SECOND TECHNICAL REVIEW OF DRAFT RI/FS WORK PLAN
HANFORD SITE 1100-EM-1 OPERABLE UNIT
May 31, 1989

START

and

DOE Responses
June 14, 1989

The following comments (listed as A through M) are new comments that were not included in EPA's March 17, 1989 comments. They have now been included due to further evaluation of the Work Plan or have resulted from consideration of additional information provided in DOE's May 1, 1989 response.

(A) p. 4-17

Deficiency: The stated objective of the Phase I remedial investigation is to determine the nature and extent of contamination, both in the soil and in the ground water, including the spatial variability of contaminant concentrations. However, the data collection network described in the work plan is not sufficient to meet this objective. Only one downgradient monitoring well is planned for each of the Battery Acid Pit, the Antifreeze Tank Site, and the 1100-3 site; one pair of nested monitoring wells is planned for the 1100-2 site; and two or three downgradient monitoring wells are planned for the Horn Rapids Landfill site. These monitoring wells will provide an indication of the direction of ground-water flow and a very limited sampling of ground-water quality, but there can be no assurance that these wells will be optimally located in the downgradient direction of ground-water flow and that they will intercept a contaminant plume if one exists at a given site.

Once the direction of ground-water flow is determined, it is almost inevitable that monitoring wells, in addition to those listed in the work plan, will need to be installed at each site to adequately characterize the existing ground-water quality in the areas of greatest likelihood of contamination, the downgradient direction of ground-water flow. However, the work plan makes no contingency for the installation of these wells. The sampling and analysis plan does not describe the criteria for selecting the number and location of the wells, nor does the schedule (Figure 3-8 and Figure 3-9) note the time at which the need for additional wells will be evaluated, when they will be installed, or for what period data will be collected.

Recommendation: In order to speed the completion of the Phase I-RI, additional wells should be installed after the ground-water flow direction has been determined and the first round of water-quality samples have been analyzed. The contingency for additional wells or additional soil samples should be described in the work plan (such as on p. 7-22, section 7.2.7). This contingency should be included in the project schedule (Figures 3-8 and 3-9) and listed as a Phase I-RI activity.

A: Accepted. The work plan has been modified to strengthen the implication that additional groundwater monitoring wells and vadose holes will be required after Phase 1 of the RI is completed. The following text has been inserted just before the last paragraph in Section 4.2 (Page 4-18)

> As Phase 1 of the RI is conducted, vadose and groundwater data will be evaluated in a timely manner. Data needs will be reevaluated, taking into account data needs associated with evaluation of likely remedial alternatives identified in Phase 1 of the FS, as well as additional site characterization requirements. It is anticipated that additional vadose zone borings and groundwater monitoring wells may be required to satisfy these data needs. If appropriate, these wells can be installed immediately.

The RI/FS schedule (Figure 3-8) has also been modified to indicate that reevaluation of data needs will begin immediately upon completion of RI Phase 1.

(B) p. 4-30, paragraph 3 (and elsewhere)

Deficiency: As stated on p. 4-15, ground-water (and contaminant) travel times are largely influenced by the hydraulic conductivity of the aquifer. It is also acknowledged that the water table is expected to be found within the lower part of the Pasco Gravels and that hydraulic conductivity of the Pasco Gravels may be an order of magnitude greater than the upper Ringold Formation. Because the hydraulic characteristics, and therefore the ground-water and associated contaminant travel times, may differ significantly in the two major strata comprising the unconfined aquifer, the hydraulic characteristics of each strata must be determined separately. Determination of the average hydraulic characteristics of the unconfined aquifer as a whole will not be sufficient to accurately estimate ground-water flow rates.

Aquifer tests (slug tests or pump tests) are proposed in the work plan to measure the hydraulic characteristics (including hydraulic conductivity) of the unconfined aquifer. The aquifer tests are not described in detail in the work plan, but the Environmental Investigations and Site Characterization Manual is referenced for further information. However, the Site Characterization Manual does not describe aquifer testing of multiple units as will be required at the 1100-EM-1 operable unit.

