

## **MODULE X – GROUNDWATER MONITORING PROGRAM**

### **X.A. REQUIRED PROGRAM**

- X.A.1. Hazardous constituents have been released from the Industrial Waste Lagoon (IWL) (SWMU 2), the TNT Washout Ponds (SWMU 10), the Sanitary Landfill/Pesticide Disposal Area (SWMUs 12/15), and Buildings 679, 615, and 620 / C-Avenue Area (SWMU 58) within the BRAC Property. The hazardous constituents detected in groundwater from these source areas are listed in Table X-1. The Permittee shall monitor groundwater in the impacted aquifer in accordance with Utah Admin. Code R315-264-98 through 99 during the post-closure care period.
- X.A.1.a. The Permittee shall establish a Groundwater Monitoring Program for TEAD-N in accordance with Module X, including the groundwater monitoring requirements for the SWMU 58 Corrective Measures Program, per Condition X.C.2.
- X.A.2. The Permittee shall, at all times, maintain a groundwater monitoring well system, in accordance with Utah Admin. Code R315-264-97. The TEAD-N Monitoring Well System consists of wells, as listed in Appendix X-A, dedicated to monitoring the release of hazardous constituents from on-Depot and BRAC Property SWMUs. Monitoring wells are located on-Depot, on the BRAC Property, and off-Depot. The location of all monitoring wells and piezometers are specified on monitoring well location maps contained in Appendix X-B.
- X.A.2.a. The Permittee shall maintain the ability to collect the groundwater samples required for the SWMU 58 Groundwater Monitoring Plan, per Condition X.C., from specific monitoring locations on off-Depot properties.
- X.A.3. Upon notification by the Director in writing, or as a result of a compliance action, the Permittee may be required to install and sample additional wells at any time during the post closure or compliance periods, if new information or unforeseen circumstances reveal a need for additional monitoring to protect human health and the environment.
- X.A.4. The Permittee shall dispose contaminated groundwater generated during groundwater monitoring well sampling and during the development of new monitoring wells as specified in Condition IX.L.2.
- X.A.5. Certain SWMUs may be subject to certain provisions of this Module. The Director shall determine which SWMUs may be subject to some or all of the provisions of Module X.
- X.A.6. The Permittee shall maintain a GIS capable and searchable database to maintain a record of groundwater related and chemical specific well data.

X.A.7. The Permittee shall submit to the Director, for written approval, all plans and reports required in Module X per the requirements of Condition VII.C.1.

X.A.8. All required Module X plans and reports shall be maintained in the Operating Record, per the requirements of Condition VII.C.5.

**X.B. GROUNDWATER PROTECTION STANDARDS**

X.B.1. The concentrations listed for each hazardous waste constituent in Table X-2 shall compromise the groundwater protection standards (GPS) for TEAD-N. The Permittee shall sample and analyze the groundwater monitoring system for these constituents, as described in Condition X.C.

X.B.2. The Permittee may apply for Alternate Concentration Limits (ACLs). A petition may be submitted if:

X.B.2.a. The approved corrective measures, as described in Module IX, fail to meet the GWPSs defined by Condition X.B.1 and the Permittee has demonstrated that all other technically feasible methods have been used to meet the concentration limits, or

X.B.2.b. A risk assessment, conducted in accordance with Utah Admin. Code R315-101, concludes that a contaminant concentration greater than the groundwater protection standard poses no unacceptable risk to human health or the environment.

X.B.3. If the Permittee submits a petition for ACL, the Director shall determine the appropriateness of any ACL petition, either accept or reject the proposed concentration level, and notify the Permittee in writing of the ACL petition decision. If the Director determines that the level is appropriate, the Permittee shall initiate a modification to the Permit in accordance with Condition I.D.5.

X.B.4. If any of the GWPSs, or approved ALCs, are still exceeded after thirty (30) years, the Permittee shall continue corrective measures, including groundwater monitoring, as specified in Condition IX.K.

