

MODULE IV - GROUNDWATER MONITORING

IV.A. POST-CLOSURE GROUNDWATER MONITORING

- IV.A.1. Hazardous constituents have been released from the M-136 Burning Area and the M-508 Photographic Waste Discharge Site. The Permittee shall monitor groundwater in the impacted aquifers as described in this Module and Attachment 3. The Permittee shall maintain compliance with R315-8-6 Groundwater Protection during the post-closure care period as defined in Condition IV.A.6.
- IV.A.2. The Permittee shall maintain a groundwater monitoring system. The monitoring well system consists of all wells dedicated to monitoring the release of hazardous constituents from M-136 and M-508. The monitoring well system also includes springs and piezometers and shall consist of the wells, piezometers and springs specified in Table 1 of Attachment 4. The monitoring well, piezometer and spring locations are also presented in Attachment 4.
- IV.A.3. The Area of Compliance is defined as all monitoring wells, piezometers and springs located within impacted aquifers and displaying concentrations that exceed the Groundwater Protection Standard as defined in section IV.C. of this Permit module.
- IV.A.4. The Permittee shall initiate a corrective action program, as described in Module V, upon exceedance of the Groundwater Protection Standard, within the Area of Compliance.
- IV.A.5. Some solid waste management units (SWMUs) may be subject to certain provisions of this Module. The Executive Secretary shall determine which SWMUs may be subject to some or all of the provisions of this Module. The Permittee shall comply with the provisions of R315-8-6.12.
- IV.A.6. The Permittee shall monitor the groundwater throughout the post-closure care period. If any of the Groundwater Protection Standards, or approved Alternate Concentration Limits are still exceeded after 30 years, the Permittee shall continue corrective action as specified in Condition V.F.

IV.B. REQUIRED PROGRAM

- IV.B.1. The Permittee shall monitor groundwater, in accordance with Condition IV.B.2., for the hazardous constituents listed below in Table IV-1.
- IV.B.2. The groundwater monitoring system shall be sampled at least semiannually as described below:
- IV.B.2.a. The Permittee shall submit a semi-annual Groundwater Monitoring Plan to the Executive Secretary thirty days prior to the collection of samples. The monitoring

plan shall include a list of monitoring wells proposed for sampling, the constituents that will be sampled for in each well, a map highlighting the well locations, and the rationale for the proposed well selections and constituents.

IV.B.3. The Permittee shall not implement the proposed Groundwater Monitoring Plan without Executive Secretary approval. The Executive Secretary may, upon written notification to the Permittee, require any or all of the monitoring wells, springs or piezometers listed in Table 1 of Attachment 4 be sampled for any or all of the constituents listed in Table IV-1.

TABLE IV-1

CONSTITUENTS AND GROUNDWATER PROTECTION STANDARD

Constituent	GWPS (ug/L)	Constituent	GWPS (ug/L)
1,1-Dichloroethene	7.0 ¹	Trans-1,2-dichloroethene	100 ¹
1,1-Dichloroethane	810 ²	Trichloroethene	5.0 ¹
1,2-Dichloroethane	5.0 ¹	Trichlorofluoromethane	1,300 ³
1,1,1-Trichloroethane	200 ¹	Vinyl Chloride	2.0 ¹
1,1,2-Trichloroethane	5.0 ¹	Xylene	10,000 ¹
Acetone	610 ²	Arsenic	50 ⁴
Benzene	5.0 ¹	Barium	1,000 ⁴
Carbon Tetrachloride	5.0 ¹	Beryllium	4.0 ¹
Chlorobenzene	100 ¹	Chromium (total)	50 ⁴
Chloroform	6.2 ²	Cobalt	730 ²
Cis-1,2-Dichloroethene	70 ¹	Molybdenum	180 ³
Methyl Ethyl Ketone (2-Butanone)	7,000 ³	Perchlorate	26.0 ³
Methylene Chloride	4.30 ²	Nitrate	10,000 ¹
Tetrachloroethene	5.0 ¹	RDX	0.610 ³
Toluene	1,000 ¹	HMX	1,800 ³

1 Maximum Contaminant Levels (MCLs), EPA, July, 2002

2 Tap Water Preliminary Remedial Goals (PRGs), EPA Region IX PRG Table, Oct. 1, 2002

3 Tap Water Risk-Based Concentration, EPA Region III RBC Table, April 14, 2004

4 Maximum Concentration of Constituents for Groundwater Protection, State of Utah Hazardous Waste Management Rules, R315-8-6.5 (Table 1), August 15, 2002

IV.C. GROUNDWATER PROTECTION STANDARD

IV.C.1. The concentrations listed for each hazardous waste constituent in Table

IV-1 shall comprise the groundwater protection standard. The groundwater monitoring system shall be sampled for these constituents, as described in Condition IV.B.

