0039571

PAGE H

ENGINEERING CHANGE NOTICE

Page 1 of 2

1. ECN № 618166

Proj. ECN

2. ECN Category (mark one) Supplemental [] Direct Revision [X] Change ECN [] Temporary [] Standby [] Supersedure [] Cancel/Void []	3. Originator's Name, Organization, MSIN, and Telephone No. M. H. EDRINGTON, EARTH AND ENVIRONMENTAL TECHNICAL SERVICES, H6-06, 376-3533		4. Date 11-7-94
	5. Project Title/No./Work Order No. INTERIM-STATUS GROUNDWATER MONITORING PLAN FOR THE 216-A-10 AND 216-A-36B CRIBS/	6. Bldg./Sys./Fac. No. 216-A-10 Crib and 216-A-36B Crib	7. Approval Designator QE
	8. Document Numbers Changed by this ECN (includes sheet no. and rev.) WHC-SD-EN-AP-170, REV. 0	9. Related ECN No(s). NA	10. Related PO No. NA

11a. Modification Work	11b. Work Package No.	11c. Modification Work Complete	11d. Restored to Original Condition (Temp. or Standby ECN only)
[] Yes (fill out Blk. 11b) [X] No (NA Blks. 11b, 11c, 11d)	NA	NA Cog. Engineer Signature & Date	NA Cog. Engineer Signature & Date

12. Description of Change

The following figures and tables contain revisions in monitoring networks and sampling and analysis: Figure 3-3. Revised Monitoring Well location for the 216-A-10 Crib; Table 3-5. Monitoring Schedule for Wells in the Revised 216-A-10 Crib Network; Figure 3-4 Revised Monitoring Well Locations for the 216-A-36B Crib; Table 3-6. Monitoring Schedule for Wells in the Revised 216-A-36B Crib Network; Table 3-7. Analytical Parameters for the Revised 216-A-10 Crib and 216-A-36B Crib Groundwater Monitoring Networks.

To remain consistent with the figure and table changes, text has been modified in sections: 3.3.3.1 Revised Monitoring Network at the 216-A-10 Crib; 3.3.3.2 Revised Monitoring Network at the 216-A-36B Crib; 3.4 Grounwater Sampling and Analysis; and 3.5.1 Establishing Background Groundwater Quality.

See attached revised pages with redlines.

13a. Justification (mark one)			
	Criteria Change []	Design Improvement []	Environmental [X]
As-Found []	Facilitate Const. []	Const. Error/Omission []	Design Error/Omission []

13b. Justification Details

The groundwater gradient direction in this region is not consistent with the gradient direction used in the modeling program when the wells were selected. Wells 299-E17-9, 299-E17-20 and 299-E24-17 will be added back into the monitoring network.

The analyte list for this monitoring network has been modified to meet the minimum requirements of 40 CFR for a RCRA monitoring network in detection monitoring.

14. Distribution (include name, MSIN, and no. of copies)

See Distribution Sheet

DEC 1994 RECEIVED EDMC

RELEASE STAMP

OFFICIAL RELEASE BY WHC 21

DATE DEC 19 1994

Sta. 21

A-7900-013-2 (06/94) GEF095

A-7900-013-1

ENGINEERING CHANGE NOTICE

1. ECN (use no. from pg. 1) 618166

15. Design Verification Required	16. Cost Impact						17. Schedule Impact (days)	
	ENGINEERING			CONSTRUCTION				
[] Yes	Additional	[]	$	Additional	[]	$	Improvement	[]
[x] No	Savings	[X]	$TBD	Savings	[]	$	Delay	[]

18. Change Impact Review: Indicate the related documents (other than the engineering documents identified on Side 1) that will be affected by the change described in Block 12. Enter the affected document number in Block 19.

