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STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

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May 4, 2011 11-NWP-34

Mr. John Sands
Richland Operations Office
United States Department of Energy
P.O. Box 550, MSIN: A3-04
Richland, Washington 99352

Re: Washington State Department of Ecology (Ecology) Comments for the Sampling and Analysis Plan for Ex-Situ Plant and Invertebrate Bioassays to Evaluate Terrestrial Environments across the Hanford Site, DOE/RL-2010-118, Draft A

Dear Mr. Sands,

Ecology's comments on the above Sampling and Analysis Plan (SAP) are enclosed. Ecology will not approve this SAP, but we are hopeful that these comments will be addressed and contribute to the improvement of this effort. Please be aware that Ecology will respond to questions to clarify our comments, but with the current workload, we are unable to devote time to the comment resolution process. Without resolution of these issues, however, Ecology will use bioassay results on a very selective basis.

If you have any questions, please contact me at 509-372-7941, or Beth Rochette at 509-372-7922.

Sincerely,

Nina M. Menard

Nina Menard
Environmental Restoration Project Manager
Nuclear Waste Program

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br/dbm
Enclosure

cc w/enc:
Dennis Faulk, EPA
Larry Gadbois, EPA
John Morse, USDOE
John Sands, USDOE-RL
Stuart Harris, CTUIR
Gabriel Bohnee, NPT
Russell Jim, YN
Susan Leckband, HAB
Ken Niles, ODOE
Administrative Record: 100, 200, 300 Areas
Environmental Portal
Hanford Operating Record General File
USDOE-RL Correspondence Control

REVIEW COMMENT RECORD	Date	Review No.
	Project No.	Page Page 1 of 7

Document Number(s)/Title(s)	Program/Project/Building Number	Reviewer	Organization/Group	Location/Phone
Sampling and Analysis Plan for Ex-Situ Plant and Invertebrate Bioassays to Evaluate Terrestrial Environments across the Hanford Site, DOE/RL-2010-118, Draft A		Damon Delistraty, Beth Rochette*, Jerry Yokel *Ecology lead		

Comment Submittal Approval: Agreement with indicated comment disposition(s) Status:

Organization Manager (Optional) _____ Date

Reviewer/Point of Contact _____ Date

Reviewer/Point of Contact

Author/Originator

Author/Originator

Item	Page #, Line #, or Section and Paragraph	Comment (s) (Provide technical justification for the comment and detailed recommendation of the action required to correct/resolve the discrepancy/ problem indicated.)	Hold Point	Disposition (Provide justification if NOT accepted.)	Status
1.	General	Given the many deficiencies listed below, Ecology cannot accept this SAP to support setting plant and invertebrate PRGs.			
2.	p. 1-2, 1st paragraph	It is stated, "Concentrations in Hanford Site soils in excess of generic lookup values may not actually be toxic under conditions at the Hanford Site." Please acknowledge in the document that the inverse may also be true. That is, COPC concentrations in Hanford soils below generic lookup values may actually exhibit toxicity (e.g., due to unique soil properties, increased bioavailability, interactions with additional contaminants).			
3.	p. 1-3, Section 1.3.4.1; Tables 1-1 and 1-2	The text states "Priority analytes (Table 1-2) were selected as those for which the literature-based soil screening levels are lower than other Hanford Site-specific PRGs. The priority analytes were selected for			

		those where the difference between the screening levels and the PRGs is large." It is not clear which "other Hanford Site-specific PRGs" have been considered. It appears that only metal contaminants have been considered. Also, hexavalent chromium is clearly missing. Overall, Ecology does not approve of this contaminant list given the insufficient justification provided here. Provide in the document clear logic explaining why only metals have been considered. Ecology will then need to consider the logic and may add metals. Add hexavalent chromium at a minimum. Also, change the title of the document to 'Sampling and Analysis Plan for Ex-Situ Plant and Invertebrate Bioassays to Evaluate Metal Contaminants in Terrestrial Environments across the Hanford Site.'			
4.	p. 1-5, Table	Ecology has not approved the PRGs and screening levels given in this table and will not do so in the near future. Ecology will have to review RCBRA Volume I, Draft C to evaluate these concentrations. Furthermore, this table has no table number or title. From the Table list (p. v), it looks like it should be Table 1-3 ("Comparison of Waste Site Contaminant Concentrations to Preliminary Screening Criteria for Prioritizing the Bioassay Study Design"). Additionally, the table does not include MTCA soil concentration to protect groundwater. Provide a footnote indicating that the contents of the table have not been approved by the Tri-Parties. Also, provide a table number for this table.			
5.	p. 1-7, Table 1-4	CEC, grain size distribution, and pH are soil properties, rather than "analytes." Some measures of radioactivity should also be listed (e.g., gamma scan, gross beta, gross alpha), since radiation may confound effects of metals in bioassays.			
6.	p. 1-7, Table 1-4	Plant micronutrients may be confounding factors. These include boron, chloride, copper, zinc, manganese and iron. It is recognized that these are also being investigated (with the exception of chloride) as			

