



CONFEDERATED TRIBES
of the
Umatilla Indian Reservation

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DEPARTMENT OF SCIENCE AND ENGINEERING

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July 13, 2007

Mr. Matt McCormick
US Department of Energy
Richland Operations Office
PO Box 550
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SUBJECT: 300-FF-5 Groundwater Operable Unit Current Conditions Baseline Risk Assessment (PNNL-16454) and Limited Field Investigation Report for Uranium Contamination in the 300 Area, 300-FF-5 Operable Unit, Hanford Site, Washington (PNNL-16435).

Dear Mr. McCormick,

The CTUIR Department of Science and Engineering is commenting on the two documents, received July 1, 2007.

Upon review, and much thoughtful discussion, the staff of the DOSE have concluded that the subject documents do not provide the level of factual analysis and results we need. If these documents are intended to provide support for your decision making it is the opinion of the reviewers that these two documents are too poor and biased to be used. Furthermore, based on the following reasons, the reviewers suggest that these documents should not be accepted as fulfilling any milestone requirements. Some of the reasons for this conclusion are (see attached pages for more detail):

- The LFI document is an update of new data from groundwater data collection. It is a snapshot of recent results, not an all-encompassing LFI. It is not clear what the path toward sufficient data is. How will we know when there is enough characterization to both understand all the contamination problems, and design remedies, to resolve them? There is also a large 3D modeling effort underway, and it would be extremely helpful if you could provide an explanation on how that data will be used for remedy selection.

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- The risk assessment does not satisfy the definition of a baseline risk assessment as defined by both EPA and DOE.
- The reports were not issued as DOE documents (unlike the RCBRA risk assessment) although they are CERCLA documents. As CERCLA documents, they are part of the Administrative Record and warrant serious examination.
- Distribution was very limited and late. Although the documents were dated in April and May, 2007, they were received on July 1. The cover letter asked for a 2-week comment period, one of which was the week of July 4th.
- High organic concentrations were detected in the new boreholes but were not used in the risk assessment. A reasonable person would ask, "why would data be collected specifically for a purpose such as this and not be used?". The validity of that data and the process as a whole need to be re-checked.
- The risk assessment process was entirely closed, and that violates the spirit and intent of DOE's collaborative approach, as set forth by Keith Klein. The computer code apparently developed by PNNL called "HUMAN" and is unreviewed, unapproved, and does not use the CTUIR exposure scenario. Fluor and PNNL do not engage with tribal and stakeholder scientists like WCH does. This breaks DOE's commitment to use the CTUIR scenario in all risk assessments and violates the collaborative process.
- The risk assumptions, methods, scenarios, and pathways are so inconsistent with the River Corridor Baseline Risk Assessment (RCBRA) that results are not comparable or even complementary. For the few results that might be comparable, it appears that the 300-FF-5 reports show up to 1000-fold less risk than the RCBRA report. This demonstrates a tremendous understatement of confidence in the data, the calculated risks, and a complete lack of integration of the groundwater risk assessments with the river corridor risk assessments.
- It is troubling that if, as stated, the HUMAN code was used in NR-2, ZP-1, and central plateau risk assessments, then there are two vastly different risk assessment processes underway and our review team has noticed very inconsistent methods in use at Hanford:
 - The RCBRA baseline risk assessment work done by WCH and Neptune was open, collaborative, competent, responsive, uses the CTUIR scenario, and has generally met with approval. Tribes and trustees were fully engaged, and the process, although time intensive, was even enjoyable. A camaraderie developed and most questions were resolved together. Consensus was reached during many workshops on most of the assumptions, selection and implementation of exposure scenarios, sampling plans and study design, and data use and interpretation.
 - The 300-FF-5 baseline risk assessment work (and perhaps NR-2, ZP and Composite Analysis) done by Fluor (?) and PNNL (?) is closed, not

collaborative, not responsive, and does not use the CTUIR exposure scenario. Assumptions and scenarios have not been reviewed or approved by the tribes and trustees and are quite different from the RCBRA document. For the 300-FF-5 reports, significant and relevant data were omitted. Reasonable people disagree on many counts and many of our staff have a fundamental disbelief in the results.

We urge EPA to reject the documents as fulfilling a CERCLA milestone. We urge DOE to cease using PNNL for performing risk assessments. We further urge DOE to make a serious effort to open up the risk assessment process, and to use the RCBRA process as implemented by WCH as a model for both process and methods.

If you have any questions, please do not hesitate to contact Dr. Barbara Harper of my staff at 541-966-2400.

Sincerely,



Stuart Harris, Director
CTUIR Department of Science and Engineering

Cc:

File

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Additional Comments

A. LFI Report

1. New data were collected but not used. Four new boreholes were drilled specifically to collect additional data for the LFI.