**X.C. SWMU 58 GROUNDWATER MONITORING PLAN**

X.C.1. Hazardous constituents have been released from several TEAD-N source areas, as described in Condition X.A.1, that have impacted the shallow groundwater aquifer. Concentrations of hazardous constituents in groundwater exceed the GWPSs listed in Table X-2; therefore, the Permittee has initiated a Corrective Measures Program (CMP) for SWMU 58 as defined under Utah Admin. Code R315-264-100, and Module IX. The purpose of this CMP is to remove the hazardous waste constituents, specifically the VOCs listed in Table X-2, from the groundwater.

- X.C.2. The Permittee shall establish and implement a SWMU 58 Groundwater Monitoring Plan (GMP) to demonstrate the effectiveness of the CMP, in accordance with Utah Admin. Code R315-264-100 (d).
- X.C.2.a. The Permittee shall collect and analyze groundwater samples for laboratory analysis of VOCs from monitoring wells identified in the SWMU 58 GMP in accordance with Condition IX.J.
- X.C.2.b. The Permittee shall conduct groundwater level measurements, per the requirements in Utah Admin. Code R315-264-97(f), in conjunction with the groundwater sampling events.
- X.C.3. The Permittee shall conduct groundwater sampling from a subset of monitoring wells from the TEAD-N Monitoring Well System on an annual or semi-annual basis. The SWMU 58 Groundwater Monitoring Plan, summarized in Table X-3, lists the subset of monitoring wells, and the frequency of sampling, which shall be used to monitor the SWMU 58 Corrective Measures Program, as specified in Condition IX.A.
- X.C.3.a. The purpose of the SWMU 58 Groundwater Monitoring Plan, as outlined in the CMIP for Groundwater (2014), is as follows:
- X.C.3.a.i. To identify trend changes and assess the stability of the contaminant plume. Accordingly, monitoring wells located throughout SWMU 58 shall be sampled annually, in the fall, as specified in Table X-3.
- X.C.3.a.ii. To monitor the effectiveness of the implemented corrective actions in the source areas of the plume. Accordingly, monitoring wells located within the source areas of the plume shall be sampled annually, in the fall, as specified in Table X-3. These monitoring wells are also sampled periodically throughout the year in support of the annual performance assessment of air sparging remediation per Condition IX.H.1.c. The performance assessment monitoring requirements are not included in Table X-3.
- X.C.3.a.iii. For detection monitoring along the periphery of the plume to guard against risks to downgradient receptors. Accordingly, sentinel wells located along the periphery of the plume shall be sampled semi-annually, in the spring and fall, as specified Table X-3.
- X.C.3.b. The Permittee shall notify the Director in writing at least 30 days prior to the SWMU 58 Groundwater Monitoring Program sampling events required per Condition X.C.2.
- X.C.3.b.i. At the time of sampling event notification, the Permittee may propose to add, remove, or substitute monitoring wells in the SWMU 58 Groundwater Monitoring Plan to meet the goals specified in Module IX.

- X.C.3.b.ii. At the time of sampling event notification, the Permittee shall provide to the Director a listing of monitoring wells proposed for sampling based on Table X-3, Module IX, and Module X, the rationale for their selection, and a map highlighting the locations of wells.
- X.C.3.b.iii. The Director may, upon notification to the Permittee, require any of the wells in the TEAD-N Monitoring Well System to be added to the annual or semi-annual sampling events, in response to the Permittee's proposed well listing.
- X.C.4. The Permittee shall collect and analyze groundwater samples in accordance with the sampling and analysis procedures outlined in Condition X.D.
- X.C.5. The Permittee shall collect and analyze groundwater samples for laboratory analysis of the VOCs listed in Table X-1.
- X.C.5.a. Required SW-846 test methods and detection limits are listed in Table X-2. If an alternate test method is to be proposed for use, the Permittee shall request a permit modification as specified in Condition I.D.5. If, at any time during the duration of this Permit, the Director determines that the test methods specified in Table X-2 are not sensitive enough to produce the required results, the Director may require the Permittee to use alternate test methods (e.g., EPA Method SW846 500 or 600 series test methods). If the Director requires a change to the test method(s), the Permittee shall modify the permit in accordance with Condition I.D.5.
- X.C.5.b. The Permittee may request to have one or more constituents removed from the groundwater monitoring constituent list (Table X-1). The Director may determine if it is appropriate to remove constituent(s), based on the rationale provided by the Permittee and monitoring results. If the Director determines that it is appropriate to remove constituents as requested, the Permittee shall initiate a modification to the Permit in accordance with Condition I.D.5.
- X.C.6. The Permittee shall report the results of the Corrective Action Groundwater Monitoring Program annually in the Annual Groundwater Monitoring Report, per Condition IX.J.2.

