

## **MODULE IV - GROUNDWATER MONITORING**

### **IV.A. POST-CLOSURE GROUNDWATER MONITORING**

- IV.A.1. The Permittee shall monitor groundwater in the uppermost aquifer as described in Attachment 5 and as described below, in a manner that will detect the release of hazardous constituents from the Waste Disposal Cell Area, in compliance with Utah Admin. Code R315-8-11.5(b)(2), R315-8-7, and R315-8-6 during the post-closure care period as defined in Condition IV.B.4.
- IV.A.2. Solid waste management units (SWMUs) may be subject to provisions of this Module. Corrective action plans developed pursuant to Module VI shall specify which SWMUs shall be subject to some or all of the provisions of this Module. The Permittee must comply with the provisions of Utah Admin. Code R315-8-6.12.
- IV.A.3. The Permittee shall follow all of the provisions listed under Utah Admin. Code R315-8-6, Groundwater Protection, and as defined by the conditions of this permit. For the purposes of this permit, Utah Admin. Code R315-8-6 rules for Groundwater Protection shall apply to the Waste Disposal Cell Area.
- IV.A.3.a. The Point of Compliance is a vertical surface located at the hydraulically downgradient boundary of the Waste Disposal Cell. The present compliance point wells are listed in Condition IV.A.4.
- IV.A.4. The Permittee shall maintain a groundwater monitoring system, which consists of monitoring wells, situated hydraulically upgradient and downgradient of the Waste Disposal Cell. Monitoring wells number 7 and 12 shall be considered hydraulically upgradient of the Waste Disposal Cell and shall serve as background monitoring wells; and the hydraulically downgradient monitoring wells will consist of the following wells; 11, 19, 20, and 21 which shall be the compliance point monitoring wells. The monitoring wells and compliance point monitoring well locations are presented in Attachment 5. The Permittee may add wells as specified in Condition IV.D.1.i.
- IV.B. **REQUIRED PROGRAM**
- IV.B.1 The Permittee shall maintain a groundwater monitoring system as required by Utah Admin. Code R315-8-6.8.

- IV.B.2. The Permittee shall construct and maintain the monitoring wells identified in Condition IV.A.4., in accordance with the detailed plans and specifications presented in Permit Attachment 5.
- IV.B.3. All wells deleted from the monitoring program shall be plugged and abandoned in accordance with procedures to be approved by the Director. Well plugging and abandonment methods and certification shall be submitted to the Director within 60 days from the date the wells are removed from the monitoring program.
- IV.B.4. As indicated by Utah Admin. Code R315-8-7, the post-closure care period for the Waste Disposal Cell is 30 years from the original effective date of this permit (December 18, 1992). If the groundwater protection standard in Condition IV.C. is exceeded after 30 years, the Permittee shall continue corrective action as specified in Condition V.D.
- IV.C. INDICATOR PARAMETERS AND MONITORING CONSTITUENTS
- IV.C.1. The Permittee shall monitor wells number 7, 12, 11, 19, 20, and 21, on an annual basis, for the parameters and constituents identified in Table IV-1, pursuant to the sampling and analysis plan presented in Attachment 5.

Table IV-1 GROUNDWATER MONITORING PARAMETERS AND CONSTITUENTS

Parameter or Constituent	Test Method	Concentrations Limit *†
<u>General</u>		
Calcium	6010C	
Magnesium	6010C	
Potassium	6010C	
Sodium	6010C	
Cyanide	9012	
Sulfate	9056.A	
Carbonate	SM2320B-2011	
Bicarbonate	SM2320B-2011	
Chloride	9056A	
Alkalinity	SM2320B-2011	
Nitrate + Nitrite as N	353.2	
Fluoride	9056.A	
Sulfide	376.2	
pH	9040C	
Specific Conductance	SM2510B-2011	
Total Dissolved Solids	160.1 or SM 2540C-2011	
Oil and Grease	1664	

Metals

Antimony	6010C
Arsenic	6010C
Barium	6010C
Beryllium	6010C
Cadmium	6010C
Chromium	6010C
Cobalt	6010C
Copper	6010C
Lead	6010C
Mercury	7470A
Nickel	6010C
Selenium	6010C
Silver	6010C
Thallium	6010C
Vanadium	6010C
Zinc	6010C

Volatile Organics

Benzene	8260B	5
Carbon disulfide	8260B	5
Chlorobenzene	8260B	5
Chloroform	8260B	5
1,2-Dibromoethane	8260B	5
1,2-Dichloroethane	8260B	5
1,4-Dioxane	8260B	500
Methylene chloride	8260B	5
Methyl ethyl ketone	8260B	20
Styrene	8260B	5
Ethyl benzene	8260B	5
Toluene	8260B	5
Xylenes <sup>‡</sup>	8260B	5

† - Reported as ug/L unless noted.