IV.C.2. The Permittee may apply for Alternate Concentration Limits (ACL). A petition may be submitted if:

IV.C.2.a. The approved corrective measures, as described in Modules V and VI, fail to meet the groundwater protection standard defined by Condition IV.C.1., (Table IV-1) and the Permittee has demonstrated that all other technically feasible methods have been used to meet the concentration limits, or

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

IV.C.3. If submitted, the Executive Secretary shall determine, the appropriateness of any ACL petition, and either accept, or reject, the proposed concentration level. If the Executive Secretary determines that the level is appropriate, the Permittee shall initiate a modification to the permit in accordance with Condition I.E.2.

IV.C.4. The Permittee may request to have one or more constituents removed from the groundwater monitoring constituent list (Table IV-1). The Executive Secretary shall determine if it is appropriate to remove constituent(s), based on the rationale provided by the Permittee and monitoring results. If the Executive Secretary determines that it is appropriate to remove constituents as requested, the Permittee shall initiate a modification to the permit in accordance with Condition I.E.2.

IV.C.5. The Permittee shall use the SW-846 test methods and detection limits listed in Table 1 of Attachment 3 to analyze groundwater samples. If an alternate test method is proposed, the Permittee shall request a permit modification in accordance with Condition I.E.2. If, at any time during the duration of this permit, the Executive Secretary determines that the test methods specified in Attachment 3 are not sensitive enough to produce the required results, the Executive Secretary may require the Permittee to use alternate test methods. If the Executive Secretary requires a change to the test method(s), the Permittee shall modify the permit.

IV.D. GROUNDWATER MONITORING REQUIREMENTS

IV.D.1 The Permittee shall comply with the following general requirements for groundwater monitoring:

IV.D.1.a. The groundwater monitoring system shall consist of the wells, piezometers and springs specified in Table 1 of Attachment 4.

- IV.D.1.b. Existing monitoring wells shall be maintained in a fully operational condition for the duration of this permit. The Permittee shall notify the Executive Secretary within seven days when a well is no longer properly functioning (including the presence of sandy or silty materials, and cracked or broken casings). The Executive Secretary shall approve the conditions for replacement or correction of improperly operating well(s).
- IV.D.1.c. The Permittee shall measure the total depth of all groundwater monitoring wells that are completed in unconsolidated sediments every three years. This information shall be reported to the Executive Secretary within 30 days of completing the well depth measurements. The monitoring well total depths shall be measured in accordance with Section IV.E. If a problem is observed, the Permittee shall follow the procedures described above in Condition IV.D.1.b. regarding notification and corrective procedures.
- IV.D.1.d. The permanent removal of any wells in the groundwater monitoring system (Table 1, Attachment 4) shall be approved by the Executive Secretary. A request for the removal of wells shall constitute a permit modification.
- IV.D.1.e. The Permittee may add new wells to the monitoring well system only upon permit modification approval of the Executive Secretary.
- IV.D.1.f. Additional groundwater monitoring wells shall be installed to maintain compliance with this Module if subsurface conditions significantly change after permit issuance. Such changes may include, but are not limited to, water level elevation or apparent flow direction changes, or detection of one of the hazardous constituents in a monitoring well. If hazardous waste constituents exceeding the groundwater protection standard concentration limits, as defined in Section IV.C. of this Module, are detected in the furthest most hydraulically down-gradient monitoring well(s), the Permittee shall install additional groundwater monitoring wells further down-gradient.
- IV.D.1.g. Upon notification by the Executive Secretary in writing, or as a result of an enforcement 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.
- IV.D.2. The Permittee shall locate, install, construct, and maintain new groundwater monitoring wells as specified below:
- IV.D.2.a. Well construction shall follow the techniques described in the Technical Enforcement Guidance Document (TEGD), OSWER-9950.1, November, 1992, or most current, approved edition. All monitoring wells shall be cased in a manner that maintains the integrity of the monitoring well bore hole. This casing shall be

screened or perforated, and packed with gravel or sand, depending on the formation, to enable collection of groundwater samples. The annular space, the space between the bore hole and well casing above the sampling depth, shall be sealed with bentonite grout to prevent contamination of samples and the groundwater.

