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100-BC-1

QA 4.1.2

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Golder Associates Inc.

CONSULTING ENGINEERS

July 19, 1991

Our ref: 903-1277,78,79,80
S/O/449

Science Applications International Corporation
1845 Terminal Drive, Suite 202
Richland, Washington 99352

Attention: Mr. John Treadwell

RE: TASK ORDERS S-91-57, 58, 59 AND 60
WHC ORDER MLW-SVV-073750
MINUTES FOR JULY 15 MEETING ON COMMENT RESOLUTIONS FOR 100-BC-1/5 AND 100-KR-1/4 OPERABLE UNIT WORK PLANS

Dear John:

Enclosed are seven copies of the minutes prepared by Golder Associates for the meeting held on July 15, 1991, with Westinghouse Hanford, DOE and EPA regarding comment resolution for the 100-BC-1/5 and 100-KR-1/4 operable unit work plans.

Please submit one copy each to Mr. Alan Krug, Mr. Fred Roeck and Ms. Roberta Day at WHC's 450 Hills Street office. The remaining copies are for SAIC and ES.

Please contact Laura Johnson at Golder's Redmond (Seattle) office, if you have any questions.

Sincerely,

GOLDER ASSOCIATES INC.

Laura Johnson
Task Manager

Donald M. Caldwell
Project Director

LJ/DMC/jk

Enclosures

JUN 1995 RECEIVED EDMC

FILE JUL 23 1991 GOLDER ASSOCIATES QA RECORDS

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REVIEW OF THE HANFORD

100-BC-5 OPERABLE UNIT WORK PLAN

1. General comment.

Comment: The 100-BC-5 document presents a work plan for the cleanup of the groundwater and surface water operable unit at the 100 B/C Area. There are four source operable units at the 100 B/C Area. At the present time, only the work plan for the 100-BC-1 source operable unit has been written. The work plans for the 100-BC-1 and 100-BC-5 units are being prepared concurrently. Work plans for the other three units (100-BC-2, 100-BC-3, and 100-BC-4) will be developed later. Attempting to understand the workings of the groundwater unit without sufficient knowledge of the potential contributions of all of the operable could cause problems. This is especially true when one considers that the three missing operable units potentially contribute to the contamination of the groundwater under the entire site.

2. Section 2.1.2.2.1, WP 2-2, sixth paragraph.

Deficiency: This section describes the in-situ vitrification demonstration at the 116-B-6-1 crib. Included is a description of the crib. In the description, the depth of the crib is given as 8 feet and its location as 6 feet below the surface. In the following paragraph, on page WP 2-3, the depth of the inlet pipe is given as 16 feet. If these figures are correct, little of the liquid waste went to the crib.

Recommendation: Explain the design of this crib.

3. Section 3.1.1, WP 3-2, second paragraph.

Deficiency: This section describes the sources in the four source operable units in the 100 B/C Area. The number of sources in each of the units does not agree, in all instances, with the number of sources shown in Table 3-1 for each of the source operable units.

Recommendation: Explain the apparent discrepancies and the rationale behind adding sources to the list.

4. Section 3.1.1.1, WP 3-3, second paragraph.

Deficiency: This paragraph gives the number of waste handling and disposal units in the 100-BC-1 operable unit as over 30. Table 3-2 lists only 29 such units including those for which no radiological information is reported.

Recommendation: Rewrite the section and the table so that they agree as to which contamination sources are considered in the document.

5. Section 3.1.1.1, WP 3-3, third paragraph.

Deficiency: This section describes sources in the 100-BC-1 Operable Unit. It states that significant quantities of hazardous chemicals were released to the soil column in operable unit 100-BC-1. The types and amounts of chemicals released are not given. Reference is made later in this section to the 100-BC-1 operable unit work plan where detailed information is given on the 100-BC-1 unit. Our review of the 100-BC-1 work plan does not indicate a sufficient level of detail on hazardous chemical contamination.

Recommendation: Prepare a table of chemical contaminants known or suspected within the 100-BC-1 operable unit.

6. Section 3.1.1.3, WP 3-7, third paragraph.

Comment: This section describes four solid waste burial grounds northeast of B Reactor. The section indicates that two of the burial grounds (118-B-2 and 118-B-3) may contain non-radioactive hazardous wastes. No information is presented as to the possible amounts or types of wastes that might be found. No information is given about the possible sources of these unknown wastes.

Recommendation: Discuss the types of operations that might have contributed wastes to these burial grounds. Include the types of wastes that could be found in the burial grounds. Also indicate whether any burning of wastes took place at either of these sites.

7. Sections 3.2.1.2, WP 3-31.

Deficiency: This section discusses State of Washington regulations applicable to chemical-specific requirements. However, The Model Toxics Control Act Cleanup Regulation (Ch. 173-340 WAC) is not mentioned.

Recommendation: Include a discussion of this regulation in Section 3.2.1.2.

8. Section 3.2.2, WP 3T-23a and b, Table 3-23.

Deficiency: The table lists potential location-specific ARARs. The following potential requirements, however, have not been included in Table 3-23:

- Wildlife classified as protected or endangered, WAC 232-12 - this should be considered for several applicable species that appear on the Hanford site.

- Historic Sites, Buildings and Antiquities Act (16 U.S.C. 461).
- Fish and Wildlife Improvement Act (16 U.S.C. 742).
- Wild and Scenic Rivers Act (167 U.S.C. 1271).
- Fish and Wildlife Conservation Act (16 U.S.C. 2901).
- Washington Shoreline Management Act (Ch. 90.58 RCW).

Recommendation: Include these requirements in Table 3-23.

9. Section 3.2.3, WP-33.

Deficiency: This section lists potential action-specific ARARs. The following potential requirements have not been included among the bulleted items:

- Occupational Safety and Health Act - Occupational Safety and Health Administration Standards (29 C.F.R. 1910).
- Solid Waste Management Recovery and Recycling Act (Ch. 70.95 RCW) and Minimum Functional Standards for Solid Waste Handling (Ch. 173-304 WAC).
- Washington State Water Code (Ch. 90.03 RCW).
- Minimum Standards for Construction and Maintenance of Water Wells (Ch. 173-160 WAC).
- State Waste Discharge Program (Ch. 173-216 WAC).
- Maximum Contaminant Levels of Turbidity (40 C.F.R. 141.13).

Recommendation: Include these requirements in Section 3.2.3.

10. Section 3.2.3, WP 3-33, first bullet.

Deficiency: This item discusses 40 C.F.R. 260-280, RCRA Hazardous Waste Regulations. However, Parts 271 and 272 discuss requirements for authorization of state hazardous waste programs and approved state hazardous waste management programs and are not applicable to TSD facility owners and operators.

Recommendation: Alter the reference to 40 C.F.R. 260-270 and 280.

11. <u>Section 3.3, WP 3-35, second paragraph.</u>

Deficiency: This paragraph states that the preliminary risk assessment addresses exposure via groundwater. How will the risk derived through this exposure pathway be combined with the risks from other exposure pathways such as that of inhalation of fugitive dust.

This paragraph also states that the risk assessment for 100-BC-1 addresses soil contamination. Fugitive dust was not identified as a pathway of concern in the risk assessment for operable unit 100-BC-1. Where will this exposure pathway be addressed? Estimated risks from exposure pathways originating from separate operable units are not necessarily mutually exclusive to receiving populations.

Recommendation: Provide an introductory paragraph that describes the coordination of risk assessments for all operable units. Explain where the summation of risks from all pathways will be presented in the workplan.

12. <u>Section 3.3.2, WP 3-37.</u>

Deficiency: This section describes the qualitative analysis of exposure. However, it does not present a quantitative analysis of the doses or intakes. Conventionally, site-specific doses are computed in the exposure assessment, rather than in the risk characterization (Section 3.3.4).