**X.D. GROUNDWATER SAMPLING AND ANALYSIS PROCEDURES**

- X.D.1. The Permittee shall include and maintain consistent sampling and analysis procedures in the groundwater monitoring program that are designed to ensure reliable monitoring results of groundwater quality below the IWL, Sanitary Landfill/Pesticide Disposal Area, and industrial area contaminant sources within the BRAC Property. As required by Utah Admin. Code R315-264-97(d), the Permittee shall include in its groundwater monitoring program procedures and techniques for:

- X.D.1.a. Sample collection;
- X.D.1.b. Sample preservation and shipment;
- X.D.1.c. Analytical procedures;
- X.D.1.d. Data collection and validation;
- X.D.1.e. Chain of custody control; and
- X.D.1.f. Quality assurance and quality control.
  - X.D.1.f.i. The quality assurance and quality control procedures required by Condition X.D.1.f. must specifically describe techniques and procedures used to accomplish the tasks specified in Conditions X.D.1.a. through e.
  - X.D.1.f.ii. Upon notification by the Director in writing, or as a result of a compliance action, the Permittee may be required to modify these quality assurance and quality control procedures and standards.
- X.D.2. The sampling and analytical methods must be appropriate for groundwater sampling and accurately measure hazardous waste constituents in groundwater samples, as required by Utah Admin. Code R315-264-97(e).
- X.D.2.a. All samples shall be analyzed according to test methods delineated in Table X-2, or an equivalent EPA approved method that has been pre-approved by the Director.
- X.D.3. The Director may request, at any time, all laboratory QA/QC documentation and supporting data on any sampling episode. The raw organics information for required sampling and analysis, including organics gas chromatographic printouts, mass spectral analyses, and QA/QC surrogate and spiking results shall be retained by the U.S. Army Corps of Engineers, and made available at Tooele Army Depot within 72 hours of request, throughout the post closure care period.
- X.D.4. In case of loss of sample integrity (i.e., breakage, loss, rejection of data based on QA/QC criteria), the Permittee shall resample within seven days of the loss of sample integrity.

**X.E. GROUNDWATER MONITORING WELL SYSTEM REQUIREMENTS**

- X.E.1. Monitoring wells and piezometers within the TEAD-N Monitoring Well System, as specified in Condition X.A.2, shall be maintained in a fully operational condition. The Permittee shall inspect the condition of the monitoring wells in the TEAD-N Monitoring Well System annually to ensure compliance with Condition X.A.2. The monitoring well inspection may coincide with the annual

groundwater level measurement specified in Condition X.D.2.b.. Inspection requirements shall include:

