Official Draft Public Notice Version **July 11th, 2025**
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STATE OF UTAH
DEPARTMENT OF ENVIRONMENTAL QUALITY
DIVISION OF WATER QUALITY
UTAH WATER QUALITY BOARD
SALT LAKE CITY, UTAH 84114-4870

**Ground Water Discharge Permit**
**Permit No. UGW350015**

In compliance with the provisions of the Utah Water Quality Act, Title 19, Chapter 5, Utah Code Annotated 1953, as amended, the Act,

**Kennecott Utah Copper LLC**
**4700 Daybreak Parkway**
**South Jordan, UT 84009**

hereafter, referred to as the Permittee, is granted a Ground Water Discharge Permit for the operation of the Magna Process Water Reservoir Facility in Magna, Salt Lake County, Utah.

The Magna Process Water Reservoirs are located on the following tracts of land (Salt Lake Base and Meridian):

Township 1 South, Range 2 West - SW 1/4 of Section 19
Township 1 South, Range 2 West - NW 1/4 of Section 30
Township 1 South, Range 3 West - SE 1/4 of Section 24
Township 1 South, Range 3 West - NE 1/4 of Section 25

The permit is based on representations made by the Permittee and other information in the administrative record. It is the responsibility of the Permittee to read and understand all provisions of this permit.

The facility shall be maintained and operated in accordance with the conditions set forth in the permit and the Utah Ground Water Quality Protection Rules (UAC R317-6).

This Ground Water Quality Discharge Permit for the Magna Process Water Reservoir supersedes all other Ground Water Discharge Permits for the North Concentrator facility previously issued.

This modified permit shall become effective on day, month, year.

This permit and the authorization to operate shall expire at midnight on ___________, 2030.

Signed this date

______________________________________
John K. Mackey, P.E.
Director
Utah Division of Water Quality

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## PART I SPECIFIC PERMIT CONDITIONS

### A. GROUND WATER CLASSIFICATION

The ground water classification for the uppermost aquifer in the area of the Magna Process Water Reservoir is generally Class II Drinking Water Quality ground water. Ground water at each compliance monitoring well has been classified based on historical monitoring data provided by the permittee.

### B. GROUND WATER COMPLIANCE LIMITS

The ground water compliance limits for monitoring wells associated with this permit are listed in Table 1.

### C. BEST AVAILABLE TECHNOLOGY PERFORMANCE STANDARD

The enforceable performance standard for this permit to achieve protection of ground water quality will be discharge minimization of process fluids to ground water from the permitted facilities listed in Table 2. The permittee is responsible for implementing and maintaining the best available technology (BAT) noted in Table 2 to minimize discharge of process fluids from the permitted facilities to ground water. Maintenance of this performance standard will be demonstrated by:

1. Adherence to the performance criteria in Table 2.

2. No ground water degradation beyond permit limits established in Table 1 and measured by compliance monitoring wells.

3. Implementation of the Best Management Practices Plan (Appendix A) to ensure the prompt cleanup of any spills and the proper handling of process waters, as well as an ongoing inspection and maintenance program for facilities covered under this permit.

4. Closure - The Magna Process Water Reservoirs shall undergo closure in accordance with the closure plan submitted in Section 7 of the permit application.

### D. PERMITTED FACILITIES

The Facilities authorized under this permit are listed in Table 2. These facilities constitute those not permitted by rule, where there is potential for the release of fluids to ground water. The facilities listed in Table 3 under the "Permit By Rule" heading are for unit processes not specifically addressed by this permit. However, no discharge of pollutants from these sites to ground water is allowed. Operational Monitoring Points are listed in Table 4.

Kennecott Utah Copper LLC (Kennecott) formerly included the Utah Power Plant (UPP) as part of the 2020 permit renewal. Kennecott has removed reference to the UPP Plant as a permittee facility as this former power plant is in various stages of demolition and will not discharge ground water during the demolition process. The existing pipeline infrastructure at the historic UPP will be utilized to route construction wash water and stormwater from demolition activities to the existing tailings pipeline.

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E. MONITORING

1. General Provisions

a) *Future Modification of the Monitoring Network* - If at any time the Director determines the monitoring program to be inadequate for determining compliance with BAT, applicable permit limits, or ground water protection levels, Kennecott shall submit within 30 days of receipt of written notice from the Director a modified monitoring plan that addresses the inadequacies noted by the Director.

b) *Monitoring Well Abandonment* - If any construction should result in the abandonment of monitoring wells listed in Part I.E.2., or make them unsafe to sample, Kennecott shall pursue one of the following alternatives: replace the wells in a suitable location, recommend existing wells as replacements, or present an alternative monitoring plan that will assess best management practices for the protection of ground water throughout the term of the permit.

c) *Compliance Monitoring Period* - Monitoring shall continue throughout the life of this permit. For compliance monitoring wells that are installed during the term of this permit, monitoring shall commence upon completion of the well installation and development.

d) *Laboratory Approval* - All water quality analyses shall be performed by a laboratory certified by the State of Utah to perform such analyses.

e) *Water Level Measurement* - In association with each well sampling event, the water level shall be measured in each monitoring well prior to the removal of any water from the well bore. These measurements will be made from a permanent single reference point clearly demarcated on the top of the well or surface casing. Water level measurements will be made to the nearest 0.01 foot.

f) *Sampling Protocol* - The Permittee shall collect, handle, and analyze water quality samples in conformance with the *Ground Water Characterization and Monitoring Plan* (GCMP) approved by the Director and included in Appendix D.

g) *Constituents Sampled* - The following analyses will be conducted on all ground water samples collected:

i) Field Parameters - pH, specific conductance, and temperature.

ii) Laboratory Parameters - including:
   a. Major Ions: alkalinity, chloride, sulfate, sodium, potassium, magnesium, and calcium;
   b. TDS (total dissolved solids), and
   c. Metals (dissolved): arsenic, boron, lead, barium, cadmium, chromium, copper, selenium, and zinc.

g) *Analytical Procedures* - Water sample analysis will be conducted according to test procedures specified under Utah Admin. Code ( UAC) R317-6-6.3L. The GCMP details the analytical and field procedures that comply with the above-referenced UAC code.

2. Operational Monitoring

a) Kennecott shall characterize the fluids utilized in the Magna Process Water Reservoirs and Pumping Facilities with grab samples for the unit process sites listed in Table 4.

b) Monitoring Frequency - Operational monitoring shall occur monthly for the Magna Water Reservoirs.

3. Monitoring Frequency

*Well Monitoring Frequency* - All existing compliance monitoring wells will be sampled semiannually throughout the term of this permit. For any new compliance monitoring wells that are installed, the permittee shall collect at least eight independent samples (quarterly) at equal time intervals over a two-year period from each well. The samples shall be analyzed for major ions and the parameters listed in Part I.E.1.f.

4. Post-Closure Monitoring

Kennecott shall conduct post-closure monitoring in accordance with the post-closure monitoring program included in the closure plan in Section 7 of the permit application.

F. DEMONSTRATION OF COMPLIANCE

1. Probable Out of Compliance for Ground Water Compliance Limits

If the concentration of a pollutant from any compliance monitoring well sample exceeds the protection level (Table 1), Kennecott shall:

a) Notify the Director in writing within 30 days of receipt of the data;

b) Resample the well(s) to confirm the probable out-of-compliance status within 60 days of receipt of the data and immediately initiate quarterly sampling if the value exceeds both the background concentration of the pollutant by two standard deviations and the applicable permit limit unless the Director determines that other periodic sampling is appropriate, for a period of two quarters or until the compliance status of the facility can be determined.

2. Out of Compliance Status for Ground Water Compliance Wells Limits

a) Out of compliance status shall be defined as follows:

i) Two or more consecutive samples from the compliance monitoring well

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are about the protection level for the constituents listed in Table 1 or;

ii) The concentration of any pollutant in two or more consecutive samples is statistically significantly higher than the applicable ground water protection level. Statistical significance shall be determined using methods described in *Statistical Method for Evaluating Ground Water Monitoring Data from Hazardous Waste Facilities, Vol. 53, No. 196 (Federal Register, October 11, 1988)*

b) Upon determining that an out of compliance situation exists, Kennecott shall:

i. Notify the Director of the out-of-compliance status within 24 hours of detection, followed by a written notice within 5 days of the detection.

ii. Initiate quarterly sampling unless the Director determines that another periodic sampling is appropriate until the facility is brought into compliance.

iii. Submit a Source Assessment and Compliance Plan and schedule to the Director for review within 30 days of detection of the out-of-compliance status. The Source Assessment and Compliance Plan shall outline the requirements listed in R317-6-6.15.

iv. Kennecott shall implement the approved Source Assessment and Compliance Plan and provide a report to the Division.

c) Corrective Action - If, after review of ground water monitoring data, the Source and Contamination Assessment Report, and other relevant information, the Director determines that utilization of the Magna Reservoir Facilities have caused an exceedance of ground water protection levels at any compliance monitoring point, the permittee shall conduct a Contamination Investigation to determine the extent and severity of contamination present. The permittee shall submit a proposed Contamination Investigation Plan including a schedule for review by the Director within 30 days following the confirmation of commination. The permittee shall prepare a Contamination Investigation Report that adheres to the criteria and timelines outlined in R317-6-6.15.D of the Utah Administrative Code.

After review of the results of the Contamination Investigation Report, the Director may require the permittee to develop a Corrective Action Plan to remediate the contamination identified in the Contamination Investigation Report.

3. <u>Out of Compliance with Allowable Leakage Rate</u>



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a) If the leakage rate is in excess of the Allowable Leakage Rate (ALR), stated in Appendix B, Kennecott shall:

i. Sample the effluent from the sump for water quality field and lab constituents noted in Part I.C.5 and report analytical results in the corresponding quarterly report.

ii. Notify the Director or the permit writer within 24 hours of the discovery that the leak detection system has exceeded the Tier II ALR. This notification shall be followed up with a written statement confirming the oral report within five days of the failure, along with a proposed schedule for implementing the Leak Detection and Repair Program.

iii. Submit for Director approval a schedule to implement the approved Leak Detection and Repair Program (approved under Part I.G) or proceed otherwise as directed by the Director.

iv. Remove water affected continuously from the sump.

4. Unit Processes with Best Management Practices

Kennecott shall operate the Magna Process Water Reservoir Containment and Pumping facilities in accordance with the Best Management Practices specified in Appendix A.

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G. NON-COMPLIANCE FOR BEST AVAILABLE TECHNOLOGY

1. Kennecott is required to maintain the Best Available Technology in accordance with the approved design and practice for this permit. Failure to maintain the BAT or adhere to the approved design and practice shall be a violation of this permit. In the event a compliance action is initiated against the permittee for violation of permit conditions relating to best available technology, Kennecott may affirmatively defend against that action by demonstrating the following:

   a) Kennecott submitted notification in accordance with UAC R317-6-6.13;

   b) The failure was not intentional or caused by Kennecott's negligence, either in action or in failure to act;

   c) Kennecott has taken adequate measures to meet permit conditions in a timely manner or has submitted an adequate plan and schedule for meeting permit conditions for the Director 's approval, and

   d) The provisions of UAC 19-5-107 have not been violated.

H. REPORTING REQUIREMENTS

1. Semiannual Ground Water Monitoring Reporting

   a) Monitoring Reports - Water quality sampling results with any supporting data for compliance monitoring wells shall be submitted two times per year to the Director as follows:

| **Quarters Sampled In** | **Results Due On** |
|---|---|
| January through June | August 15 |
| July through December | February 15 |

   b) Failure To Submit - Reports submitted outside the specified time frame shall be deemed as noncompliance and may result in enforcement action.

2. Electronic Filing Requirements

   a) The permittee shall submit electronically the required ground water monitoring data in the electronic format specified by the Director. The data may be submitted via e-mail, compact disc, or other approved transmittal mechanism.

3. Changes to Operational Processes

   a) The permittee shall notify the Division of any changes in the operational status of the Magna Process Water Reservoir facilities within seven (7) days.

I. COMPLIANCE SCHEDULE

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1. Within one year of permit issuance, Kennecott shall submit to the Director, for review and approval, a series of contour maps covering the site-wide facility area. The contour maps shall display the average concentrations of selenium, arsenic, chloride, and ground water elevations. The contour maps will include years 2010, 2015, 2020, and 2025, corresponding to previous permit renewal years, to track changes in water elevation and analyte concentrations over time to support future groundwater permit renewal applications.

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## PART II MONITORING, RECORDING AND REPORTING REQUIREMENTS

A. REPRESENTATIVE SAMPLING
Samples collected in compliance with the monitoring requirements established under Part I shall be representative of the monitored activity.

B. ANALYTICAL PROCEDURES
Water sample analysis must be conducted according to test procedures specified under UAC R317-6-6.12 unless other test procedures have been specified in this permit.

C. PENALTIES FOR TAMPERING
The Act provides that any person who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required to be maintained under this permit shall, upon conviction, be punished by a fine of not more than $10,000 per violation or by imprisonment for not more than six months per violation, or by both.

D. REPORTING OF MONITORING RESULTS
Monitoring results obtained for each monitoring period specified in the permit shall be submitted to the Director, Utah Division of Water Quality, at the following address no later than 45 days after the end of the monitoring period (unless specified otherwise in this permit):

State of Utah
Division of Water Quality
P.O. Box 144870
Salt Lake City, Utah 84114-4870
Attention: Ground Water Protection Section
Electronic reporting submission portal: https://deq.utah.gov/water-quality/water-quality-electronic-submissions

E. COMPLIANCE SCHEDULES
Reports of compliance or noncompliance with, or any progress reports on interim and final requirements contained in any Compliance Schedule of this permit shall be submitted no later than 14 days following each schedule date.

F. ADDITIONAL MONITORING BY THE PERMITTEE
If the permittee monitors any pollutant more frequently than required by this permit, using approved test procedures as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted. Such increased frequency shall also be indicated.

G. RECORDS CONTENTS
Records of monitoring information shall include:
1. The date, exact place, and time of sampling or measurements:
2. The individual(s) who performed the sampling or measurements;
3. The date(s) and time(s) analyses were performed;
4. The individual(s) who performed the analyses;
5. The analytical techniques or methods used; and,
6. The results of such analyses.

H. RETENTION OF RECORDS

The permittee shall retain records of all monitoring information, including all calibration and maintenance records and copies of all reports required by this permit, and records of all data used to complete the application for this permit for a period of at least three years from the date of the sample, measurement, report or application. This period may be extended at the Director's request at any time.

I. TWENTY-FOUR-HOUR NOTICE OF NONCOMPLIANCE AND SPILL REPORTING

1. The permittee shall verbally report any noncompliance, or spills subject to the provisions of UAC 19-5-114, which may endanger public health or the environment as soon as possible but no later than twenty-four (24) hours from the time the permittee first became aware of the circumstances. The report shall be made to the Utah Department of Environmental Quality 24-hour number, (801) 536-4123, AND to the Division of Water Quality, Ground Water Protection Section at (801) 536-4300, during regular business hours (8:00 am - 5:00 pm Mountain Time).

2. A written submission shall also be provided to the Director within five days of the time that the permittee becomes aware of the circumstances. The written submission shall contain:

   a) A description of the noncompliance and its cause;
   b) The period of noncompliance, including exact dates and times;
   c) The estimated time noncompliance is expected to continue if it has not been corrected; and
   d) Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance.

3. Reports shall be submitted to the addresses in Part II D, Reporting of Monitoring Results.

J. OTHER NONCOMPLIANCE REPORTING

Instances of noncompliance not required to be reported within 24 hours shall be reported at the time that monitoring reports for Part II D are submitted.

K. INSPECTION AND ENTRY

The permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the permittee's premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of the permit;

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;

3. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this permit; and,

4. Sample or monitor at reasonable times to assure permit compliance or, as otherwise authorized by the Act, any substances or parameters at any location.

# PART III COMPLIANCE RESPONSIBILITIES

## A. DUTY TO COMPLY

The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action; for permit termination, revocation and re-issuance, or modification; or for denial of a permit renewal application. The permittee shall provide advance notice to the Director of any planned changes to the permitted facility or activity that may result in noncompliance with permit requirements.

## B PENALTIES FOR VIOLATIONS OF PERMIT CONDITIONS

The Act provides that any person who violates a permit condition implementing provisions of the Act is subject to a civil penalty not to exceed $10,000 per day of such violation. Any person who willfully or negligently violates permit conditions is subject to a fine not exceeding $25,000 per day of violation. Any person convicted under Section 19-5-115(2) of the Act a second time shall be punished by a fine not exceeding $50,000 per day. Nothing in this permit shall be construed to relieve the permittee of the civil or criminal penalties for noncompliance.

## C. NEED TO HALT OR REDUCE ACTIVITY NOT A DEFENSE

It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

## D. DUTY TO MITIGATE

The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

## E. PROPER OPERATION AND MAINTENANCE

The permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) that are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also include adequate laboratory controls and quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems, which are installed by a permittee, only when the operation is necessary to achieve compliance with the conditions of the permit.

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## PART IV GENERAL REQUIREMENTS

A. PLANNED CHANGES The permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required when the alteration or addition could significantly change the nature of the facility or increase the quantity of pollutants discharged.

B. ANTICIPATED NONCOMPLIANCE The permittee shall give advance notice of any planned changes in the permitted facility or activity that may result in noncompliance with permit requirements.

C. PERMIT ACTIONS This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the permittee for permit modification, revocation and re-issuance, or termination, or notification of planned changes or anticipated noncompliance, does not stay any permit condition.

D. DUTY TO REAPPLY If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a permit renewal or extension. The application should be submitted at least 180 days before the expiration date of this permit.

E. DUTY TO PROVIDE INFORMATION The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish the Director, upon request, with copies of records required to be kept by this permit.

F. OTHER INFORMATION When the permittee becomes aware that it failed to submit any relevant facts in a permit application or submitted incorrect information in a permit application or any report to the Director, it shall promptly submit such facts or information.

G. SIGNATORY REQUIREMENTS All applications, reports or information submitted to the Director shall be signed and certified.

1. All permit applications shall be signed as follows:

    a) For a corporation: by a responsible corporate officer;

    b) For a partnership or sole proprietorship: by a general partner or the proprietor, respectively.

    c) For a municipality, State, Federal, or other public agency: by either a principal executive officer or ranking elected official.

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2. All reports required by the permit and other information requested by the Director shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:

   a) The authorization is made in writing by a person described above and submitted to the Director, and,

   b) The authorization specified either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.)

3. Changes to Authorization. If an authorization under Part IV G 2. is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Part IV G 2. must be submitted to the Director prior to or together with any reports, information, or applications to be signed by an authorized representative.

4. Certification. Any person signing a document under this section shall make the following certification:

   "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

H. PENALTIES FOR FALSIFICATION OF REPORTS The Act provides that any person who knowingly makes any false statement, representation, or certification in any record or other document submitted or required to be maintained under this permit, including monitoring reports or reports of compliance or noncompliance shall, upon conviction be punished by a fine of not more than $10,000 per violation, or by imprisonment for not more than six months per violation, or by both.

I. AVAILABILITY OF REPORTS Except for data determined to be confidential by the permittee, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Director. As required by the Act, permit applications, permits, effluent data, and ground water quality data shall not be considered confidential.

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J. PROPERTY RIGHTS The issuance of this permit does not convey any property rights of any sort, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of federal, state or local laws or regulations.

K. SEVERABILITY The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

L. TRANSFERS This permit may be automatically transferred to a new permittee if:

1. The current permittee notifies the Director at least 30 days in advance of the proposed transfer date;

2. The notice includes a written agreement between the existing and new permittee containing a specific date for transfer of permit responsibility, coverage, and liability between them; and,

3. The Director does not notify the existing permittee and the proposed new permittee of his or her intent to modify, or revoke and reissue the permit. If this notice is not received, the transfer is effective on the date specified in the agreement mentioned in paragraph 2 above.

M. STATE LAWS Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable state law or regulation under authority preserved by Section 19-5-117 of the Act.

N. REOPENER PROVISION This permit may be reopened and modified (following proper administrative procedures) to include the appropriate limitations and compliance schedule, if necessary, if one or more of the following events occur:

1. If new ground water standards are adopted by the Board, the permit may be reopened and modified to extend the terms of the permit or to include pollutants covered by new standards. The permittee may apply for a variance under the conditions outlined in UAC R317-6-6.4(D).

2. If alternate compliance mechanisms are required.

3. If the water quality of the facility is significantly worse than represented in the original permit application.

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**FIGURE 1**

KENNECOTT MAGNA RESERVOIRS MONITORING WELLS AND PERMITTED OR PERMIT BY RULE FACILITY LOCATIONS

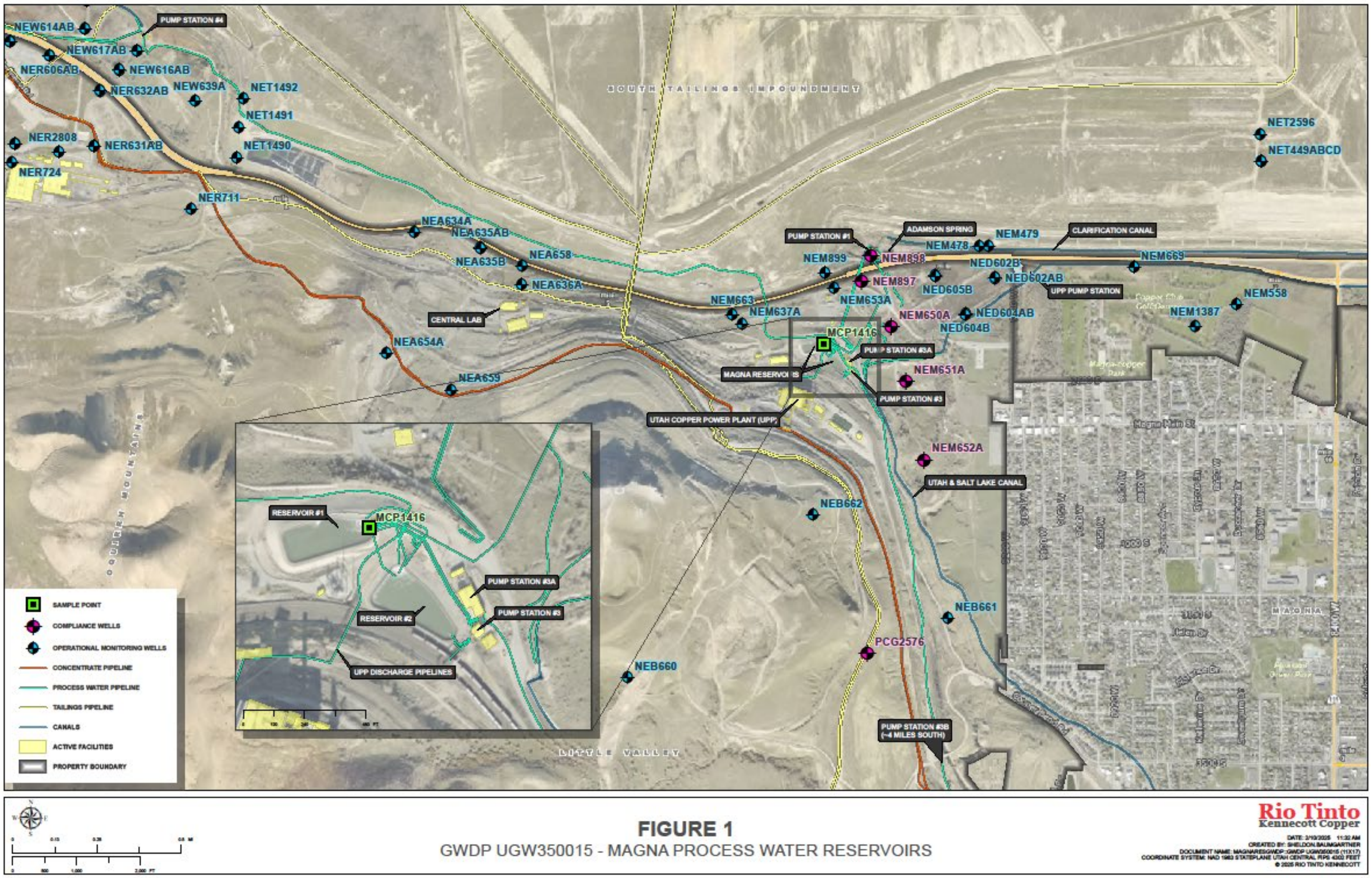

**TABLE 1**

KENNECOTT MAGNA PERMIT COMPLIANCE LIMITS

| Well | Permit Limit | pH | TDS | Sulfate | Arsenic | Boron | Cadmium | Chromium | Copper | Lead | Selenium | Zinc |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **NEM650A** | Protection Level | 6.5 - 8.5 | 1364 | 231 | 0.013 | 0.16 | 0.0025 | 0.025 | 0.325 | 0.005 | 0.013 | 1.250 |
| **NEM651A** | Protection Level | 6.5 - 8.5 | 1626 | 540 | 0.013 | 0.2 | 0.0025 | 0.025 | 0.325 | 0.005 | 0.026 | 1.250 |
| **NEM652A** | Protection Level | 6.5 - 8.5 | 1597 | 585 | 0.022 | 0.5 | 0.0025 | 0.025 | 0.325 | 0.005 | 0.025 | 1.250 |
| **NEM897** | Protection Level | 6.5 - 8.5 | 2468 | 400 | 0.019 | 0.23 | 0.0025 | 0.025 | 0.325 | 0.005 | 0.013 | 1.250 |
| **NEM898** | Protection Level | 6.5 - 8.5 | 2095 | 300 | 0.02 | 0.24 | 0.0025 | 0.025 | 0.325 | 0.005 | 0.013 | 1.250 |
| **PCG2576** | Protection Level | 6.5 - 8.5 | 1057 | 228 | 0.013 | 0.078 | 0.0025 | 0.025 | 0.325 | 0.005 | 0.013 | 1.250 |
| Ground Water Quality Standards | | 6.5 - 8.5 | 3000 | n/a | 0.05 | n/a | 0.005 | 0.10 | 1.30 | 0.015 | 0.05 | 5.00 |

NOTES:
units: **milligrams per liter (mg/L)**, except for pH;
Ground water protection levels and compliance limits are established in accordance with R317-6-4.
Only the highest allowable value is shown in Table 1.

Last Revision date: June 2020

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TABLE 2

MAGNA PROCESS WATER RESERVOIR POINT SOURCE COMPONENTS

| Facility | Fluids Handled | BAT Description | Operation and Maintenance | Performance Criteria |
|---|---|---|---|---|
| Magna Process Water Reservoir | Process water<br>• No. 1 pump station<br>• No. 4 pump station | Double HDPE liner with leak detection | • Process water recycled<br>• Inspections as per BMP plan | • Prompt repair of leaks<br>• Adherence to Appendix B |
| No. 3 Pump Station | Process water | Concrete basin | • Inspections as per BMP plan | • Prompt repair of leaks<br>• Adherence to BMP plan (Appendix A) |
| No. 3A and 3B Pump Station | Process water<br>Water pumped from the Magna Process Water Reservoir via Pump Station No. 3A to the Copperton Process Water Reservoir | Concrete basin | • Daily inspection | • Weekly inspection |
| UPP Pump Station | Potable Water<br>• Section 21 | Concrete basin | • Inspections as per BMP plan | • Prompt repair of leaks<br>• Adherence to BMP plan |

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TABLE 3

MAGNA PROCESS WATER RESERVOIR FEATURES PERMITTED BY RULE

| **Facility** | **Fluids Handled** | **BAT Description** | **Regulatory Status** | **Operation and Maintenance** | **Performance Criteria** |
|---|---|---|---|---|---|
| UPP discharge pipelines to Magna Reservoir | Construction washdown water and stormwater | 12” HDPE pipeline, non-vented | De Minimis | Weekly Inspection | None |

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TABLE 4

MAGNA PROCESS WATER RESERVOIR OPERATIONAL MONITORING POINTS

| **Operational Monitoring Site** | **Sample ID** | **Sampling Location** |
|---|---|---|
| Magna Process Water Reservoir | MCP1416 | Grab sample of reservoir water |

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# APPENDIX A

BEST MANAGEMENT PRACTICES PLAN

FOR

MAGNA RESERVOIRS
GROUND WATER DISCHARGE PERMIT
Permit No. UGW350015

## INTRODUCTION

The Kennecott Utah Copper LLC (Kennecott) has been issued Ground Water Discharge Permit #UGW350015 for the Magna Reservoirs. The Magna Reservoirs physical permit boundaries includes the Power Plant and the Magna Process Water Containment and Pumping Facilities that route process water for Kennecott operations. Based on topographical maps the permit area covers approximately 65 acres. The permit specifies monitoring conditions, performance criteria, Best Available Technology (BAT) and development and implementation of a Best Management Practices (BMP) plan to reduce or eliminate the loss of process fluids to ground water.

As directed in the permit, the BMP plan forms Appendix A of the Magna Reservoirs Ground Water Discharge Permit and is intended to ensure prompt cleanup of any spills and proper handling of process fluids and materials as well as an ongoing inspection and maintenance program for permitted facilities.

## INSPECTION AND MAINTENANCE PROCEDURES

### OPERATIONS

Operations at the Magna Reservoir facilities are controlled and monitored 24 hours a day via a combination of distributed control systems, video imagery, alarms, and operator visual inspections. Every section of both facilities is assigned operators that are responsible for inspecting areas at least once a day to verify systems integrity and operations. Operators are also responsible for rectifying any deficiencies found in system components or equipment in a timely manner. The maximum allowable leakage rate (ALR) is described below.

### MAINTENANCE

Each operational area at the Magna Reservoirs has been assigned personnel responsible for repair and maintenance of all equipment. Scheduling of maintenance activities is part of a comprehensive preventive maintenance program (PM). The overall maintenance program utilizes computer assisted preventive maintenance scheduling. A PM schedule has been developed for each key piece of equipment.

Tracking of the PM schedule, as well as the PM procedures, is done via a computerized maintenance program called SAP. SAP is utilized as an information management system for scheduling maintenance tasks and compiling equipment, material and supply data. Based on information from the control system, feedback from operator inspections, and preset schedule inputs, SAP assists maintenance planners in tracking and scheduling PMs. When a PM is due, the computer system triggers the PM process for a specific piece of equipment. Equipment associated with the storage and transfer of process fluids is included in the SAP program.

Pre-established job procedures are printed out for the PM. Maintenance schedulers then assign an employee the responsibility of completing the work.

After PM work is completed, the employee returns a signed PM checklist to the maintenance scheduler. Items noted during inspections that require additional repairs are noted by the maintenance planner. A work order is then written for any additional repair work and the work will be scheduled. The work order tracking system is intended to ensure that proper and complete implementation of required repairs occurs. The SAP system will continue to remind maintenance planners weekly until the job work order is completed and closed out.