Recommendation: Describe the computation of doses or intakes in the exposure section.

13. <u>Section 3.3.2, WP 3-39, second paragraph.</u>

Deficiency: The term *exposure pathway* is used to describe an *exposure scenario*.

Recommendation: Use the term scenario when describing a combination of exposure pathways.

14. <u>Section 3.3.4.2, WP 3-45, second and third paragraph.</u>

Deficiency: These paragraphs describe the derivation of the natural background cancer risk due to radiation. It is unclear how they calculated the average lifetime risk of cancer from natural background radiation.

Recommendation: Explain the assumptions and show the equation for the computation of the risk from natural background exposures to radiation.

15. Section 3.3.6.2, WP 3-47.

Deficiency: This section describes the potential for underestimating risk. However, inhalation of vapors and aerosols from showering is not mentioned as a potential for underestimation of risk.

Recommendation: Include justification for the exclusion of this exposure route.

16. Section 3.3.7, WP 3-48.

Deficiency: This section summarizes the risk assessment, yet it does not mention that the risk assessment does not address all offsite exposure pathways. The summary addresses only the groundwater pathway.

Recommendation: Describe how other exposure pathways will be combined with the groundwater pathway to evaluate total off-site risk.

17. Section 5.1.2, WP 5-4, fifth paragraph.

Comment: This section discusses the 100-BC-5 source investigation and indicates that one of its objectives is to identify sources in operable units 100-BC-1, -2, -3, and -4 that may contribute to contamination of the 100-BC-5 unit. It indicates that an RI will be conducted on 100-BC-1 and will provide information on that operable unit. Operable units 100-BC-2, -3, and -4 will have RIs conducted on them and which may not include detailed source investigations, and will be included in the 100-BC-5 investigation. To identify the contribution of contamination from 100-BC-2, -3, and -4 to 100-BC-5, RIs that include detailed source investigations are necessary on all operable units within 100-BC-5.

18. Section 5.1.2.2, WP 5-5, second paragraph.

Deficiency: This section introduces the base map development. It indicates that the Hanford site coordinate system will be used as a reference grid. The 100-BC-1 work plan indicates that the National Geodetic Survey coordinate system will be used. If these two investigations are to compliment each other, they should both use the same coordinate system, as should all investigations at the Hanford Reservation.

Recommendation: All investigations at Hanford should use the North American Datum of 1983 for all horizontal coordinates.

19. Section 5.1.3.2.2, WP 5-9, fourth paragraph.

Deficiency: This section describes the drilling and sampling program, but does not state what drilling technique will be used.

Recommendation: State what drilling technique will be used.

20. Section 5.1.4, WP 5-11, fifth paragraph.

Comment: This section describes the surface water and sediment investigation and the assumptions used to develop the investigation. One of the assumptions is that "there is no significant residual contamination . . . in the sediment." However, on page WP 5-12, fifth paragraph, it is stated that "some of the long-lived . . . radionuclides . . . may be present." This statement is inconsistent with the assumption. The assumption is probably incorrect and should be deleted. In addition, the work plan rational reviewed to assure that the deletion of this assumption does not alter the rationale.

Recommendation: Delete this assumption and evaluate if changes in the work plan rational are necessary.

21. Section 5.1.5, WP 5-16, third paragraph.

Deficiency: This section introduces the vadose zone investigation. This investigation does not include a vadose zone monitoring system, such as lysimeters to characterize the transport of contaminants through the vadose zone.

Recommendation: Include a discussion of the applicability of lysimeters and other monitoring systems in the vadose zone investigation.

22. Section 5.1.7, WP 5-25, sixth paragraph.

Deficiency: This section describes the air investigation. The section refers the reader to the Health and Safety Plan (HSP) for details of the air investigation. On page 17, the HSP states that the purpose of the air quality monitoring program will be ". . . to provide adequate warning and facilitate appropriate preventive action prior to potentially excessive exposure to contaminants in the work environment." The HSP goes on to note that modifications to the level of personal protection will be based on data available to the site safety officer. The potential for excessive levels of dust contaminated with radionuclides is mentioned but the potential for airborne particulate matter contaminated with chemicals is not mentioned. EPA guidance calls for meteorological data ". . . to characterize atmospheric transport of contaminants for risk assessment determination and provide real-time monitoring for health and safety issues." Information collected for the purpose of the HSP does not appear to satisfy this need especially with respect to the transport of contaminants beyond the site.

Recommendation: Expand the air investigation section to include the collection of meteorological information (e.g. wind speed and direction, precipitation, and temperature) and the measurement of atmospheric concentrations of contaminants, in addition to VOCs and radionuclides, which may be in particulate form (e.g. chemical composition of particulate matter and particulate size distribution).

23. Section 5.1.11.2, WP 5-33.

Deficiency: This section describes the exposure assessment. It is unclear what exposure pathways have been identified as a concern. Is the risk assessment to be comprehensive for all exposure pathways from the source or just ground water?

Recommendation: Discuss all exposure pathways to be addressed. Explain why certain exposure pathways were not addressed.

24. Section 5.1.11.2, WP 5-33, fifth paragraph.

Deficiency: The exposure assessment objective is described as the estimation of environmental concentrations. However, the *E.P.A. Risk Assessment Guidance for Superfund* manual defines the objective as the estimate of dose or intake concentrations.

Recommendations: Present the quantitative exposure assessment as doses or intakes.

25. Section 5.4.2.5, WP 5-57, first paragraph.

Deficiency: This section discusses the costing analysis for remedial alternatives. It states:

> "Cost considerations will be an important evaluation criteria at the Hanford Site because funding is distributed by Congress."

However, Section 5.2.2.4, page WP 5-39, third paragraph discusses how different remedial process options will be evaluated. It states:

> "Cost will be the least important of the criteria used to evaluate process options."

These two statements seem to be discussing the same subject, but they are inconsistent.

Recommendation: Make both sections consistent by resolving the importance of cost considerations for remedial options.

26. SAP/FSP, General.

Deficiency: In general, the field sampling plan (FSP) is not detailed enough for a trained field person to understand the steps needed to implement the necessary work. The level of detail provided in the FSP was similar to the level of detail provided in the work plan. In some cases, pertinent details to completing the work were included in the work plan but not the FSP.

Recommendation: The document should be written so there is a better description of where the samples will be taken, the method of sampling, and the number of samples taken in each media. This information should be summarized in tables with a matrix similar to table FSP 6-3 in the 100-BC-1 SAP. If additional information is needed prior to selecting sampling procedures or locations, the process that will be used to make these selections should be described (i.e., a decision tree). For example, if the method of sampling depends on the drilling conditions encountered, guidance should be provided regarding methods to be used. If sampling methodology is to be determined after the FSP is completed, a description of an additional document (e.g., work plan amendment, memorandum, etc.) outlining the sampling methods and other necessary information is needed.

27. Section 3.2, SAP/FSP-4.

Deficiency: More detail is needed in this section.

Recommendation: A list of items that will be in the participant contractors' procedure documents should be provided. For example, since the survey monuments will be permanent structures, more detail on where and how they will be constructed is needed; this detail can be included in either the contractors' procedure document or the sampling and analysis plan (SAP). Since the Columbia River shoreline can fluctuate significantly, the surveyors should be provided guidance on what features along the river should be surveyed. In addition, the categories of site features that will be surveyed should be specified.

28. Section 3.3, SAP/FSP-8.

Comment: Procedures for clearing drilling locations for utilities should be provided.

Recommendation: To help clear drilling locations, utility maps and standard pipe locating techniques used by public and private utilities should be considered.