- X.E.1.a. Visual assessment of monitoring wells, including but not limited to:
  - X.E.1.a.i. Accessibility and visibility of the well, with proper labeling;
  - X.E.1.a.ii. Above ground protective metal casing is intact and locked, and protective bollards are intact, if required;
  - X.E.1.a.iii. Surface completions are intact, with minimal water retention within surface the completion annulus;
  - X.E.1.a.iv. Cap is in place on inner well casing riser;
  - X.E.1.a.v. Cement apron and surface seal are intact.
- X.E.1.b. The Permittee shall measure the depth to bottom of all monitoring wells to assess the degree of silt and sand collection in the bottom of the wells and to ensure that no foreign objects have been introduced into the wells. Measurements shall be compared to the expected depth to bottom and screened interval of each monitoring well based on the well construction logs. The Permittee shall report the depth of silt and sand at the bottom of each monitoring well, and the percentage of the screened interval that is blocked by silt and sand in each monitoring well, per the requirements in Condition X.E.1.e.
- X.E.1.c. If minor problems are observed during inspection of a monitoring well that do not have the potential to compromise the integrity of the monitoring well, such as a missing lock, cap, or faded labeling, the Permittee shall correct the problems within 14 days of discovery.
- X.E.1.d. If major problems are observed during inspection of a monitoring well that have the potential to compromise the integrity of the monitoring well, the Permittee shall follow the notification requirements, and repair or replacement procedures outlined in Condition X.E.2.
- X.E.1.e. The Permittee shall report the findings of the annual monitoring well inspections in the Annual Groundwater Monitoring Report per Condition IX.J.2, including resolutions to all issues found during inspections. The Permittee shall notify the Director within seven (7) days, when a well is no longer properly functioning (including cracked or broken casings, evidence of surface seal compromise, or the presence of sandy or silty materials within more than one-third of the well screen length). The Director shall approve, in writing, the conditions for replacement or correction of improperly operating well(s).

- X.E.1.f. Replacement of an existing well that has been damaged or rendered inoperable, without change to location, design, or depth of the well, shall not constitute a change to a permit condition.
- X.E.1.g. Modifications made to existing monitoring wells (i.e., change in type of surface completion that results in a change to the monitoring point elevation of a well) shall constitute a change to a permit condition, and thus the Permittee shall modify the Permit in accordance with Condition I.D.5.
- X.E.1.h. If the Director receives information indicating that the surveyed monitoring point elevations of the wells in the TEAD-N Monitoring Well System exceed 0.01 feet from a fixed datum, the Permittee shall resurvey any or all of these monitoring point elevations.
- X.E.2. The Permittee shall locate, install, construct, and maintain new monitoring wells in accordance with the provisions in Utah Admin. Code R315-264-97(c) and as specified below:
- X.E.2.a. Additional groundwater monitoring wells shall be installed to maintain compliance with Condition X.A.2 if subsurface conditions significantly change. Such changes may include, but are not limited to, water level elevation or apparent flow direction changes, or a new detection of a hazardous constituent in a monitoring well. If hazardous waste constituents exceeding the GWPS concentration limits, as defined in Condition X.B.1 are detected in the furthest most hydraulically downgradient monitoring well(s), the Director may require the Permittee to install additional groundwater monitoring wells further downgradient..
- X.E.2.b. Upon notification by the Director in writing, or as a result of a compliance action, the Permittee may be required to install and sample additional monitoring wells at any time during the post-closure or compliance periods, if new information or unforeseen circumstances reveal a need for additional monitoring to protect human health or the environment.
- X.E.2.c. In installing a new monitoring well, the Permittee shall comply with the well construction techniques described in the Technical Enforcement Guidance Document (TEGD), OSWER 9950.1, September 1986 and subsequent addenda. All monitoring wells shall be cased in a manner that maintains the integrity of the monitoring well borehole. This casing shall be screened or perforated, and packed with gravel or sand where necessary, to enable collection of groundwater samples. The annular space (the space between the borehole and well casing above the sampling depth) must be sealed with bentonite grout to prevent contamination of samples and the groundwater.
- X.E.2.d. The Permittee shall construct and maintain new monitoring wells and piezometers in accordance with plans and specifications to be submitted to the Director for

written approval. The Director must approve, in writing, the following: number, location, depth, and design of all new wells and piezometers prior to installation. The Permittee shall modify the Permit to incorporate the approved installation of new monitoring wells and piezometers, as specified in Condition I.D.5.

