis added].** Past experience with such measures suggests, however, that failures are likely to occur, possibly in the near term, and that humans and environmental resources will be put at risk as a result.'

A recent estimate by the DOE underscores the Academy's concern and finds that plutonium in groundwater from dump sites at Hanford could reach the near shore of the Columbia River in less than 1,000 years at concentrations 283 times greater than the federal drinking water standard."[iv]

In closing: clean-up, don't cover-up!!!

Sources for Section on Characterization of Settling Tanks and CW-5 Ditches:

TPA MILESTONE M-15-37B - Validated Data Packages and Recommendation for Regulatory Path Forward For Remediation of Tank 241-Z-361

Feasibility Study for the Plutonium/Organic-Rich Process Condensate/Process Waste Group Operable Unit: Includes the 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units

Fact Sheet: Reference Guide on the Proposed Plan for the Remediation of Waste Sites in Hanford's Central Plateau

DOE/RL-2009-117: Proposed Plan for the Remediation of the 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units

****200-W-205-PL and 200-W-220-PL are pipelines connected to the settling tanks. The pipeline characterization and remediation information is said to be listed in Appendix H (NOT ATTACHED TO DOCUMENT).

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[i] Source: International Atomic Energy Agency definition threshold amount, which includes amount lost in processing for use in the weapon.

[ii] Sources for quantities of Plutonium and other wastes in waste sites include: PNNL-15829, Rev. 0 "Inventory Data Package for Hanford Assessments", (Pacific Northwest National Lab, June, 2006);" Plutonium Wastes from the U.S. Nuclear Weapons Comple", Robert Alvarez, Senior Scholar, Institute for Policy Studies, Washington, D.C. July 5, 2010; "Large Quantities Lost: Plutonium and Transuranic Waste at Hanford", Heart of America Northwest Research Center, 2004.

[iii] Draft TCWMEIS Table U-2.

[iv] Source: Robert Alvarez, citing same TCWMEIS data presented in this presentation

Commenter #122
Fish and Wildlife Service

Comment:
The U.S. Fish and Wildlife Service (Service) appreciates the opportunity to comment on the Proposed Plan for the Remediation of the 200-CW-5, 200-PW-1, 200-PW-3, and 200-PW-6 Operable Units. Although personnel and time limit a thorough review, as with other actions on the Hanford site, we support the RTD of wastes on site and discourage capping waste in place.

The proposed plan preferred alternatives, in general, will leave waste in place in several instances. This is based, in part, on the results of the screening-level ecological risk assessment where contaminants below the biologically active zone (i.e. 15 feet bgs) are not considered to be biologically available. See for example page B.1: "The Hanford Site-specific data indicate the shallow-zone soil (<4.6 m [15 ft) bgs) is the primary contaminated medium of concern for ecological receptors. Waste sites were considered inaccessible to ecological receptors under either current or future conditions if the contamination was

deeper than 4.6 m (15 ft) bgs." The Service is concerned with this assumption and believes it is inappropriate and not supported by the best available science. We encourage the Department of Energy (DOE) to consider contaminants deeper than 15 feet below ground surface as potentially biologically available for the reasons outlined in our detailed comments (attached). Since the decisions to stop removal at a shallower depth were made, in part, on an assumption that there will be no reduced risk and thus no additional benefit compared to the added cost of deeper excavation, we feel it is important to revisit risk decisions based on the assumption of no bioavailability of contaminants at depths greater than 15 feet bgs. Additional on-site studies of rooting depth may be necessary.

Commenter #123

Lisa Rife

Comment:

To whom it may (or should) concern,

We have been trying to address the serious problem that has resulted from years of dumping nuclear waste from Hanford into Washington soil. Like so many issues we face, this problem has inevitable, far reaching impact on Washington's water, the food we grow, and ultimately the consequences will be disastrous for the health of our citizens. We have had no say in the dumping of this waste, and many are not even aware of its existence. To subject people to such danger, while using their own tax dollars to maintain what could ultimately kill them is unconscionable. There are much safer, greener, and more cost effective ways to develop power. I urge you to recognize what is at stake here, clean up all of the waste, not just half, and focus your energy and our tax dollars on an alternative source of power that does not produce waste that is unsafe.

Commenter #124

Confederated Tribes of the Umatilla Indian Reservation

Comment:

Dear Mr. McCormick and Ms. Laija,

The Confederated Tribes of the Umatilla Indian Reservation (CTUIR), Department of Science and Engineering (DOSE), appreciates the opportunity to comment on the Proposed Plan (DOE/RL-2009-117) for cleanup of the 200-CW-5 and 200-PW-1, 200-PW-3, and 200-PW-6 (200-PW-1,3,6) Operable Units.