29. Section 3.3.1, SAP/FSP-8.

Deficiency: A more detailed description of the procedures that will be used to conduct the soil gas survey is needed. The purpose of the walkover should be clarified.

Recommendation: Provide more detail on the purpose of the soil gas screening, including where and how deep the small holes for the survey will be dug. It should be specified if the screening will be conducted site-wide or just at proposed drillhole locations. Spacing to be used in the survey should also be indicated.

30. Section 4.2.1, SAP/FSP-11.

Deficiency: It may be difficult to map the surface geology unless small test pits are dug to examine the material below the top few feet. In the first paragraph, first sentence, it is unclear if "area survey" refers to the entire BC-5 operable unit or just to the proposed drilling locations. A methodology for selecting drilling locations should be provided.

Recommendations: Provide more detail on how the geologic mapping will be conducted and the drilling locations will be selected. Define what is meant by the area survey(s) along with their extent.

31. Section 4.2.2, SAP/FSP-12.

Deficiency: This section discusses the selection of drill sites for the geologic investigation at the 100-BC-5 operable unit. The first paragraph states that drill sites will be located away from areas suspected of surface or near-surface contamination. This will be done to protect the health and safety of the drilling personnel and to prevent cross contamination between hydrostratigraphic zones during drilling. However, in the next paragraph, it is proposed that surface soil samples will be collected within the working area of each well and in areas where exposure to surface and near-surface contaminants is greatest.

Recommendation: It is more logical that the drilling locations be selected in areas where the geophysical and radiation surveys indicate little or no contamination. To confirm the field screening, the surface soil samples could be taken in the areas showing little contamination. Clarification on where the surface samples will be taken, the purpose of these samples, and how this information will be used to select drilling locations should be given.

32. Section 4.2.3.1. SAP/FSP-12.

Deficiency: A ten-foot sampling interval may not be adequate to define the geology especially at shallower depths. It is not clear if the samples referred to are for geologic logging purposes alone or physical and chemical analyses.

Recommendations: Due to the high cost of drilling and well installation, it is recommended that samples be taken at 5-foot intervals to gain as much information as possible.

33. Section 4.2.3.5. SAP/FSP-14.

Deficiency: The discussion on sampling procedures in this section is too general.

Recommendation: Provide specific guidance on how the sampling will be conducted under different geologic conditions. For example, it should be clarified what procedures will be taken if a sample can not be taken with a barrel-type sampler. It is not clear if a core of the sample will be taken or a sample will be taken at a greater depth. The end use of the samples should dictate how they are taken. It would be helpful if a drilling method was discussed in the SAP.

34. Section 4.2.3.6. SAP/FSP-14.

Deficiency: The specific method for screening volatile organics is not provided.

Recommendation: It should be specified how the photo-ionization or flame ionization readings will be taken. For example, it should be specified if the samples will be put in a jar and if a headspace reading will be taken.

35. Section 4.2.3.7. SAP/FSP-14.

Deficiency: It is stated that the depth of the sample will be measured to the nearest tenth of a foot; however, it is not clear if the sample name will include the decimal place of the depth, will be rounded, or cut off.

Recommendation: Clarify the use of the depth designator for the sample name.

36. Section 4.3, SAP/FSP-15,.

Deficiency: It is unclear what analysis will be conducted on each of the samples and where the samples will come from. For example, the list of analyses presented in the first sentence of section 4.3 is shorter than the list of analyses in Table FSP-2. Because the D-level well boreholes will be over 600 feet deep, it seems likely that more than five samples for physical analysis will be needed. Quality assurance and quality control (QA/QC) procedures are not specified for the physical testing analyses.

Recommendation: A table with a matrix similar to Table FSP 6-3 in the 100-BC-1 SAP would clarify the sampling and analyses that will be conducted. Plan for more physical analyses than five per borehole, and conduct QA/QC sampling and analyses.

37. Section 5.2.1, SAP/FSP-19.

Deficiency: The grid spacing and procedures for conducting the walkover radiation survey are not specified. The location of the background radiation survey is also not specified.

Recommendation: Specify these procedures.

38. Section 5.2.2.1, SAP/FSP-19.

Deficiency: Field personnel using their personal judgment to select seep and spring sampling locations does not seem appropriate. It should be clarified what is meant by "best technical judgment and field estimates will be used" when measuring seep discharge if flows are too slow or widespread. How are these field estimates different from ASTM 1988b?

Recommendation: All the springs should be screened in some manner to select the springs that will be used for sampling. It should be assumed that seeps will be small and widespread, and procedures for estimating flow should be developed.

39. Section 5.2.2.2, SAP/FSP-20.

Deficiency: When selecting river sampling locations, seep locations and water quality should be given further consideration. The FSP indicates that all river samples are to be taken near a seep if possible. The results of the spring sampling should be used to select river sampling locations. There is only one river sampling location directly adjacent to the site; this does not seem like enough due to all the known and unknown factors that might effect river water quality. It is not specified at what depth the river samples will be taken. No directions for conducting the dye test is provided. There is also no guidance on how the dye test will be used to select sample locations at SW3 and SW4. For the outfall sampling, it is not specified how far out from the bank the samples will be taken or how far upstream the background samples will be taken. It is not clear what procedures or depths will be used to conduct the stream flow measurements. It is not clear why river samples along the transects will be collected from the bottom of the river and not the top or middle. The samples should probably be taken where the risk of exposure is greatest. This cannot be determined unless vertical profiling is conducted.

Recommendations: Provide clarification and more detail on the purpose and procedures for river sampling.

40. Section 5.2.2.3, SAP/FSP-24.

Deficiency: A system for assigning a unique sample name to the samples is not provided.

Recommendation: A unique sampling code should be presented.

41. Section 5.2.2.4, SAP/FSP-24.

Deficiency: This section is too general. There should be some existing information on the character of the river bottom near the site. This information could be used to select a sampling methodology.

Recommendation: Even though standard procedures for sediment sampling have been developed and methods for surface water sampling will be developed, some information should be provided on site-specific sampling equipment and procedures.

42. Section 5.3, SAP/FSP-25.

Deficiency: The comprehensive list of analyses listed in tables FSP-3, 4, 5, and 6 does not include the general minerals listed in Table QAPP 3-1 of the quality assurance project plan (QAPP). No justification for having a reduced list of analysis for the north shore river samples is provided. For example, it should be explained why nitrate, a known onsite groundwater contaminant, is not being analyzed.

Recommendation: A table with a matrix similar to Table FSP 6-3 in the 100-BC-1 SAP would clarify the sampling and analyses that will be conducted. Justification for the reduced list of analysis for the north shore samples should be provided in the actual work plan. The list of analyses for the first round of river sampling should be inclusive and reduced for subsequent rounds based on the first round results.

43. Section 6.2, SAP/FSP-25.

Deficiency: Most of the same deficiencies listed for the geologic investigation also apply to this section. It is not clear how the vadose zone sampling overlaps with the geologic investigation sampling. The list of analyses and analytical methods for onsite screening of metals and organics in the mobile lab is not provided.

Recommendations: See previous comments for Section 4.0. Provide clarification of vadose sampling and analysis procedures.

44. Section 7.2.3.2, SAP/FSP-36.

Comment: The well numbering scheme appears to be too limiting. For example, if a well is installed between a B and a C well, it is not clear what the well will be called. In addition, if the conceptual model of the site is wrong and there are more or less hydrostratigraphic zones at the site or it is difficult to determine which zone you are in while drilling, the numbering scheme may not work. The screened interval of the shallow well above and below the watertable should be specified. It will be important to evaluate the degree of water fluctuations at the site prior to selecting a screened interval.