- X.E.2.e. The Permittee shall submit to the Director monitoring well completion reports within 90 days after new well completions. These reports shall, at a minimum, consist of the following components: a boring log that documents well drilling and associated sampling; a well construction log and well construction diagram (“as built”); well survey information for location and monitoring point elevation (MPE) ( $\pm 0.01$  ft); and a summary that discusses how the groundwater model shall be updated based on the data obtained from the installation of the new well.
- X.E.2.f. The Permittee may request to permanently remove wells from the TEAD-N Monitoring Well System to accommodate BRAC Property or off-Depot construction activities. The Permittee shall submit a written request for monitoring well abandonment, and a Monitoring Well Abandonment Workplan, to the Director for written approval 30 days prior to the date that the Permittee expects each well to be abandoned. The Permittee shall modify the Permit, as specified in Condition I.D.5, to account for removal of a well from the TEAD-N Monitoring Well System.
- X.E.2.g. The Permittee may request to modify a monitoring well to accommodate BRAC Property or off-Depot construction activities, such as replacing an above-ground completion with a surface completion. The Permittee shall submit a written request for monitoring well modifications to the Director for written approval 30 days prior to the date the Permittee expects each well to be modified. The Permittee shall modify the Permit, as specified in Condition I.D.5, to account for the modifications made to a monitoring well, including the new MPE



**TABLE X-1  
HAZARDOUS CONSTITUENTS DETECTED IN GROUNDWATER**

Carbon tetrachloride	1,1-Dichloroethane
1,2-Dichloroethene	Methylene chloride
Chloroform	Tetrachloroethene
1,1-Dichloroethene	1,1,2-Trichloroethane
1,1,1-Trichloroethane	1,4-Dioxane
Trichloroethene	1,2-Dichloroethane
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	

**TABLE X-2  
TEST METHODS, GROUNDWATER PROTECTION STANDARDS  
AND LIMITS OF QUANTITATION  
FOR HAZARDOUS CONSTITUENTS**

<b>HAZARDOUS WASTE CONSTITUENT (µg/l)</b>	<b>TEST METHOD</b>	<b>GWPS (µg/l)</b>
Carbon tetrachloride <sup>1</sup>	8260	5.0
Chloroform <sup>3</sup>	8260	100.0
1,1-Dichloroethane <sup>2</sup>	8260	170.0
1,2-Dichloroethane <sup>1</sup>	8260	5.0
1,1-Dichloroethene <sup>1</sup>	8260	7.0
cis-1,2-Dichloroethene <sup>1</sup>	8260	70.0
Methylene chloride <sup>1</sup>	8260	5.0
Tetrachloroethene <sup>1</sup>	8260	5.0
1,1,1-Trichloroethane <sup>1</sup>	8260	200.0
1,1,2-Trichloroethane <sup>1</sup>	8260	5.0
Trichloroethene <sup>1</sup>	8260	5.0
1,4-Dioxane <sup>2</sup>	8270SIM/522 <sup>4</sup>	0.46
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX) <sup>2</sup>	8330	0.97

<sup>1</sup> Maximum Contaminant Levels (MCLs), EPA, current date

<sup>2</sup> USEPA Regional Screening Levels (RSLs) for Tapwater, current date

<sup>3</sup> The MCL for chloroform applies to the Total Trihalomethanes, which also include bromodichloromethane, bromoform, and dibromochloromethane

4. EPA Method 522 or equivalent method approved by the Director to achieve GWPS.

**TABLE X-3  
GROUNDWATER MONITORING PROGRAM**

<b>Well ID</b>	<b>Sampling Frequency</b>	<b>Sampling Objective</b>
A-02A	Annual	Well needed for stability evaluation
B-03	Annual	Well needed for stability evaluation
B-04	Annual	Well needed for stability evaluation
B-05	Annual	Well needed for stability evaluation
B-06	Annual	Well needed for stability evaluation
B-07	Annual	Well needed for stability evaluation
B-09	Annual	Well needed for stability evaluation
B-10	Annual	Well needed for stability evaluation
B-16	Semi-Annual	Evaluation of the 5 ppb boundary
B-18	Annual	Well needed for stability evaluation
B-21	Annual	Well needed for stability evaluation
B-24	Annual	Well needed for stability evaluation
B-26	Annual	Source Area Corrective Measures Evaluation and plume stability
B-27	Annual	Well needed for stability evaluation
B-32	Annual	Well needed for stability evaluation
B-34	Annual	Well needed for stability evaluation
B-35	Annual	Well needed for stability evaluation
B-37	Annual	Well needed for stability evaluation
B-40	Semi-Annual	Well needed for stability evaluation
B-42	Semi-Annual	Sentinel Well
B-54	Annual	Well needed for stability evaluation