There no greater issue of greater importance to the CTUIR than protection of, and respect for, the treaty-reserved rights. The Hanford Site lies within the ceded area of the CTUIR, within which the CTUIR retains rights to access and use the natural resources, including the protection of human health. As was stated in the proposed plan, remedial action is needed since contamination at these sites exceeds risk thresholds values for human health, the environment, and future industrial use. However, the CTUIR disagrees with the suggested level of cleanup or protection that the proposed plan offers as the preferred alternatives.

Our comments are separated into subjects below.

Future Use/Risk
The RI/FS evaluations and decisions for the need to cleanup these sites were based on an unrestricted land use scenario that "include an exposure from a driller bringing contaminated drill cuttings to the surface and then a subsistence farmer growing food crops or raising livestock on the cuttings." (page 3) However, the Remedial Action Objectives and human health Preliminary Remediation Goals are based on the industrial worker scenario (page 27). Even though the current belief is that this land will be used as an industrial site now, it is impossible to fathom how the site will be used in 1000 years. Placing caps over a landfill site does not prevent a driller from bringing cuttings back to the surface from either an intermediate depth, or from some contamination that has migrated deeper at some time in the future. The plan also states that the Tribal Nations risk scenarios are stated to be similar to those presented for the subsistence farmer exposure (page 21).

Risk Assessment and Thousand-Year Land Uses
The risks for Native Americans at 150 years are essentially unity. No estimation of the length of time that institutional controls would be needed was given, and the remedial goals are not based on protecting Native American health related to natural resource use. This means that the future lost use under Natural Resource Damage Assessment will have to be estimated once the final remedy is selected and the amount of residual contamination is known. Lost use is defined as the acreage that is unsafe to use in a manner reflected in the CTUIR exposure scenario, multiplied by the duration of restriction (or institutional controls) necessary to protect people living in a traditional manner at the study location.

USDOE proposes that institutional controls can be maintained for 300-400 years, longer than the United States has been a sovereign government. This assumption violates the USEPA requirement that institutional controls are assumed to fail at 100 or 150 years. Thus, a remedy with capping and essentially permanent institutional controls is non-compliant and should not be approved by USEPA.

Barriers
A depth of 15 feet appears to be still used as a cleanup cutoff level (page 8 and 24) for considerations when it is stated that "most soil contamination associated with these 200-PW-1,3,6 OU waste sites is located beneath the bottom of the waste sites and is deeper than 4.6 m (15 ft) below the existing ground surface (bgs)." Although 15 ft is being used as the standard point of compliance for ecological protection as described in the state of Washington's regulations for cleanup for protection of ecological receptors, the CTUIR feels that this is not deep enough and contamination could still be brought up to the surface from either human or natural causes. The engineered surface barrier alternative includes adding 15 feet of separation between the contaminated soil and the ground surface. This would be modified to include an evapotranspiration barrier layer; and 4 feet of course basalt rock to act as a physical barrier if plutonium was present (page 29). Again, the CTUIR feels that this would still not be a deterrent to either natural or unintentional intrusion. The barrier option was given a high ranking (page 35) because it is stated that this is a proven technology with readily available construction methods

and materials. The CTUIR questions if the technology is proven to last 1000 years with all possible environmental changes, and if there is an adequate supply of materials nearby to cover all of the waste sites at Hanford.

Treatment Options

On page 18, there is a discussion of "Principal Threat Waste". The soils are acknowledged to contain significant concentrations of highly toxic materials and considered a principal threat waste. Even though the preference is to treat this waste, it is stated that there is "no feasible technology to practicably treat radionuclides". This seems like a generalized statement without a reference. What technologies were evaluated and by whom? Soil washing was one technology that has been tested at Hanford in the past and it has been shown to work.

Characterization

The CTUIR is skeptical by the section (page 26) that summarizes the potential of contaminants to migrate to ground water. Technetium-99 is the only radionuclide that their model showed had the potential of contaminating the ground water. Even then, it was not listed as a COC, but listed as having a high level of uncertainty at posing a threat to the ground water. Carbon tetrachloride and methylene chloride are listed as the only volatile contaminants that could potentially migrate through the soil to contaminate the ground water. The CTUIR feel that there needs to be additional characterization of the technetium and nitrate contamination.

Blending

Apparently, cost is being used as the major argument on why the waste should not be removed. If the waste could be disposed of in ERDF, the costs are estimated at $100 per cubic meter. But removal of the contamination is estimated to generate TRU waste. This transuranic waste would have to be disposed of at the WIPP facility, and the DOE Proposed Plan estimates this disposal cost at $44,000 per cubic meter (page 31). As an alternative, the waste from the Z-Ditches would be mixed with clean soil to allow disposal at the ERDF. The CTUIR strongly disagrees with the blending of contaminated soils with clean soils. The volume of waste should be reduced, not increased for convenience.