SDD/DD	[]	Seismic/Stress Analysis	[]	Tank Calibration Manual	[]
Functional Design Criteria	[]	Stress/Design Report	[]	Health Physics Procedure	[]
Operating Specification	[]	Interface Control Drawing	[]	Spares Multiple Unit Listing	[]
Criticality Specification	[]	Calibration Procedure	[]	Test Procedures/Specification	[]
Conceptual Design Report	[]	Installation Procedure	[]	Component Index	[]
Equipment Spec.	[]	Maintenance Procedure	[]	ASME Coded Item	[]
Const. Spec.	[]	Engineering Procedure	[]	Human Factor Consideration	[]
Procurement Spec.	[]	Operating Instruction	[]	Computer Software	[]
Vendor Information	[]	Operating Procedure	[]	Electric Circuit Schedule	[]
OM Manual	[]	Operational Safety Requirement	[]	ICRS Procedure	[]
FSAR/SAR	[]	IEFD Drawing	[]	Process Control Manual/Plan	[]
Safety Equipment List	[]	Cell Arrangement Drawing	[]	Process Flow Chart	[]
Radiation Work Permit	[]	Essential Material Specification	[]	Purchase Requisition	[]
Environmental Impact Statement	[]	Fac. Proc. Samp. Schedule	[]	Tickler File	[]
Environmental Report	[]	Inspection Plan	[]		[]
Environmental Permit	[]	Inventory Adjustment Request	[]		[]

19. Other Affected Documents: (NOTE: Documents listed below will not be revised by this ECN.) Signatures below indicate that the signing organization has been notified of other affected documents listed below.

Document Number/Revision	Document Number/Revision	Document Number Revision

20. Approvals

Signature		Date	Signature	Date
OPERATIONS AND ENGINEERING			ARCHITECT-ENGINEER	
Cog. Eng.	M. H. Edrington *[signature]*	11-11-94	PE	
Cog. Mgr.	J. S. Schmid *[signature]*	11/11/94	QA	
QA	W. Thackaberry *[signature]*	11.11.94	Safety	
Safety			Design	
Environ.	D. J. Carrell *[signature]* for DJC	11/11/94	Environ.	
Other			Other	
			DEPARTMENT OF ENERGY	
			Signature or a Control Number that tracks the Approval Signature	
			[signature] for M.J. Furman	12/15/94
			ADDITIONAL	

SUPPORTING DOCUMENT

1. Total Pages	~~159~~ 160 KN

2. Title	3. Number	4. Rev No.
Interim-Status Groundwater Monitoring Plan for the 216-A-10 and 216-A-36B Cribs	WHC-SD-EN-AP-170	0-A

5. Key Words	6. Author
Groundwater Monitoring RCRA Sampling and Analysis Network Well Design	Name: M.H. Edrington [signature] for MHE Signature Organization/Charge Code 8H220/R4004

7. Abstract

Groundwater Monitoring Plan for the 216-A-10 and 216-A-36B Crib

APPROVED FOR PUBLIC RELEASE

8. RELEASE STAMP

OFFICIAL RELEASE BY WHC 21
DATE DEC 19 1994
Sta. 21

A-6400-073 (08/94) WEF124

RECORD OF REVISION

RECORD OF REVISION	(1) Document Number WHC-SD-EN-AP-170	Page 1

(2) Title
INTERIM-STATUS GROUNDWATER MONITORING PLAN FOR THE 216-A-10 AND 216-A-36B CRIBS

CHANGE CONTROL RECORD

(3) Revision	(4) Description of Change - Replace, Add, and Delete Pages	Authorized for Release (5) Cog. Engr.	Authorized for Release (6) Cog. Mgr. Date
Rev. 0	(7) EDT # 605146	G. L. Kasza	R. L. Jackson
Rev. 0-A RS	Direct Revision - replace pages 3-12 through 3-19. ECN # 618166	M. H. Edrington J. S. Schmid for MEH	J. S. Schmid J. S. Schmid 12/16/94