Well ID	Sampling Frequency	Sampling Objective
B-56	Annual	Deep Well needed for stability evaluation only
B-62	Annual	Well needed for stability evaluation
C-03	Semi-Annual	Sentinel Well
C-04	Semi-Annual	Sentinel Well
C-10	Annual	Well needed for stability evaluation
C-11	Annual	Well needed for stability evaluation
C-12	Annual	Well needed for stability evaluation
C-13	Annual	Well needed for stability evaluation
C-14	Annual	Well needed for stability evaluation
C-15	Annual	Well needed for stability evaluation
C-16	Annual	Well needed for stability evaluation
C-17	Annual **	Well needed for stability evaluation
C-19	Annual **	Source Area Corrective Measures Evaluation and plume stability
C-21	Annual **	Well needed for stability evaluation
C-22	Annual	Well needed for stability evaluation
C-24	Annual	Source Area Corrective Measures Evaluation and plume stability
C-25	Annual	Well needed for stability evaluation
C-26	Annual **	Source Area Corrective Measures Evaluation and plume stability
C-30	Annual	Well needed for stability evaluation
C-33	Annual	Source Area Corrective Measures Evaluation and plume stability
C-34	Annual	Well needed for stability evaluation
C-35	Annual **	Source Area Corrective Measures Evaluation and plume stability
C-37	Annual	Deep Well Source Area Corrective Measures Evaluation and plume stability
C-38	Annual	Deep Well in NEB Plume
C-39	Annual	Deep Well in NEB Plume

Well ID	Sampling Frequency	Sampling Objective
C-40	Annual	Source Area Corrective Measures Evaluation and plume stability
C-41	Annual	Source Area Corrective Measures Evaluation and plume stability
C-42F	Annual	Source Area Corrective Measures Evaluation and plume stability
C-43F	Annual	Well needed for stability evaluation
C-44	Annual	Well needed for stability evaluation
C-45	Annual	Well needed for stability evaluation
C-46	Annual	Deep Well in NEB Plume
C-47F	Annual	Source Area Corrective Measures Evaluation and plume stability
C-48F	Annual	Source Area Corrective Measures Evaluation and plume stability
C-49	Annual	Well needed for stability evaluation
C-50F	Annual	Source Area Corrective Measures Evaluation and plume stability
C-51F	Annual	Source Area Corrective Measures Evaluation and plume stability
C-52	Annual	Deep Well Source Area, Corrective Measures Evaluation
C-53F	Annual	Source Area Corrective Measures Evaluation and plume stability
C-54F	Annual	Source Area, Corrective Measures Evaluation
C-55	Annual	Deep Well in NEB Plume
C-56	Semi-Annual	Source Area Corrective Measures Evaluation and plume investigation
C-57	Semi-Annual	Source Area Corrective Measures Evaluation and plume investigation
C-58	Semi-Annual	Source Area Corrective Measures Evaluation and plume investigation
C-59	Semi-Annual	Source Area Corrective Measures Evaluation and plume investigation
C-60	Semi-Annual	Source Area Corrective Measures Evaluation and plume investigation
C-61	Semi-Annual	Source Area Corrective Measures Evaluation and plume investigation
C-62	Semi-Annual	Source Area Corrective Measures Evaluation and plume investigation
C-63	Semi-Annual	Source Area Corrective Measures Evaluation and plume investigation
C-64	Semi-Annual	Source Area Corrective Measures Evaluation and plume investigation