Recommendation: A numbering scheme tied to the total depth of the well should be considered. More guidance on screening the shallow wells should be provided.

45. Section 7.2.3.2, SAP/FSP-36.

Deficiency: A more detailed discussion of the well locations and depths should be provided.

Recommendation: A matrix like Figure 5-4 in the work plan could be presented and discussed. If any wells are to be located directly downgradient of known sources, these specific locations should be discussed.

46. Section 7.2.3.3, SAP/FSP-36.

Deficiency: The monitoring wells should be installed in accordance with the state of Washington, Minimum Standards For The Construction and Maintenance of Wells, chapter 173-160 WAC. The construction of the monitoring wells as shown in Figure FSP-4 is inadequate. The figure shows only a 1-inch annulus on either side of the protective casing. This will not provide adequate space to run tremie pipe to the bottom of the borehole to pump in the grout seal. The State of Washington guidelines require a minimum of a 2-inch annular seal in wells. However, a 2-inch annulus may not be large enough for wells as deep as 600 feet. Figure FSP-4 shows the first protective casing extending to over 200 feet. Because the top portion of the watertable may be more contaminated than deeper zones, it may be necessary to case off this contaminated portion of the aquifer (shallower than 200 feet). Drilling to a depth of 200 feet without casing off the shallow zone could increase the potential for cross contamination.

Recommendation: The construction specifications should be revised.

47. <u>Section 7.2.3.3, SAP/FSP-36</u>.

Deficiency: It is stated that "wherever possible, drive casing should be left in place." This practice is not recommended due to the potential for cross-contamination. Grout curing times around the protective casing prior to resuming drilling is not discussed.

Recommendation: Drive casing should not be left in place except under special circumstances that should be explained in the FSP or work plan. The grout curing time should be specified.

48. <u>Section 7.2.4, SAP/FSP-38</u>.

Deficiency: Additional site specific information on well construction and installation is needed.

Recommendation: Provide additional information on screened interval, screen size, gravel pack, pump installation and other specifications that could impact the water quality of groundwater samples.

49. <u>Section 7.2.4.1, SAP/FSP-38</u>.

Deficiency: The procedures that will be used for well development are not described.

Recommendation: Describe the specific procedures (i.e., bailing, surging, pumping, air lifting, etc.) that will be used to develop the wells.

50. <u>Section 7.2.5, SAP/FSP-38</u>.

Deficiency: A more detailed description of how the slug tests and flood-wave response test will be conducted is needed.

Recommendation: The method and frequency of water-level measurements should be described. A description of how the temporary piezometer will be installed should be provided.

Deficiency: The frequency of data logger measurements should be specified. In addition to the shallow wells specified, deeper wells should also be monitored with data loggers to determine the impact of river stage, barometric pressure, and other factors on water levels at greater depths.

Recommendation: Install pressure transducers in some deeper wells and provide information on the frequency of measurement.

52. Section 7.2.7.1, SAP/FSP-41.

Deficiency: Because drilling with cable tool rigs is slow, it may take a long time to drill all the wells proposed and begin quarterly sampling.

Recommendation: In addition to the quarterly monitoring, it is recommended that each well be sampled after development so the results can be used for locating and constructing additional wells. Conducting depth profile sampling during the drilling of the deeper wells should be considered.

53. Section 7.3, SAP/FSP-46.

Deficiency: The container, preservatives, and holding times for radionuclides, oxalate, and sulfamate are not provided in Table FSP-11. The container type for dissolved oxygen (DO) is not specified. DO should be conducted in the field, if possible. The number of containers is large because a separate container is specified for each method of analysis.

Recommendation: Specify the missing information and conduct field measurements of DO. If possible, more than one analysis should be conducted from each container.

54. Section 9.2.1, SAP/FSP-49.

Deficiency: It will be difficult to select sampling locations and methods of analysis until the seep, groundwater, and other sampling results are received.

Recommendation: The results of the phase I remedial investigation (RI) should be used as much as possible to select sample locations and chemical analyses.

55. Section 2.2, SAP/QAPP-4.

Deficiency: It is stated that:

> "Samples with detectable levels of radioactivity, using standard field survey equipment, will be routed to a WHC or Hanford site participant contractor laboratory equipped and qualified to analyze radioactive samples."

There is no mention as to what is considered "detected." There will be a certain amount of background radiation which will be detected; however, the sample may not necessarily be qualified as radioactively contaminated.

Recommendation: Designate a minimum level at which samples will be considered radioactive.

56. SAP/QAPP-8, Table QAPP 3-1.

Deficiency: Analytical methods for conductivity, dissolved oxygen, and pH are listed as not applicable. Analytical methods for these parameters do exist and are applicable.

Recommendation: Include the methods of analyses for the above-mentioned parameters in the table.

57. SAP/QAPP-9, Table QAPP 3-1.

Deficiency: The footnote for organic compounds screening and radionuclide analytical methods does not mention if the methods are U.S. Environmental Protection Agency (EPA) approved.

Recommendation: IF the methods are EPA-approved, then it should be stated. If modified or non-standard methods are to be used, they need to be described in detail in Section 7.0 or included in an appendix.

58. Section 3.0, SAP/QAPP-10, fourth paragraph.

Deficiency: The last sentence of this paragraph states that:

> "Once the analytical laboratories and methods are finalized, and the corresponding QA/QC information is in compliance with standard procurement control procedures (as noted in Section 4.1), Table QAPP 3-1 shall be revised."

This sentence implies that the data quality objectives (DQOs) are based upon laboratory procedures alone. DQOs should be defined in terms of project requirements, not in terms of the capabilities of the test methods or laboratories used.

Recommendation: The factors that may affect DQOs should not be affected by the laboratory chosen to perform the chemical analyses. However, factors which may affect the DQOs may be a result of matrix interferences or insufficient sample volume; these types of factors should be discussed.

59. SAP/QAPP-13, Table QAPP 4-1.

Deficiency: Sampling and investigative procedures for Task 7 (Air Investigation) do not include field logbooks.

Recommendation: A field logbook should be included in this type of investigation.

60. Section 6.0, SAP/QAPP-17.

Deficiency: Calibration standards, including source, traceability, and purity checks, should be listed. There is no mention of the frequency in which calibrations will be performed. Acceptance criteria for all calibration measurements should be defined.

Recommendation: The above-mentioned should be discussed in this section.

61. Section 7.0, SAP/QAPP-18.

Deficiency: There is no mention of whether the analytical methods for radionuclide or organic compounds screening are EPA-approved methods.

Recommendation: If the methods are EPA-approved, then it should be stated. If modified or non-standard methods are to be used, they need to be described in detail in this section or included in an appendix.

62. Section 10.0, SAP/QAPP-23.

Deficiency: The rate at which performance and system audits will occur is not mentioned. Section 9.0 references this section for frequency of split sample and blind sample analyses.

Recommendation: Indicate a minimum rate at which performance and system audits will occur.

63. Section 12.0, SAP/QAPP-24.

Deficiency: The last sentence in this paragraph describes Task 9 as the risk assessment and Task 10 as the Phase I RI report. The risk assessment is actually performed as Task 11 and the Phase I RI report is performed as Task 12.

Recommendation: Make the corrections that are discussed above.

7/11/91
U.S.G.S.

BWD
03/13/91 09:20:33
<DISKF>PJ.HANFORD>BWD.100-BC-5.WPREVIEW

REVIEW OF: REMEDIAL INVESTIGATION/FEASIBILITY STUDY WORK PLAN FOR THE 100-BC-5 OPERABLE UNIT, HANFORD SITE, RICHLAND, WASHINGTON

COMMENTS

SECTION 2.2.3.2.4, p. WP 2-26

The first paragraph on the page states that shallow ground water discharges to the Columbia River, although the amount and duration of discharge are uncertain. We also need to indicate that discharge may occur to the east, out of the operable unit. We need to keep this uncertainty in mind when analyzing the system.