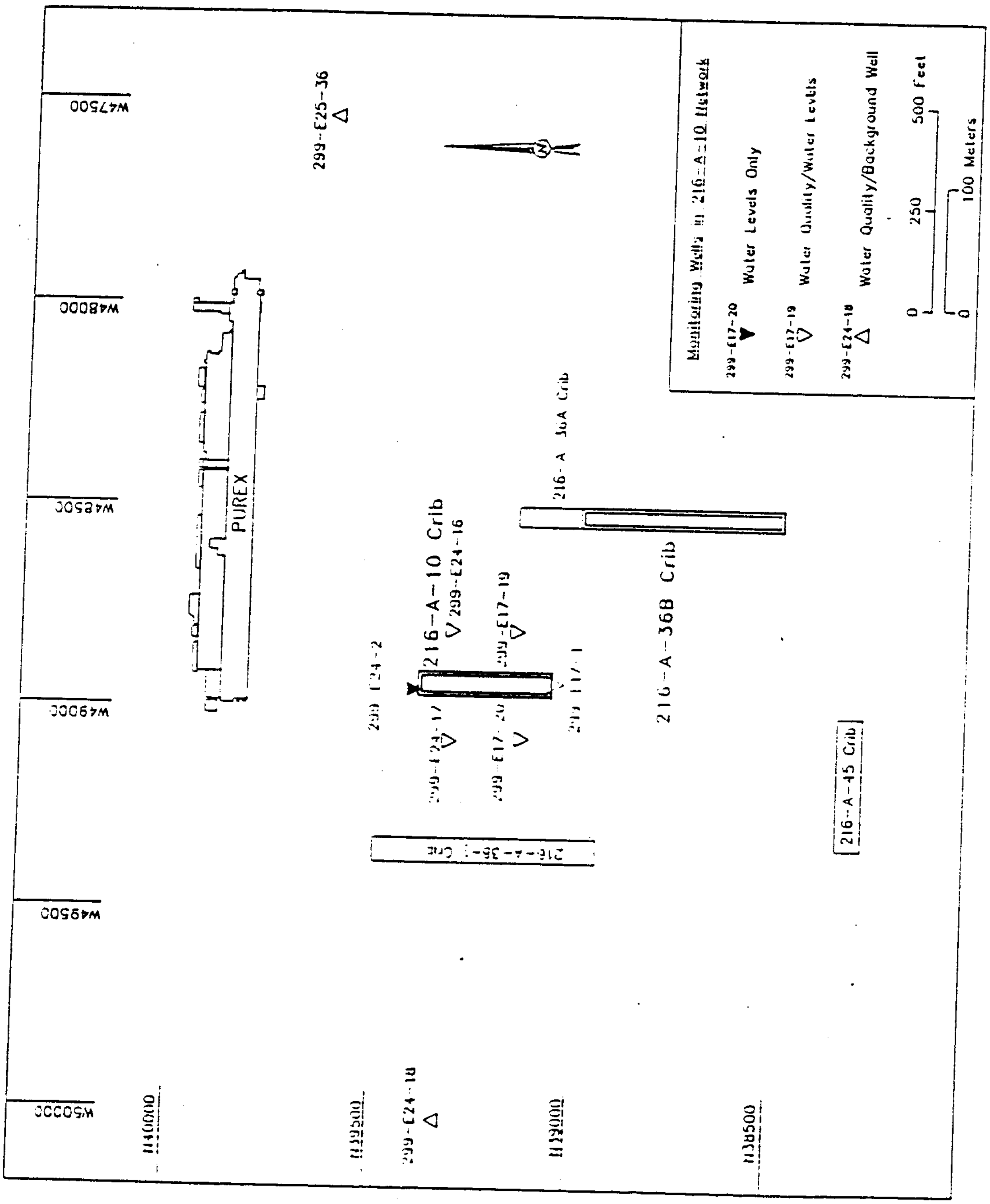
3.3.3.1 Revised Monitoring Network at the 216-A-10 Crib. The monitoring network established in 1988 consists of two upgradient (background) wells and six downgradient wells. This network was evaluated using the MEMO model to determine the most practical configuration that would achieve a minimum of 90% monitoring efficiency. The flow and transport parameters used to define the problem and the modeling results are presented in Appendix D. As presented in Appendix D, the hydraulic gradient magnitude and direction are 0.0002 ft/ft (DOE-RL 1994) and southeast, respectively. The MEMO monitoring efficiency was also estimated for gradient directions of east and south to assure that the revised monitoring network was sufficiently robust considering the uncertainty in groundwater gradient direction.

The results of the modeling showed that the network could be reduced to seven wells (Figure 3-3) and still achieve over 96.6% efficiency. This modified network consisting of wells 299-E17-1, 299-E24-16, 299-E17-19, 299-E25-36, 299-E17-20, 299-E24-17 and 299-E24-18 is RCRA 40 CFR 265.92 compliant and will be used for indicator parameter-evaluation monitoring. Both 299-E25-36 and 299-E24-18 were used as upgradient (background) wells in the monitoring network established in 1988 and will continue to serve as such in this revised monitoring network. As presented in Table 3-5, all wells in the 1988 monitoring network will continue to be used to collect water level data.