‡- Reported as ortho-, meta-, and para- isomers

\*- Background levels to be established in accordance with Module IV.C.3

IV.C.2.

A request for a substitution of an analytical method which is equivalent to the method specifically approved for use in this permit shall be submitted to the Director in accordance with Condition I.D.2. The request shall provide information demonstrating that the proposed method requested to be substituted is equivalent or superior in terms of sensitivity, accuracy, and precision (i.e., reproducibility).

- IV.C.3. For those parameters and constituents in Table IV-1 for which no concentration limit is established at the time the Permit is issued (general parameters and metals), the Permittee shall establish background values in accordance with the following procedures:
- IV.C.3.a. Background groundwater quality for a monitoring parameter or constituent shall be based on data from annual sampling of the well (or wells) upgradient from the waste management unit for one (1) year and annually thereafter [Utah Admin. Code R3158-6.8.(g)(1)].
- IV.C.3.b. The Permittee shall take a minimum of one sample from each well and a minimum of four samples from the entire system used to determine background groundwater quality for each parameter and/or constituent each time the system is sampled [Utah Admin. Code R315-8-6.8.(g)(4)].
- 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 specified in Condition IV.A.4.
- IV.D.1.b. All monitoring wells shall be constructed in accordance with the provisions in Utah Admin. Code R315-8-6.8(c) and Condition IV.D.2.
- IV.D.1.c. The groundwater monitoring program shall include sampling and analysis procedures defined in Utah Admin. Code R315-8-6.8(d) and (e).
- IV.D.1.d. The Permittee shall follow the requirements for measurement of the groundwater surface elevation of Utah Admin. Code R315-8-6.8.(f).
- IV.D.1.e. If the Director receives information indicating that the surveyed well apron elevations of the wells in the groundwater system(s) as specified in Condition IV.C. or the groundwater monitoring system as specified in Conditions IV.A.4. and Attachment 5, are inadequate, the Director shall require the Permittee to resurvey any or all of these well apron elevations.
- IV.D.1.f. The Permittee shall notify the Director in writing at least ten (10) working days prior to any sampling event required under this permit.
- IV.D.1.g. The Permittee may add new wells as part of the monitoring well system only upon approval of the Director. Approval for changes to the monitoring well

system shall constitute a permit modification. The Permittee shall follow the procedures specified in Condition I.D.2. for modification of the permit.

- IV.D.1.i. The Permittee must at all times maintain a monitoring well system as specified in Condition IV.D.1.a. The compliance point wells listed in Condition IV.A.4. may not be removed from the monitoring well system before the Permittee receives the Director’s approval of a permit modification, in accordance with Utah Admin. Code R315-3-4.3.
- IV.D.1.j. 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.1.k. The Permittee shall monitor and sample all groundwater wells for the presence of hazardous and other constituents identified in Condition IV.C. The wells shall be sampled as specified in Condition IV.C. and IV.F.2.
- 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, September 1986. 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 where necessary, to enable collection of groundwater samples. The annular space, the space between the bore hole and well casing above the sampling depth, must be sealed to prevent contamination of samples and the groundwater.
  - IV.D.2.b. The Permittee shall construct and maintain new monitoring wells in accordance with plans and specifications to be submitted to the Director for approval. The Permittee shall follow the procedures specified in Condition I.D.2. for permit modifications.
  - IV.D.2.c. Additional groundwater monitoring wells shall be installed to maintain compliance 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 Condition IV.C. of this Module, are detected in the furthest hydraulically downgradient monitoring well(s), the Permittee shall install additional groundwater monitoring wells further downgradient.