399-3-18	TCE = 63 ppm and 51 ppm (ug/L) at 50-55 ft.
399-1-23	TCE = <3 ppm from 52 to 90 ft; 1,2-DCE = up to 57 ppm all the way to the bottom of the well at 110 ft.
399-3-19	TCE = trace only
399-3-20	Tetrachloroethylene = 10 ppm at 82-95 ft TCE = 630 ppm at 82-95 ft 1,2-DCE = 7 ppm at 82-95 ft

As the LFI report states (p. 4.9), "these occurrences were unexpected and have opened new questions regarding the extent of VOC contamination." Despite the fact that these data were collected specifically to be used in the risk assessment, the RA report says that these" samples were taken after the stated time frame, and [the data are] not included in this [risk assessment]." This is arbitrary and unacceptable.

2. The focus of the LFI was to complete the determination of the location and geochemical nature of the uranium plume and its sources.

- Did the four new wells accomplish this objective?
- Have we now located the source?
- Do we now know the location and mobility characteristics for uranium?

3. The ratio of uranium in the vadose and groundwater needs to be explained clearly.

- The goal for the Phase II study with the direct push was a legitimate need. It was to determine the vertical distribution of uranium in the vadose zone above the mapped GW plume; determine lateral extent of where the uranium levels are elevated in the vadose zone; and correlate concentration patterns in the plume with waste sites, proximity to the river, and water table elevations. However, the entire phase II campaign was cancelled. Just because DOE could not do direct push and geophysical logging does not mean this goal should be abandoned (page 1.7, first paragraph; page 1.10 first paragraph). Perhaps other boreholes should be drilled and additional samples collected rather than canceling this phase II. If results are not as expected, there should be more well drilled, not fewer.
- There seem to be conflicting assumptions about whether the uranium is in the vadose or groundwater, and conflicting interpretations of unexpected data. Does the "smear zone" account for the total mass of uranium? Does it account for an unexpected ratio of vadose and groundwater uranium? Is the smear zone at the water table or higher up in the vadose zone?
- Is the uranium plume in the Ringold formation?

- Is the explanation that some forms of uranium are mobile, some less mobile, and some precipitates as immobile?
4. Derivation of estimated data.
 - How can a source of uranium truly be investigated if the concentrations are only estimated and not measured?
 5. Groundwater flow and river stage.
 - Is the uranium plume(s) static or does it move with river stages?
 - The document states that high Columbia River levels caused peaks in the uranium levels in 1996 and 1997 (page 1.4 second bullet). How is this going to be regulated and monitored in the future after the site is closed? What about significant rain events? It is also claimed that backfilling of the open trenches has limited recharge to the ground water in these areas (page 1.4 third bullet). What happens if this site becomes industrialized or residential and has grass plots irrigated?
 - Part of the Phase I included determining the hydrogeologic framework and obtain subsurface geochemical data to better define preferential pathways for uranium transport along a postulated route(s) from waste site to the river. DOE was looking for paleochannels (page 1.6). DOE may have found erosional surfaces, but not paleochannels. The preferred pathways geophysical study that the Umatilla Tribe did at the 100N area would have been ideally suited to find these paleochannels or preferential flow pathways.
 5. Volatile Organic Compounds.
 - Some of the VOCs are quite deep. Does this comport with the speculation of a southeasterly source?
 - Will DOE drill more deep wells? When? With what funding?
 - VOCs also appear widespread. Does DOE suspect a point source (such as a trench? How did the plume extend for a mile or more?
 6. The report states that high uranium concentrations were found in fine-grained sediments of an erosional remnant of the Ringold Formation. (page 2.1, third paragraph). Can this finding be extrapolated across the Hanford site to explain other contamination transport? Perhaps the vertical and horizontal dikes which are comprised of fine-grained sediments, are a significant mechanism for transport, holding, and releasing contaminants. How does this relate to the first paragraph on page 3.18 where it is stated that "contaminants ... would be removed from the aquifer system more rapidly through this more permeable unit (Hanford Formation) and are less likely to migrate deeper into the Ringold Formation portion of the aquifer..."
 7. Page 3.18 repeats the same paragraph twice. One of these should be deleted.
 8. Figure 3.13 shows evidence of a paleochannel discovered in 1958 during a trenching operation to put in a pipeline. The first paragraph on page 3.22 indicates that this paleochannel is the same one that has eroded into the Ringold formation and is shown at

depth in figures 3.15 and figure 3.16. But if this is the same channel, then the trench to put in the pipeline would have to be over 60 feet deep and was constructed below the water table. They may have indeed found evidence of an ancient paleochannel when the pipeline trench was excavated in 1958. But they can not come to the conclusions today that this channel is the same one that they are interpreting from the boreholes with depth. What is seen at the surface may not be reflected at depth.

9. Older wells have intervals that may be screened across the Hanford/Ringold boundaries. As was stated in this report (page 4.5, fourth paragraph), this may result in ground water samples that may be diluted and the uranium concentrations may not be representative of true uranium concentrations within the thin saturated Hanford formation portion of the aquifer that has a high permeability. So this brings into question many of the concentration contour maps that are used to map out contaminant plumes in general at Hanford.

10. Page 4.7 states that there are two conceptual models to explain the distribution of uranium in the ground water. It can either be evenly distributed in low concentrations in the vadose zone over a large area, or it can have "hot spots" that control the distribution of the uranium. Only one and possibly a small amount in another of the new wells had uranium in the vadose zone. Since it was not found in the vadose zone, does this support the conclusion that there could still be "hot spots" that have remained undiscovered?