The upgradient (background) wells used in the 1988 monitoring well network are retained for use as background wells in this revised network. These wells have provided acceptable background groundwater quality data in the uppermost aquifer since 1988. They are located beyond the extent of potential contamination from the 216-A-10 Crib and are providing samples representative of background water quality.

They are also screened at approximately the same stratigraphic horizon as the downgradient wells for data comparability. Well 299-E24-18 is hydraulically upgradient of the 216-A-10 Crib even given the uncertainty of gradient direction discussed previously. Well 299-E25-36 is hydraulically upgradient of the 216-A-10 Crib under most likely gradient directions. It is over 411 m (1,350 ft) from the crib, and the observed water quality from this well is not affected by the crib.

Figure 3-3. Revised Monitoring Well Locations for the 216-A-10 Crib



Modified from: DOE-RL 1994

Table 3-5. Monitoring Schedule for Wells in the Revised 216-A-10 Crib Network.

Well	Aquifer	Sampling frequency	Water levels	Well construction standards
299-E24-18[88]	top of unconfined	S/A	Q	RCRA
299-E25-36[88]	top of unconfined	S/A	Q	RCRA
299-E17-19[88]	top of unconfined	S/A	Q	RCRA
299-E17-20[88]	top of unconfined	S/A	Q	RCRA
299-E24-16[88]	top of unconfined	S/A	Q	RCRA
299-E24-17[88]	top of unconfined	S/A	Q	RCRA
299-E17-1[55]	top of unconfined	S/A	Q	PRE
299-E24-2[56]	top of unconfined	NS	Q	PRE

NOTES: Shading denotes background wells. Superscript following well number denotes the year of installation.
Q = Frequency on a quarterly basis.
PRE = Well was constructed before RCRA-specified standards.
RCRA = Well is constructed to RCRA-specified standards.
D = Dependent on monitoring program for 216-A-29 Waste Management Unit.
NS = No sampling.
S/A = Sampled for indicator parameters semiannually and sampled annually for groundwater quality parameters, drinking water parameters, and site-specific parameters.

The revised monitoring network has three fewer monitoring wells than the 1988 network, yet still achieves a monitoring efficiency of over 96%. The result is an effective monitoring network that reduces the cost of sampling and analysis compared to the 1988 network.

3.3.3.2 Revised Monitoring Network at the 216-A-36B Crib. The monitoring network established in 1988 consists of one upgradient and six downgradient wells (see Table 3-3). This network was evaluated using the MEMO model to determine the most practical configuration that would achieve a minimum of 90% monitoring efficiency. The flow and transport parameters used to define the problem and the modeling results are presented in Appendix D. As presented in Appendix D, the hydraulic gradient magnitude and direction used in the MEMO modeling are as used for the 216-A-10 Crib (see Section 3.3.3.1). Also, as with the 216-A-10 Crib, the MEMO monitoring efficiency was estimated for gradient directions of east and south in addition to southeast.