Systems that store, transfer or otherwise handle process solutions including pumping systems are included in the PM program. Pumping system components are inspected at a minimum of once every three months. Many system components are inspected more frequently. PM procedures for process fluid pumping systems include lubrication fluid check, inspecting foundations and mounting assemblies, pump vibrations, noise, etc., and inspection of associated piping and fittings.

Process fluid storage systems are included in the PM program and are tracked through SAP. Process fluid storage reservoirs are visually inspected when facility downtime periods allow drainage. Tank containment and sumps and associated piping are inspected monthly.

The following table specifies inspection frequency for both point and area sources listed in the Magna Reservoirs Ground Water Discharge Permit:

**Magna Reservoirs Point Source Inspection Schedule**

| Inspection Area | Fluids Handled | Performance Criteria |
|---|---|---|
| 21st South Pumps | Section 21 potable water via section 21 pump station | Prompt Repair of leaks |
| Station Service Pumps | Process Water | Prompt Repair of leaks |

HOUSEKEEPING

All operational Kennecott facilities at the Magna Reservoirs adhere to strict Housekeeping standards. Housekeeping standards are enforced by area supervisors via employee training and housekeeping inspections. Kennecott housekeeping standards require prompt cleanup of spilled materials, and areas are to be kept reasonably free of excess dirt, grease and oil. Kennecott personnel are trained annually on environmental aspects of proper housekeeping.

SPILL PREVENTION / SPILL CLEANUP / SPILL REPORTING

The Magna Reservoirs areas have site specific cleanup procedures. The plans specify procedures to be followed for spill response and spill prevention. Spills are contained and cleaned up as quickly as possible.

A verbal report of any noncompliance, or spills subject to the provisions of UCA 19-5-114 **which may endanger public health or the environment** are made as soon as possible, but no later than twenty-four hours from the time Kennecott first became aware of the incident. The verbal report will be made to the Utah Department of Environmental Quality 24-HOUR response NUMBER, (801) 536-4123 or to the Division of Water Quality, Ground Water Protection Section at (801) 536-4300, during normal business hours. A written report containing specific details of the incident will be submitted to the Director within five days of the time Kennecott becomes aware of the incident.

MATERIALS HANDLING



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Kennecott enforces the Occupational Safety and Health Administration (OSHA) requirements for Hazard Communications at all facilities including the former Power Plant and Magna Process Water Reservoirs.

The following is a list of key OSHA standards enforced:

- Labels and/or appropriate warning concerning chemicals are in place
- MSDSs are maintained and readily available for all chemicals on site.
- Employees are informed and trained regarding chemicals and Hazardous Communications
- Contractor employees are informed concerning chemicals at RTKC

EMPLOYEE TRAINING

All new employees are given an overview of Kennecott's Health, Safety, and Environmental (HSE) policy and procedures. Plant personnel receive annual standards training covering key elements of Kennecott's safety and environmental standards including SPCC, RCRA, Housekeeping, MSHA and OSHA Hazardous Communications. Represented employees receive the standards training from SAP online training. Kennecott encourages employees to actively participate in employee suggestion and improvement programs in an effort to enhance corporate environmental and safety performance.

RECORD KEEPING

Records that document compliance with the elements required in the BMP will be maintained for a minimum of three years. Copies of records are kept at the Tailings and Water Services record keeping centers.

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APPENDIX B

Magna Reservoir
Leak Detection & Water Quality Sampling Plan
(Revised March 2014)

## 1.0 Introduction

The Magna Reservoir System, located in the Magna Process Water Reservoirs facilities area, acts as a central hub for industrial process waters. Flows from the No. 1 and No. 4 Pump Stations are discharged into the reservoir (approximately 35,000 gpm) where the combined flows are routed to the Copperton Concentrator via Pump Station 3A and 3B, and or to the Tailing Lines via Pump Station 3.

This plan presents the sampling, analysis and quality assurance guidelines to be performed by Kennecott for water quality sampling of the groundwater protection features of the Magna Reservoir System.

## 1.1 System Description

The Magna Reservoir system consists of two reservoirs located adjacent to each other. The reservoirs were designed to be operated primarily in series with flow typically first entering Reservoir No. 1, flowing to Reservoir No. 2, and then to Pump Stations 3, 3A, and 3B. However, each reservoir has an inlet, outlet, and overflow that can be isolated from the other reservoir so that the reservoirs can be operated independently during periods of maintenance, modification or repair. A common overflow system, linked to both reservoirs, allows excess flows to passively flow over a weir and into a pipeline conveying excess flows to the Clarification Canal located influent from Kennecott Pump Station 1 within the Tailings Impoundment.

The reservoirs have identical leak detection and seepage barrier construction.

### 1.1.1 Construction

The reservoirs include an identical, double containment liner system as the seepage barrier:

- A primary liner consisting of an 80-mil HDPE geomembrane with micro spikes for surface traction is located on top.
- A secondary liner consisting of a 60-mil HDPE geomembrane with drainage nubs is located beneath the primary liner.

The drainage nubs provide separation between the two liners and allow for leakage through the primary liner to be collected in the leak detection system.

Reservoir No. 1 is constructed with engineered fill at 2:1 side slopes. Under normal operating conditions, water is first conveyed to Reservoir No. 1 which includes a concrete floor at the bottom of the reservoir to facilitate removal of any sediment that may accumulate. This concrete floor is located above and is independent of the HDPE liner system. Reservoir No. 2 is also constructed with engineered fill at 2:1 side slopes but does not include a concrete floor.

If leakage occurs through the primary liner, it is collected at a single point for each reservoir – at the east end of Reservoir No. 1 and in the northwest corner for Reservoir No. 2. See Figure 1.

Leakage flow from each reservoir is conveyed by gravity through a 6-inch diameter HDPE pipeline to independent meter vaults where the continuous flow is measured using an area velocity type flow metering system and V-notch weir. Tail water from the individual reservoir meter vaults is conveyed to the Clarification Canal located influent from Kennecott Pump Station 1 through the existing area drainage system to be circulated back to the Magna Reservoir System for use.

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The continuous quantity of leakage flow rate (GPM) from each reservoir is measured in the meter stations and, via electronic 4 to 20 ma and fiber optics signals, remotely monitored and recorded in the Kennecott plant SCADA system at the Tailings Control room.

In addition to the continuous flow being recorded, the volume of leakage (in total gallons) is determined each day by logic programmed into the dedicated PLC. If the total daily volume exceeds the allowable leakage rate an alarm will be activated and Tailings Operations will conduct a site investigation to determine the source of the increased leakage rate. The initial response will be to confirm leakage flow rates and initiate inspections and repairs as required. In addition to the total daily volume alarm being activated for excess leakage, the SCADA logic system shall be programmed for early warning alert. During a variable time period (typically shorter than 24 hours) flows can be monitored and a projected 24-hour total volume determined. On this occurrence an alert can be monitored at the control room. If it is determined that a flow meter is not operating correctly, Tailings personnel will measure the leakage flow manually and record the value in the Tailings control room.

Kennecott maintains an Operations and Maintenance Manual for Magna Reservoir that includes specifications for equipment, recommended inspections, and operations and maintenance recommendations.

### 1.1.2 Allowable Leakage Rate

Liner leakage flow from reservoir No. 1 or No. 2, if present, will report to a respective flow meter station where it can be read remotely or in the field by Tailings personnel.

Kennecott utilizes a two tier approach with respect to allowable leakage rate for the Magna Reservoir System. Tier I leaks are based upon liner manufacturer specifications and are designed to alert Kennecott personnel to an escalation in leakage rate, possible minor liner separation or flow meter station malfunction. Tier II leaks are based upon EPA guidance for allowable leakage rates for double lined surface impoundments (Bonaparte & Gross, 1993) and are designed to trigger UDWQ notification that the allowable leakage rate for the respective reservoir has been exceeded. The Tier I and II leakage rates were further developed using total liner surface area for each respective reservoir and are consistent with US EPA methodology. Allowable leakage rates are summarized in Table 1.

**Table 1**: Tier I and Tier II Allowable Leakage Rates (ALR)

| Reservoir | Liner surface area (acres) | Tier I[1] (gallons/day) | Tier II[2] (gallons/day) |
|---|---|---|---|
| No. 1 | 1.38 | 720 | 1380 |
| No. 2 | 1.49 | 720 | 1490 |

[1] Based upon guarantee by installer and manufacturer stating maximum leakage through primary geomembrane liner not to exceed 50 gallons per acre, per day (gpd/ac).
[2] Based upon US EPA recommended ALR requirements for surface impoundments of 10,000 liters per acre, per day or approximately 1000 gallons per acre, per day.

Repair requirements and a leak investigation are triggered if the allowable leakage rate for the respective reservoir exceeds Tier I over a 24-hour period. Immediate action will be required if the ALR continues past the Tier II leakage rate which will include isolating the reservoir, lowering the water level below the leak, notifying the environmental department and subsequent notification of the DWQ within 24-hours Kennecott first became aware of the incident.

## 2.0 Facility Organization and Responsibilities

The Kennecott Manager – Environment or designee will serve as the Compliance Project Manager and will have overall responsibility for direction of the sampling and compliance program, quality control,



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notifications and reporting. The Kennecott Sampling Supervisor will serve as technical director and will be responsible for execution of all activities in accordance with this sampling plan.

The Kennecott Tailings Superintendent - Operations or designee is responsible for monitoring and recording daily flows reporting to the Magna Reservoir leak detection sump. The same personnel will also be responsible for maintaining the leak detection monitoring equipment and ensuring it is fully functional on a daily basis. In the event a leak detection sump exceeds compliance limits as outlined in Section 4.2. The same personnel are responsible for notification to the Manager, Environment or designee and coordinating efforts to maintain compliance and subsequent repairs as necessary.

The Kennecott Sampling Technicians have the responsibility of collecting all water quality samples required by the permit in accordance with this sampling plan and the GCMP.

The Kennecott Manager – Tailings and Water Services will report results of water quality sampling and volume pumped from leak detection sumps in the event compliance limits are exceeded to the Director of the Utah Water Quality Board. Maintenance, repair and monthly inspections will be the responsibility of the RTKC Tailings staff.

Kennecott Laboratory Manager will ensure all water quality samples are analyzed using the appropriate methods and within the specified holding times in accordance with this sampling plan and GCMP.

## 3.0 Analytical Parameters

All water quality samples from the monitoring sump and reservoir will be analysed for the field measurements (pH, specific conductance, and temperature), major ions (alkalinity, chloride, sulfate, potassium, sodium, magnesium, and calcium), dissolved metals (arsenic, barium, boron, cadmium, chromium, copper, lead, mercury, selenium, and zinc) and TDS. All samples will be analysed using EPA approved methods as specified in Utah Regulation R317-6-6.3.

## 4.0 Schedule for Water Quality Monitoring and Reporting

### 4.1 Reservoirs

Water quality samples representing both zones of the Magna Reservoir System are collected on a monthly basis. The sample ID is MCP1416 and is collected from pump station 3A which is the Magna Reservoir System discharge point under normal operation. Water quality sampling results will be submitted to the Director in the form of semi-annual reports of the corresponding half year in which the sampling was conducted.

### 4.2 Leak Detection Sumps

Piping from respective Reservoirs No.1 and No.2 of the Magna Reservoir System report to respective flow meter stations. The flow meter stations are monitored through a control room on a continuous basis and alarms are programmed to sound in the event threshold allowable leakage rates are exceeded

- The control room will receive an alarm if allowable leakage rates outlined in Table 1 are exceeded.
- Reporting requirements are triggered as outlined in Section I Part F of the permit if the Tier II allowable leakage rate for a respective reservoir is exceeded.

### 4.3 Monitoring Wells

A series of groundwater monitoring wells listed in Table 1 of the permit are located adjacent to the Magna Reservoir System. These wells monitor groundwater quality and will aid in detection of reservoir failure should in the unlikely occurrence the early detection system fail in detection. All sampling will be in compliance with the current Kennecott Ground Water Characterization and Monitoring Plan (GCMP).

## 5.0 Water Quality Sampling Procedures

### 5.1 Reservoirs

Water quality representing both Reservoir No. 1 and Reservoir No. 2 of the Magna Reservoir System is collected from a sample port from within pump station 3A (MCP1416). Water quality sampling results will be submitted to the Director in the form of semi-annual reports of the corresponding month in which the sampling was conducted.

### 5.2 Leak Detection Sumps

Kennecott will collect a sample from the corresponding leak detection sump in the event the allowable leakage rate is exceeded.

- Magna Reservoir No.1 flow meter station – MCP2817

- Magna Reservoir No.2 flow meter station – MCP2818

All field measurements and water quality sampling will be collected in accordance with the GCMP. Results will be reported in the corresponding semi-annual report.

### 5.3 Monitoring Wells

All sampling will be compliant with the current Kennecott GCMP.

## 6.0 Sample Custody

### 6.1 Field Operations

The following records and actions will be taken as part of the water quality sampling of the Magna Reservoir System.

- Field Logs: A complete record of all field sampling activities will be kept by the sampler. The field logs will document the date, time, and location of sampling and the name of the person(s) performing the sampling, as well as any other pertinent information.
- Sample Labels- Sample containers will be labeled with the information necessary to prevent misidentification of samples. Each sample container will be clearly labeled with the sample location, date and time of collection, preservative(s), filtered or unfiltered, and the name of the person(s) performing the sampling.
- Chain-of-Custody Record: In order to establish the documentation necessary to trace sample possession, a chain-of-custody record will be filled out to accompany every sample shipment from the time of collection through receipt by the analytical laboratory. The samples will be delivered to the laboratory for analysis as soon as possible.
- All sampling will be noted and recorded as required in the GCMP.

### 6.2 Laboratory Operations

The primary laboratory to be used for analysis of the water quality samples will be the Kennecott Environmental Laboratory (KEL). KEL is certified by the State of Utah (certification No. E-21). Any other laboratories used, if necessary, will be certified by the State of Utah. The laboratories will maintain internal chain-of-custody control in accordance with their own standard quality assurance program. The date and time of analysis, name of person(s) performing the analysis, and methods used, will be documented by the laboratory.

## 7.0 Internal Quality Control Checks

### 7.1 Overview

All internal quality control checks will be conducted in accordance with the current GCMP.

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### 7.2 Field Operations

The following description refers to all sampling incorporated into the GCMP and may or may not include a sample specific to this permit or Appendices based upon the random nature of the sampling. Blind field duplicates will be prepared and submitted to the laboratory by the sampler. One out of every 20 samples or at least one sample per year will be a blind field duplicate. Sample splitting for duplications will be conducted as specified in the GCMP. The results of these duplicate analyses will be reported as required by the GCMP.

### 7.3 Laboratory Operations

The certified laboratory will conduct its own internal quality control checks in accordance with its own quality assurance program as part of State of Utah certification. This will include running at least 5 percent duplicate, spike, and control samples for all samples collected within the GCMP.
Laboratory equipment maintenance will be in accordance with the Laboratory QA Plan.

## 8.0 References

Bonaparte, R. and Gross, B.A. 1993. US EPA Project Summary, LDCRS Flow from Double-Lined Landfills and Surface Impoundments.

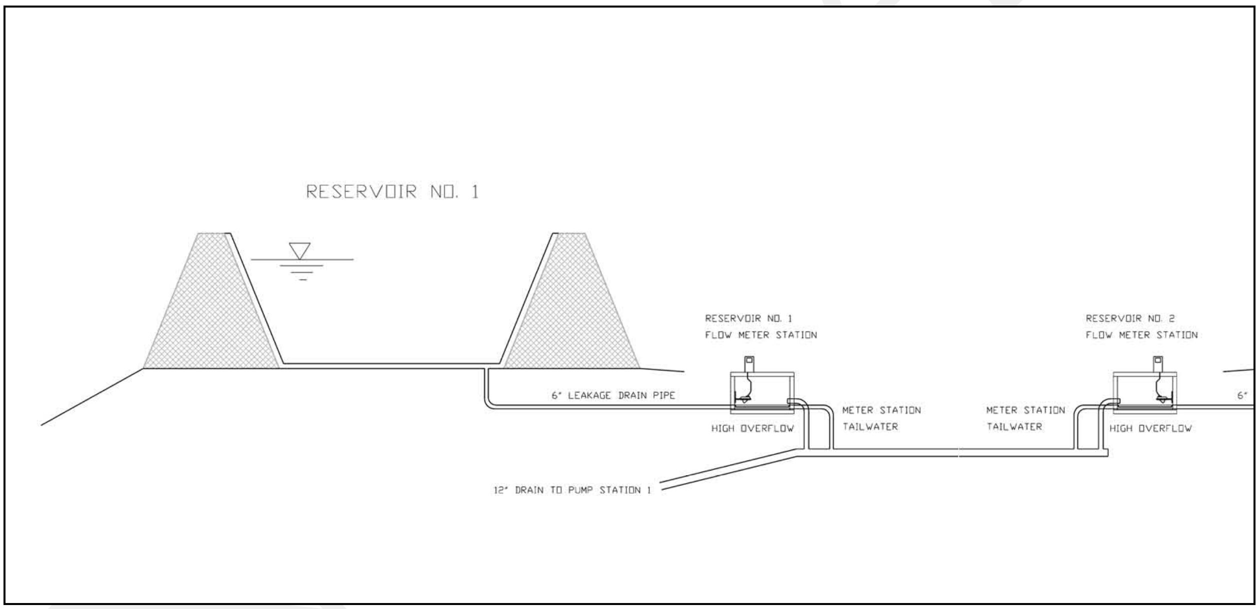


Figure 1
*Schematic of Magna Reservoir Leak Detection System*

APPENDIX C

Pipeline Inspection and Maintenance Program

FOR

MAGNA RESERVOIRS
GROUND WATER DISCHARGE PERMIT
Permit No. UGW350015

## INTRODUCTION

The Kennecott Utah Copper LLC (Kennecott) has been issued Ground Water Discharge Permit #UGW350015 for the Magna Reservoirs. The Magna Reservoirs physical permit boundaries includes the Magna Process Water Containment and Pumping Facilities that route process water for Kennecott operations. Based on topographical maps the permit area covers approximately 65 acres. The permit specifies monitoring conditions, performance criteria, Best Available Technology (BAT) and the development and implementation of a Best Management Practices (BMP) plan to reduce or eliminate the loss of process fluids to ground water.

The pipeline inspection and maintenance plan forms Appendix C of the Magna Reservoirs Ground Water Discharge Permit and is intended to ensure prompt response and cleanup of any spills including proper handling of process fluids and materials as well as an ongoing and robust inspection and maintenance program for permitted facilities. The majority of the pipelines in this permit are located in the subsurface. However, there are areas where the pipelines are above ground:

- The process water pipelines from pump station #1 and pump station #4 are above ground when they enter the permit footprint;

## INSPECTION AND MAINTENANCE PROCEDURES

### OPERATIONS

Pipelines at the Magna Reservoirs are controlled and monitored 24 hours a day via a combination of distributed control systems, video imagery, alarms and operator visual inspections. Every section of both facilities pipelines have assigned operators that are responsible for inspecting areas at least once a day to verify systems integrity and operations. Operators are also responsible for rectifying any deficiencies found in piping components or equipment in a timely manner.

### MAINTENANCE

Each operational area in the permit area has been assigned personnel responsible for repair and maintenance of all equipment including pipelines. Scheduling of maintenance activities is part of a comprehensive preventive maintenance program (PM). The overall maintenance program utilizes computer assisted preventive maintenance scheduling. A Standard Operating Procedure has been developed for specific pipelines and processes for times of repair and inspection.

### INSPECTIONS

The pipelines which are above ground are visually inspected twice per day by operational personnel.

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Pipelines located in the subsurface are monitored by pressure switches and/or flow meters which have differential alarm settings in the control room of Tailings. If there is an emergency the operational control room at Tailings is immediately notified. Otherwise a maintenance notification is entered into Kennecott's system as explained in Appendix A of this permit.

Standard Operating Procedures exist for:

- Drain down and Startup of Process Water 3A and 3B (TASOP300-211) which is a guideline for process startup of the pump stations to fill the Copperton Concentrator Reservoir.
- Planned/Unplanned Plant Shutdown Process Water Management (TASOP300-234) which describes the water management plan for shutdowns.
- Magna Reservoir System including pipeline and proper process water valve operation and settings (TASOP300-232) which describes normal operating alignment of water entering the Magna Reservoirs.
- 21$^{st}$ South Pumps (KEJSAUX33) describes the operation and startup of the pump station.

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APPENDIX D

Ground Water Characterization Monitoring Plan (GCMP)

FOR

MAGNA RESERVOIRS
GROUND WATER DISCHARGE PERMIT
Permit No. UGW350015

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# INTRODUCTION

Kennecott Environmental and Industrial Hygiene Laboratory (KEIHL) is a component of Rio Tinto Kennecott Corporation (RTKC) and has provided analytical services to RTKC for over 40 years. KEIHL is in the Central Laboratory at 2500 South 9180 West, Magna, Utah. The laboratory provides in-house analytical services for environmental, industrial hygiene, geochemical, and process monitoring programs for RTKC only. KEIHL does not provide analytical services to outside clients and will review all new work proposed to ensure the appropriate facilities and resources exist before commencing work.

**Laboratory Environment**

KEIHL is a state-of-the-art facility. The building provides large test areas, energy sources, lighting, heating, and ventilation for the proper performance of test methods. The environmental monitoring systems within the building monitor, control, and record all environmental conditions as appropriate. Such environmental conditions may include dust, humidity, main voltage, and temperature. The work areas are effectively separated for possible incompatible work areas. KEIHL maintains good housekeeping standards to ensure that any contamination does not adversely affect data quality. Access is controlled by Rio Tinto Kennecott Corporation (RTKC) by using a card key system and limited to

KEIHL personnel and RTKC's Health, Safety and Environmental Quality (HSEQ) department employees and authorized visitors. The laboratory area where environmental samples are stored and analyzed is considered a Resource Conservation Recovery Act (RCRA) secure area. A facility diagram can be found in *Section 1 Appendix A*.

## Definition

This Quality Assurance Program Plan (QAPP) was developed using four regulatory guidelines. The first guideline is NELAC Chapter 5 Quality Systems. The second guideline is the State of Utah Rule for the Certification of Environmental Laboratories, Rule 444-14. KEIHL used a combination of NELAC Chapter 5 and R444-14-7 to compile a list of essential items required for a quality assurance plan. The Third guideline used is the U.S. Environmental Protection Agency (EPA) documented in "Interim Guidelines and Specifications for Preparing Quality Assurance Program Plans," QAPPS 005/80 December 29, 1980, issued by the Office of Monitoring Systems and Quality Assurance Office of Research and Development. The fourth guideline is the AIHA/ISO 17025 for Industrial Hygiene procedures. KEIHL is in conformance with these four guidelines listed above and the Quality Assurance (QA) policy is stated in *Section 2.0*.



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## Purpose

The purpose of this QAPP is to present an overview of the essential elements of KEIHL's quality assurance program. Elements not specified in the EPA and AIHA guidance documents are included in this QAPP to provide additional QA program elements required to meet the objectives of the QA policy. The QA policies and procedures described herein are designed to eliminate systematic errors and minimize the occurrence of other errors. However, no QA program can eliminate all errors which may occur during analysis. The QA program provides the framework for minimizing errors and identifying and correcting the errors that may occur. These QA policies and procedures must be coupled with the professional judgment of the technical staff to ensure that quality data is consistently produced.

## Laboratory Organization

The organization of Kennecott Environmental and Industrial Hygiene Laboratory is described in *Section 3* of this document. Safety guidelines for the laboratory are provided in the Chemical Hygiene Plan, which is found in Bentley, a site-wide commercial document control system utilized at RTKC.

Rio Tinto Kennecott Corporation Safety Policies and Procedures can be found on the company intranet.

A list of analytical services and corresponding Standard Operating Procedures (SOP) are in Bentley.

KEIHL monitoring programs are strengthened by a variety of certification, accreditation, or licensing programs. A brief synopsis of current accreditation and staff experience certifications is provided in *Section 1 Appendix B*. A list of KEIHL's instrumentation is provided in *Section 1 Appendix C*.

## Code of Ethics

The purpose of this code is to provide a standard of ethical conduct to ensure the principles of integrity, accountability, independence, and impartiality are demonstrated by all employees at the Kennecott Environmental and Industrial Hygiene Laboratory. This code will:

- Maintain the highest level of integrity and professional competence.
- Produce data that is legally defensible.
- Follow the guidelines of NELAC, AIHA and KEIHL's Quality Assurance Program Plan (QAPP).
- Protect confidential information. *(See Section 1 Appendix D.)* Personnel, including any committee members, contractors, personnel of external bodies, or individuals' action on the laboratory's behalf, shall keep confidential all information obtained or created during the performance of laboratory activities, except as required by law.
- Be objective in the application of recognized scientific methods and in the interpretation of findings.
- Disseminate scientific knowledge for the benefit of employees, society, and the profession.
- Comply with Rio Tinto Kennecott Copper's policy on Principles of Business Conduct.
  *(See Section 1 Appendix E.)*



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- Maintain an objective attitude toward the recognition and evaluation of safety and health issues, regardless of external influences since the health and welfare of workers is of paramount importance.

The Laboratory is obligated to provide accurate and precise analytical data in a timely manner to support the various programs at RTKC. Laboratory employees are required to do all possible within their means to ensure that analytical results are of the highest quality. All data will be completed promptly with a quality sufficient to meet the needs of RTKC management and to ensure the health and safety of the individual employee.

All Laboratory employees must ensure all analytical methods, quality assurance and documentation procedures are followed. No undue pressure should be applied by any employee, manager or group that would cause a laboratory employee to compromise their work and the analytical results provided by the laboratory in any manner. If an employee has cause or feels that any form of unjustified pressure is being applied to their position, they can bring this immediately to the attention of the Laboratory Director. An employee can choose to contact the Human Resource Department if they are unable or unwilling to bring the issue to the Laboratory Director.



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| MOC# | Description of Change | Prepared By | Date |
|---|---|---|---|
| TS00020 | Revision and Review for 2004 | Janna Hardman | 09/30/04 |
| TS00085 | Revision and review for 2006. | Melissa Olsen | 08/02/06 |
| TS00113 | Statement added regarding the review of new work in first paragraph. | Melissa Olsen | 04/13/07 |
| 9006 | Revision and review for 2008. Updated instrumentation list. | Melissa Olsen | 10/10/08 |
| | Review for 2009. | Melissa Olsen | 01/21/09 |
| 11532 | Review for 2010. Updated laboratory address. Removed ELPAT from certifications and updated analytical instrumentation list. | Melissa Olsen | 02/22/10 |
| 17479 | Review for 2011. Updated instrumentation list to include Rigaku XRD and Perkin Elmer ICP-OES 7300 DV. | Melissa Olsen | 10/11/2011 |
| 23199 | Review for 2013. Updated Appendix C-Instrumentation List. | Melissa Olsen | 04/25/2013 |
| 26233 | Review for 2014. Updated instrumentation list. Removed "testing of biological sterility" under "Laboratory Environment". Updated branding. | Melissa Olsen | 05/22/2014 |
| 30091 | Review for 2015. Updated instrumentation list-added new mercury analyzer, NAG pH meters, etc. | Melissa Olsen | 03/24/2015 |
| 31572 | Review for 2016. Removed references to biological/clinical samples, removed clinical license from Appendix B. Updated Appendix C, Analytical Instrumentation. | Melissa Olsen | 03/08/2016 |
| 43586 | Review for 2017. No changes made. | Melissa Olsen | 02/06/2017 |
| 53081 | Review for 2018. Updated Appendix C-Instrumentation List. | Melissa Olsen | 05/15/2018 |
| 58723 | Review for 2019. Updated Appendix C-Instrumentation List. Removed statement regarding participation in USGS inter-laboratory studies from Appendix B. | Melissa Olsen | 08/16/2019 |
| 60468 | Added statements under Code of Ethics regarding impartiality and Confidentiality. | Melissa Olsen | 01/03/2020 |

# Quality Assurance Program Plan

## Section 1 Introduction

| Effective Date: 12/06/2022 | Document Number: CLMN4423-0001 | Rev.: 21 |
|---|---|---|

| MOC# | Description of Change | Prepared By | Date |
|---|---|---|---|
| 67192 | Review for 2020. Updated equipment list. | Melissa Olsen | 09/15/2020 |
| 79250 | Review for 2021. No changes made. | Melissa Olsen | 09/02/2021 |
| 94373 | Review for 2022. Updated instrumentation list. | Melissa Olsen | 11/30/2022 |
| 102982 | Updated instrumentation list. Rev. 20 to 21 | Melissa Olsen/Angie Zuniga | 09/06/2023 |

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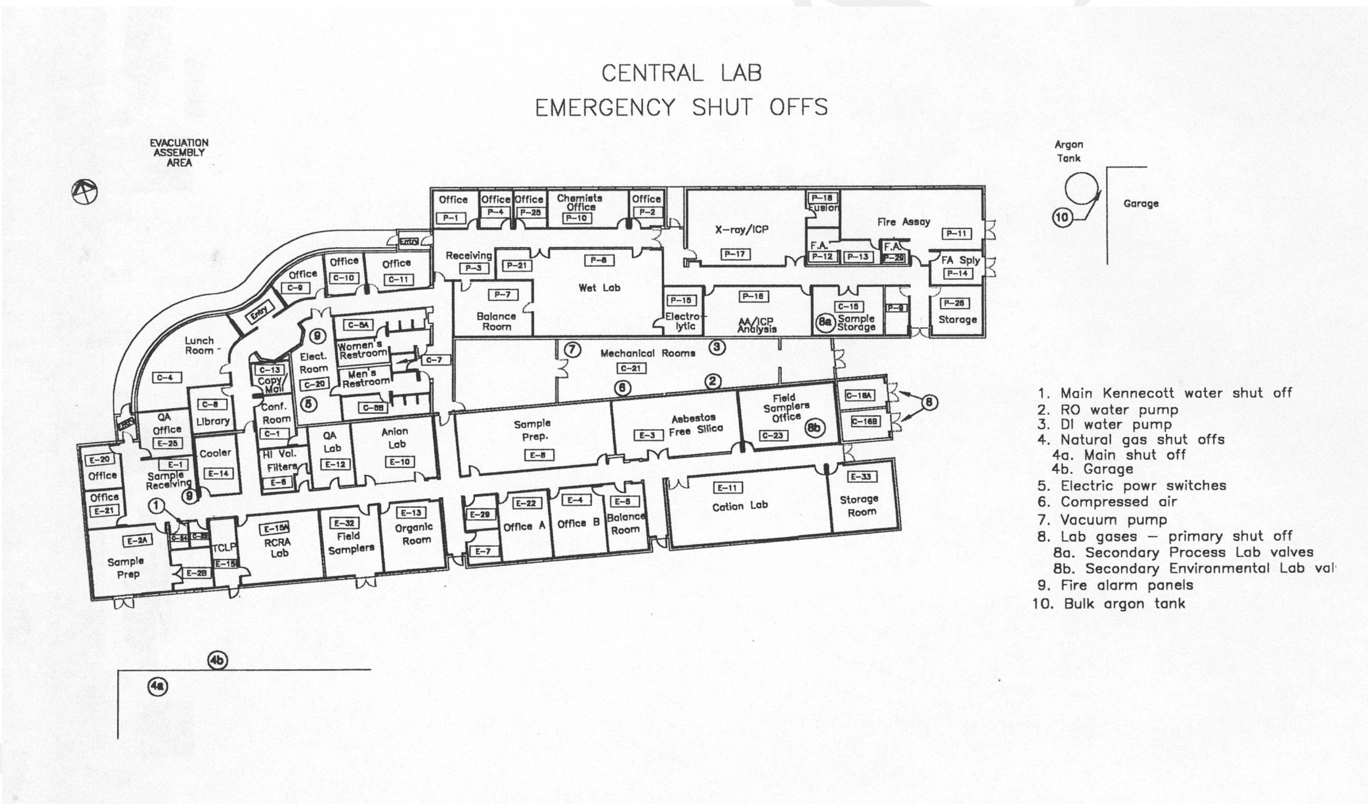
## Appendix A - KEL Building Plan



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# Appendix B - Laboratory Accreditation and Certifications

### Accreditation, Certification and Professional Experience

- Certified by the State of Utah, Environmental Testing is performed under the Safe Drinking Water Act (SDWA) the Clean Water Act (CWA) and the Resource Conservation and Recovery Act (RCRA). Certification # UT0019 (1979) (UT0019 since September 1979)
- Accredited by the American Industrial Hygiene Association (AIHA) for respirable silica and metals under the IHPAT program. Accreditation # 121 (1978)

## Professional Experience and Certifications

Professional Experience

The professional staff of environmental scientists have earned college degrees in chemistry or related disciplines.