B. Risk Assessment Report

1. This document does not meet the definition of "baseline" under CERCLA.

As DOE has recognized¹, a baseline risk assessment (RA) is used to evaluate the potential threat to human health and the environment in the absence of any remedial action. That is, the baseline RA describes the risk conditions under the "no action alternative." EPA has interpreted No Action as the "walk away" situation, leaving the site available for completely unrestricted use and maximum potential exposure. As discussed in the preamble to the revised NCP (55FR8711), EPA defines baseline risks to be those associated with a site in the absence of any remedial action or control, including institutional controls. Maximum potential exposure means exposure that could be experienced in the absence of any form of active control (institutional or otherwise). Thus, DOE also requires the use of reasonable maximum exposure scenarios even if they are presently not anticipated. The Hanford RME scenarios are the onsite CTUIR scenario and the onsite rural residential farmer scenario.

The 300-FF-5 RA does not meet the definition of "baseline" and deviates widely from the definition because

- It assumes institutional controls, contrary to the definition

¹ <http://hss.energy.gov/nuclearsafety/nsea/oepa/guidance/cercla/base.pdf>

- It fails to use either of the onsite RME scenarios (CTUIR and residential farmer), and fails to use the CTUIR scenario at all. In fact, it does not mention tribes at all. This is highly offensive. The 300 Area is part of our homeland.
 - There is an inherent fallacy in evaluating only whether institutional controls are working. If they are working, then no one is allowed to use the resources at unsafe levels, and therefore there is automatically no risk. This is a nonsensical risk assessment; in fact it is not a risk assessment at all, but simply a review of control measures.
2. The process was closed and contrary to the new standard for collaboration. Methods are non-standard, not reviewed, not approved.
- DOE committed to using the CTUIR scenario in all Hanford risk assessments. DOE is breaking its commitment and setting back tribal relations and collaborative processes by a decade.
 - The HUMAN code has never been presented or discussed with CTUIR or other risk practitioners. It is not available for review.
 - The PNNL references have never been presented or discussed at workshops.
 - A conceptual site model for exposure is not presented, and too little information is presented to understand exactly how the exposure pathways are defined.
 - The pathways are not clearly indicated and appear to be incomplete.
 - The exposure parameters are not those that have been agreed to in other river corridor risk assessments. This is quite offensive and quite contrary to all the hard work that tribes, trustees, and agencies have been doing with DOE and WCH on the river corridor work.
3. The uranium surrogation estimates are confusing. It appears that in some cases (RA report, tables 3.2 through 3.7) uranium isotopes were measured and total non-radioactive uranium was estimated, while in other cases total non-radioactive uranium was measured and isotopes were estimated. This is an example of an issue that would have benefited from tribal and trustee involvement, particularly since uranium was presented as the primary contaminant of interest for groundwater in the 300 Area.
4. The overall risk results pertain only to groundwater. No existing soil contamination was included. This does not produce a very useful report.
5. Discharge of groundwater via seeps and upwelling is a major point of discussion for the RCBRA process, yet was barely mentioned in the 300-FF-5 reports. Further, pore water and conductivity discussions were extensive in the RCBRA process but are obscure in the 300-FF-5 reports.
6. The ecological foodweb and species lists are good as stand-alone items. There are several points that trustees would probably like to discuss, and it would be beneficial

to compare the ECEM code used in the 300-FF-5 with the ecological sections of the RCBRA reports. We have never had the opportunity to review ECEM and reserve judgment or endorsement.

7. There has never been a workshop on the SAC methods. We need one. This lack also reveals previously unrecognized problems with the NR-2 and ZP-1 risk assessments. We withdraw our provisional support for the ZP-1 risk assessment based on this new realization.
8. We do not necessarily agree with the BDAC reference that 1 or 0.1 rad/day are safe for all biota whether long or short-lived and regardless of diet.
9. The comparison of measured versus ECEM-predicted tissue concentrations in biota is interesting and warrants further discussion. In some cases tissue concentrations are lower than predicted and in some cases higher. A full review with the NRTC would be beneficial.
10. Although this document was prepared in response to a CERCLA 5-year review requirement, MTCA is also an ARAR (Section 5.1.1) with its own risk limits. This is not mentioned.
11. The statement (section 5.1.2) that this document brings "consistency" to the assessment approach is incorrect. In fact, it perpetuates the *in*consistency. It references a PNNL report that we have never seen and certainly not approved. Again, this complete lack of integration is troubling; given the attention that integration has received recently.
12. We are not commenting on the individual exposure factors for the exposure scenarios. There is no point in doing so until DOE makes a good faith effort to open up the Fluor-PNNL part of the risk assessment process and bring it into line with the RCBRA methods.
13. We are not commenting on the risk results since we have no confidence in them. At this point, we only note that estimates are not cumulative, omit significant and relevant contaminant data, and probably understate risks by several orders of magnitude.