Well ID	Sampling Frequency	Sampling Objective
C-65	Semi-Annual	Source Area Corrective Measures Evaluation and plume investigation
C-66	Semi-Annual	Source Area Corrective Measures Evaluation and plume investigation
C-67	Semi-Annual	Source Area Corrective Measures Evaluation and plume investigation
C-68	Semi-Annual	Source Area Corrective Measures Evaluation and plume investigation
D-01	Annual	Source Area Corrective Measures Evaluation and plume stability
D-02	Semi-Annual	Evaluation of the 5 ppb boundary
D-03	Semi-Annual	Evaluation of the 5 ppb boundary
D-04	Annual	Source Area Corrective Measures Evaluation and plume stability
D-05	Annual	Source Area Corrective Measures Evaluation and plume stability
D-06	Semi-Annual	Evaluation of the 5 ppb boundary
D-07	Semi-Annual	Evaluation of the 5 ppb boundary
D-09	Semi-Annual	Evaluation of the 5 ppb boundary
D-10	Semi-Annual	Evaluation of the 5 ppb boundary
D-11	Semi-Annual	Sentinel Well
D-12	Semi-Annual	Sentinel Well
D-13	Semi-Annual	Sentinel Well
D-14	Annual	Source Area Corrective Measures Evaluation and plume stability
D-15	Annual	Source Area Corrective Measures Evaluation and plume stability
D-16	Semi-Annual	Sentinel Well
D-17	Semi-Annual	Evaluation of the 5 ppb boundary
D-18	Semi-Annual	Evaluation of the 5 ppb boundary
D-19	Semi-Annual	Evaluation of the 5 ppb boundary
D-20	Semi-Annual	Sentinel Well
D-21	Semi-Annual	Sentinel Well
D-22	Semi-Annual	Sentinel Well

Well ID	Sampling Frequency	Sampling Objective
D-23	Semi-Annual	Deep Sentinel Well
D-24	Semi-Annual	Deep Sentinel Well
D-25	Semi-Annual	Deep Sentinel Well
M-02	Semi-Annual	Evaluation of MNA potential of plume
M-03	Semi-Annual	Evaluation of MNA potential of plume
M-04	Semi-Annual	Evaluation of MNA potential of plume
M-05	Semi-Annual	Evaluation of MNA potential of plume
N-03A	Biennial	Assess the SWMU and ceasing GW monitoring
N-03H	Biennial	Assess the SWMU and ceasing GW monitoring
N-115-88	Annual	Source Area Corrective Measures Evaluation and plume stability
N-116-88	Annual	Source Area Corrective Measures Evaluation and plume stability
N-117-88	Annual	Source Area Corrective Measures Evaluation and plume stability
N-120-88	Annual	Source Area Corrective Measures Evaluation and plume stability
N-135-90	Annual	Well needed for stability evaluation
N-150-97	Annual	Well needed for stability evaluation
T-06	Annual	Well needed for stability evaluation

\*\* 1,4 dioxane well

**TABLE X-4  
GROUNDWATER MONITORING PROGRAM  
REPORTING REQUIREMENTS**

<b>REPORTING REQUIREMENT</b>	<b>FREQUENCY</b>
Results of groundwater sample analyses including concentrations of hazardous constituents and a summary of the QA/QC data.	Annual
Measurements of static water levels and monitoring well/piezometer conditions, including total depths	Annual
Results of groundwater flow and transport model recalibration and a summary analysis of model findings.	Every 5 years
Potentiometric maps of the impacted aquifer. This map shall indicate the rate and direction of groundwater flow.	Annual
Contaminant concentration maps of the impacted aquifer.	Annual
Tables and graphs (time series) of chemical concentrations of groundwater from sampled wells, if detected at or above GWPSs.	Annual
Identification of potential “hot spots” meriting attention for further evaluation.	Semi-annual <sup>1</sup>

<sup>1</sup> Each annual report will identify trends if any anomalies persist and propose corrective action or modification to the system.

**TABLE X-5  
GROUNDWATER MONITORING PROGRAM  
SAMPLING AND REPORTING SCHEDULE**

<b>Corrective Action Samples and System Data Collection</b>	<b>Semi-annual Groundwater Monitoring Sampling Events</b>	<b>Results Due to Director</b>
January – June	January – June	December 15
July – December	July – December	May 15