SECTION 3.1.7.2.1, p. WP 3-23

Same comment as for SECTION 2.2.3.2.4, p. WP-2-26.

SECTION 5.1.2.2, p. WP 5-5 and Section 3.2.1, SAP/FSP-7

The work plan gives specifics for the topographic base map that differ from information recently supplied to the regulators (by George Evans at the January 23, 1991 Unit Managers' Meeting). This needs to be resolved.

		Work Plan	New Info.
1) Contour interval	=	2 ft	0.5 m
2) Scale	=	?	1:2000
3) Coordinate system	=	Hanford Site	State Lambert (metric)
4) Horizontal accuracy	=	+/- 1 ft	+/- 0.25 m

SECTION 5.1.2.2, p. WP 5-5

It is stated that aerial photos will be used to correct and supplement the existing source data. Does this refer only to current aerial photos or to historical photos as well? Our experience in the 300-Area has shown that inspection of historical aerial photos can lead to the discovery of many additional potential sources. If possible, the historical aerial photos should be inspected prior to the area walkover so that potential sources identified from the photos can be checked out on the ground.

SECTION 5.1.4.2.2.1, p. WP 5-13

The first sentence in the section lists past investigations of the riverbank springs in the 100-BC-5 area. Add Dirkes (1990) to the list.

SECTION 5.1.4.2.2.1, p. WP 5-13 and SECTION 5.2.2.1, p. SAP/FSP-20

Deficiency: The discharge measurements at the springs/seeps should be done in similar fashion to the water-quality measurements. Discharge presumably will change with time, reflecting bank storage effects. A one-time measurement of discharge will not be very useful; we will require a trend in

United States
Environmental Protection
Agency

9513347.1881

Region 10
Hanford Project Office
712 Swift Boulevard, Suite 5
Richland WA 99352

EPA

March 7, 1991

Steven H. Wisness
Hanford Project Manager
U.S. Department of Energy
P.O. Box 550, A6-95
Richland, Washington 99352

Re: Borehole Geophysics Review

Dear Mr. Wisness:

A meeting was held December 12, 1990 to review and evaluate the capabilities of Westinghouse Hanford Company (WHC) and Battelle Pacific Northwest Laboratories (PNL) to perform the geophysical logging activities described in the 200-BP-1 RI/FS work plan and all other past-practice work plans. In addition, a panel of experts from outside of the Hanford Community were also assembled to identify other nuclear logging capabilities not currently in use at Hanford and to determine their applicability for various site characterization and monitoring activities.

The results of the one day session are enclosed for your use. The current on-site capabilities will not provide data of sufficient quality to meet the requirements in the 200-BP-1 work plan, but we believe certain on-site capabilities would be valuable for other uses. The U.S. Environmental Protection Agency (EPA) considers the use of down-hole geophysical logging to be an important tool for meeting the long-term goals of Hanford cleanup. These techniques are extremely well suited to the investigation of the unsaturated zone at Hanford, since much of the radioactive and hazardous substance inventory remains in the soil column above the water table. EPA believes that the use of geophysical logging can yield significant reductions in the overall cost of site characterization, operational monitoring, and post-closure monitoring. This capability is especially attractive since thousands of boreholes were installed to monitor liquid disposal sites and tank leaks as a standard practice. These boreholes provide access to valuable information on stratigraphy, moisture distribution, and hazardous substance and radionuclide distributions without additional drilling. Used in conjunction with core sampling, down-hole geophysics can enhance our understanding of contaminant mobility and focus sampling and analysis plans on selected constituents.

9513347.1882

EPA believes application of commercially available techniques to the Hanford Site characterization and monitoring projects would help to focus development of these capabilities at Hanford without the initial capital costs associated with procurement of equipment. EPA would like to work with the DOE and the Washington State Department of Ecology to enhance the role of borehole geophysics in both site characterization and monitoring at Hanford.

If you have questions on the enclosed review, please feel free to call Doug Sherwood of my staff on (509) 376-9529.

Sincerely,

Paul T. Day
Hanford Project Manager

Enclosure

cc: E. Bracken, DOE
G. Bracken, DOE
M. Buckmaster, WHC
C. Cline, Ecology
J. Erickson, DOE
R. Freeberg, DOE
D. Hildebrand, DOE
G. Hofer, EPA
T. Nord, Ecology
W. Staubitz, USGS

REVIEW OF HANFORD-SITE BOREHOLE GEOPHYSICAL CAPABILITIES AND THEIR APPLICATION FOR PAST-PRACTICE REMEDIAL INVESTIGATIONS

BACKGROUND

Borehole geophysical techniques are commonly used in hydrogeologic and hazardous waste investigations to provide site characterization information. Geophysical logs can be interpreted in terms of the lithology, thickness, and continuity of aquifers and confining beds; permeability, porosity, bulk density, and moisture content of the soil and aquifer matrix; and the chemical characteristics of soil and groundwater including the distribution of selected radionuclides. These data are required to evaluate the distribution of contaminants in the subsurface, to understand the groundwater flow system, and to quantify the potential for contaminant transport.

Geophysical logs are generally run to augment and complement borehole sampling programs. The logs usually are run continuously down a borehole. They provide a continuous record of physical properties with a high degree of spatial resolution and fill in data gaps left between discrete borehole sampling points. The logs often times measure the properties of a volume of rock many times larger than core or cuttings that have been extracted from the hole, and the data they provide are objective, repeatable, and comparable unlike descriptive logs written by a driller or geologist, which are limited by their author's experience and purpose. Logs can also be run repeatedly down the same hole allowing measurement of changes in the groundwater system or in contaminant distribution over time. For instance, spectral-gamma logs can periodically measure the distribution of selected radionuclides in the subsurface and thereby measure their rate of movement.

Most importantly, the cost benefit ratio for recording geophysical logs usually is quite favorable when compared to the alternative of installing boreholes. A major advantage of borehole geophysics as a site characterization technique is that it permits the relatively inexpensive lateral extrapolation of quantitative data from test or core holes. Using geophysical logs, a measured value at a point in a borehole can be extrapolated in three dimensions thereby increasing its value. This is particularly significant at Hanford where there are so many existing boreholes in which geophysical logs can be run and where the costs of installing new boreholes are so great. Because of the large site characterization effort being undertaken at Hanford, it is critical that this work be carried out in the most cost effective manner possible. The proper application of borehole geophysics has the potential to maximize the amount of information provided by new and existing Hanford Site boreholes and reduce the total amount of drilling required and, therefore, the total cost of site characterization.

It should be noted, however, that geophysical logging cannot replace borehole sampling completely. Detailed borehole sample data are needed for each study area to aid log analysis. The borehole samples provide a precise analysis of physical properties, and logs--when correlated with the samples--give a high resolution vertical distribution of these properties along the borehole and a horizontal distribution of the properties in adjacent boreholes. The combination of samples and logs provides superior results that cannot be obtained by either method alone.

TECHNICAL REVIEW

Borehole geophysics have been proposed for use in many of the Hanford Site RI/FS work plans reviewed and approved to date. Due to the unconsolidated nature of the suprabasalt sediments at the Hanford site, boreholes are cased (normally with carbon steel casing) during drilling and as a permanent installation to prevent the collapse of the borehole. The nearly uniform existence of carbon steel casing limits the geophysical techniques applicable to Hanford to nuclear logging. The carbon steel casing interferes with techniques such as electric and acoustic logging.