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## Appendix C KEIHL Analytical Instrumentation

## KEL Analytical Instrumentation

| INSTRUMENT | VENDOR | SERIAL NUMBER | LOCATION |
|---|---|---|---|
| Oven - Honeywell | Grieve | 620140 | E-2 |
| Rotap | WS Tyler | 27430 | E-2 |
| (2) Ring and Puck | TM Engineering | NA | E-2 |
| Jaw Crusher | Morse | 2000-028 | E-2 |
| Mini Flex II | Rigaku | HD209711 | E-3 |
| Particle Size 2000 | Malvern | MAL1060772 | E-3 |
| Balance-AB104-S | Mettler | 1126481482 | E-5 |
| Balance-AB104-S | Mettler | 1127140437 | E-5 |
| Balance-M104S | Mettler | B245502124 | E-5 |
| Oven-TFO-10 | Cascade Tek | 9018811 | E-5 |
| Secura 324-IS | Sartorius | 36001909 | E-5 |
| Balance-MX5 | Mettler | 1127442247 | E-6 |
| Oven-Thermlyne | Thermo Scientific | 152470301100730 | E-8 |
| Oven-732 | Lindberg | 927131 | E-8 |
| Hot Block 1 | Environmental Express | 3994CEC1863 | E-8 |
| Hot Block 2 | Environmental Express | 6843CECW3221 | E-8 |
| Hot Block 3 | Environmental Express | 3826CEC1851 | E-8 |
| Hot Block 4 | Environmental Express | 3994CEC1873 | E-15 |
| Hot Block 5 | Environmental Express | 2018CECW5024 | E-8 |
| Hot Block 6 | Environmental Express | 5837CEC2673 | E-21 |
| C/S Analyzer SC832 HT | LECO | 54801 | E-8 |
| C/S Analyzer SC632 | LECO | 3268 | E-8 |
| Dionex AS-AP | Thermo Scientific | 17121215 | E-10 |
| Integrion HPIC | Thermo Scientific | 17121215 | E-10 |
| Dilutor-Microlab 500 | Hamilton | MD91KB5266 | E-10 |
| 311 Auto Sampler | Astoria | 4625A10988 | E-10 |
| 302 D | Astoria | 302330 | E-10 |
| 303 A | Astoria | 303427 | E-10 |
| 305 D | Astoria | 305666 | E-10 |
| 311 Auto Sampler | Astoria | 4632A11095 | E-10 |
| Rapid Flow Analyzer-A2 | Astoria | 200102 | E-10 |
| 311 Auto Sampler | Astoria | 4721A12048 | E-10 |
| Rapid Flow Analyzer-A2 | Astoria | 200168 | E-10 |
| 8900 ICP-MS | Agilent | 17450348 | E-13 |
| Rapid Flow Analyzer-303A | Astoria | 303427 | E-10 |
| Optima 8300 DV | Perkin Elmer | 078S1211194 | E-11 |
| ASX-520 | Cetac | 091257A520 | E-11 |

| INSTRUMENT | VENDOR | SERIAL NUMBER | LOCATION |
|---|---|---|---|
| Chiller for 7700X | Polyscience | 1D12A0915 | E-11 |
| 7700X | Agilent | JP11441372 | E-11 |
| M-7600 Hg | Cetac | 101406Q76 | E-11 |
| ASX-260 | Cetac | 081428A560 | E-11 |
| ASX-500 | Agilent | US0813203A520 | E-11 |
| Chiller | Dimplex | 39266 | E-11 |
| 7300 DV | Perkin Elmer | 077C1072201 | E-11 |
| Dilutor-Microlab 500 | Hamilton | ML600CL4187 | E-11 |
| 5110 ICP | Agilent | MY18411003 | E-11 |
| G2392A Chiller | Agilent | 5Q12B1695 | E-11 |
| SPS 4 Autosampler | Agilent | AU17253185 | E-13 |
| Balance-AE 50 | Mettler | K54461 | E-15A |
| Balance-MS6001S/03 | Mettler | B332650103 | E-15A |
| Centrifuge-5804 | Eppendorf | 5804YN814874 | E-15A |
| Conductivity Meter-126 | Orion | 41567041 | E-15A |
| Conductivity Meter-124 | Orion | 34664087 | E-15A |
| Conductivity Meter-2052B | VWR (Amber) | 906026 | E-15A |
| Conductivity Meter | Traceable | 192367356 | E-15A |
| PH Meter | Oakton | 558890 | E-15A |
| PH Meter | Oakton | 84146 | E-15A |
| PH Benchtop Meter | Thermo | B22723 | E-15A |
| PH Benchtop Meter | Thermo | X20832 | E-15A |
| Conductivity Meter | Thermo | H06567 | E-15A |
| Colilert Quantitray-Sealer Plus | Idexx | QTP13163701348 | E-15B |
| Incubator-BOD | Fisher Scientific Model 307 | 10300096 | E-15A |
| Incubator-BOD | Thermo Scientific-Precision | WB13554787 | E-15B |
| Balance-AUX220 | Shimadzu | D449511535 | E-29 |
| MA-3000 Hg | NIC | 11740081 | E-29 |
| Balance-AE163 | Mettler | E01679 | NA |
| Optima 7300 Chiller | Polyscience | 1911-01855 | E-11 |
| Agilent 5110 Chiller | Agilent | 2208-02506 | E-11 |
| Agilent 8900 Chiller | Agilent | 1710-04668 | E-13 |
| Rigaku XRD Chiller | Haskris | HB22292 | E-3 |
| Autosampler In-Motion Flex | Mettler | C201292652 | E-10 |
| Autosampler In-Motion Flex | Mettler | C202371211 | E-10 |
| Centrifuge-5702 | Eppendorf | 5702kr756137 | E-10 |
| Furnace- lindburg blue M | Thermo Fisher | 1145492201220222 | E-5 |
| ASX-520 | Cetac | 030632A520 | E-11 |
| M-7600 Hg | Cetac | U22045001 | E-11 |
| ASX-560 | Cetac | 112136A560 | E-11 |
| SPS 4 Autosampler | Agilent | AU18154834 | E-11 |

| INSTRUMENT | VENDOR | SERIAL NUMBER | LOCATION |
|---|---|---|---|
| Chiller for ICAP-RQ | Agilent | 2208-02506 | E-11 |
| iCAP RQ | Thermo | ICAPRQ 03257 | E-11 |
| ASX-560 | Teledyne Cetac | 012247A560 | E-11 |
| Thermoflex 2500 chiller | Thermo | 1171864801220200 | E-11 |
| MA-3000 Hg | NIC | 21740743 | E-29 |
| T9 Autotitator | Mettler | C147030229 | E-10 |
| Dosing unit | Mettler | C148066397 | E-10 |
| Dosing unit | Mettler | C148066395 | E-10 |
| Sonicator | Branson | RMA10106024G | E-10 |

| Acronym | Description |
|---|---|
| **ICP/AES:** | **Inductively Coupled Plasma Atomic Emission Spectroscopy** |
| **ICP-MS** | **Inductively Coupled Plasma-Mass Spectrometry** |

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## Appendix D – Corporate Confidentiality and Legal Agreement

In consideration of my employment or continued employment with Rio Tinto Kennecott Corporation, its successors, or assigns ("Company"), and in further consideration of the salary or other compensation to be paid to me by Company, I agree to the following terms and conditions:

1. NONDISCLOSURE OF CONFIDENTIAL INFORMATION. I acknowledge that during my employment with Company, I have obtained or will obtain information or access to information regarding Company including but not limited to its trade secrets, customer lists, customer purchasing histories and plans, costs, budgets, policies, procedures, processes, methods of operations, pricing, marketing plans, financial information, personnel information, compensation programs, vendor sources, vendor identities and capabilities, research, machine and component histories, engineering data, designs and drawings, design standards, formulas, computer software and programs. Inventions (as defined below), and other data, as well as information, which Company receives from a third party and holds in confidence (collectively, "Confidential Information"). Confidential Information may be oral or written and may reside in works which I have originated or will originate or which otherwise have come or will come into my possession or knowledge. I understand that Confidential Information does not include information concerning Company and its business which is widely disclosed to the public in published form, nor does it include generally available information concerning principles of business operations. I agree that I shall not at anytime during my employment with Company or at any time thereafter, directly or indirectly disclose to any person or entity or use any Confidential Information except in the normal course of my duties as an employee of Company.

2. OWNERSHIP OF MATERIALS AND RETURN. All books, records, papers, notes, documents or catalogs, compilations of information, drawings, correspondence, recordings, information stores for use in or with or from computers, tools, equipment, and other items and materials, including copies thereof, that I have developed or will develop or which have come or will come into my possession or control during my employment by Company, which relate to the business of Company, are the property of Company. Further, I shall promptly deliver all such materials and items to Company on termination of my employment or at any time Company may so request.

3. INVENTIONS. All inventions, discoveries, improvements, or ideas (jointly or severally, "Inventions") made, developed or conceived by me, individually or jointly with others, during the term of my employment that relate to Company's present or future business, or that are capable of beneficial use by Company shall be the property of Company. Without further salary or other compensation. I shall promptly disclose in writing such Inventions to my immediate supervisor and execute any patent applications, assignments, and other instruments deemed necessary by Company that relate to the Inventions. Company shall have exclusive control over all such Inventions. I shall cooperate fully, even after my termination, in a lawful manner and at the reasonable expense of Company, other than for my time, in the prosecution of patent applications and in any legal actions and proceedings concerning such Inventions.

4. CREATIONS. I hereby assign, convey, and transfer to Company, any and all manuscripts, writings, pictorial materials, computer programs or software, and other creations (collectively, "Creations") created by me, either individually or jointly with others, during my employment which relate to the present or future business of Company or which are capable of beneficial use by Company. All such Creations shall be "work made for hire," as this is defined in the Copyright Act, Title 17 of the United States Code. If for whatever reason a work is deemed other than a "work made for hire." I hereby assign all copyright interests to Company. Company shall have the full right to seek and procure copyright registration on the Creations, and I shall cooperate fully, even after my termination, in a lawful manner and at the reasonable expense of Company, other than for my time, in securing copyrights and in any legal actions and proceedings concerning the Creations.

5. POST-TERMINATION RIGHTS. Without diminishing the rights granted to Company above, if within one (1) year after leaving the employ of Company, an Invention related to existing or potential products, services, or business of Company is described in a patent application or is disclosed to third parties by me, or if a Creation relating to existing or potential products, services or business of Company is published or is disclosed to third parties by me, there shall be a presumption that the Invention or the Creation was conceived, made, developed, acquired, or created by me during my employment by Company and the Invention or Creation shall belong to Company.

6. REMEDIES. Irreparable damage shall result to Company in the event of the breach by me of this Agreement. In the event of a breach or threatened breach by me, Company shall be entitled to all remedies, including money damages, as well as injunctive relief and such other equitable relief to prevent or restrain any breach or threatened breach of this Agreement. Each remedy of Company shall be cumulative and not in limitation of any injunctive relief or other rights or remedies which Company is or may be entitled at law or in equity. Company shall be entitled to its reasonable

attorney's fees, expert witness fees, and other expenses and costs it incurs in enforcing this Agreement or pursuing damages for my breach of this agreement.

**7.** NO EMPLOYMENT AGREEMENT. The employment relationship between Company and me is one of employment-at-will and no rights to employment for a definite period of time are created by this Agreement. I acknowledge this Agreement survives the termination of my employment with Company.

**8.** SEVERABILITY. Any provision of this Agreement which is unenforceable in any jurisdiction shall, as to such jurisdiction, be ineffective to the extent of such unenforceability without invalidating the remaining provisions hereof or affecting the validity or enforceability of such provision in any other jurisdictions.

7. GOVERNING LAW. This Agreement shall be construed and interpreted in accordance with the laws of the State of Utah, and the District Courts of Salt Lake County or the United States District Court for the Central District of Utah in session in Salt Lake City shall have exclusive and concurrent jurisdiction to entertain any action arising under this Agreement.

8. ASSIGNABILITY. This Agreement and the rights and obligations of Company hereunder may be assigned by Company. No rights or obligations of mine under this Agreement may be assigned or transferred by me.

9. NOTICES TO EMPLOYERS. For five (5) years following the termination of my employment with Company, I will disclose the terms of this Agreement to the persons or entities by which I may become employed, or to which I may render services, for example as a consultant, prior to accepting such employment or performing such services.

## Appendix E – Code of Conduct and Ethical Statement

General Code Of Conduct



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Notice To All Rio Tinto Kennecott Corporation:
All employees of Rio Tinto Kennecott Corporation are expected to use sound and prudent judgment in their approach to all employment–related matters. This approach requires employees to appropriately apply their skills, knowledge, and training with due respect for the rights and property of others to promote a safe, productive, and harmonious work environment. Employees who do not conform to this general code of conduct will be subject to discipline, up to and including termination. When in doubt about what this general code of conduct requires of you in a particular situation, ask your supervisor or Employee Relations Representative.

Violations of the general code of conduct include but are not limited to the following:

1. Failure to comply with established health and safety rules and regulations or operating procedures, or performing acts or engaging in behavior which endangers the safety of any employee or other person doing business with the company or on company property, including:

    a. Working without required personal protective equipment (PPE).
    b. Operating equipment or performing a task without required and documented training.
    c. Working at heights without fall prevention or protection equipment
    d. Entering into a confined space without following entry procedures.
    e. Working on plant or equipment without following lockout/isolation procedures.
    f. Failing to immediately report accidents and incidents which occur to yourself and/or others.
    g. Violating traffic rules while operating or being transported in mobile equipment.
    h. Failing to follow established safe-work procedures.
    i. Tampering with or making safety devices inoperable.
    j. Failing to perform a pre-operation or other required inspection prior to operating the responsibilities of the job.

2. Insubordination; failure or refusal to comply with instructions, perform work assignments, or complete the responsibilities of the job.

3. Bringing onto company property, posting, or distributing literature which is libelous, defamatory, scurrilous, abusive, or insulting; unauthorized distribution of literature during working time or in work areas; or unauthorized solicitations of employees during working time.

4. Leaving the job (work station) during working hours without supervisory permission.

5. Interfering with the work of others.

6. Damaging, destroying, or misusing company property or that of another employee or person doing business with the company.

7. Violation of the Drug and Alcohol Abuse Policy, including failure to submit to testing pursuant to that Policy, bringing onto company property, having possession of, being under the influence of, having or not being free from the presence of, using or consuming, transferring, selling or attempting to sell, any form of intoxicant, narcotic, depressant, stimulant, hallucinogen, or any mind-or perception-altering drug or substance (excepting only the taking, with notification to the supervisor for the purpose of determining any appropriate work restrictions, of a prescribed drug under the direction of a physician) at any time during working hours, or on company property.

8. Unexcused, chronic, or excessive tardiness, absenteeism, or early departure from work.

9. Falsifying company records or making false statements or reports concerning company business, including false wage or benefit claims.

10. Sleeping, loafing, malingering, or unauthorized reading on the job.

11. Theft, concealment, or unauthorized possession of company property or that of another employee or others doing business with the company.

12. Fighting or threatened or actual violence against another employee or other persons doing business with the company, whether on or off the job; gambling, playing cards or other games, horseplay, or other disorderly conduct on the job.

13. Harassment of other employees or other persons doing business with the company, including but not limited to verbal and physical conduct or unwelcome advances with regard to or on the basis of sex, race, color, national origin or ancestry, citizenship, age, religion, marital status, status as a Vietnam era or disabled Veteran or disabled person, or union or non union status.

14. Engaging in non-job-related activities during working time.

15. Entering company property during off-duty hours without authorization.
16. Engaging in sexual acts or lewd behavior on company property.
17. Carrying or having firearms or other weapons on company property without written management authorization.
18. Unauthorized disclosure of confidential or proprietary information concerning company business, its customers, suppliers, employees or personnel associated with the company.
19. Unsatisfactory safety or work performance.
20. Unauthorized solicitation of vendors or contractors for non-company-sponsored events.

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# QUALITY ASSURANCE POLICY

The objective of the Kennecott Environmental and Industrial Hygiene Laboratory (KEIHL) is to provide analytical data that is accurate, reliable, and adequate for the intended purpose. The quality assurance program will be continuously maintained to ensure the production and documentation of quality data that is legally and scientifically defensible. Laboratory management and personnel will perform due diligence and strive to ensure that all tests and calibrations comply with International Standard 17025, NELAP regulatory methods, and client requirements. The data generated by KEIHL will be used to support the Data Quality Objectives (DQOs) and monitoring programs of Rio Tinto Kennecott Corporation (RTKC). Therefore, the primary objective of the QAPP is to ensure that all results generated by the laboratory are valid representations of the environmental material in the samples at the time of sampling. It is the policy of Kennecott Industrial Hygiene and Environmental Laboratory to ensure all personnel familiarize themselves with, and subsequently implement, the policies addressed in this Quality Assurance Program Plan (QAPP) and all associated Standard Operating Procedures (SOPs). To meet the QAPP objective, it is essential that the following secondary goals be met:

- Maintain accreditation and certification from the following organizations:
    1. American Industrial Hygiene Association (AIHA) ISO17025, Laboratory Accreditation program.


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2. State of Utah, Environmental Testing Certification performed under the Safe Drinking Water Act (SDWA), Clean Water Act (CWA), and the Resource Conservation and Recovery Act (RCRA)

- Participate regularly in Inter laboratory Performance Evaluation testing for the Environmental Protection Agency (EPA), and Proficiency Analytical Testing (PAT) performance evaluations.

- Evaluate regularly and continuously the quality of the measurement process performed in the laboratory using Schuart type quality control charts for both accuracy and precision of all analyses performed.

- Review the Quality Assurance Program Plan (QAPP) and Standard Operating Procedures (SOP) at least once per year. It may be necessary to update the QAPP and/or SOPs more often to ensure that KEIHL is current with the most recent methods available for Industrial Hygiene and environmental analyses.

- Maintain the integrity of accepted samples. Perform analysis within the deadlines required by project managers and Sampling Analysis Plans (SAP).

- Adhere to Good Laboratory Practice (GLP) recommendations found in the Code of Federal Regulation 40 (CFR) Part 160, Revision July 1, 1997.

- Determine the accuracy and precision of all methods by analyzing duplicates, blanks, matrix spikes and matrix spike duplicates.

- Provide and document training of personnel for laboratory operations.

- Analyze samples using accepted laboratory methods and protocols published by EPA, NIOSH, ASTM, Standard Methods, and Agronomy Society.

- Report KEIHL performance measures including QA objectives and performance samples to Kennecott management.

- Remain committed to implementing effective processes which promote continuous improvement to remain a sustainable service.



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- Maintain all data records for Environmental work for five years.
- Maintain all data records for Industrial Hygiene work for ten years.

| MOC# | Description of Change | Prepared By | Date |
|---|---|---|---|
| TS00020 | Revision and Review for 2004 | Janna Hardman | 09/30/2004 |
| TS00046 | 2005 Review and improvement for ISO17025 | Janna Hardman | 03/30/2005 |
| TS00085 | Review for 2006 | Melissa Olsen | 08/04/2006 |
| | Review for 2008. | Melissa Olsen | 10/10/2008 |
| | Review for 2009. No changes. | Melissa Olsen | 01/27/2009 |
| 11532 | Added statement regarding continuous improvement and the familiarization of all policies and procedures in the QAPP by laboratory personnel. Removed ELPAT. Updated laboratory address in header. | Melissa Olsen | 02/22/2010 |
| 17479 | Review for 2011. No changes. | Melissa Olsen | 06/15/2011 |
| 23199 | Review for 2013. No changes. | Melissa Olsen | 04/19/2013 |
| 26233 | Review for 2014. Changed KEIHL to KEIHL. Removed KUC logo and replaced with Rio Tinto. Updated branding. | Melissa Olsen | 04/21/2014 |
| | Review for 2015. No changes. | Melissa Olsen | 04/17/2015 |
| 31572 | Review for 2016. Removed all references to clinical laboratory certification. | Melissa Olsen | 03/08/2016 |
| 43586 | Review for 2017. Removed participation in USGS proficiency testing studies. | Melissa Olsen | 03/23/2017 |
| 53081 | Review for 2018. No changes made. | Melissa Olsen | 05/15/2018 |
| 58723 | Review for 2019. Removed DMRQA proficiency testing. | Melissa Olsen | 08/16/2019 |
| 60468 | Review for 2020. No changes made. | Melissa Olsen | 01/03/2020 |
| 67192 | Review for 2020. No changes made. | Melissa Olsen | 09/15/2020 |
| 79250 | Review for 2021. No changes made. | Melissa Olsen | 09/02/2021 |
| 94373 | Review for 2022. No changes made. | Melissa Olsen | 12/02/2022 |
| 102982 | Review for 2023. No changes made. | Melissa Olsen | 09/06/2023 |



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# ORGANIZATION AND RESPONSIBILITY

Kennecott Environmental and Industrial Hygiene Laboratory (KEIHL) continuously strives to implement an effective QA program in a laboratory that performs a broad scope of analytical services. This requires the commitment and attention of both management and staff. The organization chart for KEIHL is found in *Section 3 Appendix A, B, C, and D*. The QA/QC Officer coordinates the QA program. The Laboratory Director is responsible for the quality of data produced by the laboratory. The laboratory analysts assist both the QA/QC Officer and the Laboratory Director in daily operation of the QA program. Specific QA requirements and responsibilities of laboratory personnel are described in this section.

## Certified Laboratory

A certified laboratory must meet the criteria listed below with regards to the Laboratory Personnel.

- A certified laboratory must have a laboratory director who meets the qualification requirements. The laboratory director may also serve as the laboratory supervisor or the laboratory quality assurance officer.
- A certified laboratory must have a laboratory supervisor who meets the qualification requirements. The laboratory supervisor may also serve as the laboratory director.
- A certified laboratory must have a laboratory quality assurance officer who meets the qualification requirements. The laboratory quality assurance officer may also serve as the Laboratory Director.

- A certified laboratory must specify and document the responsibility, authority, and interrelation of all personnel who manage, perform, or verify work affecting the quality of testing.
- A certified laboratory must supervise its technical employees to assure quality test results.
- A certified laboratory must have job descriptions and describe the lines of responsibility for all key personnel and technical employees.
- A certified laboratory must maintain documentation of the qualifications of all key personnel.
- A certified laboratory must maintain a record of training for all key personnel and technical employees.

**Laboratory Director/ Laboratory Supervisor/Superintendent/Technical Manager**

The Laboratory Director is ultimately responsible for the quality of data produced by the laboratory. Accordingly, only the Laboratory Director has the authority to approve the release of analytical results and give final approval of analytical methods and SOPs. The Laboratory Director must meet one of the following qualification requirements.

- The Laboratory Director must have an earned doctoral degree in the medical, biological, chemical, or physical sciences from an institution of higher education, plus three years experience in a certified laboratory.
- The Laboratory Director must have a master's degree in biological, chemical, or physical sciences from an institution of higher education plus four years experience in a certified laboratory.
- The Laboratory Director must have a bachelor's degree in the biological, chemical, or physical sciences from an institution of higher education, plus six years work experience in a certified laboratory.



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- The Laboratory Director at KEIHL has the credentials found in NELAC Chapter 5.6.2.

The Laboratory Director at KEIHL is responsible to perform the following activities.

- The Laboratory Director at KEIHL defines the minimum qualifications, experience, and skill necessary for all technical employees.
- The Laboratory Director at KEIHL supervises the quality assurance officer and ensures the production and quality of all results reported by the laboratory.
- The Laboratory Director at KEIHL administers the use of accurate and current analytical methods and SOPs in the laboratory.
- The Laboratory Director is responsible for ensuring the effectiveness and integrity of the ISO17025 compliant quality management system.
- Ensures that all technical staff have documented capability in the activities for which they are responsible.
- The Laboratory Director at KEIHL maintains a work environment that emphasizes the importance of data quality.
- The Laboratory Director at KEIHL maintains a safe working environment for all personnel.
- The Laboratory Director at KEIHL provides management support to the QA Officer.
- The Laboratory Director at KEIHL ensures all analysts are trained to perform analytical methods with proper QA procedures.
- The Laboratory Director at KEIHL pursues and maintains external accreditation, licensing, and certification programs.
- The Laboratory Director at KEIHL participates in internal and external system audits.



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- The Laboratory Director at KEIHL participates in performance evaluation audits.

- The Laboratory Director at KEIHL reviews and approves data reports before release.

- The Laboratory Director at KEIHL assumes the responsibility if QA/QC Officer in the absence of the QA/QC Officer.

## QA/QC Officer

The QA/QC Officer is directly responsible for the ongoing implementation of the QA program. The QA/QC Officer must meet the requirements found in NELAC Chapter 5.4.2.

- The QA Officer at KEIHL must serve as the focal point for quality assurance and oversee and review quality control data.

- The QA Officer at KEIHL must have documented training or experience in quality assurance procedures and be knowledgeable in the quality assurance requirements.

- The QA Officer at KEIHL must have knowledge of the NELAC and AIHA requirements and approved methods the laboratory uses and verify the laboratory is following them.

- The QA Officer at KEIHL is responsible for maintaining and improving the ISO17025 compliant Quality Management System.

- The QA Officer at KEIHL cannot analyze samples as part of the *regular* certified analyses performed by the laboratory.

- The QA Officer at KEIHL must have access to the highest level of management at which decisions are taken on laboratory policy and resources.

- The QA Officer at KEIHL must objectively evaluate data and objectively perform assessments, independent of outside influence.



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- The QA Officer at KEIHL must oversee all aspects of sample handling, testing, and reporting.
- The QA Officer at KEIHL must be responsible for an annual review of the entire technical operation of the laboratory.
- The QA Officer must notify laboratory management of deficiencies in the quality system and monitor corrective action.

The QA/QC Officer has the authority to discontinue the use of analytical methods and SOPs and can delay the release of sample data until QA requirements are achieved and corrective action has taken place, if required. Additionally, the QA/QC Officer is responsible for performing the following activities.

- The QA/QC Officer ensures laboratory participation in external system audits.
- The QA/QC Officer ensures that internal performance and system audits are conducted and documented.
- The QA/QC Officer provides QA reports and internal and external systems audit reports to the Laboratory Director.
- The QA/QC Officer oversees all aspects of sample handling, testing, report collation and distribution to produce high quality results.
- The QA/QC Officer identifies corrective action procedures and monitors their implementation.
- The QA/QC Officer ensures that all analysts are trained to perform their QA procedures at the bench level.
- The QA/QC Officer ensures laboratory participation in accreditation, licensing, and certification programs.
- The QA/QC Officer maintains an archive of all QC data, analytical methods, QA reports, and SOPs.

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- The QA/QC Officer maintains stocks of certified reference materials for use as check standards.

- The QA/QC Officer reviews all data produced for adherence to QA program requirements.

- The QA/QC Officer maintains the QC databases.

- The QA/QC Officer reports results of statistical analyses of QC data to the Laboratory Director and laboratory staff.

- The QA/QC Officer conducts and documents internal performance audits and system audits.

The QA/QC Officer is responsible for reviewing the Certificates provided for the Groundwater Characterization Monitoring Program (GCMP). The GCMP is a specific program within Kennecott Utah Copper. The QA/QC Officer is responsible to perform the following activities:

- The QA/QC Officer monitors status of the samples in the GCMP program.

- The QA/QC Officer reviews the certificates of analysis to ensure the samples meet the DQO's established for the GCMP program.

- The QA/QC Officer produces a rerun sheet for those samples that do not meet DQO's for GCMP.

- The QA/QC Officer prints final Certificates for the GCMP samples and gives the final certificates to the Laboratory Director for review and approval.

**Laboratory Section Supervisors and Analysts**



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Each laboratory section Supervisor or analyst is responsible for ensuring that QC criteria are met for the type of analysis they perform. The laboratory Supervisors must meet one the following educational requirements:

- The laboratory Supervisors must have an earned doctoral degree in the medical, biological, chemical, or physical sciences from an institution of higher education, plus two years experience in a certified laboratory.
- The laboratory Supervisors must have a master's degree in biological, chemical, or physical sciences from an institution of higher education plus four years experience in a certified laboratory.
- The laboratory Supervisors must have a bachelor's degree in the biological, chemical, or physical sciences from an institution of higher education, plus six years work experience in a certified laboratory.
- The laboratory Supervisors must ensure competency annually for each technical employee. KEIHL requires analysts to analyze a blank sample and laboratory fortified blank with every analytical batch. In addition, analysts must participate in and pass one proficiency test annually. Proficiency testing documentation will be kept with the QA/QC Officer.

The analyst is responsible for following the QA program while achieving a productive, compliant, and cohesive work environment. Accordingly, the laboratory analysts are required to perform the following activities.

- The analyst follows approved analytical methods and SOPs.
- The analyst must demonstrate the ability to produce reliable results through accurate analysis of Certified Reference Materials, proficiency testing samples or in-house control samples. This demonstration must be done every 6 months for AIHA and annually for NELAC certification.
- The analyst maintains the integrity of the analysis by charting the accuracy and precision of the system controls on control charts to ensure the quality of the data.