- IV.D.2.b. The Permittee shall construct and maintain new monitoring wells and piezometers in accordance with plans and specifications to be submitted to the Executive Secretary for approval. The Executive Secretary will approve in writing the following: number, location, depth, and design of all new wells and piezometers prior to installation.
- IV.D.2.c. The Permittee shall submit monitoring well completion reports within 90 days after completion of the wells installed after permit issuance. These reports shall, at a minimum, consist of the four 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 locations and elevations of the newly completed wells, and a summary that discusses how the groundwater flow model shall be updated based on the data obtained from the installation of the new wells. The detailed information that shall be included for each of the four components is outlined in Attachment 5.
- IV.D.2.d. The Permittee shall provide for the proper disposal of contaminated groundwater generated during groundwater monitoring well sampling and during the development of new monitoring wells.
- IV.D.2.e. The Permittee shall permanently remove wells from the monitoring well system in accordance with the plugging and abandonment procedures described in the Technical Enforcement Guidance Document (TEGD), OSWER-9950.1, November, 1992, and subsequent addenda and as specified in Condition IV.D.1.d. above.
- IV.D.3. The Permittee must include and maintain consistent sampling and analysis procedures in the groundwater monitoring program that are designed to ensure reliable monitoring results. As required by R315-8-6.8(d), the program shall include procedures and techniques for:
- IV.D.3.a. sample collection;
- IV.D.3.b. sample preservation and shipment;
- IV.D.3.c. analytical procedures;
- IV.D.3.d. chain-of-custody control; and
- IV.D.3.e. quality assurance and quality control.

- IV.D.4. The sampling and analytical methods must be appropriate for groundwater sampling and accurately measure hazardous waste constituents in groundwater samples, as required by R315-8-6.8(e).
- IV.D.5. The Permittee shall use the following techniques and procedures when obtaining samples and analyzing samples from the groundwater monitoring wells, piezometers and springs:
- IV.D.5.a. All samples from monitoring wells, piezometers and springs shall be collected, preserved and transported in accordance with the procedures specified in the Sampling and Quality Assurance Project Plans, presented in Attachment 3;
- IV.D.5.b. Changes to the sampling or analysis procedures specified in Attachment 3, Module IV, or Module V, shall require a permit modification;
- IV.D.5.c. All samples shall be analyzed according to the test methods shown in Table 1 of the Groundwater Sampling and Analysis Plan, Attachment 3, or an equivalent EPA-approved method that has been pre-approved, by the Executive Secretary as per the conditions contained in Section G.13 of Module I. In addition:
- IV.D.5.c.i. All major peaks greater than 25% of the peak height of the closest internal standard shall be identified using the most current National Bureau of Standards (NBS) Library. The quantity of these compounds shall be estimated and reported based upon the closest internal standard;
- IV.D.5.c.ii. Any major peak found during the analysis may become a target parameter.
- IV.D.5.c.iii. All data shall be collected and validated as outlined in the Sampling and Quality Assurance Project Plans contained in Attachment 3. The Permittee shall resample all wells from which data is rejected.
- IV.D.5.c.iv. The Executive Secretary 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 Permittee at the Promontory facility and made available within five working days of request, throughout the post-closure care period.
- IV.D.5.c.v. All samples shall be tracked and controlled using the chain-of-custody procedures specified in the Sampling and Quality Assurance Project Plans contained in Attachment 3.
- IV.D.5.c.vi. In case of loss of sample integrity (e.g. breakage, loss), resampling shall take place within seven days of the loss of sample integrity.