		contaminants, but soils with insufficient amounts of these elements may not support growth as well as soils with optimal amounts of the elements. Also, sulfur is a macronutrient. Include all of the above elements in soil analyses.			
7.	p. 1-7, 2nd paragraph	It is stated, "The presence of herbicides or insecticides in soils could create a false-positive indication of soil toxicity." In this case, however, toxicity is real (not a false-positive), due to herbicides or insecticides. Please modify the statement to 'The presence of herbicides or insecticides in soils could contribute to soil toxicity.'			
8.	p. 1-7, 3rd paragraph	Text indicates that analytes (or soil properties) in Table 1-4 are confounders, rather than priority analytes. Please clarify the distinction between a "confounder" vs. "priority analyte."			
9.	p. 1-8, Section 1.3.4.2	The site selection process is very unclear, and appears to have no basis. It is not clear that the best sites were selected for this evaluation. Include text that explains why these are the best sites for this evaluation, relative to all other sites.			
10.	p. 1-8, Section 1.3.4.2	This section makes reference to 'target concentration ranges' and field controls without giving the concentration ranges and the locations of the field controls. Include in the document the target concentration ranges and the locations of the field control samples.			
11.	p. 1-8, 2nd paragraph	Because waste site 600-281 (Figure 1-1) is located outside the Central Plateau Outer Area (OA), explain how this site represents the OA.			
12.	p. 1-9, Table 1-5	Screening level concentrations should also include MTCA soil concentrations to protect groundwater. It looks like the column "Lowest Wildlife Eco-SSL" has a few MTCA values (e.g., Ba, Mn, Hg, Se), despite a footnote that identifies Eco-SSL with EPA. This column should simply be labeled "Lowest Wildlife SSL" (indicating the lower of MTCA and EPA SSLs). Also, Tables 1-3 and 1-5 contain			

		redundant information (e.g., many of the screening criteria). Please list both MTCA and EPA wildlife SSLs (side by side, as with plants and inverts).			
13.	p. 1-14, 1st paragraph, bullet 3	Please clarify why "low priority analytes" (i.e., As, Co, Ni, Se, V in Table 1-6) are not expected to drive remedial decisions (e.g., considering As is a risk driver in RCBRA).			
14.	p. 1-14, 2nd paragraph	Text states, "For PRG development, concentration range is more important than exposure location." However, the two are closely linked, i.e., a contaminant concentration is a property of an exposure location. That is, exclusion of a subset of locations may also exclude a subset of contaminant concentrations. Therefore, in order to develop site-specific PRGs, exposure locations must spatially and statistically represent the assessment area to assure inclusion of a full range of concentrations.			
15.	p. 1-14, 3rd paragraph	Temporal considerations may be important to radionuclides with short half lives or labile organics with high potential for degradation. Please clarify this in the text.			
16.	p. 1-14, 5th paragraph	Please describe the statistical basis for initially collecting 100-120 soil samples and 20 field control samples, followed by sub-selection of 60-80 samples for bioassays and 10 field control samples.			
17.	p. 1-16, Table 1-6	The assignment of high, medium, and low priority appears to have no basis. Also, a map is needed to show the HEIS sample locations. Include a column in the table with the logic for assigning each metal to a priority category. Also, include a map giving the HEIS sample locations.			
18.	p. 1-18, 1st paragraph, bullet 1	Please show PAH and Aroclor data that are below screening levels for plants and invertebrates. Note too that PCB toxic equivalent (TEQ) at pptr levels (e.g., MTCA soil concentration to protect wildlife is 2 ng/kg) may also cause dioxin-like toxicity but was apparently not			