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- The analyst reviews all QC and sample data to ensure that QC criteria are achieved.
- The analyst evaluates and documents performed corrective actions as needed.
- The analyst maintains logbooks for instrument maintenance, standards, run logs, and instrument specific electronic data.
- The analyst performs and participates in peer review and data entry.
- The analyst reports and documents corrective action via the QA/QC manager.
- The analyst prepares and documents traceable standards and certificates of analysis.

**Laboratory Technician**

Laboratory Technicians work under the direction of the Laboratory Analysts, QA/QC Manager, and Laboratory Director. Laboratory technicians perform the following activities.

- The technician must demonstrate ability to produce reliable results through accurate analysis of Certified Reference Materials, proficiency testing samples or in-house control samples. This competency must be demonstrated every 6 months for AIHA and annually for NELAC certification.
- A Laboratory Technician follows approved analytical methods and SOPs.
- A Laboratory Technician prepares samples for analysis.
- A Laboratory Technician performs analysis under the direction of the Laboratory Analyst.
- A Laboratory Technician participates in peer review.



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- A Laboratory Technician performs data entry.
- To ensure compliance with the annual competence for each technical employee, KEIHL requires the analyst to analyze a blank sample and laboratory fortified blank with every analytical batch. In addition, the analyst must participate in and pass one proficiency test annually. The proficiency documentation will be kept with the QA/QC Officer.

## Laboratory Training

Rio Tinto Kennecott Corporation (RTKC) encourages individual training for all employees. The trainers and contract personnel teach formalized training courses in computer skills, management, supervisory skills, emergency response, and MSHA/OSHA required instruction. In addition, the company mandates online training courses which are required annually for all employees. Also, the employee or the Laboratory Director may wish to attend additional training courses such as the following: instrument manufacturers training seminars, professional development courses, university courses, in-house courses and reviews, and courses taught by the State or Regulatory Agencies. Certificates of completion are kept in the individuals training file. The training file includes the training courses, method training records, instrument training records and performance evaluation records for each employee. Training records are updated as often as needed. (See Section 7 for training details.)

The Laboratory Director will complete an annual performance review with each employee. The review includes a personal interview and verbal or written comments



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on performance, goals and objectives. Performance reviews are part of the confidential Human Resource records and are not available for review by outside auditors.

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# Quality Assurance Program Plan

## Section 3 Organization and Responsibility



| MOC# | Description of Change | Prepared By | Date |
|---|---|---|---|
| TS00020 | Revision and Review for 2004 | Janna Hardman | 09/30/04 |
| TS00085 | Revision and Review for 2006 | Melissa Olsen | 08/02/06 |
| TS00113 | Updates to organizational charts. | Melissa Olsen | 04/13/07 |
| 9006 | Updates to organizational charts. | Melissa Olsen | 09/15/08 |
| | Updated laboratory training to include the mandatory online training courses. Updated organization charts. | Melissa Olsen | 01/21/09 |
| 11532 | Review for 2010. Updated organization charts. | Melissa Olsen | 02/22/2010 |
| 17479 | Review for 2011. Updated organization charts. | Melissa Olsen | 02/28/2011 |
| | Inserted statements regarding the commitment of Lab Director and QA officer to comply with the ISO17025 standard. | Melissa Olsen | 01/12/2011 |
| 23199 | Review for 2013. Updated organization charts. | Melissa Olsen | 04/23/2013 |
| 23227 | Updated organization charts. Removed Donna Smith . | Melissa Olsen | 07/15/2013 |
| 25673 | Updated org. charts. Designated a deputy for the Technical Manager in case of absence in Appendix D. Removed Hyun Ah Choi from Environmental Org. Chart. | Melissa Olsen | 12/07/2013<br>03/10/2014 |
| 26233 | Updated Appendix A (removed Mick Routledge)and Appendix D (changed from manager to superintendent, process laboratory). Updated branding. | Melissa Olsen | 04/22/2014 |
| 30091 | Updated Appendix A: removed Stephan Leblanc and replaced with Nigel Steward. Updated Appendix B: Removed JaDee Bodell and added Tamara May. Appendix C: Removed JaDee Bodell, added Adam Sharp as analyst. | Melissa Olsen | 04//17/2015 |
| | Updated Org. Charts: Removed Josh Mackay and replaced with Tiffany Robinson;removed JD Bodell and Xiaoli Wang; replaced Scott Bruce with Ian Billinglsey to reflect new reporting relationship | Melissa Olsen | 03/08/2016 |
| 43586 | Removed Nigel Steward and replaced with Marc Cameron, Removed Ian Billingsley and replaced with Andrew Miller | Melissa Olsen | 04/08/2017 |
| 53081 | Updated Org. Charts. Removed Andrew Miller and replaced with Bill Forsyth and Saskia Duyvesteyn. Added contractors: Dane Schofield and Keyana Watson. | Melissa Olsen | 05/15/2018 |
| 58723 | Updated org. charts. Added Andy Hadden, Malcolm Reeves, and Jack Swanson. Rev. 22 to 23 | Melissa Olsen | 08/15/2019 |
| N/A | No changes made. | Melissa Olsen | 01/03/2020 |
| 67192 | Updated Org. Charts. Removed Marc Cameron, Bill Forsyth and added Stephen Jones, Geraldine Lyons, Nadjla Borges. | Melissa Olsen | 09/15/2020 |
| 79250 | Updated Org. Charts. Removed Stephen Jones, replaced with Bhuvanesh Malhotra. Removed Jack Swanson as project contractor and added Chemist I, Arunjit Shergill. Updated Tiffany Robinson to Chemist II. Rev. 24 to 25. | Melissa Olsen | 07/13/2021 |
| 94373 | Updated Org. Charts. Removed Malcolm Reeves and added vacant Chemist II position. Rev. 25 to 26 | Melissa Olsen | 12/02/2022 |
| 102982 | Updated Org. Charts. Replaced Bhuvanesh Malhotra with Richard Hassall. Replaced Geraldine Lyons with Katie Robertson. Added Jake Fisher in vacant Chemist II position. Removed Cation/Anion sections from Lab org. chart.Rev. 26 to 27 | Melissa Olsen | 09/07/2023 |



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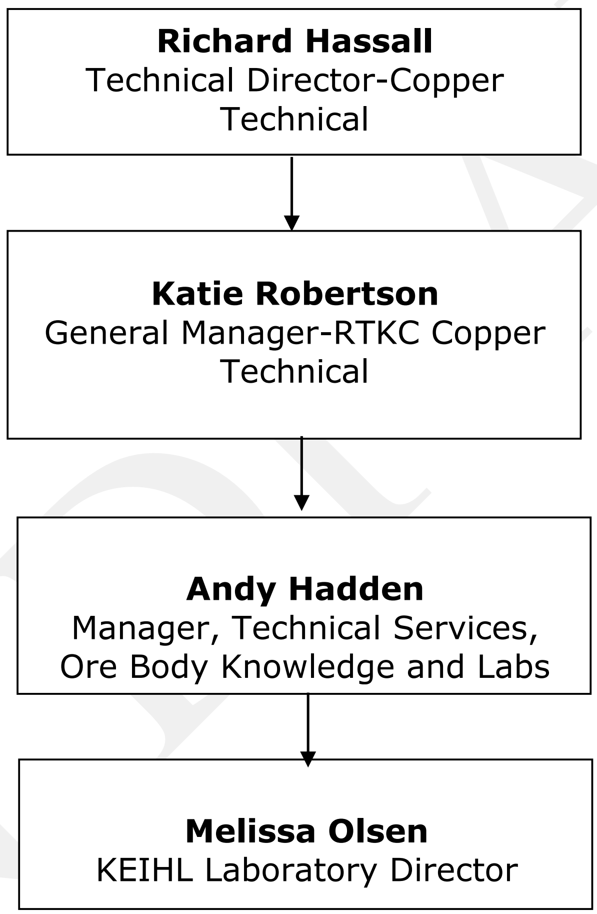
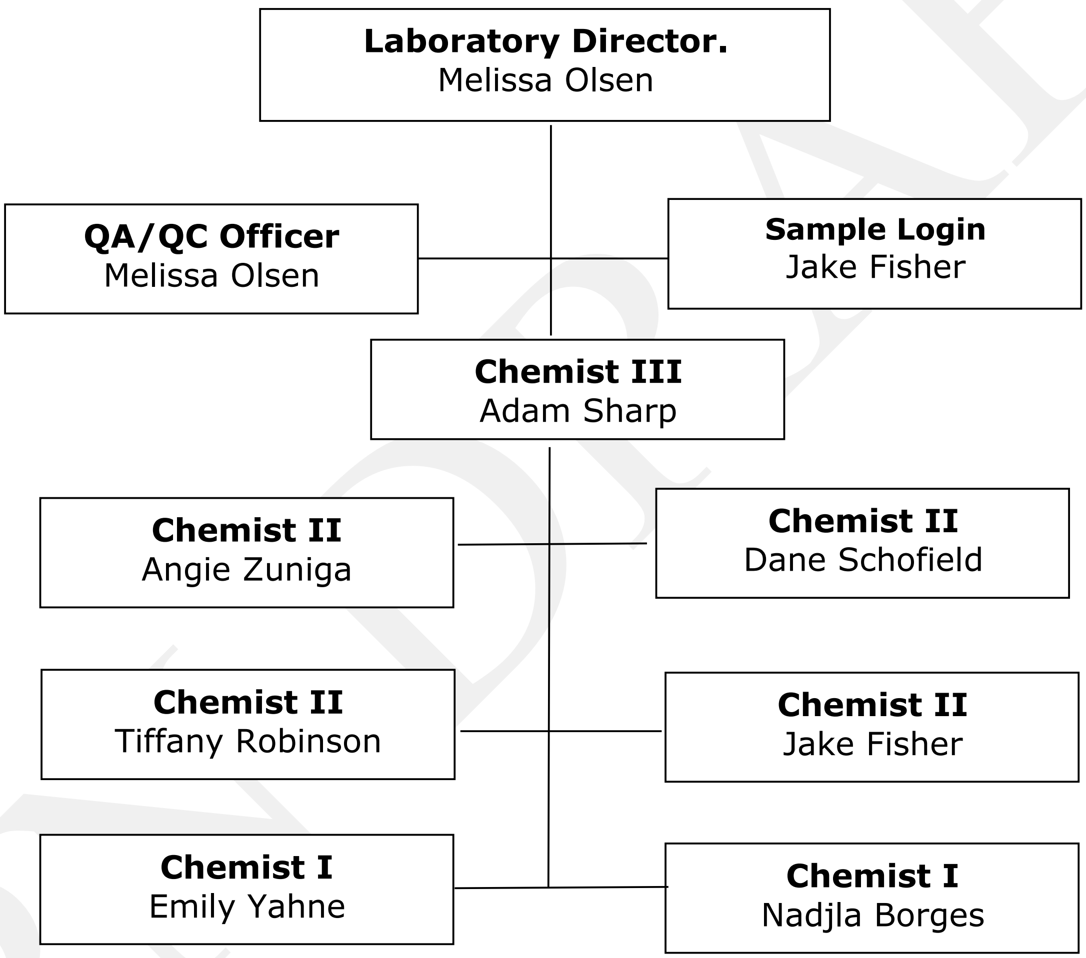
# Rio Tinto Copper Operations Organization Chart



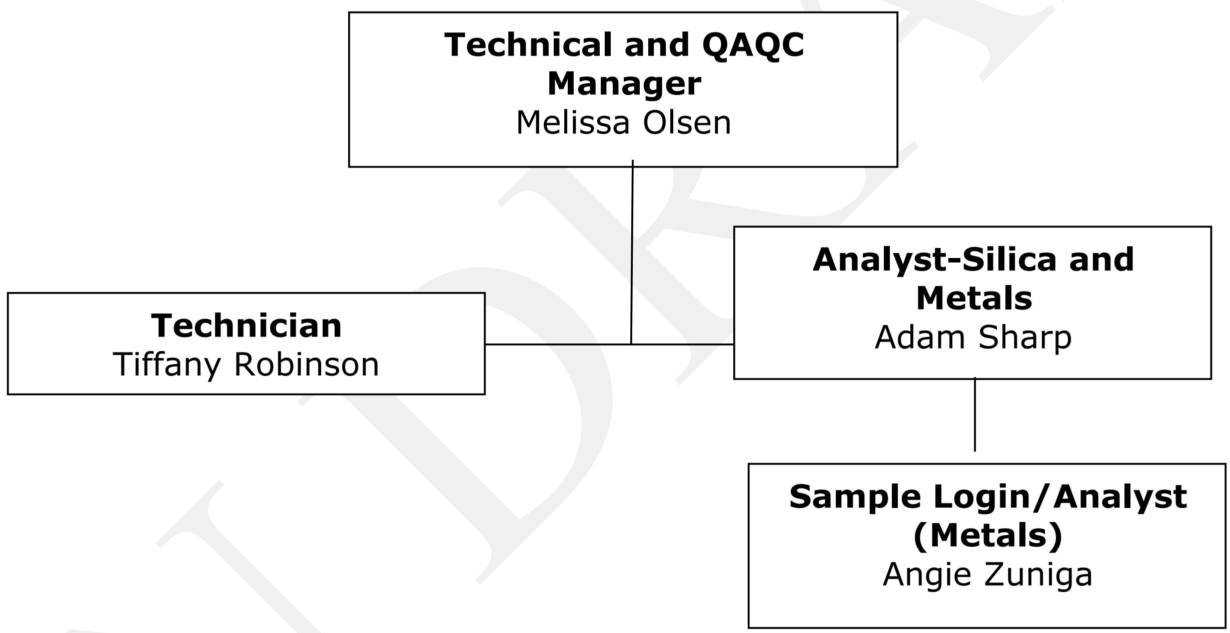

**Appendix A – Organizational Chart**

# Kennecott Environmental Laboratory Organization Chart




**Appendix B – KEIHL Environmental Organizational Chart**

# Kennecott Industrial Hygiene Laboratory Organization Chart




**Appendix C - KEIHL Industrial Hygiene Organizational Chart**

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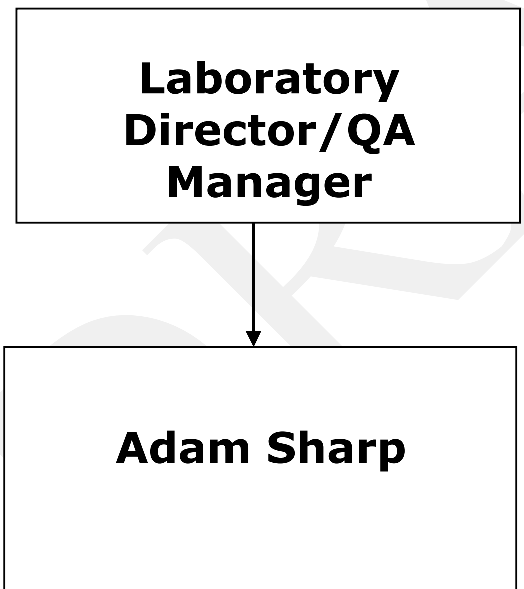
# KEIHL - Organizational Chart for Nominated Deputies in case of absence




**Appendix D – KEIHL in case of Absence**

## Laboratory Services

KEIHL'S activities encompass all processes from the review of vendors for external products and services to sample, equipment, supply, and data handling and reporting within the laboratory. The laboratory is ***not*** responsible for any sampling activities.

## Environmental Analytical Services

KEIHL's analytical services include the routine analysis of samples of groundwater, drinking water, surface water, soil, sludge, waste, and air (particulate). A complete list of methods used by KEIHL is found in Section 6 - Analytical Methods of this manual. KEIHL's standard operating procedures (SOPs) are dynamic and follow approved EPA methodology for analysis of the following:

- Metals by inductively coupled plasma/atomic emission spectroscopy (ICP/AES), ICP/mass spectrometry (ICP/MS) methods, and classical wet chemistry procedures.
- Anions by Ion Chromatography as well as continuous flow analysis methodology.
- Cyanide by colorimetric methods.
- Physical parameters by conventional techniques.
- Volumetric, Gravimetric, Titrimetric, Colorimetric, and X-ray Techniques.



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## Industrial Hygiene Analytical Services

KEIHL's analytical services for Industrial Hygiene samples include analysis for metals, silica, and gravimetric dust. KEIHL maintains Industrial Hygiene Standard Operating Procedures (SOPs) for all Industrial Hygiene methods, which include the following:

- Crystalline silica analysis performed according to the NIOSH Method 7500 by XRD (SOP number CLSOP4423-7009).
- Metals analysis performed according to the NIOSH Method 7300 by ICP-MS (SOP number CLSOP4423-7021.).
- Gravimetric analysis performed according to the NIOSH Method 0500 and NIOSH 0600 (SOP number CLSOP4423-7020)

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| MOC# | Description of Change | Prepared By | Date |
|---|---|---|---|
| TS00020 | Revision and Review for 2004 | Janna Hardman | 09/30/2004 |
| TS00085 | Review for 2006. | Melissa Olsen | 08/02/06 |
| | Review for 2008. No changes. | Melissa Olsen | 10/07/2008 |
| | Review for 2009. Updated Environmental Analytical Services section to reflect current methodologies. | Melissa Olsen | 01/21/09 |
| | Review for 2010. Updated laboratory address in header. | Melissa Olsen | 02/22/2010 |
| 17479 | Review for 2011. | Melissa Olsen | 06/28/2011 |
| 23199 | Review for 2013. No changes. | Melissa Olsen | 04/23/2013 |
| 25673 | Updated IH methods and SOP references | Melissa Olsen | 12/17/2013 |
| 26233 | Removed ion chromatography (IC) from under Environmental Analytical Services. Updated branding. | Melissa Olsen | 04/22/2014 |
| | Review for 2015. No changes. | Melissa Olsen | 04/17/2015 |
| 31572 | Review for 2016. No changes. | Melissa Olsen | 03/08/2016 |
| 43586 | Review for 2017. No changes. | Melissa Olsen | 02/07/2017 |
| 53081 | Review for 2018. No changes. | Melissa Olsen | 05/16/2018 |
| 58723 | Review for 2019. Removed NIOSH 0500 and 0600 from IH methods. Rev. 10 to 11. | Melissa Olsen | 08/16/2019 |
| 60468 | Added Laboratory Services section to describe the range of laboratory activities. Changed title from Analytical Services to Laboratory Services. Rev. 11 to 12. | Melissa Olsen | 12/13/2019 |
| 67192 | Added ion chromatography to analytical services | Melissa Olsen | 09/15/2020 |
| 79250 | Review for 2021. No changes made. | Melissa Olsen | 09/02/2021 |
| 94373 | Review for 2022. No changes made. | Melissa Olsen | 12/02/2022 |
| 102982 | Review for 2023. No changes made. | Melissa Olsen | 09/07/2023 |

# SAMPLE CUSTODY

Every sample or group of samples submitted to KEIHL must have a completed Analytical Request Sheet *(Section 5 Appendix A).* The Analytical Request Sheet is a standard form used to record sample description, collection date and time, number of bottles, analytical field data, and the requested analyses. The Analytical Request Sheet serves as the sample Chain of Custody (COC).

## Sampling Materials

KEIHL does not provide any sampling materials. Rio Tinto Kennecott Corporation (RTKC) has specific departments for Environmental Sampling and Industrial Hygiene sampling.

## Sample Clerk

The Sample Clerk reviews the Analytical Request Sheets and sample containers are inspected for the criteria listed below prior to samples being accepted by KEIHL.

- Proper chain-of-custody documentation.
  - Sample identification
  - Number of Bottles
  - Collection Date and time
- The sample bottles must include the following information:
  - Sample identification
  - Sample location, date, and time of collection
  - Collectors name
  - Preservative added
- Matrix

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- Adequate volume for the requested testing.
- Any special remarks concerning the samples.
- Condition and temperature of the samples and sample containers.
- Proper sample preservation is verified and documented in LIMS.
- Agreement between the Analytical Request Sheet and sample labels.
- A list of analyses ordered.
- Special instructions or precautions for handling.

## Sample Acceptance/Client Communication

If the criteria listed above are not met, the samples are unacceptable, and the sample-receiving clerk is responsible for initiating action. The sample receiving clerk contacts the individual who submitted the samples to complete the COC properly. The Laboratory Director can accept samples at their discretion, even though some information is still incomplete if it is noted on the COC, and the final report.

Once the Analysis Request Sheet has been completed appropriately, the sample receiving clerk is then responsible for performing the activities listed below.

- Sign and accept the sample.
- Each Chain of Custody Sheet is considered a Login Group. Each Login Group is assigned a unique number.
- The Sample Clerk assigns each sample, including duplicates, matrix spikes and laboratory control samples a unique laboratory number by logging the samples into the LIMS system.



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- The LIMS program prints barcode labels. The labels are attached to the appropriate corresponding sample containers. The barcode label number is explained below:

  *Example:* GA00001 (+Subcategory ID)

  The first two letters in the number indicates the year,
  i.e. FA= 2023 back to GA = 2022

  The following five numeric characters are the numbers of samples received for the year. In the above example the sample would be the first sample of the year.

1. Each individual sample container received at the laboratory is given a unique laboratory number. The unique laboratory identification number is documented on the chain of custody. The sample container subcategories are listed below.

   NUT1 = Nutrients non-preserved #1
   NUT2 = Nutrients non-preserved #2 (SO4)
   T1 = Total Metal preserved with HNO3 #1
   T2 = Total Metal preserved with HNO3 #2
   D = Dissolved Metal preserved with HNO3
   HG= Mercury preserved with HNO3
   NO3 = Nitrate preserved with H2SO4
   SO4 = Sulfate preserved with HCl
   CN = Cyanide preserved with NaOH
   COLI1 = Fecal Coliform
   COLI2 = Total Coliform
   TML = Total Metals Soil
   TCLP = TCLP Soil
   SPLP = SPLP Soil
   MISC1 = Misc #1
   MISC2 = Misc #2
   SPLIT = Split #1
   SPLIT = Split #2

- The laboratory numbers are generated by the LIMS system to ensure that no number can be repeated.



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- The laboratory identification number is recorded on the original Analytical Request Sheet.

- All samples which require thermal preservation are placed in a refrigerator that can maintain temperatures ± 4°C. Samples that are hand delivered to the laboratory immediately after collection may not meet these criteria. In these cases, the samples are considered acceptable if there is evidence that the chilling process has begun, such as arrival on ice.

- Samples are stored away from all standards, reagents, food and other potentially contaminating sources. Samples are stored in a manner to prevent cross contamination.

- All documentation, such as memos or transmittal forms, that may be brought to the laboratory by the sample transmitter are retained with the COC file.

## Subcontracting Samples

Kennecott Environmental and Industrial Hygiene Laboratory (KEIHL) does not subcontract industrial hygiene samples. If RTKC Industrial Hygiene Group requires testing that KEIHL does not provide, the Industrial Hygiene Group must submit their samples to another laboratory. This is handled independent of KEIHL.

## Sample Tracking

Samples are tracked through the laboratory by using the computerized Laboratory Information Management System or LIMS Progress Report. The progress report may contain the following information:

- Date samples are received.
- Date samples are logged into the LIMS system.
- Sample due date.
- Collection Date.
- The person to whom the results are reported.
- The laboratory sample numbers.



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- The sample matrix.
- The analytes requested.

The LIMS System is "**LABWORKS Desktop** for Windows", version 7.2.0.0, Build 7.2.0.135, serial number 91410206. The LIMS software operates on a P.C. based NT/SQL network, which includes an interface for analytical instrumentation. The LIMS program provides the means for assigning a unique sample identification number for samples. The unique sample identification number is then used for real-time scheduling, backlog management, accounting, sample tracking, quality assurance, audit trailing, reporting, archival data storage, data search, and data retrieval. Following analyst review, peer review, and the bench level quality control review, the analytical data is entered into LIMS either manually or imported directly from instrumentation data files. There are additional reviews including site history checks, ion balance checks, and total dissolved solids balance. The reporting of GCMP (Groundwater Characterization Monitoring Plan) samples typically involve comparability checks against historical data to identify trends and outlying data points. Once data is found compliant with agreed data quality objectives, analytical certificates are issued. Validation by the QA Manager and Laboratory Director is required prior to final reporting. Laboratory personnel can generate control charts. The QA/QC Officer can monitor data quality using LIMS and the SQL interface. LIMS database and the SQL interface are maintained by a designated in-house specialist or by contract help.



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Upon completion of analysis, the samples are returned to the designated storage place and archived for up to six months after the analytical results are released. After the archive time elapses, the QA/QC Officer arranges for proper disposal of the samples (refer to CLMAN4400-0006 Central Laboratory Waste Identification and Management).

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| MOC# | Description of Change | Prepared By | Date |
|---|---|---|---|
| TS00020 | Revision and Review for 2004 | Janna Hardman | 09/30/04 |
| TS00085 | Review for 2006 | Melissa Olsen | 08/03/06 |
| | Review for 2008. Updated Labworks information (version, build number and update). | Melissa Olsen | 10/07/08 |
| | Review for 2009. No changes. | Melissa Olsen | 01/21/09 |
| 11532 | Revision and review for 2010. Added Appendix B-Chain of Custody for Industrial Hygiene samples. Updated laboratory address in header. | Melissa Olsen | 02/22/10 |
| 17479 | Modified section on subcontracting samples. | Melissa Olsen | 08/29/11 |
| 23199 | Updated version of Labworks. | Melissa Olsen | 05/20/13 |
| 26233 | Review for 2014. Changed KEL to KEIHL. Updated branding. Added reference to CLMAN4400-0006 CL Waste Identification and Management. | Melissa Olsen | 04/23/14 |
| | Review for 2015. No changes. | Melissa Olsen | 04/17/2015 |
| 31572 | Review for 2016. No changes. | Melissa Olsen | 03/08/2016 |
| 43586 | Updated current Labworks version | Melissa Olsen | 02/07/2017 |
| 53081 | Review for 2018. No changes. | Melissa Olsen | 05/17/2018 |
| 58723 | Review for 2019. Updated Labworks version. Revision 16 to 17. | Melissa Olsen | 08/16/2019 |
| 60468 | Review for 2020. No changes. | Melissa Olsen | 12/13/2019 |
| 67192 | Review for 2020. No changes. | Melissa Olsen | 09/15/2020 |
| 79250 | Review for 2021. No changes. | Melissa Olsen | 09/03/2021 |
| 94373 | Updated Labworks version, build and serial number. Rev. 17 to 18 | Melissa Olsen | 12/02/2022 |
| 102982 | Updated Labworks version and build. Removed Perkin Elmer as the distributor of Labworks. Updated description for barcode label identification. Rev. 18 to 19 | Melissa Olsen | 09/08/2023 |



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## Appendix A - Chain of Custody/Analytical Request Sheet.

Log-in Group No.__________

KENNECOTT
ENVIRONMENTAL LABORATORY
9600 West 2100 South Magna, Utah 84044

**ANALYTICAL REQUEST SHEET**
**Sample Chain of Custody**

_____ - _____ - _____
Sheet Request No.
Lab Use Only

| # | Lab I.D. # (Lab Use Only) | Sample Description | Date Collected | Time Collected | Total # of Containers | Field Data | | | | | | Analyses Requested |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | |

**Sample Submitted by:** __________ **Telephone #** __________ **Fax #** __________
**Report Results to :** __________ **Telephone #** __________ **Fax #** __________

**Sampler:** __________ **Sampling Site:** __________ **Sampling Date:** __________ **Time:** __________
Surrendered By: __________ Received By: __________ Date/Time: __________
Surrendered By: __________ Received By: __________ Date/Time: __________
Surrendered By: __________ Received By: __________ Date/Time: __________
**Comments / Special Instructions:** __________

### Appendix B - Chain of Custody/Analytical Request Sheet for Industrial Hygiene Samples

**Kennecott Utah Copper**
*A member of the RIO TINTO Group*
**ENVIRONMENTAL LABORATORY**
**3325 So. 9200 W. Magna, Utah 84044**

Log-in Group No.__________

**ANALYTICAL REQUEST SHEET**
**Sample Chain of Custody**
**For Industrial Hygiene**

______ - ______ - ______
**Sheet Request No.**
**Lab Use Only**

| # | Lab I.D. # (Lab Use Only) | Sample Description | Date Collected | Time Collected | Field Data | | | Analyses Requested |
|---|---|---|---|---|---|---|---|---|
| | | | | | | Flow Rate | Time | |
| 1 | | | | | | | | |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| 4 | | | | | | | | |
| 5 | | | | | | | | |
| 6 | | | | | | | | |
| 7 | | | | | | | | |
| 8 | | | | | | | | |
| 9 | | | | | | | | |
| 10 | | | | | | | | |
| 11 | | | | | | | | |
| 12 | | | | | | | | |
| 13 | | | | | | | | |
| 14 | | | | | | | | |
| 15 | | | | | | | | |
| 16 | | | | | | | | |

**Sample Submitted by:** __________ **Telephone #** __________ **Fax #** __________
**Report Results to :** __________ **Telephone #** __________ **Fax #** __________

**Sampler:** __________ **Sampling Site:** __________ **Sampling Date:** __________ **Time:** __________

Surrendered By: __________ Received By: __________ Date/Time: __________
Surrendered By: __________ Received By: __________ Date/Time: __________
Surrendered By: __________ Received By: __________ Date/Time: __________

**Comments / Special Instructions:** __________

# ANALYTICAL METHODS

Analyses performed by KEIHL are designed to comply with regulatory guidelines and standards. Therefore, the laboratory analytical methods are predominantly based on those published by regulatory agencies. The methods used are those specified by federal agencies, state agencies, and professional organizations, as provided in the references listed below.

- "Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act.", 40 CFR Part 136
- Methods for Chemical Analysis of Water and Wastes, EPA-600/4-79-020 (revised March 1994).
- Methods for the Determination of Metals in Environmental Samples, EPA-600/4-91/010 (June) EPA 1989
- Test Methods for Evaluating Solid Waste (SW-846). Office of Solid Waste and Emergency Response. Office of Solid Waste and Emergency Response, EPA
- Standard Methods for the Examination of Water and Wastewater, 20th Edition, American Public Health Association, American Water Works Association, Water Pollution Control Federation Washington, D.C. (1998)
- Standard Methods for the Examination of Water and Wastewater, 22nd Edition, American Public Health Association, American Water Works Association, Water Environment Federation (2012)
- Official Methods of Analysis, 16th Edition, Association of Official Analytical Chemists Arlington, Virginia (1996)
- Annual Book of ASTM Standards, Volumes 11.01 and 11.02, 11.03 American Society for Testing and Materials (ASTM), Philadelphia Pennsylvania (1996)



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- Techniques of Water Resources Investigations of the USGS, Book 5, Laboratory Analysis, United States Geological Survey (USGS), Washington D.C. (1979)

- NIOSH Manual of Analytical Methods, NMAM Fourth Edition. National Institute for Occupational Safety and Health Division of Physical Sciences and Engineering, Cincinnati, Ohio (1994)

- OSHA Analytical Methods Manual, Second Edition August 1991, Occupational Safety and Health Administration (1991)

- Methods of Soil Analysis, Parts I and II. American Society of Agronomy, No. 9.