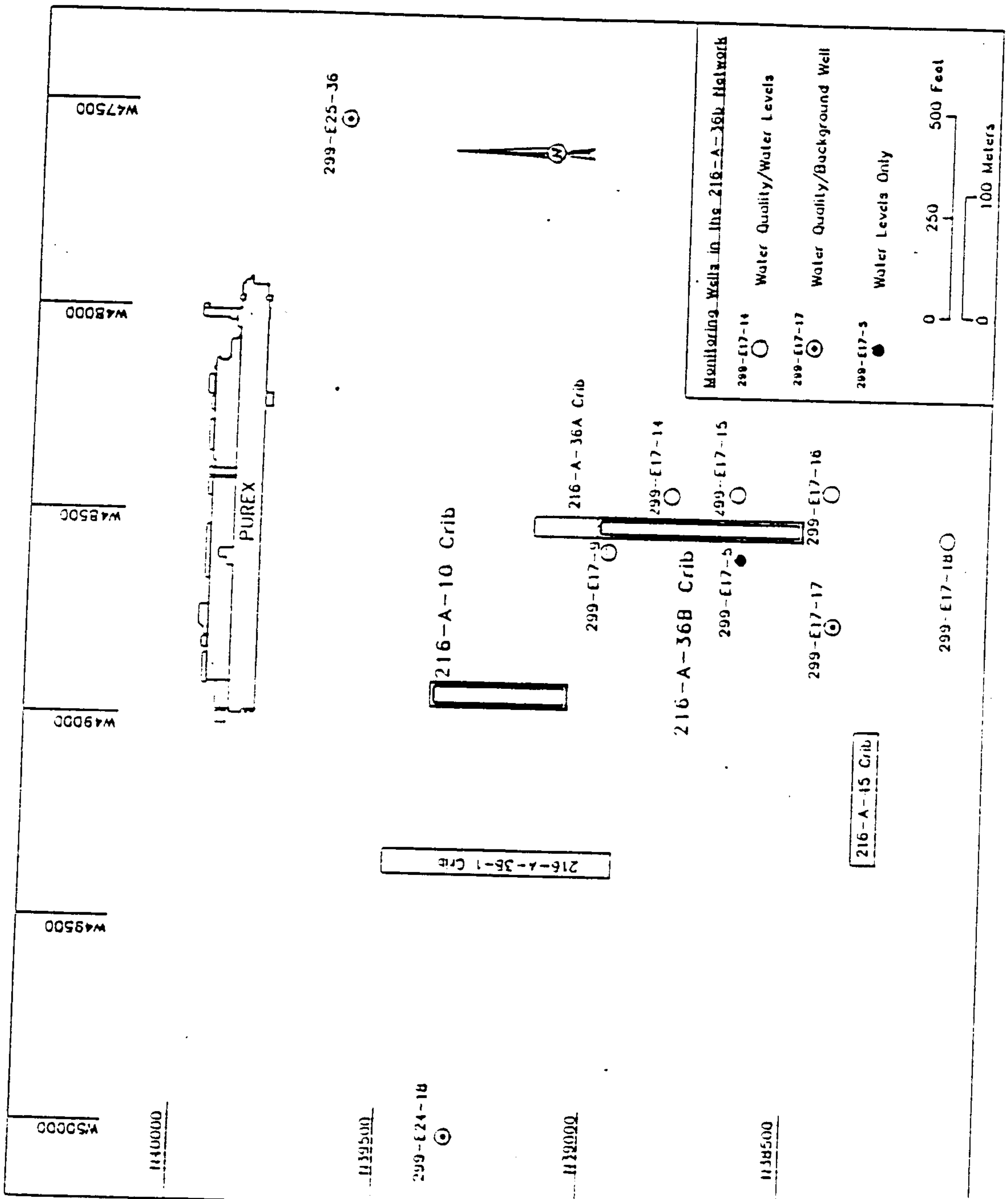
The revised groundwater monitoring network for the 216-A-36B Crib consists of a total of eight wells: three upgradient (background) and five downgradient with a monitoring efficiency of approximately 99% (Figure 3-4). The upgradient wells are:

- 299-E17-17, which was used in the 1988 network for the 216-A-36B Crib
- 200-E24-18 and 299-E25-36, which were (and continue to be) used in the 1988 network for the 216-A-10 Crib.

These wells have provided acceptable background groundwater quality data in the uppermost aquifer since 1988. They are located beyond the extent of potential contamination from the 216-A-36B Crib and are providing samples representative of background water quality. They are also screened at approximately the same stratigraphic horizon as the downgradient wells for data comparability. Wells 299-E24-18 and 299-E17-17 are hydraulically upgradient of the 216-A-36B Crib even given the uncertainty of gradient direction discussed previously. Well 299-E25-36 is hydraulically upgradient of the 216-A-36B Crib under most likely gradient directions. It is more than 345 m (1,130 ft) from the crib, and the observed water quality from this well is not affected by the crib. The addition of these two upgradient wells from the 216-A-10 Crib network reduces the risk of false indication of contamination release (EPA 1986, p. 67) and better accounts for heterogeneities in the background water quality.