Recommendation: Describe in detail in the work plan how aquifer tests will be conducted and the results analyzed to determine the hydraulic characteristics of both the Pasco Gravels and Ringold Formation in the vicinity of the 1100-EM-1 operable unit.

B: Accepted. The discussion of aquifer testing has been expanded to indicate that an aquifer test plan will be prepared. The following insert replaces the next to last paragraph in section 4.4.1.2.

Aquifer Testing will be conducted during groundwater monitoring well construction in Phase 1B to estimate aquifer properties required for groundwater flow and contaminant transport modeling. However, the high permeability of the Ringold Formation and overlying glaciofluvial deposits (the Hanford formation), the difficulty in the proper disposal of well discharge water that may contain hazardous wastes, and the limitations imposed by well construction present obstacles to effective aquifer testing. Aquifers tests will be carried out in accordance with an Aquifer test plan, and with the aquifer test procedure (see Appendix C).

Slug tests will be conducted during well construction. However, aquifer response may be too rapid for standard water-level measuring and recording techniques. This will be addressed by the use of down-hole pressure transducers and high-speed data recording.

State of Washington regulations may prohibit discharge of water from pumping tests if the water may contain hazardous wastes. If the groundwater in the 1100 Area and the Horn rapids Landfill contains detectable levels of hazardous wastes, then pumping tests will not be conducted until the issue is resolved. Determination of aquifer properties will be restricted to non-pumping methods. If pumping tests are possible, then one single-well, constant discharge pumping test will be performed in at least two areas during Phase 1B: one in the vicinity of the Horn Rapids Landfill and the other in the vicinity of the 1171 Building.

The aquifer testing proposed for Phase 1B will provide only a rough approximation of aquifer properties. It is recognized that slug tests and single-well pumping tests will provide some indication of hydraulic conductivity, but not of the storage coefficient. Furthermore, because the water table roughly corresponds to the same stratigraphic position as the Ringold Formation - glaciofluvial deposits contact, the well screen in some of the groundwater monitoring wells may straddle both geological units (a rough estimate is about half the wells installed). Interpretation of aquifer properties under this condition would obviously be more difficult. However, it is anticipated that the screens will be exclusively in the Ringold Formation in roughly half the wells drilled, and results of these wells will be compared to results from well that contain glaciofluvial sediments in the saturated zone.

If data from the Phase 1 RI suggest that the groundwater pathway constitutes a significant hazard, then more extensive aquifer testing will be performed in Phase 2 to satisfy data needs associated with the FS. Assuming that discharge water is not a problem, Phase 2 aquifer testing will attempt to determine individual aquifer properties in both the Ringold and

glaciofluvial deposits. A potential difficulty in testing the glaciofluvial deposits alone is that the glaciofluvial deposits probably have a very small saturated thickness.

(C) p. 4-43, last paragraph & p. 4-53, first paragraph

The depth of the vadose-zone holes has been reduced from approximately 55 feet (expected depth of the water table) to only 20 feet. This limited depth will not provide an adequate characterization of either contamination or the physical and chemical characteristics of the vadose-zone in these areas. If contamination is found in these borings or at an appreciable depth in the 10 foot, near surface samples, additional borings will need to be completed to the water table to provide full vadose-zone characterization.

C: Accepted. Note that the reduction to 20 ft depth was in response to EPA's concerns regarding drilling prior to work plan approval. The following insert is added in section 4.4.1.3, page 4-46:

> If contamination is found in the upper part of the vadose zone, or if other conditions warrant, additional vadose zone holes will be drilled to the groundwater table in the vicinity of the battery acid pit.

Modifications have also been made in section 4.4.1.5, page 4-53 to indicate that additional vadose holes may be drilled in pit 1100-2 or 1100-3 if contamination is found or if field data indicate a higher degree of complexity than expected.

(D) p. 46, second paragraph, line 4

The water table should be at approximately 55 feet, not 25 feet as stated here.

D: Corrected.

(E) p. F-3, Figure F-1

A scale is needed for the figure.

E: A scale has been added.

(F) p. A-5, paragraph 3

Well 10/29-10G1 as noted is likely to actually be well 10/28-10G1.

F: Corrected.

(G) p. 4-27, paragraph 3, line 2

The notation of Figure 1-2 should probably be Figure 1-3.