- Modified Sobek Method for Acid Base Accounting.

KEL analytical methods and analytical methodologies are listed in Section 6 Figure *1*.

1. Methods for the Chemical Analysis of Water and Wastewater U.S. Environmental Protection Agency (EPA), EPA-600/4-79-020, March.

2. Standard Methods for the Examination of Water and Wastewater, 20th Edition, 1998 and 22nd Edition, 2012

3. Test Methods for Evaluating Solid Waste U.S. Environmental Protection Agency, Office of Solid Waste and Emergency Response. SW-846 November 1986 Third Edition.

**Standard Operating Procedures**

Kennecott Environmental and Industrial Hygiene Laboratory have Standard Operating Procedures (SOP) for each analytical method. All SOPs for the laboratory are located in Bentley, a commercial online document control system. All SOPs are accessible for all personnel. The SOPs contains the following items:

1. Identification of the test method.
2. Applicable matrix.
3. Detection limit.
4. Scope and application.
5. Summary of the test method.
6. Definitions
7. Interferences.
8. Safety.
9. Equipment and Supplies.
10. Reagents and Standards.
11. Sample Collection, preservation, and storage.
12. Quality Control
13. Calibration and Standardization.
14. Procedure.
15. Calculations
16. Method Performance
17. Pollution Prevention.
18. Data Assessment and sample acceptance.
19. Corrective Action
20. Contingencies for handling out-of-control data.
21. Waste Management
22. Reference.

On the title page or in the header section of every SOP, the following items are found effective date, revision number, signatures of approval and page numbers. Prior to the implementation of a new method or SOP, or any other significant change in instrument type or personnel, a new demonstration of capability is completed. The demonstration of capability record is filed in the personnel training records.



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| Mei | Description of Change | Prepared By | Date |
|---|---|---|---|
| TS00020 | Revision  and Review for 2004 | Janna Hardman | 09/30/2004 |
| TS00045 | Updated the Method List | Janna Hardman | 03/21/2004 |
| TS00085 | Review for 2006 | Melissa Olsen | 08/04/2006 |
| 9006 | Revisions to analytical methods list to comply with 40 CFR 136 method updates. | Melissa Olsen | 09/16/2008 |
| | Review for 2009.  No changes. | Melissa Olsen | 01/27/2009 |
| | Review for 2010.  Updated laboratory address in header. | Melissa Olsen | 02/22/2010 |
| 17479 | Review for 2011. No changes. | Melissa Olsen | 10/11/2011 |
| | Review for 2012.  No changes. | Melissa Olsen | 10/01/2012 |
| 23199 | Review for 2013.  No changes. | Melissa Olsen | 04/19/2013 |
| 26233 | Removed kinetic testing using humidity cells and selenium hydride generation.  Updated branding. | Melissa Olsen | 04/24/2014 |
| 30091 | Added reference: Standard Methods $22^{nd}$ Edition (2012) | Melissa Olsen | 04/20/2015 |
| 31572 | Reviewed for 2016.  Added NIOSH 7300 and 7500 to analytical methods listed in Figure 1 | Melissa Olsen | 03/08/2016 |
| 43586 | Review for 2017. Removed Documentum and replaced with Bentley. | Melissa Olsen | 02/07/2017 |
| 53081 | Review for 2018. No changes made. | Melissa Olsen | 05/17/2018 |
| 58723 | Review for 2019.  No changes made. | Melissa Olsen | 08/16/2019 |
| 60468 | Review for 2020. No changes made. | Melissa Olsen | 1/3/2020 |
| 67192 | Review for 2020.  Added method 300.1 to list. 14.2 to 15 | Melissa Olsen | 09/15/2020 |
| 79250 | Review for 2021. No changes made. | Melissa Olsen | 09/03/2021 |
| 94373 | Review for 2022. Fixed minor grammatical errors. Rev. 14 to 15 | Melissa Olsen | 12/02/2022 |
| 102982 | Removed RFA anion methods in list of methods. Rev. 15 to 16. | Melissa Olsen | 11/03/2023 |

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## Section 6 Figure1 – KEIHL Analytical Methods

| Method # | Method Description |
|---|---|
| 120.1 | EPA - Conductivity |
| 200.2 | EPA - Water Preparation |
| 200.7 | EPA - Metal by Inductively Coupled Plasma (ICP) |
| 200.8 | EPA - Metals by Inductively Coupled Plasma Mass Spectroscopy (ICPMS) |
| 245.2 (1974) | EPA - Mercury by Cold Vapor |
| 300.1 | EPA-Analysis of Ions by Chromatography |
| 310.1 | EPA - Alkalinity |
| 335.4 (1993) | EPA – Cyanide, Total |
| 350.1 (1993) | EPA – Ammonia |
| 1311 | SW-846 – TCLP |
| 1312 | SW-846 - SPLP |
| 2310 B | Standard Methods– Acidity |
| 2320 B | Standard Methods - Alkalinity (Titration) |
| 2340 B | Standard Methods – Hardness by Calculation |
| 2540 C | Standard Methods-Total Dissolved Solids |
| 2540 D | Standard Methods-Total Suspended Solids |
| 3005A | Acid Digestion of Waters for Total Recoverable or Dissolved Metals for Analysis by FLAA or ICP. |
| 3010A | Acid Digestion of Aqueous Samples and Extracts for Total Metals for Analysis by FLAA or ICP. |
| 3050B | Acid Digestions of Sediments, Sludge, and Soils. |
| 4500 (Cn) E | Standard Methods-Cyanide |
| 4500 (H+) | Standard Methods-pH (Electrometric) |

## Section 6 Figure1 – KEL Analytical Methods

## KEL Analytical Methods (continued)



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| Method # | Method Description |
|---|---|
| 6010 B | SW-846 – Metals by Inductively Coupled Plasma (ICP) |
| 6020 | SW-846 – Metals by Inductively Coupled Plasma Mass Spectroscopy (ICPMS) |
| 7471 A | SW-846 – Mercury analysis in soils |
| 9012 A | SW-846 Total and Amenable Cyanide |
| 9040 B | SW-846 – pH meter |
| 9045 C | SW-846 – pH in soils |
| 9050 B | SW-846 – Conductivity |
| Modified NIOSH 7500 | Industrial Hygiene Respirable Silica |
| Modified NIOSH 7300 | Industrial Hygiene Respirable Metals |

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# QUALITY CONTROL SYSTEMS

KEIHL employs several types of essential quality control procedures to achieve high-quality data. The quality control procedures are discussed in this section of the QAPP.

*Industrial Hygiene methods certified under ISO17025 utilize different terminology and require different frequencies relative to quality control. For Industrial Hygiene methods, please refer to the following standard operating procedures for specific quality control requirements: CLSOP 4423-7009, CLSOP4423-7021, and CLSOP4423-7020).*

## Training

Training is essential for a Laboratory to produce quality data. KEIHL employs several techniques. When a new analyst is hired, the new analyst must first read the QAPP. This informs the new hire of the type of quality they are to produce and the code of ethics they are required to meet. When a new assignment is made to the analyst, the analyst must complete training from the section supervisor and a checklist must be completed.

1. Read and understand the QAPP.
2. Read and understand the methods and the SOP's.
3. Learn the software and the hardware of the system.
4. Perform an analytical run using a sample batch which includes a QC set with an original, duplicate, matrix spike, matrix spike duplicate, blank and a blank spike under the supervision of the section supervisor or QA Manager
5. Where possible, use a reference sample with the batch.



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This training checklist is documented and kept in the analyst training record. Only analysts who have completed training are authorized to independently operate and use equipment. Ongoing demonstrations of capability for each analyst are performed annually for NELAC (National Environmental Laboratory Accreditation Certification) and semi-annually for AIHA (American Industrial Hygiene Association). Several types of studies may be used to demonstrate ongoing capability: 1) A quality control sample can be obtained from an outside source. (This may include a performance evaluation study or a reference sample). 2) The analyte may be diluted in clean matrix sufficient to prepare four aliquots at the concentration specified or to a concentration approximately 10 times the method stated, or laboratory calculated MDL. 3) At least four aliquots shall be prepared and analyzed according to the test method either concurrently or over a period of days.
If the analyst chooses to perform number 2 or 3, the results of all the data are calculated for the mean recovery, and the standard deviation for the n-1 population. The information is then compared to the laboratory generated acceptance criteria for precision and accuracy. If the parameter meets the acceptance criteria, the analysis of actual samples may begin. If any one of the parameters does not meet the criteria, the performance is deemed unacceptable for that parameter. The analyst must then locate and correct the problem and repeat the test for the parameters that fail to meet the criteria.



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## Performance Evaluation (PE) Testing

KEIHL participates in 9 different PE events annually. Depending on the PE study these tests may be annual, bi-annual, tri-annual, quarterly or six times annually. KEIHL follows the proficiency testing provider's instruction for preparing the proficiency-testing sample and analyzes the PE sample in the same manner as a client sample. KEIHL uses certified reference materials in conjunction with the PE studies to detect any flagrant deviations from the analytical run. KEIHL may use a different method for a given sample (if needed) to capture the higher concentration analytes so that they are within the instrument calibration range. KEIHL may retain these samples for one year and use them later for monitoring methods, training new employees, and for demonstration of capability studies. KEIHL directs the PE provider to send result of each PE study results to the State of Utah. KEIHL maintains a copy of all PE testing records. If the laboratory fails a proficiency-testing audit, they must initiate a corrective action plan.

## Laboratory Operations: Quality Control

KEIHL follows the Quality Control requirements of the methods. If there are no Quality Control limits described in the method, the analyst must meet quality control requirements specific to accuracy, precision, interference, contamination, selectivity, and sensitivity.



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## Chemical Testing

When performing chemical testing, KEIHL uses both negative and positive controls to obtain high-quality data.

## All Blanks/Negative controls

Negative controls include the use of Method Blanks. These are performed at a frequency of one per preparation batch per matrix, usually 1 in 20 samples. The result of the Method Blank analysis is used to assess possible contamination of the batch. If contamination is found, then the source must be investigated and measures taken to correct, minimize, or eliminate the problem. There are two Method Blank criteria which trigger action: 1.) If the blank contamination exceeds the concentration of greater than 1/10 of the measured concentration of any sample in the associated sample batch. 2.) The blank contamination exceeds the concentration present in the samples and is greater than 1/10 the specified regulatory limit. Any sample associated with the contaminated blank shall be reprocessed for analysis.

Additional types of blank samples routinely analyzed by KEIHL include the following: field, equipment, trip, instrument, and method blanks. Field, equipment, and trip blanks are analyzed as part of the field QC program as set forth in the Groundwater Characterization Monitoring Program (GCMP) or other appropriate documents. Instrument blanks are included in calibration curves and are evaluated before beginning sample analysis.



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## Accuracy and Precision/Positive controls

1.) Laboratory Control Samples (LCS) are prepared and analyzed at a frequency of one per preparation batch or 1/20 per matrix, unless the method specifies a more stringent frequency. (Analytes that are exempt from this requirement are total volatile solids, pH, color, odor, temperature, dissolved oxygen, and turbidity.) The LCS is used to determine the acceptance of the preparation batch. KEIHL's performance is charted on control charts.

2.) Matrix Spikes are analyzed at a frequency of one per preparation batch of 20 samples for each matrix type, unless the method specifies a more stringent frequency. (Except for analytes for which spiking solutions are not available, such as total volatile solids, pH, color, odor, temperature, dissolved oxygen, and turbidity.) Matrix spikes are selected at random. Poor performance in a matrix spike sample may indicate a problem with the sample composition and shall be reported to the client whose sample was used for the spike.

3.) Surrogates (Internal Standards) - Surrogate compounds are added to all samples, standard, and blanks for all mass spectroscopy and certain ICP methods. Poor surrogate recovery may indicate a problem with the sample composition or instrument fluctuation. The samples are reanalyzed if the surrogate recovery drops more than 20 percent of the known value for possible problems with the instrument. If the recovery drops a second time, the poor recovery is reported to the client.



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4.) Interference is determined by evaluating a matrix spike sample. Matrix spike and matrix spike duplicate samples are labeled as Spike 1 and Spike 2. Matrix spikes are analyzed at a frequency of one matrix spike every 10 samples for water samples and one matrix spike every 20 samples for soils. A matrix spike sample set is created in the laboratory by collecting two aliquots from a homogenized sample. One aliquot is not spiked and the remaining aliquot is spiked with a known concentration of standard reference material. Both aliquots are then processed through the entire analytical system, including sample preparation. Matrix spike results are reported by computing the percent recovery. The percent recovery is computed by using *Equation 1*.

**Equation 1** **% Recovery =** $\{(A - B)/ C\} \times 100$

**A** = Spiked Sample Result
**B** = Sample Result
**C** = Spike Value

KEIHL's acceptable limits for matrix spike samples are ± 25% for water, and ± 35% for soils. These limits were agreed to by the Utah State Department of Environmental Quality under the Consent Agreement Kennecott Utah Copper has for the Ground Water Characterization Monitoring Plan (GCMP). References are available.

## Analytical Variability/ Reproducibility

Unless the method requires a more stringent frequency, Matrix Spike Duplicates and Laboratory Duplicates are analyzed at a minimum of 1 in 20 samples per matrix type, sample extraction or preparation method. Samples are selected at random. Poor performance in duplicates may indicate a problem with the sample composition and shall be reported to the client whose sample was used for the duplicate. The analytical results are reported by computing the Relative Percent Difference (RPD) using

*Equation 2*.

**Equation 2** $$\%\ RPD = \{(A - B)/[(A+B)/2]\} \times 100$$

**A** = Spiked Sample Result
**B** = Sample Result

The RPD's are evaluated and compared to method specific acceptance criteria for a given matrix. RPD results provide an estimation of the precision for a given sample matrix. The relative percent difference must fall within ± 25% or the sample batch is reanalyzed. The results of these samples are captured in a web-based report and are reviewed monthly.

**Method Evaluation**

To ensure the accuracy of the reported result, the following procedures are in place:

1. Demonstration of Capability is performed initially and following significant change in instrument type, personnel, and sample matrix or test method.
2. Calibration protocols are specified in the calibration section of this QAPP.
3. Participation in performance evaluation to evaluate the ability to produce accurate data.



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## Detection Limits

KEIHL performs MDL studies at least annually on all methods it performs by following the guidelines in 40 CFR, Part 140, and Appendix B. Refer to KEIHL SOP CLSOP4423-1013 for the process. An MDL study may be performed more frequently if significant changes occur, such as a change in location of the laboratory, a new technical employee, a new instrument, or a new technique.

## Standard/Reagent and Reference Standard Preparation

A critical element of producing quality data is the purity, quality and traceability of the standard solutions and reagents used in the laboratory. To ensure the highest possible purity, all primary calibration standards, reference standards and standard solutions must be purchased from suppliers in conformance with ISO Guide 34 requirements. These types of standards are logged into the appropriate Standards and Reagent Log upon arrival at KEIHL. A logbook for this purpose is maintained in each lab section. The analyst preparing the standard gives the standard a unique identification number and documents the vendor, lot number, concentration, open/preparation date, preparer's initials, method of preparation, and expiration date. The standard's Certificate of Analysis is kept on file with the standard number, date received, and initials of the analyst. The Certificate of Analysis file is maintained by the analyst and/or the QA/QC Officer. These logbooks and Certificates of Analysis provide the traceability of the standards from the time the standard arrives at KEIHL to the time it is used for an analytical purpose. The standard log number is also recorded on the raw data for traceability.



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A second source standard must be used at a minimum of every three months. However, most analysts analyze the second source after the daily calibration to verify the calibration curve. The second source standard is prepared at a different time and is obtained from a different source or different lot number. This verification is used to evaluate the calibration and the vendor's product. Stock standards and working standards are checked regularly for signs of deterioration, such as discoloration, formation of precipitates, or change in concentration. Care is exercised in the proper storage and handling of standard solutions. Standards are not stored with samples. Working standard reagent containers are clearly labeled with the following information: Standard number, description, preparation date, concentration, expiration date, preparer's initials, and special safety precautions or SDS (Safety Data Sheets) information.

The quality of the laboratory's reagent water source is continuously monitored through the analysis of blanks. The water must meet the method specified requirements.

## Constant and Consistent Test Conditions

KEIHL maintains a temperature-controlled environment to assure that the test instruments consistently operate within the specification required for the application for which the instruments are used.

Glassware is cleaned to meet the sensitivity requirements of the test methods. All cleaning and storage procedures that are not specified by the test method are documented in the laboratory records and SOPs.



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| MOC | Description of Change | Prepared By | Date |
|---|---|---|---|
| TS00020 | Revision and Review for 2004 | Janna Hardman | 09/30/04 |
| TS00085 | Revision and Review for 2006 | Melissa Olsen | 08/03/06 |
| | Review for 2008. No changes. | Melissa Olsen | 10/07/08 |
| | Review for 2009. No changes. | Melissa Olsen | 01/21/09 |
| | Review for 2010. Updated laboratory address in header. | Melissa Olsen | 02/22/2010 |
| 17479 | Updated section on Performance Evaluations. Updated the frequencies stated under the Accuracy and Precision section #4. | Melissa Olsen | 08/29/2011 |
| 23199 | Review for 2013. No changes. | Melissa Olsen | 04/23/2013 |
| 25673 | Under standard/reagent and reference standard preparation, added the requirement that all suppliers must conform to ISO Guide 34 requirements. Added statement regarding Industrial Hygiene methods and QC requirements. | Melissa Olsen | 02/04/2013 |
| 26233 | Expanded on statement regarding ongoing demonstration of capability to state the requirements of AIHA (2 DOC/year) and NELAC (annually). Updated branding. | Melissa Olsen | 04/24/2014 |
| 30091 | Changed frequency of analysis of laboratory reagent water from "daily" to "monitored through the analysis of blanks". | Melissa Olsen | 04/20/2015 |
| 31572 | Review for 2016. No changes. | Melissa Olsen | 03/08/2016 |
| 43586 | Review for 2017. No changes. | Melissa Olsen | 02/07/2017 |
| 53081 | Review for 2018. No changes. | Melissa Olsen | 06/19/2018 |
| 58723 | Review for 2019. No changes. | Melissa Olsen | 08/16/2019 |
| 60468 | Review for 2020. No changes. | Melissa Olsen | 01/03/2020 |
| 67192 | Updated number of PT studies to 9. | Melissa Olsen | 09/15/2020 |
| 79250 | Added comment "Unless the method specifies a more stringent frequency" to Accuracy and Precision #1 LCS, #2 Matrix Spikes and under Analytical Variability and Reproducibility. Rev. 12 to 13. | Melissa Olsen | 09/03/2021 |
| 94373 | Review for 2022. Fixed minor grammatical errors. Rev. 13 to 14 | Melissa Olsen | 12/02/2022 |
| 102982 | Review for 2023. No changes. | Melissa Olsen | 11-03-2023 |



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# CALIBRATION

Calibration requirements are divided into two parts: (1) requirements for analytical support equipment and (2) requirements for instrument calibration.

## Support Equipment

These devices are not the actual test instruments but include auxiliary equipment necessary to support laboratory operations. This equipment requires calibration documentation indicating they were calibrated by an organization accredited under ISO/IEC 17025 and therefore, in conformance with the necessary requirements. These include, but are not limited to, the following: balances, ovens, refrigerators, incubators, thermometers, volumetric dispensing devices, such as Eppendorfs, or automatic diluters. KEIHL maintains records of repairs and maintenance activity. All raw data records are maintained to document equipment performance. Results of the calibrations must be within the specifications required for the application for which the equipment is used. Prior to use, balances, ovens, and refrigerators are checked for expected temperature range with NIST traceable references. Mechanical volumetric dispensing devices are checked for accuracy quarterly.



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Weights and Balance Calibration

A contractor performs all necessary preventative maintenance and calibrates balances every six months and weights annually. The Class S weights are calibrated annually and checked against NIST traceable weights for accuracy. The contractor issues a certificate of calibration for both the weights and the balances that states the variability of the balances. Documented weight verification is performed each time the balance is used by the analyst. The analyst performs verification by placing one of the Class S weights on the balance and recording the result in the balance calibration book. The analyst should select a Class S weight in the weight range of the sample or reagent to be weighed.

Thermometer Calibration

Thermometer calibration is performed on all glass mercury thermometers annually. This is accomplished by using an NIST traceable thermometer. The NIST traceable thermometer is placed beside the glass mercury thermometer and allowed to equilibrate for one hour. The respective temperatures are recorded. If there are discrepancies between the NIST traceable thermometer and the glass mercury thermometer, it is noted on the label which is attached to the thermometer. Alternatively, thermometers can be sent out for calibration to an approved ISO17025 certified calibration service provider.



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Mechanical Pipette Calibration Verification

A calibration verification is performed on KEL's mechanical pipettes quarterly. The calibration verification is performed using "Pipette Tracker" software. Each pipette has a unique number. The unique number may be the pipette serial number or an assigned laboratory ID number. The unique number is engraved or labeled on the pipette. The non-adjustable pipettes are calibrated using a ± 2% criteria for precision and accuracy. The calibration verification acceptance range uses a ± 5% for precision and accuracy at the lowest adjustable reading and a ± 2% for precision and accuracy for every actual volume a minimum of three concentrations are verified for calibration. When the calibration verification has been completed, a Certificate of Calibration is printed and kept in the Pipette Calibration Book in the QA/QC Manager's Office.

## Instrument Calibration

Instrument calibrations are divided into two parts: Initial Calibration and Continuing Instrument Calibration Verification.

Initial Calibration

Instrument calibration procedures are intended to ensure that analytical systems are operating correctly and have adequate sensitivity and accuracy to meet method requirements. The details of the initial instrument calibration procedures are included or referenced in the SOP. The manufacturer specifies general instrument calibration procedures. Method specific procedures are given in the appropriate analytical method. Instruments are calibrated daily and/or each time they are prepared to run samples. Each instrument is calibrated with standards appropriate to the designated function of the instrument, type of analysis, and the established operating range of the analytical methods. Calibration is always performed prior to analysis. Sample results must be calculated from the initial instrument calibration and may not be calculated from any continuing instrument calibration verification. The lowest calibration standard must be above the detection limit. Calibration standards must include concentrations at or below the regulatory limit or decision level, unless these concentrations are below the demonstrated detection limits determined by the laboratory. Sufficient raw data records must be retained to permit reconstruction of the initial instrument calibration, e.g., calibration date, test method, instrument, analysis date, each analyte name, initials of analyst or signature, concentration and response, calibration curve or response factor. The analyst analyzes a second source after the daily calibration to verify the calibration curve. The second source standard is prepared at a different time and obtained from a different source or different lot number. The second source verification is used to evaluate the calibration and the vendor's product.

The calibration standards must have a correlation coefficient (also referred to as $r^2$) of 0.995 or better and blanks must meet the method specific criteria for acceptance, or the analysis is terminated, and all samples analyzed after the last acceptable calibration are reanalyzed. If the result of an analysis is higher than the highest point on the calibration, the sample is diluted until the result falls within the calibration range. If results are lower than the lowest point on the calibration, which goes through zero, the results are reported Below Reporting Limit (RL).

Continuing Instrument Calibration Verification

The details of the continuing instrument calibration procedure, calculations and associated statistics must be included or referenced in the SOP. A continuing instrument calibration verification must be repeated at the beginning, every ten samples and at the end of every analytical run. For the photometric determination of anions, the continuing instrument calibration standards are analyzed every 15 samples, including 9 daily samples and 6 quality control samples. The concentration of the calibration verification shall be varied within the established calibration range. Sufficient raw data records must be retained to permit reconstruction of the initial instrument calibration, e.g., calibration date, test method, instrument, analysis date, each analyte name, initials of analyst or signature, concentration and response, calibration curve or response factor. The criteria for acceptance of continuing instrument calibration verification is established as ± 10% of the known concentration. If the continuing instrument calibration verification results obtained are outside the established acceptance criteria, corrective actions must be performed. If routine corrective action



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procedures fail to produce second consecutive calibration verification within the acceptance criteria, then either the laboratory must demonstrate performance after corrective action with two consecutive successful calibration verifications or a new initial instrument calibration must be performed.

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| MOC | Description of Change | Prepared By | Date |
|---|---|---|---|
| TS0020 | Review for 2004 | Janna Hardman | 09/30/2004 |
| TS00085 | Review for 2006 | Melissa Olsen | 08/03/2006 |
| TS00113 | Added statement indicating the frequency of continuing calibration verification checks for the photometric determination of anions every 15 samples. | Melissa Olsen | 04/13/2007 |
| | Review for 2008. Minor grammatical changes made. | Melissa Olsen | 10/07/2008 |
| | Review for 2009. No changes. | Melissa Olsen | 01/21/2009 |
| 11532 | Revision and review for 2010. Removed water bath from support equipment. | Melissa Olsen | 02/22/2010 |
| 17479 | Added frequency of thermometer calibration. | Melissa Olsen | 08/29/2011 |
| 23199 | 2013 review. No changes. | Melissa Olsen | 04/24/2013 |
| 25673 | Added statement to thermometer calibration regarding sending thermometers to an ISO17025 certified service provider.<br>Added statement under support equipment regarding the requirement to meet ISO/IEC 17025 standards. | Melissa Olsen | 12/17/2013 and 01/30/2014 |
| 26233 | Updated branding. | Melissa Olsen | 05/22/2014 |
| 30091 | Review for 2015. No changes. | Melissa Olsen | 04/20/2015 |
| 31572 | Review for 2016. No changes. | Melissa Olsen | 03/08/2016 |
| 43586 | Review for 2017. No changes. | Melissa Olsen | 03/24/2017 |
| 53081 | Review for 2018. No changes. | Melissa Olsen | 06/19/2018 |
| 58723 | Review for 2019. No changes. | Melissa Olsen | 08/16/2019 |
| 60468 | Review for 2020. No changes. | Melissa Olsen | 01/03/2020 |
| 67192 | Review for 2020. No changes. | Melissa Olsen | 09/16/2020 |
| 79250 | Review for 2021. No changes. | Melissa Olsen | 09/03/2021 |
| 94373 | Review for 2022. No changes. | Melissa Olsen | 12/02/2022 |
| 102982 | Review for 2023. No changes. | Melissa Olsen | 11/02/2023 |



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# PREVENTIVE MAINTENANCE

Preventive maintenance of analytical instrumentation and other traditional equipment is routinely performed on an as needed or on a recommended basis and documented in the instrument maintenance logbooks. One important aspect of the instrument maintenance program is service contracts which cover most of the analytical instrumentation utilized at Kennecott Environmental and Industrial Laboratory (KEIHL). Preventive maintenance procedures specified by the instrument manufacturer or the QA program are included in the method/SOPs relating to the instrument. Instruments requiring service from an authorized service engineer are removed from service until the repair or maintenance is completed. Authorized maintenance personnel service other pieces of equipment such as the balances on a semi-annual basis. Service call maintenance is documented and service records are kept on file. Internal system audits monitor preventive maintenance. Annual systems audits are designed to address any long-standing or recurring problems with the instrumentation and engineering controls.

Records are maintained for each major piece of equipment and all reference materials significant to the test performed. The records shall include the following information:

1. The name of the item of equipment.



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2. The manufacturer's name, type identification, and serial number or unique identifier.
3. Date received and date placed in service.
4. Current location when appropriate.
5. Condition received.
6. Copy of the manufacturer's instructions
7. Details of the maintenance carried out to date.
8. History of any damage, malfunction, modification or repair.

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| MOC# | Description of Change | Prepared By | Date |
|---|---|---|---|
| TS00020 | Review for 2004 | Janna Hardman | 09/30/2004 |
| TS00085 | Review for 2006. | Melissa Olsen | 08/03/2006 |
| | Review for 2008. No changes made. | Melissa Olsen | 10/07/2008 |
| | Review for 2009. No changes made. | Melissa Olsen | 01/21/2009 |
| | Review for 2010. Updated laboratory address in header. | Melissa Olsen | 02/22/2010 |
| 17479 | Review for 2011. No changes. | Melissa Olsen | 08/30/2011 |
| 23199 | Review for 2013. No changes. | Melissa Olsen | 04/24/2013 |
| 26233 | Updated branding. | Melissa Olsen | 06/02/2014 |
| 30091 | Review for 2015. No changes. | Melissa Olsen | 04/20/2015 |
| 31572 | Review for 2016. No changes. | Melissa Olsen | 03/08/2016 |
| 43586 | Review for 2017. No changes. | Melissa Olsen | 03/24/2017 |
| 53081 | Review for 2018. No changes. | Melissa Olsen | 06/19/2018 |
| 58723 | Review for 2019. No changes. | Melissa Olsen | 08/16/2019 |
| 60468 | Review for 2020. No changes. | Melissa Olsen | 01/03/2020 |
| 67192 | Review for 2020. No changes. | Melissa Olsen | 09/17/2020 |
| 79250 | Review for 2021. No changes. | Melissa Olsen | 09/03/2021 |
| 94373 | Review for 2022. No changes. | Melissa Olsen | 12/02/2022 |
| 102982 | Review for 2023. No changes. | Melissa Olsen | 11/02/2023 |

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# DATA QUALITY ASSESSMENT

The Data Quality Assessment section of the QAPP describes the techniques that are used to assess the precision, accuracy, completeness, and comparability of all data generated under the Quality Assurance Program.

## Precision

Precision is defined as the measure of mutual agreement among individual measurements of the same property, usually under similarly prescribed conditions. Precision is best expressed in terms of relative percent difference. The Precision is determined by performing duplicate analyses of a certified reference material or laboratory control sample and graphing the data on a control chart to see if the sample concentrations fall within the statistical limits. Each analyst performs duplicate analysis of certified reference materials or performance evaluation samples for every QC set analyzed in the analytical process.

## Accuracy

Accuracy is the degree of agreement of a measurement (or an average of measurements of the same property) with the accepted reference value or true value. It is a measure of the bias in a system and will be expressed as the percent recovery in a spiked sample. It can also be assessed using a certified reference

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material (CRM also called a Standard Reference Material (SRM)) with certified values. Accuracy is evaluated through the steps listed below.

- Calculating the average and the standard deviation for the QC check samples for each parameter and graphing the results on control charts to determine if the accuracy is within the statistical acceptance limits.
- Inspecting all blank analysis data for field or laboratory contamination problems.
- Calculating the percent recovery of laboratory fortified samples and laboratory fortified blanks to ascertain the accuracy of the system.

Proper evaluation of precision and accuracy will offer insight into instrument performance and general data quality.

