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STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
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February 29, 2000

Mr. Marvin Furman
United States Department of Energy
Richland Operations Office
825 Jadwin
P.O. Box 550, MSIN A5-13
Richland, Washington 99352

Dear Mr. Furman:

Re: Statistical Assessment for the 300 Area Resource Conservation and Recovery Act Of 1976 (RCRA) Ground Water Monitoring Plan

The Washington State Department of Ecology (Ecology) has evaluated the proposal from Pacific Northwest National Laboratory (PNNL) regarding a change to interim status groundwater monitoring requirements for the 300 Area Process Trenches (300 APT). The purpose of this letter is twofold(1) to present general guidance for possible site wide application of the proposed statistical method and (2) to specify requirements for the 300 APT that would allow Ecology approval of the method.

The most recent proposal to change the requirements for statistical modeling in the 300 Area was presented to Ecology by PNNL at a meeting in October 1999. A similar proposal was made for B Pond groundwater monitoring in 1998 by the United States Department of Energy (USDOE) and PNNL. That proposal was reviewed by Ecology and by Washington State University (WSU) Statisticians. A final report (for B Pond only) was issued in February 1999 by WSU. Ecology approval was never granted for the B Pond proposal because statistical issues such as model input parameters and test for normality were never resolved. Since the 300 APT proposal is very similar, conclusions made from the previous Ecology/WSU review will be applied.

Ecology understands that the Shewart-CUSUM control chart (using intra-well comparison) is being proposed to replace analysis of variance (ANOVA)/inter-well comparison. WAC-173-303-645(i)(iv) allows for "*A control chart that gives control limits for each constituent*". Moreover WAC-173-303-645(i)(iii) states that "*If a control chart approach is used to evaluate ground water monitoring data, the specific type of control chart and its associated parameters must be proposed by the owner or operator and approved by the department if it finds it to be protective of human health and the environment*".

In general, to support the proposed change in the statistical evaluation method currently employed, the following criteria must be met. Please note that these criteria may apply to all RCRA treatment, storage and disposal (TSD) facilities, excluding those directly associated with tank waste TSDs.

- **Identification of baseline period and selection of background data**

  Serious consideration must be given to the data quality and the baseline period selected for the data set that will be used to establish background concentrations. For example, samples collected during high river stages may not reflect the true concentrations of the contaminants of concern (COCs) because of the dilution that can take place. Samples collected during low river stages should more accurately represent COC levels, because river water should not dilute COC concentration in the groundwater. Time periods at which samples are collected and data quality will require approval from Ecology.

- **Test for normality**

  The USEPA interim guidance (i.e., *Statistical Analysis of Ground-Water Monitoring Data At RCRA Facilities Draft Addendum To Interim Final Guidance EPA/530-R-93-003, 1/28/93*) recommends three specific tests for normality: Chi-square Test, Probability Plots, or Coefficient-of-Variation One of these tests should be used, and Ecology must agree that the baseline data does in fact exhibit a normal distribution.

- **Adequate protection of the false negative rate and approval of associated parameters**

  The "Provisional Standard Guide for Developing Appropriate Statistical Approaches for Ground-Water Detection Monitoring Programs" (ASTM Designation: PS 64-96) was used for developing the B Pond proposal It is Ecology's understanding that this guidance, in part, is the basis for changing all interim status groundwater monitoring (excluding tank waste units) Pages 3 through 7 of PS 64-96 present a flow sheet for developing a statistical detection monitoring plan. If an intrawell comparison is the best approach based on hydrology, step C (page 6) of the guidance will need clarification in terms of how it relates to the specific TSD facility. For example, how was the first question, "Is Detection Frequency > 25%?" answered? Ecology will expect that each question of the flow chart (as applicable) be adequately addressed, and the answer/conclusion be reasonable in terms of what is already known about the groundwater in the 300 Area.

  Ecology understands that the values for K, H and SCL determine the sensitivity and statistical power of the Shewart-CUSUM approach An obvious outcome from the analysis of numerous power curves using a range of values of these parameters by WSU was that the false positive rate is directly proportional to the probability of detecting an exceedance. Since 300 APT proposal is very similar, conclusions made from the previous Ecology/WSU review will be applied. Power curves are generated on the assumption that these are fixed values, therefore each TSD will require its own unique power curve.

- **Independent samples**

  WAC –173-303-645(8)(g)(I*)* states that "*A sequence of at least four samples taken at an interval that assures to the greatest extent technically feasible, that an independent sample is obtained, by reference to the uppermost aquifer's effective porosity, hydraulic conductivity and hydraulic gradient and fate and transport characteristics of the potential contaminant;* or *(ii) An alternate sampling plan proposed by the owner operator and approved by the department".* Samples must be statistically independent. Collecting one sample, then volumetrically splitting it into 3 samples, does not equate to collecting 3 independent samples.

- **Possibility of re-calibration of the baseline when necessary**

  In the event that an unusually high sample value is obtained and is not determined to be an outlier, consideration should be given to re-calibrating the mean, standard deviation, and control limit of the subject constituent. The process by which an outlier is determined must be approved by Ecology.

The above analysis/procedure should be conducted for all proposed changes to groundwater monitoring requirements unless a technical justification can be provided correlating the proposed work to previous analysis. In the case of the 300 Area Process Trenches, although some analysis has been done, further consideration to analyze the above mentioned items must be given for an acceptable groundwater monitoring.

If you have any questions regarding this letter, please contact Dib Goswami at (509) 736-3015 or Ted Wooley at (509) 736-3012.

Sincerely,

Dib Goswami, Ph.D.
Sitewide Groundwater Coordinator
Nuclear Waste Program

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Administrative Record: 300 APT/300-FF-5