- IV.D.2.d. 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.
- IV.D.2.e. The Permittee shall submit monitoring well completion reports which include boring logs, sieve analysis (grain size), standard penetration tests, analytical tests performed on soils (Atterberg limits, etc.), water level elevations, groundwater contour maps, well development results including recharge rates, cross sections or fence diagrams as well as all other data, within ninety (90) days after completion of the wells which are installed after permit issuance.
- IV.D.2.f. Existing monitoring wells shall be maintained in a fully operational condition for the duration of this permit. The Permittee shall notify the Director within seven (7) days when a well is no longer properly functioning (including the presence of sandy or silty materials, and cracked or broken casings). The Director shall approve the conditions for replacement or correction of improperly operating wells. Replacement of an existing well that has been damaged or rendered inoperable, without change to location, design, or depth of the well, shall constitute a permit modification under Condition I.D.
- IV.D.2.g. The Permittee shall, on an annual basis, measure the depth to the bottom of all groundwater monitoring wells to the nearest 0.01 feet. This information shall be recorded on well purging volume calculation sheets. If a problem is observed, the Permittee shall follow the procedures described above in Condition IV.D.2.f. regarding notification and corrective procedures.
- IV.D.2.h. The Director shall approve the permanent removal of any wells listed in Condition IV.A.4 and Attachment 5, or any wells installed after permit issuance. A request for the removal of wells shall constitute a Class 2 permit modification.
- IV.D.2.i. The Permittee shall permanently remove wells from the monitoring well system in accordance with the plugging and abandonment procedures outlined in Utah Administrative Rules for water well drillers, R655-4-12.
- IV.D.2.j. The Permittee shall provide for the proper disposal of groundwater generated during the development of any newly installed monitor wells.
- 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 of groundwater quality below the Waste

Disposal Cell. As required by Utah Admin. Code 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 shall be appropriate for groundwater sampling and accurately measure hazardous waste constituents in groundwater samples, as required by Utah Admin. Code 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 and for obtaining and analyzing water samples from the Waste Disposal Cell:
  - IV.D.5.a. Samples from all wells shall be collected in the order and by the techniques described in the approved Sampling Plan, located in Attachment 5.
  - IV.D.5.b. All samples shall be preserved and transported in accordance with the procedures specified in the approved Sampling Plan of Attachment 5.
  - IV.D.5.c. All changes to the sampling and analysis procedures specified in Attachment 5 shall constitute a permit modification following the procedures of Condition I.D.
  - IV.D.5.d. All samples shall be analyzed according to test methods delineated in Condition IV.C. or an equivalent EPA-approved method that has been pre-approved by the Director in accordance with Permit Condition I.F.13.b. In addition:
    - IV.D.5.d.i. All major peaks greater than 25% of the peak height of the closest internal standard shall be identified. The quantity of these compounds shall be estimated and reported based upon the closest internal standard.
    - IV.D.5.d.ii. Any major peak found during the analysis may become a target parameter.

- IV.D.5.d.iii. For each annual sampling event under the groundwater monitoring program, the use of quality control sample data shall be explained in full detail in the Sampling Plan and in the annual reports. The Permittee shall collect and analyze for each day of sampling, at least one (1) field blank and, one (1) set of replicates representing, at a minimum, 10% of the total number of samples. The laboratory shall provide method blanks, spikes, and duplicates. If non-dedicated sampling equipment is used, the Permittee shall collect and analyze one decontamination blank for analysis at each daily sampling event. The Permittee shall reject data from any field, decontamination, or laboratory blanks exceeding three times the method detection limit for any organic parameter. The Permittee shall resample all wells from which data has not been validated. Qualifiers as defined by the EPA Contract Lab Program (CLP), shall be indicated on all organic laboratory reports when blanks indicate contamination above the method detection level.
- IV.D.5.d.iv. 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 provided by the Permittee, upon request throughout the post-closure care period.
- IV.D.5.d.v. All samples shall be tracked and controlled using the chain-of-custody procedures specified in the Sampling Plan and as indicated in Attachment 5.
- IV.D.5.d.vi. In case of loss of sample integrity (i.e., breakage, loss), resampling shall take place within seven (7) days of notification of the loss.
- IV.D.6. The Permittee shall determine the elevation of the groundwater surface at each well each time the groundwater is sampled, in accordance with Condition IV.D.1.d [Utah Admin. Code R315-8-6.8.(f)].
- IV.D.7. The Permittee shall record the surveyed elevation of the monitoring well(s) IV.E when installed (with as-built drawings).
- IV.E. STATISTICAL PROCEDURES
- IV.E.1. The Permittee shall follow the procedures and performance standards specified in Attachment 7. The statistical test outlined in Attachment 7 shall be conducted for each hazardous constituent in each well. Where the practical quantification limits (PQLs) are used in any of statistical procedures contained in Utah Admin. Code R315-8-6.8(h), the PQLs shall be proposed by the Permittee and approved by the Director. The statistical method chosen

under Utah Admin. Code R315-8-6.8(h) for approval shall comply with the performance standards in Attachment 7.

IV.E.2. If necessary, the statistical method shall include procedures to control or correct for seasonal and spatial variability as well as temporal correlation in the data.

IV.E.3. If the statistical method described in Attachment 7 indicates that an exceedance has occurred, the out of control condition should be verified in the next round of sampling before further action is initiated. If the exceedance is verified, then Condition IV.G will apply.