G: Corrected.

(H) Section 5.1, p. 5-1 2nd para.

Deficiency: The Work Plan refers to Figure 5-1 for specific procedures used for the activities of the RI/FS. Many of the procedures listed are not commonly established techniques, such as those for Soil Gas Surveying or Radiological Surveys. Furthermore, they appear to be approved internal to DOE-RL or PNL.

Recommendation: Any procedures or techniques not well established (such as EPA SW-846, 3rd ED), must be specifically cited or included in the Work Plan for external review.

H: Figure 5-1 and page 5-1 have been modified. The procedures for soil gas, geophysical surveying, and air quality monitoring will be cleared and issued separately.

(I) Section 5.3.1, p.5-4 2nd para.

Deficiency: While the overall discussion of precision is well constructed, there are really no specified activities identified to determine precision from sample collection to lab analysis. Lab precision and accuracy can be assessed from historical work as discussed in the text, however, this discussion should go on to quantitate what levels of precision would be acceptable under this Plan.

Recommendation: In effect reference to the contract laboratory program would be most appropriate since it addresses overall precision and accuracy pertaining to analytical practices.

I: The last paragraph of section 5.3.1 has been replaced with the following:

> Analytical factors are related to laboratory performance. The precision and accuracy of the laboratory can be assessed by an evaluation of the performance of the laboratory in analyzing matrix spikes. An indication of the laboratory performance can also be obtained from an evaluation of historical data on accuracy and precision that has been compiled under the CLP, and from assessment of the results of analysis of quarterly performance evaluation samples.
>
> Where the detection limits associated with CLP routine

analytical services are not sufficient to ensure compliance with primary drinking water standards, alternative tests will be utilized under CLP special analytical services.

(J) Section 5.3.4, p.5-4

Deficiency: No reference is made on whether previously collected data is appropriate for comparison with RI/FS data to be collected.

Recommendation: State that data with less than an EPA acceptable level of quality assurance should only be used in a limited capacity. It can provide direction as to what areas have contamination, but data can not be relied upon to be sure contamination does not exist or to support risk assessment studies.

J: The following is inserted in section 5.3.3 (page 5-5).

> Existing data associated with the 1100-EM-1 operable unit generally do not satisfy either EPA or NQA-1 quality assurance criteria and thus cannot be relied upon to support risk assessments or to demonstrate that the sites are in fact free of contamination. However, the existing data do provide some indication as to where contamination is likely to exist and the probable nature of the contamination.

(K) Section 5.3.5, p. 5-5

Deficiency: While the text covers sample duplicates, no commitment is made to perform their collection. The commitment of 1 in 20 for some sample types may not be adequate for the monitoring project at hand. For example, since 15 wells are proposed for sampling (Table 4-5), only one replicate will be collected.

Recommendation: To ensure the duplicate adds maximum value to the sampling effort, you may want to increase the frequency or specifically identify the well for replicate sampling. Such discussion should be provided in the project operations plan. The Work Plan should be clear that QA samples mentioned are minimum requirements, adjustments should be made as appropriate to the particular task.

K: A discussion if media-specific QC sample requirements is contained in section 5.3.6.

(L) Section 5.4.3, p. 5-8

Deficiency: The Work Plan does not consider that there will be potential revisions to the CLP.

Recommendation: Given the potential for incorporation of revised

analytical methods to the CLP, the Work Plan should refer to the CLP's "most current statements of work for inorganic and organic analysis."

L: The text on page 5-8 has been modified to indicate that the most recent version of the CLP scope of work will apply.

(M) Section 5.8.2.1, p. 5-12

Deficiency: The audit procedure is not clear.

Recommendation: The text should refer to the protocol for establishing responsibility and frequency for project audits and corrective actions (see section 5.8.4). It should be clear as to whether there are phases of the project that may not proceed in the absence of an audit.

M: Audits are discussed in section 5.8. Additional detail on audits and surveillance is contained in WHC QA manuals and procedures.

The following section contains comments identified by the same number as was used in EPA's March 17, 1989 comments. The inclusion of these comments means that the May 1, 1989, response was inadequate in some manner.