**Completeness**

Completeness is defined as a measure of the amount of valid data obtained from a measurement system compared to the amount that is expected to be obtained under normal operating conditions. Completeness is evaluated in terms of the amount of valid data obtained compared to the amount that is needed to complete the QA goals. The amount of valid data generated in an analytical sequence can vary due to several causes: laboratory sample handling or preparation errors resulting in the loss or destruction of an analyte, instrumental errors resulting in data rejection, and insufficient QC data (e.g., lack of spike recovery data). If data acquisition targets are not met, the data may be

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determined to be incomplete by the analyst or QA manager and further analysis or repeated sampling may be required.

## Comparability

Comparability is defined as the confidence with which one data set can be compared to another. Identifying pertinent data characteristics that may limit comparability to other sets assesses comparability. Comparability will be evaluated using the steps listed below.

- Assuring that measurements obtained during a predetermined time frame are statistically comparable using SOPs and standard analytical procedures.
- Internal performance audits may be initiated by the QA manager. One data set generated by one analyst or instrument can be compared to another.
- Comparison of current data with historical data from the same sampling site.

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# Quality Assurance Program Plan

# Section 10 Data Quality Assessment



| MOC# | Description of Change | Prepared By | Date |
|---|---|---|---|
| TS00020 | Review for 2004 | Janna Hardman | 09/30/04 |
| TS00085 | Review for 2006 | Melissa Olsen | 08/03/06 |
| | Review for 2008. No changes were made. | Melissa Olsen | 10/07/08 |
| | Review for 2009. No changes were made. | Melissa Olsen | 01/23/09 |
| | Review for 2010. Updated laboratory address in header. | Melissa Olsen | 02/22/2010 |
| 17479 | Review for 2011. No changes were made. | Melissa Olsen | 08/30/2011 |
| 23199 | Review for 2013. No changes made. | Melissa Olsen | 04/24/2013 |
| 26233 | Under "Comparability", modified statement regarding internal performance audits. Updated branding. | Melissa Olsen | 06/02/2014 |
| 30091 | Review for 2015. No changes made. | Melissa Olsen | 04/20/2015 |
| 31572 | Review for 2016. No changes made. | Melissa Olsen | 03/08/2016 |
| 43586 | Review for 2017. No changes made. | Melissa Olsen | 03/24/2017 |
| | Review for 2018. No changes made. | Melissa Olsen | 06/19/2018 |
| 58723 | Review for 2019. No changes made. | Melissa Olsen | 08/19/2019 |
| 60468 | Review for 2020. No changes made. | Melissa Olsen | 01/03/2020 |
| 67192 | Review for 2020. No changes made. | Melissa Olsen | 09/17/2020 |
| 79250 | Review for 2021. No changes made. | Melissa Olsen | 09/03/2021 |
| 94373 | Review for 2022. No changes made. | Melissa Olsen | 12/02/2022 |
| 102982 | Review for 2023. No changes made. | Melissa Olsen | 11/02/2023 |

PREVIEW

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# DATA REDUCTION, VERIFICATION, AND REPORTING

All data are processed to ensure that the precision, accuracy, completeness, and comparability of the data are of known and documented quality. Data validation includes data reduction, verification, and reporting procedures completed independently by the analyst, QA/QC Officer and Laboratory Director.

## Traceability of Measurement

Traceability is the ability to trace the history, application, or location of an entity by means of recorded identifications for a given sample or project. KEIHL's Quality Control Systems strives to provide a program to ensure that measurements made by the laboratory are traceable to national standards of measurement when possible. When traceability to national standards of measurement is not applicable, the laboratory provides satisfactory evidence or correlation of results by participation in inter-laboratory comparisons, proficiency testing or independent analysis.

### Sample Traceability

The traceability begins with the sample numbers being assigned to the samples and then being recorded on the Chain of Custody. The preparation chemist then records the laboratory assigned sample number in the preparation logbook. After the samples have been prepared, the completed samples are placed in a sample type designated area. The Analyst then prepares an analytical run from the backlog and types the corresponding number into the analytical sample identification table. This then becomes part of the final record.

## Standard, Reagent, and Reference Material Traceability

The KEIHL laboratory only purchases standards that are traceable to national standards. When the laboratory receives new standards, reagents or reference material, the Laboratory records the following information into a Standard/ Reagent Logbook: name of the standard, concentration, vendor, lot number, date of receipt, expiration date and the analyst's initials. The standard is then assigned a unique laboratory number. All standards are received with a Certificate of Analysis. The unique number is recorded on the Certificate of Analysis and the certificate is kept in the QA Manager's office. A sticker is placed on the standard with the information listed above. If a standard is diluted, or added to a working standard, the directions for this are also recorded in the Standard Logbook. The new working standard is given a unique number and labeled accordingly. The working standard number is recorded on each analytical run to provide traceability back to the standards used for the analytical run.

## Analyst Data Reduction, Validation, and Reporting

The analyst has primary responsibility for generating data of acceptable,



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known, and documented quality. The analyst reduces instrumental output to concentration values and verifies that all QC results are acceptable by comparing analytical results to statistically generated control charts for accuracy and precision, method specific criteria, and historical control limits.

**Peer Review**

Peer review of sample data is completed after each analytical batch and is documented on the raw data. Typically, the Group Supervisor, or designee, reviews a minimum of 10% of the data generated by a Laboratory Group. The analyst documents corrective action at the bench level on the raw data or by using the Corrective Action Report Summary maintained by the QA officer.

The analyst inspects standard, blank, sample, duplicate, and matrix spike results during an analytical batch or run and compares results against known control limits and method QC requirements. Results found to be suspect and those that are outside acceptance limits are investigated. The analyst will troubleshoot the problem(s) and restart the batch, beginning with calibration, if necessary. A Supervisor or the QA/QC Officer will be notified if the problem(s) cannot be resolved at the analyst level. The QA/QC Officer will be notified to determine whether further corrective action is required and the analyst will document conclusions. The tools used to determine acceptable results may include control charts for QC and check standard results and historical data for sample results. After the analyst determines that data quality is acceptable and the other aspects related to the data quality are



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known and documented, the analyst will transfer the data into the LIMS (Laboratory Information Management System).

## QA/QC Officer Data Reduction, Validation and Reporting

The QA/QC Officer is responsible for ensuring the precision, accuracy, completeness, and comparability of the data are of known and documentable quality. The QA/QC Officer reviews the data only after all requested analyses for a sample or sample set have been completed. The process followed by the QA/QC Officer includes a review of all stages of the sample from receipt and chain-of–custody to data reduction, verification, final reporting and the final archival processes. Data reduction is performed using the QA SQL interface program and the LIMS based Northwest Quality Analyst (NWQA). The QA/QC Officer reviews the data and determines whether corrective action is required. Verification includes an assessment of QC results, confirmation of cation/anion balances and total dissolved solids comparisons measurements for each water sample. The ionic balance check program compares the major cation to major anion results for each water sample along with the electrical conductivity and pH. These data reports are also reviewed using the professional judgment of the QA/QC Officer and corrective action is initiated as needed.

The QA/QC Officer transfers completed data sets to the QA database, reviews the data, and determines whether corrective action is required. If the data is unsatisfactory, the QA/QC Officer submits a rerun sheet to the laboratory group to



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reanalyze the rejected data sets. The QA/QC officer implements corrective actions as needed based on this additional review of the QA statistics and control chart data.

When the QA/QC Officer verifies that all required corrective actions have been implemented and documented, the data is of known and documentable quality. The QA/QC Officer then provides the Laboratory Director with the printouts of the cation anion balance and the final Certificate of Analysis report. The data is not reported to the Laboratory Director until the QA/QC Officer is satisfied that the data are acceptable.

## Laboratory Director Data Reduction, Validation and Reporting

The Laboratory Director has the final responsibility to ensure that the precision, accuracy, completeness, and comparability of the data are known and documented. The Laboratory Director reviews all corrective actions taken. The Director reviews sample results that have ion balances that are not comparable. The Director then approves or rejects the data. Any additional corrective actions identified by the Laboratory Director are investigated, documented and reviewed before the Laboratory Director approves the final Certificate of Analysis report.

## Electronic Signatures

The Laboratory Director uses an electronic signature for all Certificates of Analysis (COA) generated. This electronic signature is unique to the individual and is secured by a personal log-in identification username and password, which are periodically



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changed.

## Certificate of Analysis

KEIHL produces a Certificate of Analysis (COA) for every sample analyzed at the laboratory. The KEIHL report has the following items listed on the report:

1. Report Title.
2. Name and address of the laboratory.
3. Total number of pages.
4. Name of the client (KEL is an in-house lab. Therefore, the address is the same.)
5. Identification of the sample
6. Date of sample Receipt, Collection date, and analysis date.
7. Identification of the test method
8. Any deviations pertaining to the sample.
9. Signature and title of the responsible persons.

KEIHL does not subcontract any samples. Therefore, KEIHL follows the guidance found in NELAC 5.13 b) 2) which states: "The laboratory provides information to another department within the organization for the preparation of regulatory reports". The facility management must ensure the appropriate report items are included in the report to the regulatory authority if such information is required.



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## Computers and Electronic Data Requirement

When computers and automated equipment are used for the capture, processing, manipulation, recording, reporting, storage, or retrieval of test data, KEIHL follows an SOP that covers the requirement found in NELAC Chapter 5.10.6 and Good Automated Laboratory Practice of the EPA Document 2185.

## Customer Complaints

KEIHL has a Standard Operating Procedure for addressing and resolving customer complaints. Records of complaints and the subsequent actions are maintained in accordance with CLSOP4423-1021.

## Record Documentation

All essential information associated with analysis including Chains of Custody, logbooks, laboratory sample ID codes, analysis type, manual calculations, raw instrument data, analysts initials or signatures, and electronic data are kept for a minimum of five years.

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| MOC# | Description of Change | Prepared By | Date |
|---|---|---|---|
| TS00020 | Revision and Review for 2004 | Janna Hardman | 09/30/04 |
| TS00085 | Review for 2006 | Melissa Olsen | 08/03/06 |
| | Review for 2008. No changes were made. | Melissa Olsen | 10/07/08 |
| | Review for 2009. No changes were made. | Melissa Olsen | 01/23/09 |
| | Review for 2010. Updated laboratory address in header. | Melissa Olsen | 02/22/2010 |
| 17479 | Review for 2011. No changes made. | Melissa Olsen | 10/11/2011 |
| 23199 | Review for 2013. Removed statements regarding the review of sample results against historical means and standard deviations. This work is performed by the Water Resources Group. | Melissa Olsen | 04/24/2013 |
| 26233 | Under Sample Traceability, removed "instrument chemist" and replaced with "analyst" Updated branding. | Melissa Olsen | 06/02/2014 |
| 30091 | Added section on the use of Electronic Signatures for Certificates of Analysis. | Melissa Olsen | 04/09/2015 |
| 31572 | Review for 2016. No changes. | Melissa Olsen | 03/08/2016 |
| 43586 | Review for 2017. No changes. | Melissa Olsen | 03/24/2017 |
| | Review for 2018. No changes. | Melissa Olsen | 06/19/2018 |
| 58723 | Review for 2019. No changes. | Melissa Olsen | 08/19/2019 |
| 60468 | Review for 2020. No changes. | Melissa Olsen | 01/03/2020 |
| 67192 | Review for 2020. No changes. | Melissa Olsen | 09/17/2020 |
| 79250 | Under Certificate of Analysis, removed paragraph about report formats to DEQ. Rev. 9.3 to 10 | Melissa Olsen | 09/03/2021 |
| 94373 | Review for 2022. No changes. | Melissa Olsen | 12/02/2022 |
| 102982 | Referenced CLSOP4423-1021 in Customer Complaints section. Rev 10 to 11 | Melissa Olsen | |



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# Corrective and Preventive Action

The Laboratory Director and/or the Quality Manager are responsible for initiating, monitoring and recording non-conformances and corrective actions (Refer to SOP CLSOP4423-1004). Corrective Actions are recorded on the "Corrective Action" form, CLFRM4423-0001 (Appendix A), which can be found in the Bentley document control system.

Examples of **non-conformances** (random events) may include the following:

- Continuing calibration verification (CCV) results not within method-defined control limits
- Sample analyzed outside of maximum holding time limits
- Loss of sample (broken glassware, spill, etc.)
- Erroneous double spiking of sample with surrogate
- Outlier for Proficiency Testing round, Round Robin, or Demonstration of Capability

Examples of **corrective actions** (systematic events) may include the following:

- Internal Quality Audit findings
- External Assessment Deficiencies
- Non-conformances which become systematic events
- Becoming non-proficient with proficiency testing samples
- Customer feedback or complaints

All Laboratory Employees and members of the QAQC group have the authority, as appropriate, to stop work on samples when any aspect of the process does not conform to laboratory requirements. The employee who stopped the work shall immediately notify laboratory management (Laboratory Director, QA Manager, or designee). Upon investigation of the issue, Laboratory Management will authorize the resumption of work.

The essential steps in the corrective action system are as follows:

- Assign responsibility for investigating the problem.
- Investigate and determine the root cause of the problem (5-Why's).
- Once the root cause has been determined, implement an appropriate corrective action to solve the problem.
- Verify that the corrective action has resolved the problem.
- Complete the documentation of the corrective action.

Additionally, as part of the Groundwater Characterization Monitoring Plan (GCMP), KEIHL reviews the data for ion balance. If any sample fails the criteria for this review, a request to verify the suspected analysis/analyses which is/are contributing to this failure is requested by the QA/QC manager. When these reruns result in changes to the original values, the analyst will enter a comment in the LIMS (Laboratory Information Management System). Likewise, if the sample is



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rerun and the result does not change, a comment is entered indicating the sample was verified. These changes are also tracked through the audit trail in the LIMS.

**Customer Complaints**

KEIHL is a private technical support facility for Rio Tinto Kennecott. Therefore, the customers receiving KEIHL services are the environmental and industrial hygiene personnel. The Laboratory Director or the QA/QC Manager receive any questions, concerns or issues pertaining to analytical data. Questions and concerns are resolved by following the procedure listed below:

- Review of Field Data Observation Sheets.
- Review of the Chain of Custody request and supplied field data.
- Review of raw analytical data.
- Review of the associated quality assurance data.
- If needed, re-analysis of samples if original sample is available.

Please refer to CLSOP4423-1021 Customer Services and Complaints.

# PREVENTIVE ACTION

KEIHL determines action to eliminate the causes of potential nonconformities to prevent their occurrence. Preventive actions are appropriate to the effects of the potential problems and are recorded on a Preventive Action Report, CLFRM4423-0002 (Appendix B). For the procedure on Preventive Action, refer to SOP CLSOP4423-1023.



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| MOC# | Description of Change | Prepared By | Date |
|---|---|---|---|
| TS00020 | Review for 2004 | Janna Hardman | 09/30/04 |
| TS00046 | Review for 2005 Procedure change for follow up on the implementation of Corrective Action. | Janna Hardman | 03/30/05 |
| TS00085 | Review for 2006 | Melissa Olsen | 08/04/06 |
| 9006 | Review for 2008. Updated Appendix A corrective action form. | Melissa Olsen | 10/10/08 |
| | Review for 2009. No changes. | Melissa Olsen | 01/26/09 |
| 11532 | Revision and review for 2010. Added Preventive Action section to SOP as well as a document reference. Modified report in Appendix A (Non-Conformance and Corrective Action) and added Appendix B (Preventive Action Report). Updated laboratory address in header. | Melissa Olsen | 12/17/2010 |
| 17479 | Review for 2011. No changes made. | Melissa Olsen | 10/11/2011 |
| 21418 | Review for 2012. Inserted updated forms for Corrective and Preventive Actions. | Donna Smith | 01/12/2012 |
| | Review for 2013. Removed statements “and limit check programs”, and “historical data check review” as these are not performed by the laboratory personnel. Historical data checks for specific locations are performed by the Water Resources Group. | Melissa Olsen | 04/24/2013 |
| 26233 | Updated branding. | Melissa Olsen | 06/02/2014 |
| 30091 | Updated Appendix A and B forms | Melissa Olsen | 04/21/2015 |
| 31572 | Review for 2016. Updated Appendix A with current revision of Corrective Action Report | Melissa Olsen | 03/11/2016 |
| 43586 | Review for 2017. Removed non-conformance from Appendix A header. Rev. 13 to 14. | Melissa Olsen | 03/27/2017 |
| 53081 | Aligned policy with procedure after procedure updates for corrective and preventive action. Rev. 14 to 15 | Melissa Olsen | 09/17/2018 |
| 58723 | Review for 2019. No changes made. | Melissa Olsen | 08/19/2019 |
| 60468 | Review for 2020. No changes made. | Melissa Olsen | 01/03/2020 |
| 67192 | Added SOP reference for Customer Complaints CLSOP4423-1021. | Melissa Olsen | 09/17/2020 |
| 79250 | Review for 2021. No changes made. | Melissa Olsen | 09/07/2021 |
| 94373 | Review for 2022. No changes made. | Melissa Olsen | 12/02/2022 |
| 102982 | Review for 2023. No changes made. | Melissa Olsen | 11/02/2023 |



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## Appendix A
## Corrective Action Report

| Corrective Action | | |
|---|---|---|
| Effective Date: 11/17/2017 | Document Number: CLFRM4423-0001 | Rev: 3 |

| | |
|---|---|
| **Corrective Action Number:** | |
| Name of Person Registering the Corrective Action: | Date: |
| Source: (internal audit, external audit, etc.) | |
| Details of the systematic non-conformance including sample details where appropriate, what actually happened and how it occurred: | |
| Root Cause Analysis (Five whys). List details of cause and contributing issues. | |
| Corrective Action Taken | |
| Review of Corrective Action: | |
| Corrective action satisfactory?: YES NO | |
| QA/Technical Manager: | Date: |
| Additional Review Required? YES NO | |

## Appendix B
## Preventive Action Report

| **Preventive Action Form** | | |
|---|---|---|
| **Effective Date: 11/15/2013** | **Document Number: CLFRM4423-0002** | **Rev: 0** |

**Date:** **Initiator:**

**Preventive Action Report number:**

**Source (Circle One):**

Service Request  Staff Observation  Internal/External Audit

Customer Complaint  Control Chart  Management Review

Customer Survey  Other ________________

**Identification of Problem and Evidence of Occurence:**

**Evaluation of Problem (Root Cause):**

**Action Plan:**

**Follow-Up**

Have all changes been verified for completion?  Yes_____  No_____

If yes, please list the date this took place:_______________________________

**Steps taken to prevent future occurrence:**

**Additional Comments:**

| | Signature | Date |
|---|---|---|
| Initiator: | | |
| QA/Technical Manager: | | |

# AUDITS AND SYSTEM REVIEWS

## Internal System Audits and Managerial Review

The QA/QC Officer will conduct system audits annually. Audits are carried out by trained and qualified personnel who are independent of the activity to be audited. Personnel shall not audit their own activities except when it can be demonstrated that an effective audit will be carried out. Internal audits include a review of documentation, data record checks, logbook inspections, and laboratory inspections conducted by the QA/QC Officer, his or her designee, or external auditors. Internal audits are conducted to verify the staff has the equipment, facilities, engineering controls, and procedures necessary to generate data of acceptable, known, and documented quality. Any deficiencies identified in the audit are documented and addressed as part of the audit process. Corrective actions resulting from a system audit can include revising SOPs, reanalyzing affected samples, or repairing instrumentation. A well-administered system audit may isolate deficiencies regarding inadequate engineering controls within the laboratory, such as an inoperable fume hood. The Laboratory Director conducts independent reviews or audits as needed in response to problems identified through the QA program or performance audit samples (both internal and external). The Laboratory Director addresses safety and compliance problems. Analysts must



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have appropriate controls in place to properly execute their job functions. The QA/QC Officer maintains the system audit schedule.

## External System Audits

Auditors from federal, state, and county agencies conduct external system audits. External system audits are conducted as part of the accreditation, licensing, and certification programs identified above and as oversight by government agencies. The QA/QC Officer and Laboratory Director actively participate in the audit. KEIHL responds to all external system audits through corrective action deficiency reporting as required by the agency and by documenting and correcting problems identified during the audit.

## Performance Audits

Performance audits are an important component of the QA program. KEIHL implements several types of checks to monitor the quality of analytical activity. A few of these are listed below:

- Internal quality control procedures using statistical techniques.
- Replicate testing using the same or different test methods.
- Use of certified reference materials or secondary reference materials.
- Re-testing of retained samples.
- Ion balance on the major components of water samples.



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- Review the results for different, but related analysis of a sample. i.e. Total vs. Dissolved.
- Participate in proficiency testing or other interlaboratory comparisons.

Performance audits include the analysis of a standard QC set: original, duplicates, matrix spikes, matrix spike duplicates, blanks, and certified reference materials. The performance audits are designed to verify the ability to correctly identify and quantify sample concentrations in reference samples and blind QC samples.

**Proficiency Test Studies**

The Laboratory participates in several proficiency test studies listed below.

- Environmental Monitoring under SDWA (WS), twice a year and CWA (WP), twice a year, and RCRA (Soil Study) twice a year.
- Laboratory certification program administered by the State of Utah Department of Health, Bureau of Laboratory Services.
- The Proficiency of Analytical Testing (PAT) program jointly administered by AIHA and NIOSH, four times a year.

The information provided through participation in these programs is used to evaluate laboratory performance in each section and to assist the QA/QC Officer, Laboratory Director, and external audit teams in assessing analytical methods that require increased attention to correct any deficiencies. Sample information for external performance evaluation samples is recorded and tracked in the LIMS



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database, including sample identity and reported results. All audit samples are processed through the laboratory in the same manner as routine samples, from sample receipt to final reporting. All results of performance evaluation tests are distributed to the Laboratory Director and/or Technical Services Manager.

| MOC# | Description of Change | Prepared By | Date |
|---|---|---|---|
| TS00020 | Review for 2004 | Janna Hardman | 09/30/04 |
| TS00085 | Review for 2006 | Melissa Olsen | 08/04/06 |
| | Review for 2008. No changes were made. | Melissa Olsen | 10/07/08 |
| | Review for 2009. Updated the current analyses performed on Toxicology proficiency test studies. | Melissa Olsen | 01/26/09 |
| 11532 | Review for 2010. Removed ELPAT from proficiency testing studies and updated laboratory address in header. | Melissa Olsen | 02/22/2010 |
| 17479 | Review for 2011. No changes. | Melissa Olsen | 10/11/2011 |
| 23199 | Review for 2013. Added RCRA Soil study PT tests and frequency under Proficiency Testing studies | Melissa Olsen | 04/24/2013 |
| 26233 | Updated branding. | Melissa Olsen | 06/02/2014 |
| 30091 | Review for 2015. No changes. | Melissa Olsen | 04/24/2015 |
| 31572 | Removed clinical proficiency testing studies. | Melissa Olsen | 03/11/2016 |
| 43586 | Removed USGS proficiency testing studies. | Melissa Olsen | 03/27/2017 |
| | Review for 2018. No changes made. | Melissa Olsen | 09/04/2018 |
| 58723 | Review for 2019. No changes made. | Melissa Olsen | 08/19/2019 |
| 60468 | Review for 2020. No changes made. | Melissa Olsen | 01/03/2020 |
| 67192 | Review for 2020. No changes made. | Melissa Olsen | 09/17/2020 |
| 79250 | Review for 2021. No changes made. | Melissa Olsen | 09/07/2021 |
| 94373 | Review for 2022. No changes made. | Melissa Olsen | 12/02/2022 |
| 102982 | Removed NPDES (DMRQA) from PT studies. Rev. 11 to 12 | Melissa Olsen | 11/02/2023 |



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# QUALITY ASSURANCE REPORT

A QA/QC activity report may be prepared periodically by the Laboratory Director and distributed to laboratory personnel. These reports may include the points listed below.

- QC Summary reports for the GCMP samples.
- All Performance Evaluation sample results for all accreditations.
- Correspondence for all Performance Evaluation samples.
- Results for the internal and external system audits.
- Corrective action reports.
- Documentation review.
- Control Charts

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| MOC# | Description of Change | Prepared By | Date |
|---|---|---|---|
| TS00020 | Revision and Review for 2004 | Janna Hardman | 09/30/04 |
| TS00085 | Review for 2006 | Melissa Olsen | 08/04/06 |
| | Review for 2008. No changes were made. | Melissa Olsen | 10/07/08 |
| | Review for 2009. No changes were made. | Melissa Olsen | 01/26/09 |
| | Review for 2010. Updated laboratory address in header. | Melissa Olsen | 02/22/2010 |
| 17479 | Review for 2011. No changes were made. | Melissa Olsen | 10/11/2011 |
| 23199 | Review for 2013. Removed statement indicating that the QAQC reports would be submitted to the Manager of Technical Services. | Melissa Olsen | 04/24/2013 |
| 26233 | Removed statement "The Laboratory Director and the Manager of Technical Services may judge the data quality in terms of precision, accuracy and completeness." Updated branding. | Melissa Olsen | 06/02/2014 |
| 30091 | Review for 2015. No changes. | Melissa Olsen | 04/24/2015 |
| 31572 | Review for 2016. No changes. | Melissa Olsen | 03/11/2016 |
| 43586 | Removed statement regarding the generation of control charts for the purpose of generating control limits for the next quarter. | Melissa Olsen | 03/27/2017 |
| | Review for 2018. No changes made. | Melissa Olsen | 09/04/2018 |
| 58723 | Review for 2019. No changes made. | Melissa Olsen | 08/19/2019 |
| 60468 | Review for 2020. No changes made. | Melissa Olsen | 01/13/2020 |
| 67192 | Review for 2020. No changes made. | Melissa Olsen | 09/17/2020 |
| 79250 | Review for 2021. No changes made | Melissa Olsen | 09/07/2021 |
| 94373 | Review for 2021. No changes made. | Melissa Olsen | 12/02/2022 |
| 102982 | Revised language to say the report may be prepared, but not that it "is" prepared as this is not a requirement under ISO or NELAC guidelines. Rev. 9 to 10 | Melissa Olsen | 11/03/2023 |



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# GLOSSARY

**Commonly used environmental terminology is defined in the Glossary.**

**Acceptable Criteria:** specified limits placed on characteristics of an item, process, or service defined in requirement documents.

**Accreditation:** the process by which an agency or organization evaluates and recognizes a program of study or an institution as meeting certain predetermined qualifications or standards, thereby accrediting the laboratory.

**Assessment:** the evaluation process used to measure the performance or effectiveness of a system and its elements. As used here, assessment is an all-inclusive term used to denote any of the following: audits, performance evaluations, management reviews, peer reviews, inspections, and surveillance.

**Accuracy:** a data quality indicator. The degree of agreement between an observed value and an accepted reference value. Accuracy includes a combination of random error (precision) and systematic error (bias) components, which are due to sampling and analytical operations.

**Analyte:** means the substance or thing for which a sample is analyzed to determine its presence or quantity.

**Analytical Reagent (AR) Grade:** designation for the high purity of certain chemical reagents and solvents given the American Chemical Society.

**Audit:** A systematic evaluation to determine the conformance to quantitative specifications of some operational function or activity.

**Batch:** environmental samples, which are prepared and/or analyzed together with the same process and personnel, using the same lot(s) of reagents. A preparation batch is composed of one to 20 environmental samples of the same NELAC-defined matrix, meeting the above mentioned criteria and with a maximum time between the start of processing of the first and last sample in the batch to be 24 hours. An analytical batch is composed of prepared environmental samples, extracts, digestates or concentrates) which are analyzed together as a group. An analytical batch can include prepared samples originating from various environmental matrices and can exceed 20 samples.

**Bias:** the systematic or persistent distortion of a measurement process that causes errors in one direction (i.e., the expected sample measurement is different from the sample's true value).

**Blank:** a sample that has not been exposed to the analyzed sample stream in order to monitor contamination during sampling, transport, storage or analysis. The blank is subjected to the usual analytical and measurement process to establish a zero baseline or background value and is sometimes used to adjust or correct routine analytical results.

**Blind Sample:** a subsample for analysis with a composition known to the submitter. The analyst/laboratory may know the identity of the sample but not its composition. A blind sample is used to test the analyst's proficiency or the laboratory's proficiency in the execution of the measurement process.

**Calibration:** comparison of a measurement standard, instrument, or item with a standard or instrument of higher accuracy to detect and quantify inaccuracies and to report or eliminate those inaccuracies by adjustments.

**Calibration Curve:** the graphical relationship between the known values, such as concentrations, of a series of calibration standards and their instrument response.

**Calibration Method**: a defined technical procedure for performing a calibration.

**Calibration Standard:** a solution prepared from the primary dilution standard solution or stock standard solutions. The Calibration solutions are used to calibrate the instrument response with respect to analyte concentration.

**Certified Reference Material (CRM):** a reference material one or more of whose property values are certified by a technically valid procedure, accompanied by or traceable to a certificate or other documentation which is issued by a certifying body.

**Chain of Custody:** an unbroken trail of accountability that ensures the physical security of samples, data and records.

**Characteristic:** any property or attribute of a data, item, process, or service that is distinct, describable, and/or measurable.

**Clean Air Act:** the enabling legislation in 42 U.S.C. 7401 et seq., Public Law 91-604, 84 Stat. 1676 Pub. L. 95-95, 91 Stat., 685 and Pub. L. 95-190, 91 Stat., 1399, as

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amended, empowering EPA to promulgate air quality standards, monitor and to enforce them.

**Client:** any individual or organization for which items or services are furnished or work performed in response to defined requirements and expectations. See also Participant and User.

**Comparability:** a measure of the confidence with which one data set can be compared to another.

**Completeness:** a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under correct, normal conditions.

**Compromised Samples:** those samples which are improperly sampled, insufficiently documented (chain of custody and other sample records and/or labels), improperly preserved, collected in improper containers, or exceeding holding times when delivered to a laboratory. Under normal conditions compromised samples are not analyzed. If emergency situations require analysis, the results must be appropriately qualified.

**Computer program:** a sequence of instructions suitable for processing by a computer. Processing may include the use of an assembler, a compiler, an interpreter, or a translator to prepare the program for execution. A computer program may be stored on magnetic media, and be referred to as software, or may be stored permanently on computer chips, and be referred to as firm: Draft Final October 1997 EPA QA/R: 5 B: 2ware. Computer programs covered by this Standard are those used for design analysis, data acquisition, data reduction, data storage (data bases), operation or control, and data base or document control registers when used as the controlled source of quality information.

**Confirmation:** verification of the presence of a component through the use of an analytical technique based on a different scientific principle from the original method. These may include second column confirmation, alternate wavelength derivatization, mass spectral interpretation, alternative detectors, or additional cleanup procedures.

**Conformance:** an affirmative indication or judgement that a product or service has met the requirements of the relevant specifications, contract, or regulation; also the state of meeting the requirements.



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**Consensus standard:** a standard established by a group representing a cross section of a particular industry or trade, or a part thereof.