- IV.D.6. The Permittee shall notify the Executive Secretary in writing at least 30 days prior to any sampling event required under this permit.
- IV.D.7. The Permittee shall determine the groundwater surface elevation in the monitoring wells and piezometers that are listed in Table 1, Attachment 4 semiannually as shown in Table IV-2.
- IV.D.8. The Permittee shall, on a semi-annual basis, construct maps of the potentiometric surface, based on the groundwater surface elevation data collected as described in Condition IV.D.7. If, based on semiannual monitoring, the Executive Secretary determines that additional potentiometric data is needed, the Permittee shall install additional monitoring wells or piezometers.
- IV.D.9. The Permittee shall determine the groundwater flow rate and direction in the impacted aquifers based on groundwater surface elevation measurements. An updated potentiometric map shall be submitted to the Executive Secretary with each semi-annual report as specified in Table IV-3.
- IV.D.10. If the Executive Secretary receives information indicating that the surveyed well casing elevations of the wells in the groundwater monitoring system, as specified in Condition IV.A.2., exceed 0.01 feet from a fixed datum the Permittee shall resurvey any or all of these well casing elevations.
- IV.D.11. The Permittee shall submit plume maps, as specified in Section IV.E. to show the concentration of hazardous constituents detected in impacted aquifers. Plume maps shall be submitted for the following constituents: trichloroethene, 1,1,1-trichloroethane, 1,1-dichloroethene, 1,1-dichloroethane, cis-1,2-dichloroethene, chloroform and perchlorate.

IV.E. REPORTING AND RECORD KEEPING

- IV.E.1. The Permittee shall keep a record of all monitoring, testing and analytical data obtained pursuant to the groundwater monitoring requirements contained in this Module. This data shall be managed as part of the Operating Record.
- IV.E.2. The Permittee shall submit semi-annual reports on the results of groundwater monitoring and the effectiveness of the corrective action program. These reports shall be submitted no later than January 15 and July 15 of each year. The semi-annual reports shall contain the information and be submitted at the frequency as specified in Table IV-2 below:

TABLE IV-2

TYPE OF INFORMATION	FREQUENCY
Results of sample analysis including; concentration of hazardous constituents, and a summary of the QA/QC data as specified in Attachment 3	semi-annual
Measurements of static water levels as directed by Condition IV.D.7.	semi-annual
Potentiometric surface maps of the impacted aquifer(s). This map shall indicate the rate and direction of groundwater flow, as indicated by Conditions IV.D.8. and IV.D.9.	semi-annual
Monitoring well total depth measurements, as directed by Condition IV.D.1.c.	beginning in 2008 and every three years thereafter
Results of annual model recalibration and a summary analysis of annual model results, as directed by Condition IV.E.4.	annual
Contaminant concentration maps of the impacted aquifers, as directed by Condition IV.D.11.	annual
Identification of potential “hot spots” meriting attention for further evaluation.	semi-annual
	Subsequent report will anomalies persist and propose corrective action or modification to the system
IV.E.3.	The Permittee shall submit to the Executive Secretary the analytical results and information collected pursuant to the Conditions of this Module and Table IV-2 in accordance with the following schedule:

TABLE IV-3

<u>Semi-annual sampling events</u>	<u>Results due to the Executive Secretary</u>
Jan-June	July 15
July-Dec.	January 15

- IV.E.4. Annual groundwater model updates, contaminant concentration maps, and total well depth data shall be submitted by January 15 of every year. If new groundwater surface or contaminant data does not show any discernable differences from the previous groundwater model calibration, and if the previous groundwater model calibration was deemed satisfactory by the Executive Secretary, the Permittee may petition the Executive Secretary to postpone the groundwater model recalibration for one year.
- IV.E.5. Semiannual results of sample analysis and potentiometric data shall also be submitted electronically in accordance with Table IV-3. Data submitted electronically shall be in a format approved by the Executive Secretary.
- IV.E.6. The Permittee shall submit monitoring well completion reports within 90 days after completion of the wells as directed by Condition IV.D.2.c.
- IV.E.7. The Permittee shall submit a Groundwater Sampling Plan for approval at least 30 days prior to the collection of samples for semi-annual groundwater monitoring events as per condition IV.B.2.a.
- IV.E.8. The Permittee shall notify the Executive Secretary in writing, as required by Condition IV.D.6., at least 30 days prior to any sampling event required under this permit.
- IV.E.9. The Permittee shall notify the Executive Secretary within seven days when a well is no longer properly functioning (including the presence of sandy or silty materials, and cracked or broken casings).