Excavation Depths

For the high-salt waste sites, the report claims (page 37) that excavating the waste to 15 feet removes any contamination to threaten human health, but excavating to greater depths would not provide additional beneficial protection to groundwater. This is assuming that the plutonium cannot be mobilized as some time in the future. The RTD option is also ranked low because of the "challenges of excavating to 90 feet". The workshop that the Tribes and the WA State Dept of Ecology held regarding industrial technologies that could be used at Hanford showed that the depth of excavation is not a challenge with currently available technology. Excavations deeper than 15 feet should be a reasonable cleanup goal…especially with the view of potential future contamination mobilization outlined below.

Plutonium as an Attractive Nuisance

Minable quantities of plutonium represent an attractive nuisance to future inhabitants. Presently, the total amount of plutonium associated with the 200-PW-6 OU cribs and trenches is estimated to be greater than 50 kilograms and most likely more than 100 kg. It is conceivable that someone living in the future could recover plutonium from the soil beneath the 200-PW-6 OU cribs and trenches using construction or mining equipment and techniques available today. The process of extracting plutonium from a sand matrix is simple and straightforward. The chemistries for the extraction of plutonium are well known, and numerous practical processes are conceivable. The equipment needed to perform these extractions might include polyethylene or stainless steel tanks, mixers, pipes, pumps and other readily available components. [Parenthetically, if the technologies are available today, they could be used for remediation today.]

Removing or reducing the concentration of plutonium closest to the surface, then capping and using administrative controls to attempt to prevent access does not remove the attractive nuisance. A person living in the future, with sufficient means and knowledge, could develop countermeasures to any administrative controls. Leaving large quantities' of plutonium behind can provide sufficient motivation for someone to attempt its recovery. This reasoning is not without precedent. The consequences to a future society of a properly motivated individual exploiting the "resource" for nefarious purposes could be devastating. If the plutonium is judged to not be mobile, then this scenario has even greater likelihood. Just as with glass making, at one time the techniques and recipes required for the initial fusing of glass from raw materials was a closely guarded technological secret reserved for the large palace industries of powerful states. The same might be said for construction of nuclear weapons in the future.

Regarding the 200-PW-1 and 200-PW-6 settling tanks, the option of removing the waste, but leaving the tanks in place and grouting them, leaves another attractive nuisance situation. Presently, the value of steel does not justify the effort of recovering it from a grouted tank. However, this assumption cannot be made for some future economy. If past history is capable of providing any insight into the future, one need only to look at the Medieval trade of Damascus steel blades in order to appreciate the potential attractive nuisance that abandoned buried steel tanks may pose to a future society.

Contamination Mobility

This report states that plutonium and americium are not mobile under existing or anticipated conditions (page 39). A report in the Los Alamos National Labs site titled: "Mobility of Plutonium and Americium through a Shallow Aquifer in a Semiarid Region" have shown that plutonium can be mobile and was detected in monitoring wells 3390 m downgradient from the point of discharge. In addition and very importantly, a recent PNNL report (PNNL-17839 titled "Plutonium Mobility Studies: 216-Z-9 Trench Sample Analysis Results") have shown plutonium and americium mobility at the 200-PW-1 Operable Unit that have migrated to a depth of 110 feet below the ground surface. Cesium is also stated to not be mobile under existing or anticipated conditions (page 40), yet cesium has been mobilized in other locations at Hanford.

It is time for USDOE to stop claiming that Pu geochemistry, redox chemistry, mineral and

salt formation/dissolution, and colloid formation are understood well enough to assume that Pu is always immobile, when there is a wealth of evidence that clearly disputes this continued assertion.

Tank Removal

For the settling tanks waste group, the sludge removal alternative was evaluated and found it to be protective of human health (page 42). However the CTUIR would also like to see the tanks themselves removed rather than having them grouted in place for stabilization. Even though some of the pipelines that will be removed as part of this cleanup effort may be a part of another operable unit (page 18), the settling tanks should also be removed. The CTUIR believe that all pipelines and tanks should be removed as the individual sites are remediated; no matter what operable unit they belong.

Cesium Waste

For the waste sites with cesium-137, the current depth to this waste is between 12 and 15 feet. This is easily excavated for disposal. Rather than construction of an additional layer or barrier on top, the waste from this site should be excavated and eliminated from any additional long-term monitoring.

References:

Cantrell, K.J., K.N. Geiszler, B.W. Arey (2008), *Plutonium Mobility Studies: 216-Z-9 Trench Sample Analysis Results*, PNNL-17839

Penrose, W.R., W.L. Polzer, E.H. Essington, D.M. Nelson, and K.A. Orlandini (1990), *Mobility of Plutonium and Americium through a Shallow Aquifer in a Semiarid Region*, Environmental Science Technology, Vol. 24, No. 2, page 228-234.

If you have any questions, please feel free to contact myself, Barbara Harper, Ted Repasky, or George Klinger, all within my department.

Sincerely,

Stuart Harris,
Director