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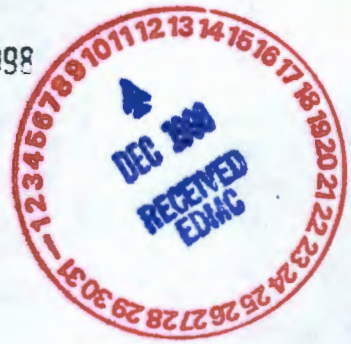
Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

063262

Mr. E. R. Skinnarland
200 Area Section Manager
Nuclear Waste Program
State of Washington
Department of Ecology
1315 West 4th Avenue
Kennewick, Washington 99336-6018

NOV 10 1998



Dear Mr. Skinnarland:

COMMENTS ON GROUNDWATER MONITORING PLAN FOR HANFORD SITE 216-B-3 POND RESOURCE CONSERVATION AND RECOVERY ACT FACILITY (PNNL-11903)

49420

Please find attached the response to the comments submitted by the State of Washington Department of Ecology (Ecology) on the subject document. In data quality objective (DQO) meetings held over the past year-and -one half Ecology management assigned staff to work with the U.S. Department of Energy (DOE), the U.S. Environmental Protection Agency, and stakeholders to address modifications in groundwater monitoring to enhance effectiveness and efficiency within a technically defensible framework. Techniques to approach these issues were identified during the course of the DQO, and the Ecology staff indicated qualified acceptance. To further explore implementation, the Ecology staff requested that proposals be submitted that employed these techniques. The subject plan on the 216-B-3 Pond is such a proposal. On March 26, 1998, this proposal was presented in detail to Messrs. Dib Goswami and Stan Leja of Ecology. No objections to the proposal were voiced at the time of the presentation and the only question raised was when the document would be completed. The techniques are identified and discussed in the plan and by reference in the attachment to this letter. A comprehensive review would have taken into account the information and discussions of the DQOs, the subsequent presentation in March 1998, and the background documentation cited in the plan and previously provided to Ecology.

If you want to discuss this matter further or require additional information, please contact me at 373-9630.

Sincerely,

M. J. Furman, Project Manager
Groundwater Project

GWP:MJF

Attachment

cc: See page 2

cc w/attach:
D. B. Barnett, PNNL
M. L. Blazek, Oregon DOE
C. J. Chou, PNNL
D. N. Goswami, Ecology
S. Leja, Ecology
T. A. Wooley, Ecology

Response to Ecology Comments on the *Groundwater Monitoring Plan for the Hanford Site 216-B-3 Pond Facility* (herein referred to as the "plan")

Specific comment responses:

1) The term "critical mean" has been widely used by the RCRA groundwater compliance documentation, and is described in detail in all Hanford Site RCRA annual reports since groundwater monitoring began at the Hanford Site in the late 1980s. Most recently, derivation of the critical mean was described in *Hanford Site Groundwater Monitoring for Fiscal Year 1997* (Hartman and Dresel 1998 –cited in the Plan). This term, and the associated t test, is also described in the RCRA Ground Water Monitoring Technical Enforcement Guidance Document ([TEGD] EPA 1986). The term "critical mean" has been a key term for the evaluation of RCRA facilities in interim status, detection monitoring for several years, and is used frequently in the literature. No regulatory limits exist for TOC or TOX, since these are *indicator parameters* used to determine the possible presence of specific species. Additionally, Total Organic Halogen is commonly abbreviated as TOX or DOX (dissolved organic halogen), not TOH (see, e.g., Standard Methods for the Examination of Water and Waste Water, A.D. Eaton et al., 1995). No revision is necessary.

2) The report, *Results of RCRA Groundwater Quality Assessment at the 216-B-3 Pond Facility*, (Barnett and Teel 1997), was submitted to Ecology in June 1997. The document was submitted to Ecology through PNNL Distribution and hand delivered to the Ecology front desk by the lead author at this time. No comments were ever received from Ecology regarding this document. If Ecology had issues with the report contents, we would have expected comments in the intervening 15 months since the document was issued. The document is referenced and cited frequently in the Plan. No revision is necessary.

3) The comprehensive nature of groundwater analyses at the B Pond facility is described sufficiently in Section 4.0, and the reference noted above in 2) is cited. Furthermore, Ecology has access to the HEIS database, which contains all analytical groundwater data for this site, if further scrutiny is required. All other pertinent documentation is referenced abundantly in Section 4.0 of the Plan. If Ecology had had any disagreement with the evaluation of the data and recommendations of the assessment report it is reasonable to expect that a response would have been forthcoming during the 15 months since the document was submitted.