Westinghouse Hanford Corporation and the Pacific Northwest Laboratories have been identified as the organizations to do the nuclear logging at Hanford. The U.S. Environmental Protection Agency and the Washington State Department of Ecology requested a meeting to review the nuclear logging capabilities of the Hanford Site contractors to determine their ability to carry out the work in a manner that meets the data quality objectives of the RI/FS work plans. The meeting was held on December 12, 1990, in Richland. The review team consisted of hydrogeologists and geophysicists from the U.S. Geological Survey, Geologic and Water Resources Divisions, the Washington State Department of Natural Resources, and the Washington State Department of Ecology. The purpose of the review was (1) to evaluate the potential for successful application of borehole geophysics as a site characterization tool in the Hanford environment; (2) to evaluate existing capabilities of Hanford Site contractors and their ability to meet RI/FS data quality objectives; (3) to make recommendations to correct any deficiencies found; and (4) to provide suggestions for the application of additional or innovative geophysical techniques appropriate for use at Hanford. Although the review was directed to the application of borehole geophysics to the Hanford Site as a whole, the review focused on the 200-BP-1 remedial investigation as a representative example.

During the review, presentations were made by representatives of the Westinghouse Geosciences and Environmental Engineering groups and the Pacific Northwest Laboratory Geosciences group describing (1) the geology of the Hanford Site; (2) the 200-BP-1 geophysical logging program goals; (3) PNL logging equipment and procedures; and (4) WHC logging equipment and procedures. It should be noted that representatives of the PNL Nuclear Chemistry Department did not attend the meeting. This group is also equipped with certain down-hole geophysical logging capabilities which were not subject to review by the panel.

CONCLUSIONS AND RECOMMENDATIONS

After one day of presentations and discussions, the review panel has the following observations and recommendations.

(1) Geophysical logging has a strong potential for providing important site characterization and monitoring information in a cost effective manner at Hanford. Nuclear logging should be successful in measuring the critical physical properties of porosity and moisture content by neutron-neutron logging and the distribution of selected radionuclides in the subsurface by spectral-gamma logging. Gross-gamma logs should be useful for identifying confining layers and for stratigraphic correlation. Measuring bulk density by gamma-gamma logging is less assured and will likely require some degree of development and demonstration work.

The review panel further concluded that the Hanford logging environment with air filled, large diameter, carbon steel cased boreholes presents some difficulties not normally encountered in conventional geophysical logging applications and that existing technology may need to be adapted to meet Hanford Site specific requirements. The panel stresses that the appropriate technology exists within the industry, but that it needs to be properly configured to provide the best results for the Hanford environment. The panel recognizes that some inhouse development work may be necessary, but notes that this is not a research activity. It is a technology transfer activity, and the panel strongly recommends full use of the technical expertise available from commercial "production logging" companies.

(2) The gamma-gamma and neutron-neutron tools fielded by PNL were designed for logging slim, uncased holes typical of those installed in bedrock for the mineral exploration industry. These tools do not represent current technology and were not designed for use in the large diameter, carbon steel cased boreholes installed in the suprabasalt sediments. The tools have not been calibrated nor in past applications at Hanford have they been shown to provide a correlation between log signals and the properties of the formation being logged. These PNL tools will not provide quantitative data, nor do we believe that they will provide even useful qualitative data. The PNL tools will not meet the data quality objectives of the 200-BP-1 remedial investigation, and we, therefore, recommend that they not be used for this application and, further, that the use of the PNL gamma-gamma and neutron-neutron probes in carbon steel cased boreholes in alluvium be discontinued at all Hanford facilities.

The PNL gross-gamma tool has been calibrated and shown to provide defensible logs for lithologic studies and continued use for this purpose should be appropriate. It should be noted that the PNL gross-gamma tool can become saturated in contaminated zones with high nuclear activity. A shielding system should be developed for this tool if it is to be used to measure the distribution of radionuclides in the subsurface.

WHC has apparently successfully developed a state-of-the-art spectral-gamma-ray logging system employing dual NaI and GeLi detectors. This system is well suited for quantifying total gamma radiation and identifying specific gamma-ray emitting radionuclides in the vicinity of the borehole. The spectral-gamma logs should provide valuable site characterization information on the present distribution of radionuclides in the subsurface and should be one of the few techniques capable of providing insitu data for post-closure monitoring of remedial-action performance assessment. Post-closure monitoring is likely to be an important component of most operable unit RODs, and developing and demonstrating the capability to conduct post-closure monitoring within both the saturated and unsaturated zones should be a very high priority and fully supported activity. We, therefore, recommend that the WHC spectral-gamma tool be used at 200-BP-1 boreholes and at other Hanford facilities.

-Our primary concerns with the WHC spectral-gamma system are: (i) the spectral-gamma tool has no shielding system. Although less easily saturated than the PNL gross-gamma tool, the WHC spectral-gamma tool may saturate in zones of very high nuclear activity and therefore should have a shielding system as well. (ii) WHC does not have a proven field monitoring capability. Only a limited number of actual spectral-gamma logs have been taken in Hanford boreholes and little information was supplied about the WHC capability to perform characterization, as well as routine monitoring; (iii) WHC possesses no backup detector. If the detector becomes contaminated or otherwise inoperable, the spectral-gamma logging system will be inoperable for potentially long periods, making it impossible to meet remedial investigation commitments and milestones. We recommend procurement of a backup detector.

In light of the development of the WHC spectral-gamma system, the PNL gross-gamma system appears to be outdated and somewhat redundant and may be phased out in the near future. Before phasing out the PNL tool, we recommend that both the WHC and PNL tools be run sequentially in a series of boreholes so that the logs can be compared and a link developed between the old logs run by the PNL system and new logs to be run by the WHC system.

(3) The Hanford Site contractors appear to presently lack the capabilities to provide technically defensible neutron-neutron and gamma-gamma logs as required by the approved 200-BP-1 RI/FS work plan. It is likely that commercial contractors using dual detector neutron-epitheral-neutron probes have the capabilities to provide technically defensible neutron-neutron logs for Hanford Site conditions. However, there may be difficulties in bringing a contractor on site for routine borehole logging due to scheduling and logistical difficulties and uncertainties in the areas of decontamination, possible tool abandonment, and certification of proprietary data reduction algorithms. These uncertainties were not clearly understood by the review panel and should be explained and documented before accepting or rejecting the use of outside contractors for providing routine logging services at Hanford. Neutron-neutron logs are expected to provide very necessary site characterization information, and if outside contractors are not available or are unacceptable, Hanford Site capabilities should be developed.

It was agreed by the review panel that it is unlikely that outside contractors have the ability to provide defensible gamma-gamma logs in typical Hanford Site boreholes. There was some question by the panel whether defensible gamma-gamma logs run for bulk density measurements could be successful at Hanford at all due to the likelihood of air gaps occurring outside the casing. The review panel agreed that if defensible gamma-gamma logs are able to be produced at Hanford, they will provide valuable site characterization information, particularly when used in conjunction with the neutron-neutron logs. The panel concluded that the best commercially available neutron-neutron and gamma-gamma logging technology should be tested and evaluated at Hanford. If demonstrated to be successful, the commercial technology should be used, and if found lacking, onsite development work should be initiated in association with experienced commercial logging companies.