**Contractor:** any organization or individual that contracts to furnish services or items or perform work.

**Corrective Action:** action taken to eliminate the causes of an existing nonconformity, defect or other undesirable situation in order to prevent recurrence.

**Data Audit**: a qualitative and quantitative evaluation of the documentation and procedures associated with environmental measurements to verify that the resulting data are of acceptable quality.

**Data of known quality:** data that have the qualitative and quantitative components associated with their derivation documented appropriately for their intended use, and when such documentation is verifiable and defensible.

**Data quality assessment (DQA):** a statistical and scientific evaluation of the data set to determine the validity and performance of the data collection design and statistical test, and to determine the adequacy of the data set for its intended use.

**Data quality objectives (DQOs):** Qualitative and quantitative statements derived from the DQO process that clarify study, technical, and quality objectives, define the appropriate type of data, and specify tolerable levels of potential decision errors that will be used as the basis for establishing the quality and quantity of data needed to support decisions.

**Data usability**: the process of ensuring or determining whether the quality of the data produced meets the intended use of the data.

**Data Reduction:** the process of transforming raw data by arithmetic or statistical calculations, standard curves, concentration factors, etc., and collation into a more useful form.

**Deficiency:** an unauthorized deviation from acceptable procedures or practices, or a defect in an item.

**Demonstration of capability:** a procedure to establish the ability of the analyst to generate acceptable accuracy.

**Digestion**: To decompose by heat, moisture or chemicals. 2 To extract a soluble ingredient by warming with a liquid.

**Director (however named):** the individual designated as being responsible for the overall operation, all personnel, and the physical plant of the environmental laboratory. A supervisor may report to the manager. In some cases, the supervisor and the manager may be the same individual. (NELAC)

**Document:** any written or pictorial information describing, defining, specifying, reporting, or certifying activities, requirements, procedures, or results.

**Document Control:** the act of ensuring that documents (and revisions thereto) are proposed, reviewed for accuracy, approved for release by authorized personnel, distributed properly and controlled to ensure use of the correct version at the location where the prescribed activity is performed.

**Double Blind Sample:** a sample submitted to evaluate performance with concentration and identity unknown to the analyst.

**Duplicate Analyses:** the analyses or measurements of the variable of interest performed identically on two subsamples of the same sample. The results from duplicate analyses are used to evaluate analytical or measurement precision but not the precision of sampling, preservation or storage internal to the laboratory.

**Electronic Signature:** symbols or other data in digital form attached to an electronically transmitted document as verification of the sender's intent to sign the document.

**Entity:** that which can be individually described and considered, such as a process, product, item, organization, or combination thereof.

**Environmental conditions:** the description of a physical medium (e.g., air, water, soil, sediment) or biological system expressed in terms of its physical, chemical, radiological, or biological characteristics.

**Environmental data:** any measurements or information that describe environmental processes, location, or conditions; ecological or health effects and consequences; or the performance of environmental technology. For EPA, environmental data include information collected directly from measurements, produced from models, and compiled from other sources such as databases or the literature.



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**Environmental data operations:** work performed to obtain, use, or report information pertaining to environmental processes and conditions.

**Environmental monitoring:** the process of measuring or collecting environmental data.

**Environmental processes:** manufactured or natural processes that produce discharges to or that impact the ambient environment.

**Environmental programs:** activities involving the environment, including but not limited to: characterization of environmental processes and conditions; environmental monitoring; environmental research and development; laboratory operations on environmental samples; and the design, construction, and operation of environmental technologies.

**Environmental technology:** an all: inclusive term used to describe pollution control devices and systems, waste treatment processes and storage facilities, and site remediation technologies and their components that may be utilized to remove pollutants or contaminants from or prevent them from entering the environment. Examples include wet scrubbers (air), soil washing (soil), granulated activated carbon unit (water), and filtration (air, water). Usually, this term will apply to hardware: based systems; however, it will also apply to methods or techniques used for pollution prevention, pollutant reduction, or containment of contamination to prevent further movement of the contaminants, such as capping, solidification or vitrification, and biological treatment.

**Evidentiary records:** records identified as part of litigation and subject to restricted access, custody, use, and disposal.

**Equipment blank:** a sample that is known not to contain the target analyte and that is used to check the: cleanliness of sampling devices, collected in a sample container from a clean sample-collection device and returned to the laboratory as a sample.

**Extramural agreement:** a legal agreement between EPA and an organization outside EPA for items or services to be provided. Such agreements include contracts, work assignments, delivery orders, cooperative agreements, research grants, state and local grants, and EPA: funded Interagency agreements.

**Federal Water Pollution Control Act (Clean Water Act, CWA):** the enabling legislation under 33 U.S.C. 1251 et seq., Public Law 92-50086 Stat. 816, that empowers EPA to set discharge limitations, write discharge permits, monitor, and bring enforcement action for non-compliance.

**Field blank:** a sample that is known not to contain the target analyte and that is used to check for analytical artifacts or contamination introduced by sampling and analytical procedures, carried to the sampling site, exposed to sampling conditions and returned to the laboratory and treated as an environmental sample.

**Finding:** an assessment conclusion that identifies a condition having a significant effect on an item or activity. An assessment finding may be positive or negative, and is normally accompanied by specific examples of the observed condition.

**Good Laboratory Practices (GLP):** either general guidelines or formal regulations for performing basic laboratory operations or activities that are known or believed to influence the quality and integrity of the results.

**Guideline:** a suggested practice that is not mandatory in programs intended to comply with a standard.

**Hazardous waste:** any waste material that satisfies the definition of hazardous waste as given in 40 CFR Part 261, Identification and Listing of Hazardous Waste.

**Holding Times (Maximum Allowable Holding Times):** the maximum times that samples may be held prior to analysis and still be considered valid.

**Independent assessment:** an assessment performed by a qualified individual, group, or organization that is not a part of the organization directly performing and accountable for the work being assessed.

**Initial demonstration of analytical capability:** the procedure described in the method 40 CFR Part 136, Appendix A, used to determine a laboratory's accuracy and precision in applying an analytical method.

**Inspection:** an activity such as measuring, examining, testing, or gauging one or more characteristics of an entity and comparing the results with specified requirements in order to establish whether conformance is achieved for each characteristic.

**Instrument Blank:** a clean sample (e.g., distilled water) processed through the instrumental steps of the measurement process; used to determine instrument contamination.



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**Interference:** means the effect on the final result caused by the sample matrix.

**Internal Standard:** a known amount of standard added to a test portion of a sample and carried through the entire measurement process as a reference for evaluating and controlling the precision and bias of the applied analytical method.

**Laboratory:** a body that calibrates and/or tests.
NOTES:
1. In cases where a laboratory forms part of an organization that carries out other activities besides calibration and testing, the term "laboratory" refers only to those parts of that organization that are involved in the calibration and testing process.
2. As used herein, the term "laboratory" refers to a body that carries out calibration or testing - at or from a permanent location, - at or from a temporary facility, or - in or from a mobile facility.

**Laboratory Control Sample (quality control sample):** an uncontaminated sample matrix spiked with known amounts of analytes from a source independent of the calibration standards. It is generally used to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system.

**Laboratory Duplicate:** Aliquots of a sample taken from the same container under laboratory conditions and processed and analyzed independently.

**Management:** those individuals directly responsible and accountable for planning, implementing, and assessing work.

**Management system:** a structured non-technical system describing the policies, objectives, principles, organizational authority, responsibilities, accountability, and implementation plan of an organization for conducting work and producing items and services.

**Management Systems Review (MSR):** the qualitative assessment of a data collection operation and/or organization(s) to establish whether the prevailing quality management structure, policies, practices, and procedures are adequate for ensuring that the type and quality of data needed are obtained.

**Matrix:** The component or substrate that contains the analyte of interest. For purposes of batch and QC requirements determination, the following matrix distinctions shall be used: Aqueous: Any aqueous sample excluded from the definition

of Drinking Water matrix or Saline/Estuarine source. Includes surface water, groundwater and effluents.
*Drinking Water:* Any aqueous sample that has been designated a potable or potential potable water source.
*Saline/Estuarine:* Any aqueous sample from an ocean or estuary, or other salt-water source such as the Great Salt Lake.
*Non-aqueous liquid:* Any organic liquid with <15% settable solids.
*Biological Tissue:* Any sample of a biological origin such as fish tissue, shellfish, or plant material. Such samples shall be grouped according to origin.
*Solids:* Includes soils, sediments, sludges and other matrices with >15% settable solids.
*Chemical Waste:* A product or by-product of an industrial process that results in a matrix not previously defined.
*Air Samples:* Media used to retain the analyte of interest from an air sample such as sorbent tubes or summa canisters. Each medium shall be considered as a distinct matrix.

**Matrix Spike (spiked sample, fortified sample):** prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. Matrix spikes are used, for example, to determine the effect of the matrix on a method's recovery efficiency.

**Matrix Spike Duplicate (spiked sample/fortified sample duplicate):** a second replicate matrix spike is prepared in the laboratory and analyzed to obtain a measure of the precision of the recovery for each analyte.

**May:** denotes permitted action, but not required.

**Measurement and testing equipment (M&TE):** tools, gauges, instruments, sampling devices or systems used to calibrate, measure, test, or inspect in order to control or acquire data to verify conformance to specified requirements.

**Method:** a body of procedures and techniques for performing an activity (e.g., sampling, chemical analysis, quantification) systematically presented in the order in which they are to be executed.

**Method Blank:** a clean sample processed simultaneously with and under the same conditions as samples containing an analyte of interest through all steps of the analytical procedures.



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**Method Detection Limit (Analytical Detection Limit):** the minimum concentration of a substance (an analyte) that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.

**Mixed waste:** hazardous waste material as defined by 40 CFR 261 (RCRA) and mixed with radioactive waste subject to the requirements of the Atomic Energy Act.

**Must:** denotes a requirement that must be met.

**Negative Control:** measures taken to ensure that a test, its components, or the environment do not cause undesired effects, or produce incorrect test results.

**Non-conformance:** a deficiency in characteristic, documentation, or procedure that renders the quality of an item or activity unacceptable or indeterminate, non-fulfillment of a specified requirement.

**Observation:** an assessment conclusion that identifies a condition (either positive or negative) that does not represent a significant impact on an item or activity. An observation may identify a condition that does not yet cause a degradation of quality.

**Organization:** a company, corporation, firm, enterprise, or institution, or part thereof, whether incorporated or not, public or private, that has its own functions and administration.

**Organization structure:** the responsibilities, authorities, and relationships, arranged in a pattern, through which an organization performs its functions.

**Participant:** when used in the context of environmental programs, an organization, group, or individual that takes part in the planning and design process and provides special knowledge or skills to enable the planning and design process to meet its objective.

**Peer review:** a documented critical review of work generally beyond the state of the art or characterized by the existence of potential uncertainty. The peer review is conducted by qualified individuals (or organization) that are independent of those who performed the work, but are collectively equivalent in technical expertise (i.e., peers) to those who performed the original work. The peer review is conducted to ensure that activities are technically adequate, competently performed, properly documented, and satisfy established technical and quality requirements. The peer review is an in depth assessment of the assumptions, calculations, extrapolations,



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alternate interpretations, methodology, acceptance criteria, and conclusions pertaining to specific work and of the documentation that supports them. Peer reviews provide an evaluation of a subject where quantitative methods of analysis or measures of success are unavailable or undefined, such as in research and development.

**Performance Audit:** the routine comparison of independently obtained quantitative measurement system data with routinely obtained data in order to evaluate the proficiency of an analyst or laboratory.

**Performance Based Measurement System (PBMS):** a set of processes wherein the data quality needs, mandates or limitations of a program or project are specified and serve as criteria for selecting appropriate methods to meet those needs in a cost-effective manner.

**Pollution prevention (P2):** an organized, comprehensive effort to systematically reduce or eliminate pollutants or contaminants prior to their generation or there release or discharge to the environment.

**Positive Control:** measures taken to ensure that a test and/or its components are working properly and producing correct or expected results from positive test subjects.

**Precision:** a measure of mutual agreement among individual measurements of the same property, usually under prescribed similar conditions, expressed generally in terms of the standard deviation.

**Preservation:** means the temperature control or the addition of a substance to maintain the chemical or biological integrity of the target analyte.

**Procedure:** a specified way to perform an activity.

**Process:** a set of interrelated resources and activities that transforms inputs into outputs. Examples of processes include analysis, design, data collection, operation, fabrication, and calculation.

**Proficiency Testing or Evaluation:** determination of the laboratory calibration or testing performance by means of interlaboratory comparisons.

**Proficiency Testing Program:** the aggregate of providing rigorously controlled and standardized environmental samples to a laboratory for analysis, reporting of results,



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statistical evaluation of the results in comparison to peer laboratories and the collective demographics and results summary of all participating laboratories.

**Proficiency Test Sample (PT):** a sample, the composition of which is unknown to the analyst and is provided to test whether the analyst/laboratory can produce analytical results within specified performance limits.

**Project:** an organized set of activities within a program.

**Proprietary:** belonging to a private person or company.

**Protocol:** a detailed written procedure for field and/or laboratory operation (e.g., sampling, analysis, etc.) which must be strictly followed.

**Provisionally approved:** a determination by the department that a certified laboratory does not follow the accepted method or has not passed the appropriate proficiency testing audit for the most recent audit for an analyte or interdependent analyte group, but the certified laboratory is still capable of producing valid data.

**Provisionally certified** a determination by the department that a certified laboratory has deficiencies, but the certified laboratory is still capable of producing valid data.

**Pure Reagent Water:** shall be ASTM Type I or Type II water in which no target analytes or interferences are detected as required by the analytical method.

**Qualified data:** any data that have been modified or adjusted as part of statistical or mathematical evaluation, data validation, or data verification operations.

**Qualified services:** an indication that suppliers providing services have been evaluated and determined to meet the technical and quality requirements of the client as provided by approved procurement documents and demonstrated by the supplier to the client's satisfaction.

**Quality:** the totality of features and characteristics of a product or service that bear on its ability to meet the stated or implied needs and expectations of the user.

**Quality assurance officer:** the individual designated as the principal manager within the organization having management oversight and responsibilities for planning, coordinating, and assessing the effectiveness of the quality system for the organization.



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**Quality Assurance:** an integrated system of activities involving planning, quality control, quality assessment, reporting and quality improvement to ensure that a product or service meets defined standards of quality with a stated level of confidence.

**Quality Assurance (Project) Plan (QAPP):** a formal document describing the detailed quality control procedures by which the quality requirements defined for the data and decisions pertaining to a specific project are to be achieved.

**Quality control (QC):** the overall system of technical activities that measures the attributes and performance of a process, item, or service against defined standards to verify that they meet the stated requirements established by the customer; operational techniques and activities that are used to fulfill requirements for quality.

**Quality Control Sample:** an uncontaminated sample matrix spiked with known amounts of analytes from a source independent from the calibration standards. It is generally used to establish intra-laboratory or analyst specific precision and bias or to assess the performance of all or a portion of the measurement system.

**Quality improvement:** a management program for improving the quality of operations. Such management programs generally entail a formal mechanism for encouraging worker recommendations with timely management evaluation and feedback or implementation.

**Quality indicators:** measurable attributes of the attainment of the necessary quality for a particular environmental decision. Indicators of quality include precision, bias, completeness, representativeness, reproducibility, comparability, and statistical confidence.

**Quality Manual:** A document stating the quality policy, quality system and quality practices of an organization. This may be also called a Quality Assurance Plan or a Quality Plan. NOTE - The quality manual may include by reference other documentation relating to the laboratory's quality arrangements.

**Quality management:** that aspect of the overall management system of the organization that determines and implements the quality policy. Quality management includes strategic planning, allocation of resources, and other systematic activities (e.g., planning, implementation, and assessment) pertaining to the quality system.

**Quality System:** a structured and documented management system describing the policies, objectives, principles, organizational authority, responsibilities,



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accountability, and implementation plan of an organization for ensuring quality in its work processes, products (items), and services. The quality system provides the framework for planning, implementing, and assessing work performed by the organization and for carrying out required QA and QC.

**Range:** the difference between the minimum and the maximum of a set of values.

**Raw Data:** any original information from a measurement activity or study recorded in a laboratory notebook, worksheets, records, memoranda, notes, or exact copies thereof and that are necessary for the reconstruction and evaluation of the report of the activity or study. Raw data may include photography, microfilm or microfiche copies, computer printouts, magnetic media, including dictated observations, and recorded data from automated instruments. If exact copies of raw data have been prepared (e.g., tapes which have been transcribed verbatim, data and verified accurate by signature), the exact copy or exact transcript may be submitted.

**Reagent Blank (method reagent blank):** a sample consisting of reagent(s), without the target analyte or sample matrix, introduced into the analytical procedure at the appropriate point and carried through all subsequent steps to determine the contribution of the reagents and of the involved analytical steps.

**Record (quality):** a document that furnishes objective evidence of the quality of items or activities and that has been verified and authenticated as technically complete and correct. Records may include photographs, drawings, magnetic tape, and other data recording media.

**Record Retention:** The systematic collection, indexing and storing of documented information under secure conditions.

**Reference Material:** a material or substance one or more properties of which are sufficiently well established to be used for the calibration of an apparatus, the assessment of a measurement method, or for assigning values to materials.

**Remediation:** the process of reducing the concentration of a contaminant (or contaminants) in air, waters, or soil media to a level that poses an acceptable risk to human health. Representativeness: a measure of the degree to which data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition.



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**Replicate Analyses:** the measurements of the variable of interest performed identically on two or more subsamples of the same sample within a short time interval.

**Reproducibility:** the precision, usually expressed as variance that measures the variability among the results of measurements of the same sample at different laboratories.

**Resource Conservation and Recovery Act (RCRA):** the enabling legislation under 42 USC 321 et seq. (1976), that gives EPA the authority to control hazardous waste from the "cradle-to-grave," including its generation, transportation, treatment, storage, and disposal.

**Safe Drinking Water Act (SDWA):** the enabling legislation, 42 USC 300f et seq. (1974), (Public Law 93-523), that requires the EPA to protect the quality of drinking water in the U.S. by setting maximum allowable contaminant levels, monitor, and enforce violations.

**Scientific method:** the principles and processes regarded as necessary for scientific investigation, including rules for concept or hypothesis formulation, conduct of experiments, and validation of hypotheses by analysis of observations.

**Sample Duplicate:** two samples taken from and representative of the same population and carried through all steps of the sampling and analytical procedures in an identical manner. Duplicate samples are used to assess variance of the total method including sampling and analysis.

**Selectivity:** means the capability of a method or instrument to respond to the target analyte in the presence of other substances or things.

**Self-assessment:** assessments of work conducted by individuals, groups, or organizations directly responsible for overseeing and/or performing the work.

**Service:** the result generated by activities at the interface between the supplier and the customer, and by supplier internal activities to meet customer needs. Such activities in environmental programs include design, inspection, laboratory and /or field analysis, repair, and installation.

**Shall:** denotes a requirement that is mandatory whenever the criterion for conformance with the specification requires that there is no deviation. This does not



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prohibit the use of alternative approaches or methods for implementing the specification so long as the requirement is fulfilled.

**Should:** denotes a guideline or recommendation whenever noncompliance with the specification is permissible.

**Significant condition:** any state, status, incident, or situation of an environmental process or condition, or environmental technology in which the work being performed will be adversely affected sufficiently to require corrective action to satisfy quality objectives or specifications and safety requirements.

**Specification:** a document stating requirements, and which refers to or includes drawings or other relevant documents. Specifications should indicate the means and the criteria for determining conformance.

**Spike:** a known mass of target analyte added to a blank sample or subsample; used to determine recovery efficiency or for other quality control purposes.

**Standard:** a protocol established by a recognized authority (such as the American society for Testing Materials, the American National Standards Institute, or the Institute of Electrical and Electronic Engineers).

**Standard Operating Procedures (SOPs):** a written document which details the method of an operation, analysis or action whose techniques and procedures are thoroughly prescribed, and which is accepted as the method for performing certain routine or repetitive tasks.

**Standard Reference Material (SRM):** a certified reference material produced by the U.S. National Institute of Standards and Technology and characterized for absolute content, independent of analytical method.

**Surrogate:** a substance with properties that mimic the analyte of interest. It is unlikely to be found in environment samples and is added to them for quality control purposes.

**Supplier:** any individual or organization furnishing items or services or performing work according to a procurement document or financial assistance agreement. This is an all-inclusive term used in place of any of the following: vendor, seller, contractor, subcontractor, fabricator, or consultant.



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**Surveillance (quality):** continual or frequent monitoring and verification of the status of an entity and the analysis of records to ensure that specified requirements are being fulfilled.

**Systems Audit (also Technical Systems Audit):** a thorough, systematic on-site, qualitative review of the facilities, equipment, personnel, training, procedures, record keeping, data validation, data management, and reporting aspects of a total measurement system.

**Target analyte:** means the analyte that a test is designed to detect or quantify.

**Technical Director:** the individual(s) responsible for managing the technical aspects of an organization, and ultimately accountable for the quality of the organization's product(s).

**Technical Analyst:** the designated individual who performs the "hands-on" analytical methods and associated techniques and who is the one responsible for applying required laboratory practices and other pertinent Quality Controls to meet the required level of quality.

**Technical review:** a documented critical review of work that has been performed within the state of the art. The review is accomplished by one or more qualified reviewers who are independent of those who performed the work but are collectively equivalent in technical expertise to those who performed the original work. The review is an in-depth analysis and evaluation of documents, activities, material, data, or items that require technical verification or validation for applicability, correctness, adequacy, completeness, and assurance that established requirements are satisfied.

**Technical systems audit (TSA):** a thorough, systematic, onsite, qualitative audit of facilities, equipment, personnel, training, procedures, record keeping, data validation, data management, and reporting aspects of a system.

**Test:** a technical operation that consists of the determination of one or more characteristics or performance of a given product, material, equipment, organism, physical phenomenon, process or service according to a specified procedure. NOTE - The result of a test is normally recorded in a document sometimes called a test report or a test certificate.

**Test Method:** defined technical procedure for performing a test.



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**Traceability**: the ability to trace the history, application, or location of an entity by means of recorded identifications. In a calibration sense, traceability relates measuring equipment to national or international standards, primary standards, basic physical constants or properties, or reference materials. In a data collection sense, it relates calculations and data generated throughout the project back to the requirements for quality for the project.

**Trip blank:** means a sample known not to contain the target analyte that is carried to the sampling site and transported to the laboratory for analysis without having been exposed to sampling procedures.
United States Environmental Protection Agency (EPA): the federal governmental agency with responsibility for protecting public health and safeguarding and improving the natural environment (I.e., the air, water, and land) upon which human life depends.

**User:** when used in the context of environmental programs, an organization, group, or individual that utilizes the results or products from environmental programs. A user may also be the client for whom the results or products were collected or created.

**Validation:** confirmation by examination and provision of objective evidence that the particular requirements for a specific intended use are fulfilled. In design and development, validation concerns the process of examining a product or result to determine conformance to user needs.

**Verification:** confirmation by examination and provision of objective evidence that specified requirements have been fulfilled. In design and development, validation concerns the process of examining a result of a given activity to determine conformance to the stated requirements for that activity.

**Work:** the process of performing a defined task or activity (e.g., research and development, field sampling, analytical operations, equipment fabrication).



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# Quality Assurance Program Plan

## Section 15 Glossary



| MOC# | Description of Change | Prepared By | Date |
|---|---|---|---|
| TS00020 | Review for 2004 | Janna Hardman | 09/30/2004 |
| TS00085 | Review for 2006 | Melissa Olsen | 08/04/2006 |
| | Review for 2008. No changes made. | Melissa Olsen | 10/07/2008 |
| | Review for 2009. No changes made. | Melissa Olsen | 01/26/2009 |
| | Review for 2010. Updated laboratory address in header. | Melissa Olsen | 02/22/2010 |
| 17479 | Review for 2011. No changes made. | Melissa Olsen | 10/11/2011 |
| 23199 | 2013 Review. No changes. | Melissa Olsen | 04/24/2013 |
| 26233 | Updated branding. | Melissa Olsen | 06/02/2014 |
| 30091 | Review for 2015. Added definition for electronic signature. Rev. 7 to 8 | Melissa Olsen | 04/09/2015 |
| 31572 | Review for 2016. No changes. | Melissa Olsen | 03/11/2016 |
| 43586 | Review for 2017. No changes. | Melissa Olsen | 03/27/2017 |
| | Review for 2018. No changes made. | Melissa Olsen | 09/04/2018 |
| 58723 | Review for 2019. No changes made. | Melissa Olsen | 08/19/2019 |
| 60468 | Review for 2020. No changes made. | Melissa Olsen | 01/13/2020 |
| 67192 | Review for 2020. No changes made. | Melissa Olsen | 09/17/2020 |
| 79250 | Review for 2021. No changes. | Melissa Olsen | 09/07/2021 |
| 94373 | Review for 2022. No changes. | Melissa Olsen | 12/02/2022 |

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# REFERENCES

1. U.S. Environmental Protection Agency, 1983, Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans: QAMS-005/80, February.
2. NELAC Quality Systems Chapter 5, 2016
3. NELAC TNI Standard, 2016
4. R444-14 Rule for the Certification of Environmental Laboratories, by the State of Utah Bureau of Laboratory Improvement.
5. American Industrial Hygiene Association, Laboratory Quality Assurance Program April 2002.
6. Kennecott Utah Copper Chemical and Hygiene Plan
7. Kennecott Safety Policies (most current is in Bentley, a commercial document control system).
8. Kennecott Utah Copper Environmental Laboratory SOP's and manuals, most current revision in Bentley

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# Quality Assurance Program Plan

## Section 16 References



| MOC# | Description of Change | Prepared By | Date |
|---|---|---|---|
| TS00020 | Review for 2004 | Janna Hardman | 09/30/2004 |
| TS00085 | Review for 2006 | Melissa Olsen | 08/04/2006 |
| | Review for 2008. Updated NELAC revision number and date. | Melissa Olsen | 10/07/2008 |
| | Review for 2009. No changes made. | Melissa Olsen | 01/26/2009 |
| | Review for 2010. Updated laboratory address in header. | Melissa Olsen | 02/22/2010 |
| 17479 | Review for 2011. Added reference #3-NELAC TNI Standard, Volume 1-2009 | Melissa Olsen | 10/11/2011 |
| 23199 | Review for 2013. No changes. | Melissa Olsen | 04/24/2013 |
| 26233 | Updated branding. | Melissa Olsen | 06/02/2014 |
| | Review for 2015. No changes. | Melissa Olsen | 04/24/2015 |
| 31572 | Review for 2016. No changes. | Melissa Olsen | 03/11/2016 |
| 43586 | Review for 2017. No changes. | Melissa Olsen | 03/27/2017 |
| | Review for 2018. No changes. | Melissa Olsen | 09/04/2018 |
| 58723 | Review for 2019. Updated #9 to Bentley. | Melissa Olsen | 08/19/2019 |
| 60468 | Review for 2020. No changes. | Melissa Olsen | 01/13/2020 |
| 67192 | Review for 2020. No changes. | Melissa Olsen | 09/17/2020 |
| 79250 | Review for 2021. No changes. | Melissa Olsen | 09/07/2021 |
| 94373 | Review for 2022. No changes. | Melissa Olsen | 12/02/2022 |
| 102982 | Updated NELAC references. Removed reference to Kennecott Waste manual. This manual is in the Central Lab Manuals which are in Bentley, a commercial document control system. Rev. 9 to 10 | Melissa Olsen | 11/03/2023 |



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# Control of Documents

All documents relating to the Quality Management System (QMS) at Kennecott Environmental Laboratory (KEL) are controlled according to the following document control procedures:

- CLSOP4423-1010 -Preparation of Standard Operating Procedures
- CLSOP4423-1015 -Quality Assurance Manual Maintenance and Updates

# Control of Records

Quality records are maintained to provide evidence of conformity to requirements and for the effective operation of the QMS. The records are maintained according to the following procedures:

- CLSOP4423-1027 - Onsite Storage and Control of Records
- CLSOP4423-1029 - Offsite Contracted Data Storage (Iron Mountain)

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| MOC# | Description of Change | Prepared By | Date |
|---|---|---|---|
| | Initial Release | Melissa Olsen | 02/22/2010 |
| 17479 | Review for 2011. No changes. | Melissa Olsen | 10/11/2011 |
| 23199 | Review for 2013. No changes. | Melissa Olsen | 04/24/2013 |
| 26233 | Updated branding. | Melissa Olsen | 06/02/2014 |
| 30091 | Review for 2015. No changes. | Melissa Olsen | 04/2015 |
| 31572 | Review for 2016. No changes. | Melissa Olsen | 04/11/2016 |
| 43586 | Review for 2017. No changes. | Melissa Olsen | 03/27/2017 |
| | Review for 2018. No changes. | Melissa Olsen | 09/04/2018 |
| 58723 | Review for 2019. No changes. | Melissa Olsen | 08/19/2019 |
| 60468 | Review for 2020. No changes. | Melissa Olsen | 01/13/2020 |
| 67192 | Review for 2020. No changes. | Melissa Olsen | 09/17/2020 |
| 79250 | Review for 2021. No changes. | Melissa Olsen | 09/07/2021 |
| 94373 | Review for 2022. No changes. | Melissa Olsen | 12/02/2022 |
| 102982 | Review for 2023. No changes. | Melissa Olsen | 11/03/2023 |



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# Procurement of Laboratory Supplies and Services

A documented procedure, CLSOP4423-7013 Procurement of Laboratory Supplies and Services, is followed to ensure purchased products and services conform to specified purchase requirements. The procedure outlines the extent of control and the criteria for the selection and evaluation of the suppliers.

| MOC# | Description of Change | Prepared By | Date |
|---|---|---|---|
| | Initial Release | Melissa Olsen | 02/22/2010 |
| 17479 | Review for 2011. No changes. | Melissa Olsen | 10/11/2011 |
| 23199 | Review for 2013. No changes. | Melissa Olsen | 04/24/2013 |
| 26233 | Updated branding. | Melissa Olsen | 06/02/2014 |
| 30091 | Review for 2015. No changes. | Melissa Olsen | 04/24/2015 |
| 31572 | Review for 2016. No changes. | Melissa Olsen | 03/11/2016 |
| 43586 | Review for 2017. No changes. | Melissa Olsen | 03/27/2017 |
| | Review for 2018. No changes. | Melissa Olsen | 09/04/2018 |
| 58723 | Review for 2019. No changes. | Melissa Olsen | 08/19/2019 |
| 60468 | Review for 2020. No changes. | Melissa Olsen | 01/13/2020 |
| 67192 | Review for 2020. No changes. | Melissa Olsen | 09/17/2020 |
| 79250 | Review for 2021. No changes. | Melissa Olsen | 09/08/2021 |
| 94373 | Review for 2022. No changes. | Melissa Olsen | 12/02/2022 |
| 102982 | Review for 2022. No changes. | Melissa Olsen | 11/03/2023 |

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GROUND WATER CHARACTERIZATION AND MONITORING PLAN
RIO TINTO KENNECOTT
SOUTH JORDAN, UTAH

Revision 12 - December 2023

Approved By: Cassady Kristensen Date: 1/11/2024
Cassady Kristensen
Senior Environmental BP – Rio Tinto Kennecott

Approved By: ______________ Date: 01/11/2024
Erka Naran
Principal Advisor, Water Quality – Project Manager

Approved By: Melissa Olsen Date: 01/08/24
Melissa Olsen
Superintendent, Environmental Laboratory
Quality Assurance Manager

Approved By: ______________ Date: 01/08/24
Trevor Paulson
Advisor Water Quality – Supervisor Sampling

## SUMMARY

Ground water conditions are monitored to evaluate ground water quality and the potential impacts on ground water beneath and near Rio Tinto Kennecott (RTK) facilities. Specific objectives of the ground water monitoring conducted by RTK are to: 1) establish baseline ground water quality and hydrogeologic conditions; 2) identify areas where operations may have impacted ground water conditions; 3) monitor ground water quality in areas impacted by operations; 4) monitor progress of ground water cleanup efforts, 5) provide continued monitoring in the vicinity of current operations to detect ground water quality impacts should they occur; 6) collect data for use in the classification of ground water; and, 7) comply with permit requirements.