		assessed.			
19.	p. 1-18, 3rd paragraph	Text states, "PRGs that result from this work will be applicable throughout the Hanford Site, including the Inner Area and Outer Area of the Central Plateau and the upland and riparian areas of the River Corridor." As such, soil samples should be collected from (and represent) all of these areas. In contrast, it appears that this SAP proposes to collect soil samples from only six waste sites (shown in Figures 1-1 and 1-2 and listed in Table 3-3), which are not fully representative of the Hanford Site (e.g., Central Plateau Inner Area and 300 Area are not sampled). Therefore, it is problematic to conclude, "PRGs that result from this work will be applicable throughout the Hanford Site…." Please delete this text.			
20.	p. 1-19, Section 1.3.5.2, 7th bullet	The document states "If the analyte concentrations exceed generic lookup values and no samples had statistically significant effects relative to field controls, then the maximum concentration measured represents the NOEC." This cannot be accepted. If there is insufficient replication around any chosen NOEC value (i.e. isolated high concentrations in field samples), the results from the associated bioassays are not robust enough to set NOECs or PRGs. Provide Ecology with histograms of the data for each contaminant for plants and invertebrates and delete the quoted bullet.			
21.	p. 1-20, Section 1.3.5.2, 1st bullet on page	The text states "Compare the concentration range for each analyte to the mean concentration in the nontoxic samples, as described in Field et al., 2002." 'Nontoxic samples' requires definition in the text. Add a definition for 'nontoxic samples' in the text.			
22.	p. 1-20, 1st paragraph, bullets 8 and 10	Text indicates that hypothesis tests and regression analysis will be considered statistically significant if $p \geq 0.05$. Please clarify these statements, since statistical significance is conventionally defined as $p<0.05$.			

23.	p. 1-20, 2nd paragraph	Provide rationale for a "biased (nonstatistical)" approach, relative to a more statistically based method for PRG development, since pros and cons are associated with each approach.			
24.	p. 2-4, 4th paragraph	Looks like "Figures 1-2 and 1-3" should be "Figures 1-1 and 1-2."			
25.	p. 2-6, Table 2-1	Under "Representativeness," text states, "Judgment sampling ensures areas most likely to be contaminated, based on current information, will be evaluated." Please acknowledge in the document that judgmental sampling runs the risk of missing contamination, since knowledge of contaminant distribution is imperfect.			
26.	p. 2-9, Table 2-2	The boron lab reporting limit of 4.1 mg/kg is too high and may be above background for the Hanford site. This value should be reduced to 1 mg/kg or lower. Also, the cadmium reporting limit of 1 mg/kg is too high and should be reduced to 0.5 mg/kg or lower. Soil samples analyzed for waste site cleanup can achieve the above reporting limits. Reduce the lab reporting limits for boron and cadmium as specified above.			
27.	p. 2-9, Table 2-2	Hexavalent chromium is missing for soil and is needed. Add hexavalent chromium with a lab reporting limit of 0.2 mg/kg.			
28.	p. 2-11	Precision and Accuracy for soil seem high. Explain why the 30% range cannot be obtained.			
29.	p. 2-17, Table 2-3	Define abbreviations under "Bottle Type."			
30.	p. 3-2, 4th paragraph, bullet 1	Text states, "If radionuclides are detected above background, samples will not be collected." Excluding samples with high radioactivity may alter representativeness of samples. For example, a soil sample containing Cs-137 above background, along with high Pb (lead), would be excluded, biasing Pb representation.			

		Please document this as an uncertainty.			
31.	p. 3-3, 1st paragraph	Text states, "The intent of the investigation is to collect samples for developing PRGs for metals. The presence of concentrations of radionuclides could confound interpretation of the bioassay results." This important constraint should be specified in the Introduction, as part of the purpose (Section 1.2).			
32.	p. 3-3, 2nd paragraph	Please clarify that screening for Cs-137 (as a radiological indicator analyte) may miss some radionuclides (e.g., alpha-emitters), since all radionuclides do not always co-occur.			
33.	p. 3-3, 5th paragraph	Text refers to Section 1.7, but there is no Section 1.7. Please fix.			
34.	p. 3-3, Section 3.2.4.1	Although "focused judgmental sampling" may have certain benefits (e.g., use of prior knowledge or observational information), acknowledge its potential limitations (e.g., excluding potential contamination due to imperfect knowledge or observations). Sampling without a statistical basis will not be representative of the Hanford site. Use a statistical basis for sampling or delete text stating that the results will be used for the whole Hanford site.			
35.	p. 3-4	The XRF obtainable metal specific concentrations need to be listed and compared to table 1-5.			
36.	p. 3-5, Table 3-3	Waste site identifier "600-281" is located in the River Corridor, not the Outer Area (see Figure 1-1).			