The downgradient wells selected for this monitoring network are 299-E17-9, 299-E17-14, 299-E17-15, 299-E17-16, and 299-E17-18. As presented in Table 3-6, all wells in the 1988 216-A-36B Crib monitoring network will continue to be used to collect water level data. The revised monitoring network has the same number of monitoring wells as did the 1988 network, yet still achieves a reduction in sampling and analysis cost while achieving a monitoring efficiency of over 99%. This was accomplished by reducing the number of downgradient monitoring wells in the network from six in the 1988 network to five and adding the two upgradient wells from the 216-A-10 Crib network. Adding these two wells did not increase sampling and analytical costs as they were already part of the 216-A-10 Crib network. It does provide the advantage of reducing the risk of false indication of contamination release and better accounts for heterogeneities in the background water quality.

Figure 3-4. Revised Monitoring Well Locations for the 216-A-36 Crib



Modified from: DOE-RL 1994

Table 3-6. Monitoring Schedule for Wells in the Revised 216-A-36B Crib Network.

Well	Aquifer	Sampling frequency	Water levels	Well construction standard
299-E17-16[88]	top of unconfined	S/A	Q	RCRA
299-E17-17[88]	top of unconfined	S/A	Q	RCRA
299-E17-18[88]	top of unconfined	S/A	Q	RCRA
299-E17-15[88]	top of unconfined	S/A	Q	RCRA
299-E17-14[88]	top of unconfined	S/A	Q	RCRA
299-E17-9[68]	top of unconfined	S/A	Q	PRE
299-E17-5[65]	top of unconfined	NS	Q	PRE
299-E24-18[88]	top of unconfined	S/A	Q	RCRA
299-E25-36[88]	top of unconfined	S/A	Q	RCRA

NOTES: Shading denotes background wells. Superscript following well number denotes the year of installation.
PRE = Well was constructed before RCRA-specified standards.
RCRA = Well is constructed to RCRA-specified standards.
Q = Frequency on a quarterly basis.
S = Frequency on a semiannual basis.
D = Dependent on monitoring program for 216-A-29 Waste Management Unit.
NS = No sampling.
S/A = Sampled for indicator parameters semiannually and sampled annually for groundwater quality parameters, drinking water parameters, and site-specific parameters.

3.4 GROUNDWATER SAMPLING AND ANALYSIS

This section describes or references procedures for groundwater sampling, sample collection documentation, chain-of-custody requirements, and laboratory analysis. The detailed description of specific standard sampling and analysis procedures are provided by reference to the specific EIIs (WHC 1988) and the Quality Assurance Project Plan for RCRA Groundwater Monitoring Activities (WHC 1993). Work by subcontractors shall be conducted to their equivalent approved standard operating procedures such as PNL-MA-567 (PNL 1994).

All field sampling activities will be recorded in the proper field logbook as specified in EII 1.5. Electric submersible or Hydrostar pumps will continue to be used in existing monitoring wells for purging and sampling. Prior to sampling each well, the static water level will be measured and recorded as specified in EII 10.2. Based on the measured water level and well construction details, the volume of water in the well will be calculated and documented in the well sampling form or field notebook. As specified in EII 5.8, prior to sampling, each well will be purged until the approved criteria is met. Purge water will be managed according to EII 10.3. In the situations where well pumps dry because of very slow recharge, the sample will be collected after recharge. Samples will be collected and field preserved as specified in EII 5.8. Sampling equipment decontamination will follow procedures specified in EII 5.4.

Sample preservation, chain-of-custody procedures, and sample analysis in accordance with 40 CFR 265.92 are discussed in EII 5.1. The quality assurance/control (QA/QC) protocol as specified in WHC (1993). The purpose of the QC activities is to determine and document that samples were carefully collected and transferred to an analytical laboratory, that the quality of the analytical results being produced by the laboratory are defensible, and to see that corrective actions will be taken as necessary.

Under the indicator parameter-evaluation monitoring program, water-level elevation data will be evaluated at least annually to determine if the monitoring wells are strategically located. If the evaluation indicates that existing wells are no longer adequately located, the groundwater monitoring network will be modified to bring it into compliance with 40 CFR 265.91(a).

The wells in both monitoring networks will continue to be in the indicator parameter-evaluation monitoring program. These wells will be sampled on a semiannual basis for indicator parameters and certain site-specific parameters shown in Table 3-7. Annually these wells will be sampled for groundwater quality parameters and certain site specific parameters shown in Table 3-7. The list of site-specific parameters to be analyzed for at both facilities was reduced from that shown on Tables 3-2 and 3-4 to include tritium, alkalinity, turbidity, gross alpha, gross beta, and iodine-129 for three wells. Although radionuclides are not regulated under RCRA, trends in concentrations of these constituents will be useful in monitoring the direction of groundwater flow and will assist in monitoring the existing radionuclide plumes in the 200 East Area. The annual sampling event will be concurrent with one of the semiannual sampling events. All samples will be submitted to the current analytical laboratory contractor for RCRA facilities at the Hanford Site under chain-of-custody procedures as specified in EII 5.1.

