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Ms. Julie Atwood
Washington Department of Ecology
5826 Pacific Avenue, Suite A
Lacey, Washington 98503

Dear Ms. Atwood:

WELL LOCATION JUSTIFICATION - 216-A-36B CRIB

Please find enclosed the justification and rationale for the proposed locations of wells which will be installed to monitor the 216-A-36B crib as a detection monitoring system. This information was discussed with Mr. Mark Fuchs and yourself during the conference call of March 21, 1988 involving representatives from Westinghouse Hanford Company (WHC) and Pacific Northwest Laboratories. During that discussion WHC did confirm with you that they would continue drilling at the present locations. A discussion on the use of existing wells to be incorporated as part of the monitoring system is also included in the enclosure.

Please call Ms. Pam Peacock of WHC on (509) 373-1946 if you have additional questions.

Sincerely,

Elizabeth A. Bracken

for R. D. Izatt, Director
Environmental Restoration Division
U. S. Department of Energy
Richland Operations Office

R E Lerch

R. E. Lerch, Manager
Environmental Division
Westinghouse Hanford Company

Enclosure

cc: [redacted]
P. J. Mitchell, PNL

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WELL LOCATION JUSTIFICATION - 216-A-36B CRIB

General Locations of New Wells with Respect to Groundwater Flow Direction

Well 299-E17-14: Location is 100 feet east of the inlet end of the crib. This position is downgradient of the crib at the boundary of the solid waste management unit.

Well 299-E17-15: Location is 100 feet east of the middle of the crib. This position is downgradient of the crib at the boundary of the solid waste management unit.

Well 299-E17-16: Location is 100 feet east of the lower end of the crib. This positions downgradient of the crib at the boundary of the solid waste management unit. Moisture contents at levels above background and ammonia have been encountered in the vadose zone above 107 feet in this well.

Well 299-E17-17: Location is 150 feet west of the lower end of the crib opposite well 299-E17-16. This position is upgradient of the crib and between the 216-A-36B and 216-A-45 cribs. This well and well 299-E17-10 provide upgradient monitoring of the solid waste management unit.

Well 299-E17-18: Location is 300 feet south of the lower end of the crib. This position is downgradient of the crib and adjacent to well 299-E17-6. Monitoring at this position provides an additional southerly monitoring point for 216-A-36B and 216-A-45. In addition, monitoring of the near water table groundwater will provide some indication of existing contaminant plume thickness when compared with results from well 299-E17-6 which has a long open interval. If the vertical extent of the plume is limited to near the water table, monitoring data from well 299-E17-18 will indicate higher contaminant concentrations than in well 299-E17-6.

General Locations of Existing Wells in Relation to Groundwater Flow

Well 299-E17-4: Location is approximately 25 feet east of the crib and at the north end of the "B" portion of the crib. This well has an open interval of approximately 70 feet. This well provides a monitoring point at the extreme north end of the crib and across a long open interval. Data from this well in relation to data from well 216-E17-9 will provide information on the vertical extent of contamination.

Well 299-E17-5: Location is immediately west of the crib and approximately 200 feet from the south end. This well has an open interval of approximately 15 feet. This well will monitor the uppermost part of the aquifer directly beneath the crib.

Well 299-E17-6: Location is approximately 300 feet south of the crib. This well has an open interval of approximately 170 feet. Data from this well in relation to data from well 299-E17-18 will provide some indication of the vertical extent of contamination.

Well 299-E17-9: Location is immediately west of the crib and about 25 feet north of the "B" section of the crib. This well has an open interval of approximately 10 feet, and will monitor the uppermost part of the aquifer directly beneath the crib. Data from this well in relation to data from well 216-E17-4 will provide information on the vertical extent of contamination.

Well 299-E17-10: Location is approximately 125 feet west of the crib and approximately 100 feet south of the north end of the "B" section of the crib. The open interval is approximately 10 feet. This well will be used as an upgradient well monitoring the uppermost part of the aquifer between 216-A-10 crib and 216-A-36B crib.

Justification For Well Spacing

- Horizontal spreading of contaminants in the vadose zone: As liquid wastes move vertically through the vadose zone, the contaminant plume will spread laterally. This spreading will be greatest at lithologic contacts between sediments of differing particle size distributions, especially above fine-grained materials. Initial results from drilling at the 216-A-36B crib (well 299-E-17-16) indicates that this lateral spreading has been at least 100 feet from the crib. (Ammonia levels of approximately 1,000 ppm at the well head were detected in this well at a depth of 90 feet.) Based on this information and experience based on characterization activities at other cribs, the boundary of the solid waste management unit is set at a distance of 100 feet from the 216-A-36B crib.

  If contaminants reach the water table beneath the crib, they will first have spread laterally in all directions in the unsaturated zone, as previously indicated. Upon reaching the water table, those contaminants will continue to spread in the downgradient direction. Wells 299-E17-5 and 9 are positioned so that they will detect contamination directly beneath the crib. It is important to also detect any contamination which may, as a result of spreading in the unsaturated zone, enter groundwater east (downgradient) of the crib. Since some contamination has been detected in the unsaturated zone at a distance of 100 feet, wells 299-E17-14, 15, and 16 are adequately located at a distance which allows them to detect any contamination reaching groundwater.

- Travel time from the crib to downgradient monitoring wells: Another important factor to consider is the ability of downgradient wells to "...immediately detect any statistically significant amounts of hazardous waste ... to the uppermost aquifer (40 CFR 265.91 (a)(2))." "Immediately detect" is inferred to mean that the hazardous waste constituents will be detected within one sampling period of the time waste constituents have entered groundwater. Since the sampling frequency is semiannual after background has been established, the wells must be located close enough to detect these constituents within 180 days. Conservatively assuming a distance of 100 feet from where contaminants enter groundwater, constituents would be detected within this time frame. Travel times for this distance have been determined to be approximately eight days, using a model of the aquifer (Buelt et al, 1988).

Plans for Evaluating Existing Wells

Existing wells will be evaluated for their utility in three general ways, as listed below:

- Log evaluation: The logs of the existing wells will be closely evaluated for construction details. If it is determined that there may be a problem with the design (i.e., poor annular seal, severe problems during drilling or construction) the well will either be remediated (if possible) or will not be used.

- Visual inspection: The wells will be inspected at the surface for casing and concrete pad integrity. The wells will also be inspected by downhole camera. If problems with incrustation or integrity are obvious, they will either be remediated (if possible) or will not be used.

- Comparison with data from new wells: Water chemistry data collected from the existing wells will be compared with data collected from the new wells for correlation. If the data do not correlate where they would be expected to (i.e., in the short interval wells), further evaluation will be conducted.

Reference

Buelt, J.L., et. al. 1988. Environmental Effects of Past and Future Discharges to the 216-A-36B Crib. PNL-6463. Pacific Northwest Laboratory, Richland, Washington.

For Information Only

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Correspondence No. WELL LOCATION JUSTIFICATION - 216-A-36B CRIB

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