4) The reviewer is referred to the body of the text. Section 5.0 describes the state of knowledge on depth of potential contamination, based on a *conceptual model* of the site by Johnson et al. 1993 and DOE/RL 1994 (see references and citations). No estimates of specific depths of contamination exist (though approximate scales are given in the schematic diagrams), nor does sufficient information exist in enough detail to derive a meaningful estimate for specific contaminants—only general distributions. The qualitative statement alone, that contamination *potentially* resides in the vadose zone, is the primary basis for continued groundwater monitoring.

5) Appendix D of the plan presents rationale and evaluation of the combined Shewhart-CUSUM tests for the B Pond System. Power curves of various values for the input parameters (SCL, h and k) were compared with the EPA's reference power curve. Specifically three cases were evaluated (Case 1: SCL = 2, h = 2, k = 0.75, and 1 verification sample; Case 2: SCL = 3, h = 3, k = 0.75, and 1 verification sample; Case 3: SCL = 4, h = 4, k = 0.75, and 1 verification sample). Based on the analysis presented in Appendix D and discussion of site specific conditions, the authors concluded that the proposed decision values for the combined Shewhart-CUSUM approach will achieve the goal of balancing false positives with false negatives. Extensive work in studying the most appropriate input parameter values for groundwater monitoring activities already has been done (e.g., Lucas 1982; Starks 1989; EPA 1989; ASTM 1996—cited in plan), and our proposed input parameter values are consistent with EPA and ASTM guidance. Also, it should be noted that the proposed statistical

method is allowed under final status regulations as stipulated in WAC 173-303-645(8)(h) (iv). Furthermore, groundwater monitoring requirements specified in the Washington State Dangerous Waste Regulations (WAC 173-303-645) are essentially the same as federal requirements as specified by EPA in 40 CFR Part 264. EPA stated that "Due to the fact that most interim status land disposal facilities are expected to receive RCRA permits by November 1988, EPA is not amending the Part 265 Subpart F regulations governing statistical methods at interim status facilities." (Federal Register 39720, October 11, 1988, cited in the plan.) Thus, had EPA revised statistical methods at interim status facilities in 1988, we believe that there would be no need for us to seek approval from Ecology to grant variance because the revised methods would be incorporated into the state regulations (i.e., WAC). The groundwater science is advancing; it is the owner/operator's responsibility to present viable new methodologies and also it is the regulator's responsibility to consider them based on their merits. We should evaluate whether following monitoring (the constituents using the statistical method) stipulated in interim status will be better in achieving the ultimate goal of groundwater monitoring (i.e., protection of human health and environment). We believe, the proposed approach is better (see responses to comment #11). However, this useful approach cannot be effected if Ecology does not grant a variance from interim-status sampling and analysis requirements. The authors also recognize the need to have ongoing discussions with Ecology and are committed to work toward a successful resolution of differences of opinion concerning the proposed statistical method and decision values.

6) The DQO process on this topic is nearly completed. Tools proposed in the plan were discussed at length in DQO meeting with Ecology's representatives. They indicated during the course of the meetings that they had no objections to the approaches, and requested that proposals utilizing these tools be submitted. This plan represents one such proposal. Under these circumstances we are proceeding with a reasonable expectation that the proposal will receive an objective, equitable, and fully-informed review. The paragraph in question does not imply any concurrence by Ecology. We suggest that this description of the DQO process and Appendix A be left unchanged until the final approach to the DQO process is determined, or until it is determined that the process will not be used.

7) "Emulating" final status means to equal or exceed regulatory requirements by incorporation of the useful and appropriate aspects of final status groundwater monitoring while remaining in interim status. Nowhere in the Plan is it stated that final status will be effected before permitting requirements are met. Indeed, the 3rd paragraph of p. 1.1 of the Plan explicitly states that;

> "Although federal regulations typically required implementation of a final-status permit by November 1988, the Hanford Federal Facility Agreement and Consent Order (Ecology, et al. 1994, hereinafter referred to as the Tri-Party Agreement or TPA) extended the time period for compliance with final-status provisions to the year 2000 for the B Pond System. It should be noted that the progression as stipulated in the final-status regulations (i.e., from detection-level to compliance level and to corrective action, if warranted) will be governed by the schedules established in the TPA."

8) The suggested modification is rejected. These bullets represent *conclusions* in the cited report. Referencing documents and pertinent material is an accepted and widely used practice in technical literature.. No doubt, sifting through referenced material is laborious, but background knowledge is necessary, and it is impractical and inappropriate to repeat all background information verbatim in the plan. Previously, Ecology had advised against unnecessary reiteration of background material, on the grounds that Ecology maintains a well-organized library of background documents that would provide the appropriate references, if properly cited. The references in the Plan are accurate, complete, and sufficient to lead the reviewer to any additional information that may be required for decision making. As for the conclusions depending on further characterization: Ecology and the Environmental Restoration Contractor had planned for investigation of the B Pond site in 1995 (see

DOE/RL 1994 in Plan references), but Ecology abandoned this plan in favor of another site that was deemed more appropriate to B Area investigations. It is unclear why the interim conclusions noted in the comment appeared to be sufficiently acceptable to Ecology in 1995 to warrant this decision, but are now apparently drawn into question.