(4) The review panel repeatedly stressed the need to develop an exact understanding of the geophysical log response to the physical properties of the sediments on the Hanford site. The panel was particularly concerned that the geophysical response on nuclear logs associated with variations in hydraulic properties measured through large diameter carbon steel casings may be very subtle, and the ability to quantify or interpret these responses has not been demonstrated at Hanford. The panel concluded that detailed collateral geologic studies were needed to quantify the log responses to parameters such as grain size, porosity, water content, etc., and that this work should be done under optimum conditions for log response (such as small diameter plastic cased holes) to get a firm handle on the things that will be measured in less than ideal conditions (such as large diameter carbon steel cased holes). The panel does not consider this a research activity as such, but rather a type of calibration activity that is a logical and necessary step in the development and application of a defensible borehole logging program. This activity should also conclusively determine the type and quality of data that borehole geophysics are able to yield at Hanford, and in which areas of the site we can expect successful results, thereby providing guidance to the authors and reviewers of RI/FS work plans as to how borehole geophysical techniques should be included as a site characterization tool.

(5) We recommend that a field testing, demonstration, and development program be undertaken to address the issues raised in items 3 and 4. The purpose of the testing program is (a) to develop a detailed understanding of the physical properties of sediments at selected locations representative of typical Hanford waste sites, (b) to quantify the log response of commercially available nuclear logging tools to these physical properties, (c) on the basis of b, to either select appropriate commercial tools or optimize the design of Hanford Site custom gamma-gamma and neutron-neutron logging tools, and (d) to conclusively demonstrate the applicability of the final logging system proposed for use in Hanford Site remedial investigations.

To accomplish these goals, we recommend that one or more dedicated paired boreholes, representative of waste disposal sites yet remote from any contamination, be drilled and cased. One of these paired boreholes should be located in the vicinity of the 200-West Area, where borehole geophysics is likely to have its greatest utility. A continuous core should be taken during drilling to provide a complete geologist's log and samples for laboratory measurements of physical and mineralogic properties. One borehole should be cased with ABS plastic, which should provide a minimum of interference and allow optimum logging tool response, and the second borehole should be an existing carbon steel cased borehole with no annular seal representative of the "typical" Hanford borehole environment. Commercially available tools designed for logging large diameter cased boreholes should be used to log the test boreholes, and the results should be compared with the measured physical formation properties. If the commercially available tools do not provide adequate quantitative results, a modeling study should be undertaken to determine optimum design specifications for the gamma-gamma and neutron-neutron logging tools. Once these tools have been designed and built, they should be run in the paired test boreholes to again compare their logs with the measured physical properties. If the logs from these custom tools match the physical formation properties measured in the paired test boreholes, they should provide acceptable and defensible results for Hanford Site remedial investigations.

(6) Neutron-activation logging also has a strong potential to provide useful site characterization and monitoring information at Hanford, but to the best of our knowledge, has not yet been proposed for use. Neutron-activation logging can provide information on the distribution of non-gamma emitting radionuclides and stable isotopes in a similar fashion as spectral-gamma logging provides information on the distribution of gamma-ray emitting radionuclides in the subsurface. Many contaminants of concern to the Hanford Site remedial investigation are non-gamma emitting radionuclides, such as uranium 238, carbon-14, strontium-90, and technitium-99. These radionuclides cannot be detected by spectral-gamma logging, and their distribution and transport cannot be monitored by existing Hanford Site logging capabilities. Characterization of these radionuclides must rely on expensive drilling programs that have no potential for long-term monitoring. If neutron-activation logging can be shown to provide defensible data on the distribution of these radionuclides and other radionuclides of concern in the Hanford subsurface environment, a significant data need will be fulfilled. Similarly, this technique has great potential as a site characterization and monitoring tool for nonradioactive contaminants of concern. Many contaminants of concern at Hanford including nitrate, chromium, cadmium, copper phosphates, cyanides, as well as many other substances can be identified and quantitied using neutron-activation logging. Application of this tehnicque for mineral exploration is analogous to the problem of measuring the extent of contamination beneath a hazardous waste site or a single-shell tank. We recommend that the feasibility of using neutron-activation logging at Hanford be tested and aggressively pursued if successful.

In conclusion, the review panel would like to point out that borehole geophysics has a proven record of providing conclusive, defensible geologic data not readily measurable by alternate techniques. However, it should be recognized that nuclear logging is not off-the-shelf, cookbook technology that can be applied in a simplistic or haphazard fashion and still yield satisfactory results. Successful use of this technology requires a competent staff equipped with logging tools designed for specific applications and calibrated to yield predictable and quantifiable responses to variations in physical properties. This technology is analogous to that used in chemical analytical laboratories and requires a similar degree of support for instrument calibration and demonstration of performance against known standards. Without such support, borehole geophysics cannot expect to yield defensible results, just as chemical analytical laboratories do not yield acceptable results without a data validation program.

If borehole geophysics is to be included in the Hanford Site hazardous waste investigations, as we think it should, a well thought out and well organized approach, including the recommendations noted above, should be developed and funded. These activities should also be periodically reviewed by outside experts to assure that the geophysical program goals are appropriate to site characterization and monitoring needs, and that the work is being conducted in a timely and efficient manner.

100-BC-1, 100-BC-5, 100-KR-1, and 100-KR-4 COMMENT RESOLUTION
MEETING MINUTES
JULY 15, 1991, 9:00 AM

A meeting was held on July 15, 1991 at the Environmental Protection Agency's (EPA) office in Richland, Washington. The following were in attendance:

Fred Roeck, WHC
Roberta Day, WHC
Doug Sherwood, EPA
Jim Goodenough, DOE-RL
David Shafer, DOE-RL
Brian Drost, USGS
Douglas Morell, GAI
Laura Johnson, GAI

Doug Sherwood provided copies of Ecology's comments on the most recent drafts of the 100-BC-1 and 100-BC-5 operable unit work plans; these comments were dated May 25, 1991 and May 28, 1991, respectively. Doug Sherwood recommended using the Ecology comments as guidance in revising the work plans. He will discuss some of the comments with Ecology that are related to older issues already resolved. He also requested that any questions about the comments be directed to him. Responses to the comments are not required.

The Ecology comments focus on the following:

- Source data gaps
- ARARs
- Risk Assessment
- Background

Fred Roeck explained that the source data gaps will be resolved through the source data compilation activities currently being conducted by IT. The source data compilation will be completed in September 1991. Fred Roeck also explained that figures and tables are being reviewed for accuracy and consistencies. Site maps are being checked in the field.

Roberta Day discussed red line copies of 100-BC-1 and 100-BC-5 work plans, that were prepared after a review of resolved DOE and EPA comments. The redlines will be incorporated into the revised work plans.

Brian Drost provided copies of his comments on 100-BC-5 work plan. Additional comments from the USGS may be coming on 100-BC-1 work plan. Brian Drost reviewed the comments he considered deficiencies. These comments include discharge measurements at seeps and springs, and use of slug tests. Responses to the comments are not required.

Doug Sherwood expressed his concerns with borehole geophysics. Brian Drost clarified his comment on geophysics to state that the preferred methods are spectral-gamma and total-gamma. However, he expects continued research with other methods such as natural-gamma, gamma-gamma, and neutron-epithermal neutron logging. Prior to conducting geophysics, the work being done at 200-BP-1 should be reviewed. Brian Drost provided a letter from Paul

Day to Steven Wisness dated March 7, 1991 on the subject of borehole geophysics. Fred Roeck asked if a site visit should be scheduled to review the borehole staking that is occurring by the geoscience group. Doug Sherwood agreed that a site visit would be recommended at the conclusion of the staking. A site visit is scheduled for July 26, 1991, meeting at 450 Hills Street at 9:00 AM.

The discussions on the 100-BC Area concluded at 10:00 AM.

Doug Sherwood left the meeting and Dave Einan joined the meeting for comment resolutions for the 100-KR-1 work plan.

Dave Einan has not received any comments from Ecology for 100-KR-1 or 100-KR-4 work plans. He does not know if comments are coming. If comments are provided by Ecology, he agrees with the approach Doug Sherwood is taking. The comments will be used as guidance, and questions will be routed through Dave. Responses to any comments will not be required.