3.5 STATISTICAL ANALYSIS OF GROUNDWATER MONITORING DATA

3.5.1 Establishing Background Groundwater Quality

Background groundwater quality refers to local groundwater chemistry that is in a general upgradient location and therefore unaffected by waste management practices at the 216-A-10 or 216-A-36B Cribs. However, groundwater quality may have been affected by hazardous constituents from other Hanford Site activities.

Monitoring wells 299-E24-18 and 299-E25-36 will continue to serve as background monitoring wells for the 216-A-10 Crib (see Figure 3-3). Monitoring well 299-E17-17 will continue to serve to monitor background water quality at the 216-A-36B Crib (Figure 3-4) in addition to wells 299-E24-18 and 299-E25-36.

Table 3-7. Analytical Parameters for the Revised 216-A-10 Crib and 216-A-36B Crib Groundwater Monitoring Networks.

Contamination Indicator Parameters[a]		
pH Specific conductance	Total organic carbon Total organic halogen	
Groundwater Quality Parameters[b]		
Chloride Iron	Manganese Phenols	Sodium Sulfate
Site-Specific Parameters (sampled semi-annually)		
Tritium Gross alpha	Turbidity Gross beta	
Site-Specific Parameters (sampled annually)		
Alkalinity	Iodine-129[c]	

[a] 40 CFR Part 265.92(b)(3)
[b] 40 CFR Part 265.92(b)(2)
[c] For samples collected at wells 299-E24-17, 299-E17-20, and 299-E17-5).

The statistical method used to summarize background data is the AR t-test method as described in EPA (1986) and Chou (1991). Appendix C of DOE-RL (1994)provides details of this method, and the method is summarized in the following discussion. The AR t-test method results in the calculation of a test statistic that is based on the average results for each parameter from background (upgradient) and downgradient wells. This test statistic can then be compared to the Bonferroni critical value to determine if there is statistical evidence of contamination. This test can be reformulated, using only data from background wells, in such a way that the critical mean (or critical range for pH) for each parameter can be calculated. The critical mean (or range for pH) is the value above which (or above/below for pH) a compared value is determined to be statistically different from background. Tables 3-8 and 3-9 provide critical means for indicator parameters for the 216-A-10 Crib and 216-A-36B Crib monitoring networks, respectively, as reported in DOE-RL (1994) for the monitoring network established in 1988.

Samples will continue to be collected from background wells and analyzed for indicator parameters semiannually and site specific parameters(see Tables 3-5 and 3-6). Annual samples will be collected concurrent with one of the semiannual sampling events and will be analyzed for water quality and site-specific parameters. In addition, groundwater elevations will continue to be measured quarterly. These data will be evaluated to determine trends in

DISTRIBUTION SHEET

To	From	Page 1 of 1
Distribution	Earth and Environmental Technical Services	Date 11-9-94
Project Title/Work Order Interim-Status Groundwater Monitoring Plan for the 216-A-10 and 216-A-36B Cribs		EDT No. [redacted] ECN No. 618166

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
Barnett, D. B.	H6-06				X
Bryce, R. W.	K6-96				X
Cammann, J. W.	H6-06				X
Carrell, D. J.	H6-22				X
Chou, C. J.	H6-06				X
Day, D. M.	H6-06				X
Edrington, M. H.	H6-06				X(5)
Erlandson, B. G.	H6-20				X
Fritz, D. W.	H6-22				X
Gardner, M.	N3-06				X
Henckel, G. C.	H6-04				X
Kasza, G. L.	H6-04				X
Ruck, F. A.	H6-23				X
Schmid, J. S.	H6-06				X
Stewart, D. L.	K6-96				X
Sweeney, M. D.	H6-06				X
Thackaberry, W. R.	H4-16				X
Thompson, R. R.	H6-32				X
Williams, B. A.	H6-06				X
York, M. T.	H6-32				X
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