6. Figure 1-2, p. 1-6

Deficiency: Areas consisting of the 1100-EM-1 operable unit shown in Figure 1-2 are still not fully defined.

Recommendation: Review and revise Figure 1-2.

#6: Individual sites from 1100-EM-1 and 1100-EM-2 operable units are intermingled in the same geographic area (e.g. the 1171 building). It is impossible to clearly differentiate 1100-EM-1 and 1100-EM-2 on an areal basis.

21. Figure 4-1, p.4-3

Deficiency: Figure 4-1 still shows "well" on the legend.

Recommendation: Revise the legend for Figure 4-1.

#21: Corrected.

22. Section 4.1.1.4, p.4-5

Deficiency: The response does not adequately address the original comment.

Recommendation: If historical information can not be found, investigation must be scheduled as part of the Phase I RI, rather than Phase II.

#22: On page 4-43, the paragraph which begins "No soil samples ..." has been replaced with the following:

> One vadose hole will be drilled to obtain samples of the soil immediately below the antifreeze tank location. This hole will be drilled vertically through the floor of the service bay and will be continuously sampled to a depth of at least 5 ft below the contact between backfill material and undisturbed soil at the tank location. Samples from this hole will be analyzed for ethylene glycol as well as for the constituents listed on the TCL.

37. Section 4.4.1.3, p.4-43

Deficiency: The original comment was only partially addressed. The paragraph has been revised to indicate that no soil sampling is planned, but that future samples may be taken if necessary, depending on groundwater monitoring results.

Recommendation: See Comment #22, above, regarding the need for soil sampling in this area. If existing data is not available, it must be gathered as part of the Phase I RI.

#37: See response to #22 above.

57. Figure 4-13, p.4-62

Deficiency: Figure 4-13 still has inconsistencies, beginning with symbols for existing wells.

Recommendation: Correct the figure.

#57: Corrected.

107. Section 4.0, p.B-10

Deficiency: The May 1, 1989, response indicated the comment was accepted, but no change was made to the Work Plan.

Recommendation: Revise the Work Plan to incorporate the original comment.

#107: Corrections have been made. "Perchloroethylene" has been changed to "tetracholorethylene."

145: This comment was not adequately addressed. As stated, the definition of the water-table aquifer and the identification of the confining layer is critical to understanding ground-water and contaminant flow paths and designing the ground-water monitoring network. Since the "brown clay" confining layer has not been well identified and its continuity is in question (p. 4-14), a primary objective of the Phase I-RI should be to characterize the lateral extent and continuity of this confining layer in the vicinity of the suspected waste sites.

All monitoring wells should be drilled through the brown clay so that its lateral extent and thickness can be characterized. After penetration and collection of core samples, the bore hole should be backfilled with bentonite. Additionally, at sites with a very limited monitoring-well network, such as the Battery Acid Pit and

Antifreeze Tank Site, and the 1100-2 and 1100-3 sites, soil resistivity sounding should be conducted along transects between wells to confirm the lateral continuity of the confining layer. Also, if contamination is found in ground water and the plume extends beyond the existing monitoring well network, the "brown clay" confining layer will need to be further defined along with the contaminant plume.

#145: The text has been modified on pages 4-30, 4-48 and 4-59 to indicate that all groundwater monitoring wells will be drilled 4-5 ft into the underlying silt/clay confining unit. In addition, provisions are made for wells to investigate the uppermost confined aquifer, as discussed in the following inserts:

[page 4-30]

Drilling wells to the confining layer will help to determine the layer's lateral continuity - an important factor in groundwater flow and contaminant transport modeling. One and possibly two groundwater monitoring wells will be completed in the uppermost confined aquifer. If, as is thought, a significant head differential exists between the two aquifers, this will help confirm the effectiveness of the silt/clay layer as an aquitard.

[page 4-48]

A fourth well (MW-17) is tentatively planned to investigate the uppermost confined aquifer, immediately below the clay/silt layer in the Ringold Formation. It is likely that the piezometric head in this aquifer is significantly greater than in the overlying unconfined aquifer. If this is the case, the presence of such a head differential is evidence that the clay layer is continuous and functions as an aquitard. This well will be located in the vicinity of MW-1. In addition, other nearby wells completed into the unconfined aquifer will be evaluated to determine the extent of the confining layer.