Brian Drost provided comments on 100-KR-4. These comments were not discussed. Responses to the comments are not required.

Fred Roeck explained that a source data compilation is being conducted and is due in October 1991. A review of the resolved DOE and EPA comments has been done, all technical comments were incorporated, some editorial comments are outstanding.

The meeting concluded at 10:30 AM.

Attachments (5)

R Day

100-BC-1 & 5 OPERABLE UNIT WORK PLANS COMMENTS

The following comments on the 100-BC-1 & 5 Operable Unit Work Plans are provided for your consideration by Bob Richards and Rod Griffin of 100 Area Environmental Protection. If you have any questions concerning these comments, feel free to contact Rod at 3-1925.

1. Please find attached red lined copies of **Figure 1-2, Map of the 100-BC Area Showing the Surface and Groundwater Operable Units** and **Figure 2-1, 100-BC Area Showing Existing and Original Facilities**. The recommended changes in site designations are consistent with the designations either listed or in the process of being listed in WIDS. It was also noted during this review that some site coordinates now documented in WIDS will require corrections. These corrections will be initiated as soon as possible.

2. Because **Figure 1-2** is somewhat busy in the area where the 116-B-3 and 116-B-4 are located, we felt it would be easier to provide the following comment rather than red line the drawing: **Figure 1-2** indicates that these two cribs are approximately 50 ft square and lay side by side. In actuality, they are approximately 10 ft square, and the 116-B-4 lies approximately 70 ft southeast of the 116-B-3.

3. Please note the revision to **Figure 1-2** concerning the 118-B-9 (104-B2 Storage Building) and the 116-B-9 (104-B-2 French Drain). The 118-B-9 is located at the northwest corner of the exclusion area just inside the exclusion area fence. The 116-B-9 is adjacent to the east end of the 118-B-9. We have provided this same comment on several occasions and the location has not been changed.

4. There appears to be a discrepancy with the septic tank shown as 124-B-7 in **Figure 1-2**. The WIDS designation for this tank is 1607-B7, or 124-C-1, and it is described as servicing the 183-C. I know there is a tank at this approximate location which caved in (subsidence) and had to be backfilled. However, **Figure 1-2** shows this tank approximately 2000 ft from the 183-C, and it is unusual for a tank to be that far away from the facility it serviced. Additionally, Bob and I both believe there is a tank and drain field located at the south end of what used to be the 183-C head house. I will not be able to investigate this issue until I return on July 8, 1991. In any case, a site designation alias of 124-B-7 does not exist. Also, please note, as indicated on the red lined copy of **Figure 1-2**, that the 124 designation is the alias and 1607 is the correct designation for septic tanks.

5. The insitu vitrification demonstration project information in both plans should be revised to indicate that the correct crib designation is 116-B-6A and not 116-B-6-1.

6. References to the pluto crib at 100-C should be revised to the correct designation of 116-C-2A. If the reference is to the entire pluto crib complex (116-C-2A, 116-C-2B, and 116-C-2C), the use of 116-C-2 is correct. When referencing the individual components, the individual designations of 116-C-2A, etc., should be used. Please note that 116-C-2, 116-C-2-1, and 116-C-2-2 are aliases in WIDS.

7. Please note that the paperwork has been initiated to include the 105-B & -C fuel storage basin cleanout percolation pits in WIDS . These pits are discussed in the sections on "Fuel Storage Basin Water."

8. In the sections on **"Radioactive Sludge/Solid Wastes,"** reference is made to the two sludge trenches at the 116-B-11. It identifies the designations as 116-B-14 & 15. The correct designations are 116-B-13 and 116-B-14. Also, Table 3-1 in both drafts should be revised accordingly. 116-B-15 is the new designation assigned to the 105-B fuel storage basin cleanout percolation pit.

9. Please note that paperwork has been initiated to include the fuel examination tank at the 111-B, discussed in the section on **"Radioactive Sludge/Solid Wastes,"** in WIDS .

10. The 132 designation for decommissioned radioactively contaminated facilities should be used where appropriate (e.g. references to the two decommissioned outfall structures, etc.).

11. The following revisions should be made to Table 2-1 in both drafts:

    * 110-B years in service/status should be changed to read 1944-1969.

    * The 132 designation for the 108-B, 115-B, 117-B, 117-C, 1904-B2 (116-B-8), and 1904-C (116-C-4) should be included.

    * Include the 108-B (132-B-3) exhaust stack.

    * Include the correct designation for the 184-B coal pit. The correct designation is 126-B-3 (184-B coal pit demolition and inert waste landfill).

    * 116-B-7 years in service/status should be changed to 1944-1968.

12. **Section 3.1.1 "Sources"** identifies the 116-B-14 & 15 as the sludge trenches at 116-B-11. It should be corrected to read 116-B-13 & 14 (see comment #8). This error should be changed throughout both drafts.

13. The first paragraph of section 3.1.1.1.7 **"Effluent Discharge Pipelines"** in the 100-BC-1 work plan should be revised to indicate that there were two modifications to the original B reactor effluent system. The first modification was the replacement of the original system with a 54 in. steel line from the reactor to the retention basin. The second modification was the installation of a 60 in. steel line from B reactor to the near 66 in. C reactor effluent line.

14. **Section 3.1.1.3.3 "116-B-4 (105-B) Dummy Decontamination French Drain"** should be revised to indicate the following:

* The first paragraph indicates that this french drain is overlain with a concrete slab. This statement is not correct and should be deleted.

* The second paragraph indicates that the exact location of the sample with respect to the 116-B-4 is unknown. This is also incorrect. The exact coordinates of the sample location are documented in UNI-946 under the 116-B-3. They are N69120.06/W80430.10.

15. Based on the knowledge we have of the 104-B-2 and the 116-B-9, it is highly unlikely that this french drain received 10,600 gal of waste water.

16. **3.1.1.3.8 dry well 116-B-10 (Dry Well):** During the tritium campaigns this dry well received mask and small tool decontamination wastes from a sink on the second floor. After 1954 it received decontamination waste from the tube examination facility. This continued until about 1975.

17. **3.1.1.3.9 Crib 116-B-12 (117-B Crib):** This crib was sampled, but it wasn't documented in UNI-946 because it was released.

18. The following revisions should be made to Table 3-1:

    * Why is the 132-B-1 (108-B) included in the 100-BC-1 work plan and not the 100-BC-5 work plan? In reviewing these tables, it appears as though a decision should be made concerning the inclusion of all the sites with 132 designations. With the exception of the reactor exhaust stacks, none of the 132 sites are listed and maybe they should be included.

    * Change 116-B-6-1 & 2 to 116-B-6A and 116-B-6B in both work plans.

    * The designations for 1904-B2 and 1904-C should be the correct 132 designation. 132-B-6 for the 1904-B2 and 132-C-2 for the 1904-C.

    * The 116-B-8 years in service/status should be changed to read 1944-1968.

    * The 116-B-13 (south sludge trench at 116-B-11) should be added to the 100-BC-5 work plan. The 116-B-15 should be deleted as a sludge trench (see comment #8).

    * The listing for the 116-B-14 (107-B #1 Grave) and 116-B-15 (107-B #2 Grave) should be deleted in the 100-BC-1 work plan. These sites are discussed twice in this table, and the 116-B-15 is not a sludge trench (see comment #8).

    * See comment #4, which pertains to the listing of the 124-B-7 septic tank.

- * The exhaust stacks at B & C reactors are listed. Shouldn't the 132-B-3 (108-B exhaust stack) be listed.

- * See comment #6, as it pertains to the listing of the C pluto crib complex.