9) The comment misquotes the Plan: The potential contaminants are those that were known to be in use at the generating facilities, *"but have not been recorded as present in discharges."* All appropriate background materials are cited and referenced (e.g., WHC 1989, WHC 1990, DOE/RL 1993a, DOE/RL 1993b, DOE/RL 1994).

10) (See also Response 4). The information presented in Section 5.0 represents a conceptual model, i.e., a working hypothesis of contamination potential at the site. The derivation of the conceptual model and the background references used to formulate the model and evaluate risk are presented in Section 5.0 of the Plan. A "minor degree of risk" means that an unquantified uncertainty exists regarding the potential for contamination, but that all available data suggest that the risk of such contamination is perceived as low.

11) The objective of a RCRA detection monitoring program remains the same regardless of whether the regulated unit is subject to interim-status or final-status regulations. That is, the objective is to determine the facility's impact on the quality of groundwater in the uppermost aquifer underlying the facility [see 40 CFR 265.90(a)]. This objective was clearly stated in Paragraph 1 of section 6.2 ("The detection monitoring program.... is designed to determine whether a RCRA-regulated unit has adversely affected the groundwater quality in the uppermost aquifer beneath the site.") To meet this objective, the authors (on the basis of the conceptual model depicted for the B Pond System) selected specific conductance, gross alpha, and gross beta as the constituents of interest for the B Pond System. The authors believe these parameters will provide more reliable indications of whether chemical/radioactive constituents from the facility have impacted groundwater beneath the site than will strictly following the interim-status requirements (e.g., the use of CIPs: TOC, TOX, specific conductance, and pH). CIPs are less likely to detect specific contaminants from this unit. With regard to Ecology's requirement to add a subsection discussing interim status requirements, it should noted that discussion is provided elsewhere in the plan (i.e., in Section 6.9.1, paragraphs two and three).

12) The quoted statement is applicable to all constituents of interest (see section 6.0, 1st paragraph, 3rd sentence) for the B Pond System. That is, for a particular constituent of interest, if groundwater concentrations observed in a downgradient compliance well show a statistically significant increase (or pH decrease) over baseline conditions then a compliance monitoring program will be initiated. The pH is specifically mentioned because concern for all other constituents involves an increase in concentration level (i.e., a one-sided test where contamination is indicated by an increase in concentrations). For pH, however, one is concerned about not only an increase but also a decrease (i.e., for pH it is a two-sided test where contamination could be indicated by either a pH increase or a pH decrease).

13) The authors disagree that the discussion of hydrology is insufficient for decision making. Figure 2.3 alone is sufficient argument to convince a groundwater professional that a hydraulically upgradient well is impractical for this facility. Additional background information for the surrounding areas is amply cited. Ecology's concern with the well selection process is vague. Further clarification of the precise concerns, or why the proposed well selections are considered unsatisfactory is needed. 40 CFR 265.91 (a)(1)(i) and (ii) explains that an upgradient well must be representative of *background groundwater quality* in the uppermost aquifer *near the facility*, and must not be affected by the facility. In the case of the B Pond System, these conditions are incompatible with the radial flow in the vicinity of the pond. How this was handled in the past is explained in the plan, as are the proposed modifications.

14) This comment appears largely redundant of the previous comment. The potential surface could be superimposed on Figure 6.1.

15) The 1st bullet listed in section 6.8.1 provides constituents of interest to the B Pond System and it refers to section 6.4 to avoid redundancy. It is stated clearly in section 6.4 that "Based on the conceptual model depicted for the B Pond System (see section 5.0), specific conductance, gross alpha, and gross beta were selected as the constituent of interest for the B Pond System. These indicators will be monitored on a *site-specific* scale to detect whether chemical/radioactive parameters or dangerous constituents from the regulated unit have impacted groundwater beneath the site. The rational for selecting constituents of interest for the B Pond System was provided in Section 5.0.

16) Ecology can be provided a copy of the QA plan, if they do not already have one.

17) The number of casing volumes recommended for purging by the TEGD is three. In cases where this is impractical, stabilization of field parameters is used.

18) Agreed. To date, however, the owner of the facility has not typically been required to consult Ecology for changes of this nature.

19) As stated earlier (see response to #5), the authors also recognize the need to have ongoing discussions with Ecology and are committed to work toward a successful resolution of differences of opinion concerning the proposed statistical method and decision values. In the DQO meeting, Dib Goswami and Stan Leja, assigned by Ecology management to address modifications in groundwater monitoring to enhance effectiveness and efficiency as a matter of policy, indicated that they were comfortable with the ASTM/EPA approach. Ecology asked that proposals be submitted, and that additional statistical consultation support would be needed to evaluate the approach. This is the current status, and we believe it's reasonable to expect that the appropriate resources will be allocated by Ecology for a knowledgeable and objective review of the approaches proposed in the plan.