[page 4-59]

A ninth groundwater monitoring well (MW-16) will be installed in the vicinity of MW-8 and MW-9. The purpose of this well is to investigate the uppermost confined aquifer and determine the effectiveness of the clay/silt layer as an aquitard. If the piezometric level in the confined aquifer is significantly different from that in the overlying confining aquifer, it can be assumed that the clay/silt layer is laterally continuous and effective as an aquitard, at least on a local scale.

146: The discussion of the influence of the Columbia River on groundwater levels at the 1100-EM-1 operable unit was helpful and accepted as reasonable. However, we still see the need for an area-wide water-level monitoring network in the vicinity of the 1100-EM-1 area and the Richland well field, as described in the original comment.

This data would be relatively easy to collect, due to the large number of existing wells in the area. Data collection could begin in the near future and would provide valuable information at little cost. The water-level data would help describe the ground-water (or possible contaminant) flow paths downgradient of the 1100-EM-1 area, and it would provide information on the "regional" direction of ground-water flow and needed guidance in locating monitoring wells. Area-wide ground-water level data will also be necessary for calibrating ground-water flow models to be used in considering the no-action alternative.

#146: The following has been added on page 4-30:

As part of the initial RI effort, groundwater levels will be measured in existing wells in the 1100 Area and will be used to determine local groundwater flow paths. Depending on the result of this effort, it may be necessary to adjust groundwater monitoring well locations.

147: The map was not changed to identify recharge and pumping centers nor was additional information on pumping rates included.

#147: Figure 2-1 has been modified to show the location of the PNL irrigation well and the approximate extent of the irrigated area.

151: Are the QA manuals noted in the response referring to the Environmental Investigations and Site Characterization Manual or other sources? If other sources, are the QA manuals being cleared for public release, and if so, when will they be available for inspection?

#151: The issue of QA manuals is beyond the scope of an individual work plan and cannot be adequately addressed here.

154: P. 4-45, Figure 4-8: Show the additional soil gas sampling point recommended and accepted in Figure 4-8.

#154: Figure 4-8 has been modified to show the location of an additional soil gas point immediately down gradient from the presumed location of the battery acid pit.

155: P. 4-48, paragraph 2 and Figure 4-9: This comment has not been adequately addressed. The location of the wells, MW 2 and 3, shown in Figure 4-9 is not consistent with the direction of ground-water flow described in the text. Monitoring wells should be placed directly downgradient of the expected direction of ground-water flow so as to have the greatest likelihood of

intercepting a contaminant plume. Place wells MW 2 and 3 due east of the Battery Acid Pit and the Antifreeze Tank Site.

#155: Figure 4-9 has been modified to show locations for MW-2 and MW-3 which are more consistent with the assumed regional groundwater flow direction.

156: Although the antifreeze tank was suspected to have leaked, no data are available to indicate the nature and extent of contamination from the leak. The results of analyses of soil samples taken at the time of tank removal are apparently not available, and the materials disposed of in the tank are not fully known.

One downgradient observation will not be adequate to characterize the potential extent of contamination from the antifreeze tank. Therefore, additional soil samples must be collected at the tank site and analyzed for a full suite of potential contaminants.

#156: See response to #22 above.

157: The intent of this comment was misinterpreted. We do not recommend analyzing soil samples for organic carbon for the purpose of identifying contamination. The organic carbon analyses are recommended for the evaluation of the potential for transport of hazardous organic compounds through the unsaturated zone. Sorbtion of nonionic and acidic organic compounds by soil or sediment is caused primarily by the partitioning of the solute into the soil organic matter. The soil organic matter content must therefore be known to predict the fate and transport of organic compounds through the soil column. This is of particular importance in the 1100-EM-1 operable unit where organic compounds are the primary contaminants of concern. The analysis of organic carbon in soils is, however, not absolutely required to be done as a part of the Phase I-RI, and may be more appropriate to be conducted in Phase II, once the nature and extent of contamination is known.

#157: The following has been added on page 4-41.