IV.F. MONITORING PROGRAM AND DATA EVALUATION

IV.F.1. The Permittee shall collect, preserve, and analyze samples pursuant to Condition IV.D.3.

IV.F.2. The Permittee shall determine groundwater quality at each monitoring well at the compliance point annually during the post-closure period of the Waste Disposal Cell. [Utah Admin. Code R315-8-6.9(d)] The Permittee shall express the groundwater quality at each monitoring well in a form necessary for the determination of statistically significant increases (i.e., means and variances).

IV.F.3. The Permittee shall determine the groundwater gradient and direction in the uppermost aquifer at least annually. This information shall be included in the July 28th annual report specified by Condition IV.H.3.

IV.F.4. The Permittee shall determine whether there is a statistically significant increase over the background values for each parameter identified in Condition IV.C. each time groundwater quality is determined at the compliance point. In determining whether such an increase has occurred, the Permittee shall compare the groundwater quality at each monitoring well specified in Condition IV.A.4. to the background value specified in Condition IV.C., in accordance with the statistical procedures specified in Attachment 8.

IV.F.5. The Permittee shall perform the evaluations described in Condition IV.F.4. within ninety (90) days after completion of sampling.

IV.G. SPECIAL REQUIREMENTS IF SIGNIFICANT INCREASES OCCUR IN VALUES FOR PARAMETERS OR CONSTITUENTS

- IV.G.1. If the Permittee determines, pursuant to Condition IV.F., that there is a statistically significant increase above the background values for any of the indicator parameters specified in Condition IV.C., the Permittee shall:
- IV.G.1.a. Notify the Director in writing within seven days.
- IV.G.1.b. Immediately sample the groundwater in all wells and determine the concentration of all constituents identified in Utah Admin. Code R315-50-14 (Appendix IX of 40 CFR 264).
- IV.G.1.c. Establish the background values for each Appendix IX constituent found in the groundwater.
- IV.G.1.d. Within 90 days, submit to the Director an application for a permit modification to establish a compliance monitoring program that includes the following information:
- IV.G.1.d.i. An identification of the concentration of each Appendix IX constituent found in the groundwater at each monitoring well at the compliance point.
- IV.G.1.d.ii. Any proposed changes to the groundwater monitoring system at the facility necessary to meet the requirements of compliance monitoring as described in Utah Admin. Code R315-8-6.10.
- IV.G.1.d.iii. Any proposed changes to the monitoring frequency, sampling and analysis procedures, or methods or statistical procedures used at the facility necessary to meet the requirements of compliance monitoring as described in Utah Admin. Code R315-8-6.10.
- IV.G.1.d.iv. For each hazardous constituent found at the compliance point, a proposed concentration limit, or a notice of intent to seek an alternate concentration limit for a hazardous constituent.
- IV.G.2. Within 180 days of the submission of alternate concentration limits for the hazardous constituents, the Permittee shall submit all data to support the alternate concentration limit proposed and a corrective action feasibility plan that meets the requirements of Module V.
- IV.G.3. If the Permittee determines, pursuant to Condition IV.F., there is a statistically significant increase above the background values for the parameters specified in Condition IV.C., he may demonstrate that a source other than a regulated unit caused the increase or that the increase resulted from an error in sampling, analysis, or evaluation. In such cases, the Permittee shall:

IV.G.3.a. Notify the Director in writing within seven (7) days that he intends to make a demonstration.

IV.G.3.b. Within 90 days, submit a report to the Director which demonstrates that a source other than a regulated unit caused the increase, or that the increase resulted from an error in sampling, analysis, or evaluation.

IV.G.3.c. Within 90 days, submit to the Director an application for a permit modification to make any appropriate changes to the detection monitoring program at the facility.

IV.G.3.d. Continue to monitor in accordance with the detection monitoring program at the facility.

IV.H. RECORDKEEPING AND REPORTING

IV.H.1. The Permittee shall enter all monitoring, testing, and analytical data obtained in accordance with Condition IV.D. in the operating record. The data must include all computations, calculated means, variances, and results of all statistical tests required by Condition IV.E.

IV.H.2. The established background values and the computations necessary to determine background values shall be submitted to the Director.

IV.H.3. The Permittee shall submit the analytical results required by Conditions IV.D.3. and IV.D.4. and the results of statistical analyses required by Condition IV.E. and IV.F. by July 28th following the sampling event.

IV.I. REQUEST FOR PERMIT MODIFICATION

IV.I.1. If the Permittee or the Director determines that the detection monitoring program no longer satisfies the requirements of the regulations, the Permittee shall, within 90 days of the determination, submit an application for a permit modification to make any appropriate changes to the program which will satisfy the regulations.