20) We agree with the reviewer that vadose characterization is needed if one seeks clean closure of the facility and to waive groundwater monitoring requirements. Additional vadose characterization is controlled by the ERC work scope. But this plan does not seek a regulatory "waiver" from conducting groundwater monitoring at the B Pond System. Instead of strictly applying interim status groundwater monitoring requirements (i.e., using t-test on means of quadruplicate measurements of the CIP samples) the authors believe using sampling and analysis procedures allowable under final status requirements will provide an early detection of releases of actual contaminants from the unit. Indicator parameters (CIPs) are less likely to detect specific contaminants from the unit or source. The proposed approach, therefore, achieves not only our mutual goal of improved (more protective) groundwater monitoring, but also performs groundwater monitoring in a more efficient and cost-effective manner. The authors are committed to continuing discussions with Ecology to successfully resolve the issues.

21) Further clarification is needed concerning "minimizing Type II error rate." A statistical test with a Type II (false negative) error rate of zero (absolutely the minimum) has a false positive (Type I) error rate of 100% since it will trigger a site assessment regardless of the data. Sacrificing one for the other is not acceptable. One needs to evaluate a statistical test from the perspective of balancing site-wide false positive and false negative rates. The proposed monitoring plan follows EPA guidance (EPA 1992, pages 63 – 64). That is, the proposed test when implemented, will keep the network-wide false-positive rate at an acceptably low level (~5%) and will have adequate statistical power (comparable to the EPA reference power curve) to detect real contamination when it occurs. If Ecology wants to depart from EPA's recommended parameters, then it is incumbent upon Ecology to provide a technical justification of why the balance between type I and II errors that the EPA prefers

is wrong.

22) The authors reject Ecology's first requirement (i.e. to revise the second bullet, Section 6.9.2, page 6.12) because it is merely stating a fact. That is, intra-well (within-well) comparisons completely eliminate the false-positive indications caused by spatial variability because one or more new measurements is/are compared to statistics computed from a sample of historical measurements from that same well. With regard to Ecology's second requirement (explain how the Shewhart-CUSUM will manage the false negative error rate), see response #21 and Appendix D.

23) Disagree. This paragraph simply describes hydrogeologic conditions at the site. That is: (1) the mixing of river water in the recent past, which has low electrical conductivity (average specific conductance of Columbia River is ~140 μmho/cm) with the groundwater (average specific conductance of groundwater is ~350 μmho/cm) altered the major chemical composition due to dilution; and (2) as site conditions adjust to the termination of discharge of water and the change in discharge location (discharges were redirected to the 200 Area TEDF in 1997), specific conductance will probably increase gradually toward the ambient natural groundwater background (mean) of ~350 μmho/cm. Designing a statistical test without considering site-specific conditions is not consistent with EPA (1989 and 1992) and ASTM (1996) guidance. See also response to comment 21.

24) When a variance from interim status sampling and analysis requirements is granted by Ecology, further discussion will be held with Ecology to refine the input parameters of the combined Shewhart-CUSUM approach. Without a variance from Ecology granting approval in conducting sampling and analysis allowable under final status, it will be extremely difficult to resolve differences in opinion concerning the proposed statistical methods and input parameter values.

25) As explained in Section 5.2, arsenic has been observed primarily in wells at the western extremity of the B Pond System network. It has not been identified as components of the B Pond System waste stream (see Tables 3.1 and 3.2) and may originate from other facilities in the 200 East Area. Thus, no "trigger" value is proposed for arsenic. The monitoring objective for nitrate, a widespread sitewide plume, is to delineate the areal extent and to track the movement of the nitrate plume. Therefore, to design a monitoring plan for *detection* purposes is not appropriate because the groundwater was already contaminated by nitrate. Therefore, a "trigger" value is not proposed for nitrate. Nitrate and arsenic will be monitored in conjunction with sitewide plume tracking. In addition, specific conductance in wells of the B Pond System will be monitored as an indicator. As indicated in Section 6.9.3.2, in case of a specific conductance exceedance, Stiff diagrams or similar comparisons will be used to compare natural groundwater composition with groundwater from the triggering well. If groundwater from the well has a different composition than natural background (i.e., sulfate-dominated, nitrate-dominated, etc.), then the monitoring program would need to be adjusted to determine the cause of elevated specific conductance, and its origin (i.e., a local upgradient source or the facility).

26) Agreed. Suspect data are denoted in the HEIS database. As stated in earlier responses, discussions with Ecology will continue until a successful resolution is reached.