Consideration will be given to including an analysis for TOC for soil samples. Analysis data will be used for evaluation of the fate and transport of organic compounds through the soil column. Most laboratory analyses related to soil and contaminant interaction will probably be deferred until Phase 2 of the RI when contaminants will be better defined.

159: Figure 4-10, p. 4-52: In the response to this comment it is stated that well locations at the 1100-2 and 1100-3 sites will be adjusted to gain a better definition of the water table. However

this change is not shown in Figure 4-10. The well configuration described in the text with only 3 well locations (assuming MW-4 and 5 are nested) is a nearly linear arrangement and will not provide enough lateral definition to identify the predominant direction of ground-water flow. At least one additional well will be required to be installed at the 1100-2 and 1100-3 area to accurately define the water-table surface.

#159: The well locations shown on Figure 4-10 have been modified to show a more non-linear arrangement.

160: Section 4.4.1.6, p. 4-54 and 4-56: Only one node of the grid shown in Figure 4-12 falls within either the Marked Burial Site or the Asbestos Disposal Site. A finer grid spacing should be used at these two sites so that more intensive geophysical studies will be conducted to identify buried materials and more gas-sampling will be conducted at these expected waste-disposal sites. This should be shown in Figure 4-12 and discussed clearly on p. 4-54 and 4-56.

#160: The following has been inserted on page 4-56:

The map of the Horn Rapids Landfill shown in Figure 4-12 is based on a quick reconnaissance of the site and is not considered to be accurate. A present a detailed topographic map is being prepared. This map will be used to more definitively locate surface features within the Horn Rapids Landfill and to identify those areas in which a closer grid spacing is required for greater resolution.

162: This comment was not adequately addressed. Based on the assumed direction of ground-water flow shown in Figure 4-12, wells MW-10, -14, and -15 are not in the Horn Rapids Landfill flow system (ie., neither upgradient or downgradient) and therefore, will provide little useful information. We recommend that Wells 8, 11, and 12 be installed, developed, and stabilized and water levels measured to provide additional guidance for selecting sites for wells 10, 14, and 15.

#162: Figure 4-12 has been modified to show well locations more consistent with assumed regional groundwater flow direction. In addition, the following is inserted on page 4-59:

It is anticipated that three of the wells (MW-8, MW-10, and MW-15) will be installed first. Water level readings from these three wells will then be used to determine the groundwater flow direction for the Horn Rapids Landfill, and the locations of the other wells will be adjusted as appropriate.

164: There is still no scale on Figure 1-1.

#164: A scale has been added to Figure 1-1.

166: There is still no explanation of symbols on Figure 2-1.

#166: An explanation of symbols has been added on Figure 2-1.

167: The Battelle Farms Irrigation well is described on p. 4-1 to be within a few hundred feet of the 1100 area east boundary. Why can't this be fit on Figure 2-1? If the City of Richland Landfill and Lamb-Weston processing plant cannot be fit on the figure, at least describe their location in the text (ie., 1/2 mile southwest of the 1100 area, etc.).

#167: The PNL irrigation well and the approximate irrigated area are shown on Figure 2-1.

177: The dotted line is not described in the explanation of Figures 4-5 and 4-6.

#177: This line represents the assumed location of the contact between the Hanford gravel and the Ringold Formation. An explanation has been added to Figures 4-5 and 4-6.

179: In table 4-5, three quarterly water-quality samples are listed for the Battery Acid Pit, yet there are only 2 monitoring wells, and 10 quarterly water-quality samples were listed for the Horn Rapids Landfill when there are only 8 observation wells.

#179: Corrected.

181: The mention of low and medium CRQL's was neither deleted nor further explained.

#181: Mention of medium and low CRQL's have been deleted, as they are irrelevant to the listing of TCL compounds.

182(a): The addition of table 10 and update of Figure 4-13 are helpful. However, two wells (S31-1 and S29-E12) listed in tables B-2 and B-3 are still not identifiable on Figure 4-13, one well (3000-6) is not in table 4-10, and two wells (6-ORU and 1100-8) are not found in table 4-10 or Figure 4-13.

#182(a): Corrected.

186(b): The tables were not modified for consistency.

#186(b): Corrected.