The purpose of this Ground Water Characterization and Monitoring Plan is to set forth a project plan which utilizes standardized procedures and methods for the collection and review of ground water monitoring data. The following documents are incorporated within this Plan: 1) Health and Safety Plan; 2) Quality Assurance Project Plan; and 3) Standard Operating Procedures for Ground Water Sampling. The Health and Safety Plan addresses health and safety requirements for the conduct of the field work. The Quality Assurance Project Plan presents: 1) project organization and responsibilities; 2) quality assurance objectives for the collection of data in terms of precision, accuracy, representativeness, comparability, and completeness; 3) analytical procedures; and 4) guidelines for data verification and reporting, internal quality control checks, performance and systems audits, and corrective actions. The Standard Operating Procedures include all field activities associated with ground water sampling. Together these documents provide a systematic approach to be used in the collection of ground water monitoring data and the evaluation of regional baseline conditions when needed. The guidance and standard operating procedures will help to ensure a technically sound and defensible ground water characterization and monitoring program.

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## SECTION 1 OVERVIEW

### 1.1 Objectives

RTK currently utilizes an extensive ground water monitoring system to monitor the ground water levels and water quality in the vicinity of its facilities.

Specific objectives of the ground water monitoring program conducted by RTK have been to:

- Establish baseline ground water quality and hydrogeologic conditions.
- Identify areas where operations may have impacted ground water quality.
- Monitor ground water quality in areas impacted by operations.
- Monitor progress of ground water cleanup efforts.
- Provide continued monitoring in the vicinity of current operations to detect ground water quality changes should they occur.
- Assess adequacy of source control measures.
- Support the determination of ground water classifications; and
- Comply with permit monitoring requirements.

### 1.2 Purpose of Plan

The purpose of this Ground Water Characterization and Monitoring Plan (GCMP) is to establish a project plan which standardizes procedures and methods for the collection, analysis and reporting of ground water monitoring data. Therefore, a systematic approach will be used in the collection of monitoring data and the evaluation of ground water quality.

This document identifies the goals and objectives of the program and identifies project tasks. Requirements for data reporting and review, as well as periodic review of this Plan are included, along with the following documents:

- Health and Safety Plan (HSP).
- Quality Assurance Project Plan (QAPP).
- Standard Operating Procedures for Water Sampling (SOP).

The HSP addresses health and safety requirements for conducting fieldwork. The QAPP presents: 1) project organization and responsibilities; 2) quality assurance objectives for the collection of data in terms of precision, accuracy, representativeness, comparability, and completeness; 3) analytical parameters; and 4) guidelines for data verification and reporting, internal quality control checks, performance and systems audits, and corrective actions. The SOP presents standard operating procedures for field activities, including ground water sample collection and field measurements.

Site-specific project plans to evaluate contaminant sources, plume migration, and any need for remedial actions will be developed as necessary, independent of this

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GCMP. However, the procedures presented here will be used to collect the necessary data for such evaluations. As the need for additional field procedures and data evaluation techniques becomes evident during the planning and implementation of such projects, this GCMP will be amended to include those items. Monitoring locations, analytical parameters, and frequency of sampling will also be reviewed and updated regularly (unless specified in permits) as directed in this GCMP. Updates will be based on an analysis of results for each sampling point and the data needs for specific facility areas.

## SECTION 2 SITE SETTING AND BACKGROUND

This section provides the site setting as well as background information on operations and monitoring conducted on RTK property. For discussion purposes, the property is subdivided into two areas, the Great Salt Lake Area (GSL) and the Southwest Jordan Valley Area (SWJV). The SWJV area includes all areas associated with the Bingham Mine and the Copperton Concentrator. Features include the Mine, the leach water collection system, the leach and storm water reservoirs and the historic evaporation ponds. The locations of ground water monitoring points for the SWJV Area are shown in Plate 2. The GSL area includes the general area of the Utah Copper facilities associated with the concentrating, tailings disposal, smelting, and refining of metals. The locations of established ground water monitoring points are shown in Plate 1.

RTK has conducted two Remedial Investigation and Feasibility Studies (RI/FS) of mining- related contamination in groundwater. The first RI/FS is the area east of the mine dumps in the southwestern Jordan Valley. The second RI/FS consists of the areas beneath and down-gradient of the Smelter and Refinery.

In addition, other extensive ground water studies completed in these areas have resulted in the acquisition of baseline ground water data. The hydrogeologic setting and current ground water conditions beneath RTK property are described in the "Hydrogeologic Report for the Great Salt Lake Area" (KUC, 1992a) and in "Ground Water Assessment Report the Southwestern Jordan Valley Area" (KUC, 1992b). Ground water impacts may result from natural leaching of mineralized outcroppings, commercial leaching processes, ground water pumping, storage of water in surface water impoundments, seepage from irrigation and water supply canals, and the infiltration of precipitation. In order for RTK to evaluate the potential past and present impacts on ground water beneath and near its facilities, RTK has established a ground water monitoring network to monitor and evaluate ground water conditions. Wells utilized in the ground water monitoring network include RTK monitoring wells, State, City, and County monitoring wells, RTK production wells, and public and residential supply wells.

## SECTION 3 INITIAL EVALUATION

### 3.1 Ground Water

Ground water samples have previously been collected from many of the monitoring wells included in this monitoring program. Samples were predominately collected by the RTK Sampling Crews and analyzed by the RTK Environmental Laboratory. The analytical results for samples collected and analyzed by RTK and sampling performed by others are contained in the RTK Environmental Laboratory Information Management System (LIMS) and are summarized in Attachments to the Ground Water Characterization and Monitoring Plan issued in April of 1992. Data collected are presented in the Quarterly Ground Water Characterization and Monitoring Reports and Quarterly Quality Assurance Reports.

## SECTION 4 RATIONALE

### 4.1 Objectives and Approach

The general objective of this monitoring program is to better define and document current ground water quality conditions near RTK's operations. Annual data reviews and evaluations will determine the number and frequency of sampling points monitored to achieve the objectives. This document identifies the procedures to be used to evaluate and modify the number of points sampled and the sampling frequency.

### 4.2 Monitoring Well Selection

Monitoring well selection is grouped into three categories: 1) Objectives of ground water monitoring in the Great Salt Lake area, 2) Objectives of ground water monitoring in the southwestern Jordan Valley, and 3) Regulatory required sampling in both of these areas.

Detailed information used to define the objectives of the monitoring programs in the GSL area and the SWJV is compiled in two remedial investigations and feasibility studies (RI/FS) of mining-related contamination in groundwater. Both are conducted by RTK.

The following sections identify the sampling points included in this GCMP and the general rationale for their inclusion. Sample point locations are shown on Plates 1 and 2. Ground water monitoring well construction details in Attachment 1. The hydrogeologic conditions and types of operations vary depending on site location and facility use. Therefore, the monitoring programs in each location have different objectives and approaches. Table 1 is an example of a monitoring schedule included in the Annual Report, which summarizes the rationale for the wells, current monitoring frequencies, and monitoring parameters proposed for the current monitoring program. The rationale for selection of the monitoring points is summarized in the following sections.

#### 4.2.1 Great Salt Lake Area

The general objective of the monitoring program for the Great Salt Lake Area is to establish and document current local ground water and surface water conditions and trends and to collect the data required to meet existing, as well as anticipated future, regulatory requirements. A summary of ground water conditions in this area is provided in the "Hydrogeologic Report for the Great Salt Lake Area" (RTK, 1992a.)



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There exists an extensive network of shallow and deep ground water monitoring wells and piezometers in the GSL area. The monitoring wells included in this GCMP were installed near facilities at the north end of RTK property to monitor potential effects resulting from the Tailings Impoundment, Refinery, Smelter, as well as potential effects from other facilities.

These wells were used to establish the areal and vertical distribution of aquifers and aquitards, the direction and velocity of ground water flow in and between each aquifer, and the chemical composition of the water in each aquifer.

State, County, and City monitoring wells were used to investigate ground water conditions near the Tailings Impoundment and in the vicinity of the City and County landfills up-gradient of the Tailings Impoundment (Slam 1989a, 1989b). These wells were included in the monitoring program in 1991 in order to further document the ground water conditions but will no longer be sampled.

#### *4.2.1.1 Baseline Program*

In order to accomplish the monitoring objectives identified for the GSL area, a program of baseline monitoring was established. The basis of this program was to collect four quarterly rounds of ground water samples for a comprehensive suite of analytes from each well. After collection of the baseline data, these monitoring data were reviewed to evaluate the need for continued monitoring, the need for expansion of the monitoring system, and the types of analyses required.

#### *4.2.1.2 North Zone Groundwater*

The general objective of the monitoring program in the North Zone Groundwater Operation, Maintenance, and Replacement Plan (OM&R Plan) (in preparation) is to track the nature and extent of ground water contamination from the smelter and refinery. Specifically, the program:

1. monitors the natural attenuation of the selenium plume from the refinery.
2. monitors the natural attenuation of the selenium and arsenic plumes at the smelter.
3. monitors the effectiveness of source control actions taken at the smelter and refinery and
4. provides baseline data concerning background water quality.

Oversight for the OM&R Plan is provided by Environmental Protection Agency Region VIII (EPA), Utah Department of Environmental Quality (UDEQ), and a Technical Review Committee (TRC) of various interested parties. The OM&R Plan interfaces with the GCMP in two significant areas. First, all of the data generated and used in the OM&R Plan is collected from monitoring wells that are part of the GCMP.

The second important relationship between the OM&R Plan and the GCMP is that all of the water data collected required for the OM&R Plan is subjected to the quality assurance/quality control (QA/QC) standards established in the GCMP.

#### *4.2.2.3 Continued Monitoring Program*

All baseline data have been reviewed to evaluate additional monitoring requirements. Evaluation of these requirements were based on the following:

- Aberrant data - Graphs of analytical parameters as a function of time were constructed to identify data that appear to be erroneous or deviate significantly from established data trends. If these aberrant data appeared to significantly affect the interpretation of the data for the well, additional frequent monitoring was recommended. This consideration was generally limited to the analytical constituents TDS, As, Se, Cu and Cd.

- Identification of significant temporal data trends - Evaluation of the existing data indicates many current temporal changes in the data. These changes imply that ground water conditions are changing in response to some stimulus. In many cases, these changes appear to be in response to seasonal fluctuation or other observable factors effecting ground water conditions. Where these trends are unusual, unexplained, and or appear to be significant to the understanding of ground water conditions, the wells displaying these changes were selected for additional monitoring at a frequency that would further document the presence or absence of the trend.

- Establishment of a longer or more detailed sampling history - Review of the data showed many wells in which the variation of critical analytes was greater or less than expected and additional analyses are required to identify the nature and extent of the variation. Long-term monitoring of potentially affected wells - In a number of cases, particularly in the vicinity of the Refinery, wells were identified that may have been affected by RTK operations.

Current Wells and sampling frequencies for project plans are based on one or more of the factors identified above and are identified and submitted in the Annual Report Table 1.

### 4.2.2 Southwest Jordan Valley Area

The general objective of the monitoring program in the Southwest Jordan Valley Area is to monitor groundwater plume containment and cleanup in order to meet RTK monitoring obligations under the South Facilities Groundwater Operations, Maintenance, and Replacement Plan (RTK, 2009). Specifically, the program:

1. monitors the containment and cleanup of the low pH and elevated metals plume.
2. monitors the containment and cleanup of the plume containing elevated sulfate/TDS concentrations.
3. monitors the effectiveness of the leach collection system at the toe of the waste rock dumps.
4. monitors the water quality in the areas near 11800 South Street where municipal, domestic and irrigation water supply wells are located near or down gradient of the elevated sulfate/TDS plume.

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5. meets existing, as well as, anticipated future monitoring requirements; and
6. provides baseline data concerning background water quality. The program will also monitor the effectiveness of source-control actions at the Bingham Reservoir and the Eastside Collection System.

Areas affected by RTK and pre-RTK operations have been defined using the existing database. A summary of the ground water and surface water results provided to date are given in "Ground Water Assessment Report of the Southwestern Jordan Valley Utah" (KUC, 1992b, RIFS KUC 1998, and RD/RA KUC 2002).

The 1998 SWJV RI report documents the field investigations conducted by RTK, presents the site characteristics, assesses the nature and extent of mining-related contamination, provides human health and ecological risk assessments, and offers conclusions regarding the risk to human health and the environment posed by mining related contamination. The study area covered by the RI extends from the RTK waste rock disposal areas on the eastern edge of the Oquirrh Mountains to the Jordan River. It is bounded on the north at approximately 7800 South Street and on the south by the foothills of the Traverse Mountains.

RTK funded and conducted the work for the RI/FS with oversight by the U.S. Environmental Protection Agency (EPA) Region VIII, the State of Utah Department of Environmental Quality (UDEQ) and a Technical Review Committee (TRC). The activities conducted by RTK were consistent with applicable guidance under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA also known as Superfund), and with requirements of the National Contingency Plan (NCP).

In addition to the RI report, a well inventory of the SWJV was conducted to determine the existence and use of all wells in the southwest part of the valley. This information has been used to review current GCMP sampling locations and identify changes to be made in future GCMP schedules.

#### *4.2.2.1 Continued Monitoring Program*

Sampling of a select group of wells associated with the Bingham Creek Reservoir low-pH, elevated-metals plume will generally occur biannually in order to monitor chemistry changes associated with extraction of the plume. On the leading (eastern) edge of the low-pH plume, monitoring of select wells will occur on a semiannual basis to track advancement of the plume. All samples from these wells will be analyzed for Basic and Major analytical suites plus dissolved iron, aluminum, manganese, and acidity.

Selected wells completed in portions of the aquifer that contain elevated sulfate but not low-pH will be monitored for Basic and Major group analytes. These wells are mostly completed in the halo of elevated sulfate surrounding the Bingham Creek Reservoir low-pH plume.

Key wells located in the areas between and around the B2G1193–BFG1200 and West Jordan City well fields will be sampled on a quarterly, semiannual or annual



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basis to monitor movement of the elevated-sulfate plume. All samples from these wells will be analyzed for Basic group analytes and some for Major group analytes as well. The higher monitoring frequency of these wells over those previously listed is warranted by concerns of potential effects on third party interests. Other wells that are sampled because of third party concerns include privately or municipally owned wells and RTK wells completed near areas where third parties are using water, such as irrigation wells near the elevated-sulfate plume east of the Former RTK Evaporation Ponds.

Many monitoring wells located immediately down-gradient of the leach collection system are included in regulatory monitoring and are listed in the following section. A few wells located in this area but not included in any permit required monitoring program will be sampled annually for Basic and Major analytical suites.

Several wells will be monitored for changes in Basic and Major group analytes as part of approved Drinking Water Source Protection plans, and several production wells will be sampled quarterly or annually to monitor water quality used at various RTK facilities.

#### 4.2.3 Regulatory Monitoring Requirements

RTK has six groundwater discharge permits issued by the State of Utah which require groundwater monitoring for compliance with the permits. Portions of both the SWJV and GSL are under one or more of the following permits:

- Large and Small Bingham Reservoirs - UGW350006
- Smelter – UGW350008
- Bingham Canyon Mine and Water Collection System – UGW350010
- Tailings Impoundment – UGW350011
- Magna Process Water Reservoir Facility – UGW350015
- Copperton Concentrator – UGW350017
- Barneys Canyon – UGW350001

### 4.3 Selection of Analytical Parameters

Based on the review of the existing data and regulatory (potential as well as existing) requirements, different groups of analytical parameters have been identified as listed below:

- Basic
- Major Ions
- Minor Ions
- Trace Metals 1, Trace Metals 2, Trace Metals 3
- Mercury
- Radionuclides
- Other.

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Basic

The basic group of analyses is comprised of the analytes that are sensitive to changes in ground water quality that could result from RTK's operations. The analytes included in the basic group are listed in Table 2 and include conductivity, pH, TDS, TSS, sulfate, chloride. Arsenic, selenium, copper, lead, zinc, and cadmium are analyzed for dissolved concentrations only unless totals are requested. Significant changes in ground water conditions potentially caused by RTK's operations can be detected early through monitoring of only these analytes.

Major Ions

The Major Ions group, when combined with the Basic Parameter group provides sufficient analyses to allow for the calculation of ionic and mass balances. This list of constituents is required for all wells monitored to satisfy monitoring requirements to meet the conditions of Ground Water Discharge Permits. The analyses included in Major Ion group are listed in Table 2 and include: alkalinity, calcium, potassium, magnesium, and sodium.

Minor Ions

The Minor Ion group adds some minor ions and indicator parameters that provide additional insight into the nature of the water sampled. The primary use of these constituents is for the initial characterization of water chemistry. This group is commonly monitored where the water is believed to be at a reducing potential. The analyses included in the Minor Ion group are listed in Table 2 and include: fluoride, nitrate, nitrite, phosphorus, dissolved oxygen, Eh, ferrous iron, and sulfide.

Trace Metals

The trace metals have been divided into three groups as follows:

| | |
|---|---|
| Trace Metals 1 | This group includes the trace metals barium, chromium, and silver. These metals are the most commonly requested trace metals. These trace metals have MCL's under the Safe Drinking Water Act (SDWA) and with the basic group from above contain the eight RCRA metals. |
| Trace Metals 2 | This group includes the metals iron, manganese, molybdenum, and nickel. These metals are added to include the common trace metals that have only secondary standards under the SDWA. |
| Trace Metals 3 | This group includes the trace metals aluminum, antimony, beryllium, boron, thallium, and titanium, which are rarely requested. |
| Radionuclides | The radionuclide group includes the analytes: radium 226, radium 228, total uranium, gross alpha and gross beta. This list of constituents is required for wells monitored to satisfy the conditions of the Ground Water Discharge Permit for the Tailings Impoundment in the area near the former Gypsum Tailings Impoundment. |

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| | |
|---|---|
| Mercury | Mercury analysis is done on total metals only. The analysis is to satisfy the requirements of the ground water discharge permits as well as some of the drinking water requirements. |
| Other | This is used to request additional analytes such as Cyanide (CN), Nitrates, Total Petroleum Hydrocarbons (TPH), Benzene, Toluene, Ethyl Benzene, Xylene, and Naphthalene (BTEX-N) et al. In addition, a new category listed in this group as "Balance" will include the trace metals aluminum, iron, manganese, and also acidity. This category when requested on low pH water samples will provide a more complete geochemical analysis to obtain and calculate a charge balance. |

### 4.4 Data Quality Objectives

Data Review

The results of all sampling will be reviewed by the Project Manager (Principal Advisor Water Quality) or his designee upon receipt of analytical results from the laboratory. If based on a timely review of analytical data, any significant questions are raised regarding the quality or representativeness of the results, the well will be re-sampled.

Objectives

The data quality objectives of this Plan are discussed in detail in the Quality Assurance Project Plan (QAPP) and summarized below:

- The precision objectives for analytical and field methods are: 1) within 25% of the relative percent difference or + (4) times the MDL (per 40 CFR Part 136, Ap. B Rev 1.1, July 1, 1992) whichever is greater, for duplicate samples; and 2) 75% to 125% recovery for matrix spike duplicates (70% to 130% for organic compounds). It is recognized that these objectives may not be appropriate for certain parameters and for high TDS water; particularly containing high levels of chloride and sulfate.

- The accuracy objectives for analytical and field methods are: 1) less than the method quantitation limit for blank; and 2) 75% to 125% recovery for spikes if the concentration is 10 times or greater than the MDL, (70% to 130% for organic compounds). These objectives have been identified for relatively low TDS water and will vary with TDS.

- All sample collection and measurements will be performed in accordance with protocols and procedures documented in the QAPP and SOP to assure sample representativeness. All RTK Environmental and Industrial Hygiene Laboratory Procedures are available on the RTK Intranet. These documents are controlled through the Documentum Program.

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- Every effort will be made to achieve data collection completeness.

- Comparability of data will be accomplished through the use of standard operating procedures.

## SECTION 5 TASKS

The following tasks have been identified for the Ground Water Characterization and Monitoring Plan:

| | |
|---|---|
| TASK 1 | Project Planning and Quality Assurance |
| TASK 2 | Sample Point Selection |
| TASK 3 | Sampling |
| TASK 4 | Site-wide Water-level Measurements |
| TASK 5 | Verification of Results and Data Evaluation |
| TASK 6 | Well Abandonment |
| TASK 7 | New Well Construction |
| TASK 8 | Annual Ground Water Characterization and Monitoring Reports |
| TASK 9 | Periodic Update of Ground Water Characterization and Monitoring Plan |

### 5.1 TASK 1 - PROJECT PLANNING AND QUALITY ASSURANCE

This task consists of the planning, preparation, quality assurance planning, and coordination required maintaining and fully implementing this Plan. Project planning will continue throughout the project to ensure the achievement of project objectives. The process for reviewing and updating the Ground Water Characterization and Monitoring Plan is discussed in Task 9.

Quality assurance planning is documented in the QAPP. The QAPP lists the quality control samples to be collected in conjunction with routine monitoring in order to measure the precision, accuracy, representativeness, and comparability of field and laboratory techniques. Guidelines for data verification and reduction, internal quality control checks, performance and systems audits, and corrective actions are also presented in the QAPP.

### 5.2 TASK 2 - SAMPLE POINT SELECTION

Wells considered for sampling were selected from the following groups of wells:
- RTK monitoring wells and piezometer
- RTK production wells
- State, county, and city monitoring wells
- Public and residential wells
- Municipal wells.

The selected wells and sampling frequency for these wells are listed in the current Annual Report in Table 1. The general objectives and rationale for the selection of these wells are discussed in section 4.



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### 5.2.1 Addition of New Monitoring Points

Additional sampling points may be added to the monitoring program at a future date, provided that the rationale for the addition of a sampling site is documented by submitting a Well Approval Form to the Project Manager for approval prior to inclusion to the network. Potential rationale for expanding the monitoring program includes the identification of sampling points located in critical areas, replacement of existing sampling points which must be abandoned, and the identification of problem areas. Such documentation (to be filed in the Water Quality Data Filing System) will include monitoring parameters, monitoring frequency, and previously collected monitoring data.

## 5.3 TASK 3 – SAMPLING

Water sampling activities will be conducted in accordance with the Standard Operating Procedures (SOP). Procedures to be used in the collection of water samples include:

| | |
|---|---|
| DC-01 through DC-07 | Sample Documentation and Sample Handling |
| MD-01 through MD-03 | Equipment Maintenance and Decontamination |
| QC-01 through QC-05 | Quality Control Sampling |
| GF-01 through GF-16 | Measurement of Field Parameters |
| GW-01 through GW-14 | Collection of Ground Water Samples |
| PW-01 through PW-15 | Collection of Process Water Samples |
| DW-01 through DW-09 | Collection of Drinking Water Samples |
| SW-01 through SW-11 | Collection of Surface Water Samples |
| SS-01 through SS-05 | Collection of Sediment Samples. |

## 5.4 TASK 4 - SITE-WIDE WATER LEVEL MEASUREMENTS

In addition to the water level or hydraulic head measurements taken prior to each sampling event, annual water level measurements, in select, monitoring wells will be made. These water levels will be completed as required by permit conditions and/or the needs of special projects. The measurements will be taken during the shortest elapsed time period that is feasible.

Site-wide water-level measurements will allow an evaluation of the relationships between surface water and the ground water potentiometric surface. Such determinations are not possible using measurements taken at the time of sampling over several weeks or months.

Potentiometric information is required in order to evaluate the ground water regime with respect to flow velocity and direction. Details of the methods and procedures used to conduct these measurements are provided in the SOP.

## 5.5 TASK 5 - VERIFICATION OF RESULTS AND DATA EVALUATION

Verification of analytical results will include ion balances (when complete analyses are conducted for major cations and anions), statistical checks against previous results, and spot checks of data transfer. Data management

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is described in Section 5 of the QAPP.

### 5.6 TASK 6 - WELL ABANDONMENT

A monitoring well must be properly abandoned (i.e., filled or plugged with an "impermeable" material) if it will no longer be used due to the availability of nearby wells, access problems, susceptibility to flooding, lack of water in well, well construction problems, or impending destruction due to construction activities on RTK property. A well must also be abandoned if the integrity of the annulus seal is in question. Lack of proper abandonment may result in a pathway for surface spills or cross-contamination between aquifers of different depth and quality. All monitoring well abandonments will be done in compliance with State of Utah Administrative Rules for Water Well Drillers. Procedures for monitoring well abandonment are provided in the SOP.

### 5.7 TASK 7 - NEW WELL CONSTRUCTION

The Project Manager assigned to a well installation project will select the appropriate drilling method based on expected subsurface conditions. The auger or vibratory sonic methods are appropriate for wells in lake bottom sediments (unconsolidated materials) to depths of about 100 feet. Vibratory sonic and mud or air rotary and cable tool are appropriate for unconsolidated and consolidated formations of greater depths. The water or mud used with rotary or cable tool methods must be free of contaminants and of a known composition. Procedures for new well construction are provided in the SOP.

### 5.8 TASK 8 - GROUND WATER CHARACTERIZATION AND MONITORING REPORTS

Brief reports will be written within 90 days after the end of each quarter for internal use to summarize results for the previous three months. An Annual Ground Water Characterization and Monitoring Report will present the results of the previous year's monitoring and the proposed monitoring plan for the current year. This report will be prepared by March 31 for each monitoring year (e.g., January 1 through December 31) to allow a three-month turnaround time for laboratory analyses and report preparation. The report outline will generally adhere to the following:

1.0 Summary
2.0 Introduction
3.0 Quality Assurance Summary
4.0 Summary of Water Quality Analyses
5.0 Ground Water Characterization
6.0 Well Abandonment
7.0 New Well Construction
8.0 Program Changes
9.0 Recommendations for Program Changes

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### 5.9 TASK 9 - UPDATE OF GROUND WATER CHARACTERIZATION AND MONITORING PLAN

The Ground Water Characterization and Monitoring Plan is a working document. Updates may be made by documenting the change to the file and reporting the change in the quarterly and annual monitoring reports. The Supervisor Sampling will review this Plan in September of each year. After completion of this review, the manager will determine whether or not a formal revision is needed.

The Utah State Division of Water Quality will be notified prior to implementing any changes to this document that will significantly affect the collection and analysis of regulatory required samples.

## SECTION 6 SCHEDULE

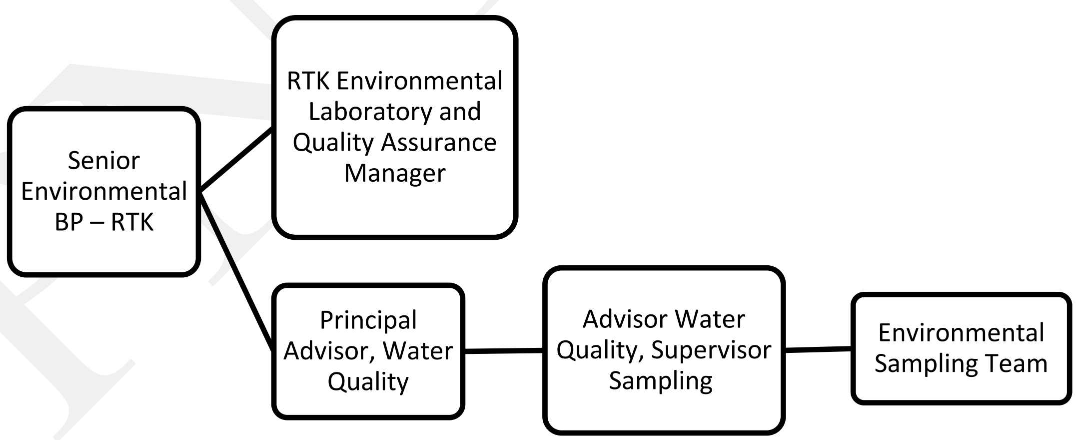
A comprehensive sampling and monitoring schedule of sampling at each point will be included in the Annual Reports Table 1. Water levels are to be measured as required by the sampling schedule in the Table 1.
Annual measurements will be done in the summer or late fall.

## SECTION 7 PROJECT MANAGEMENT

### 7.1 PROJECT ORGANIZATION

The organizational structure for implementing the ground water sampling efforts is shown in Figure 1. Responsibilities of each of the positions are described in Section 2 of the Quality Assurance Project Plan.

**FIGURE-GCMP 1. Project Organization Chart for the Ground Water Characterization and Monitoring Program**



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## TABLE-GCMP 1. RTK GROUND WATER MONITORING PROGRAM

LEGEND

| | |
|---|---|
| M | Monthly |
| Q | Quarterly sampling |
| A | Annual sampling |
| S | Semi-Annual sampling |
| E | Every other year |
| F | Sampled every five years |
| NS | Not Sampled |

NOTE:

- Table lists sample frequency as of 2023. Changes in well status is maintained in a RTK Monitoring Well database which is reviewed and updated as needed.
- Trace metals will be run only for dissolved constituents unless otherwise noted.
- Location coordinates are based on RTK mine coordinates.
- List includes only RTK monitoring wells, State, County, and others are not listed.

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| Site ID | Current Sample Frequency | Hg | CN | Total Metals | Basic | Basic Total Metals | Minor | Major | Trace 1 | Trace 2 | Trace 3 | RA-1 | RA-2 | Trace 1 - Total Metals | Trace 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **ADS2560** | S | | | | Yes | | | | Yes | | | | | | |
| **ADS2561** | S | | | | Yes | | | | Yes | | | | | | |
| **B1G1120A** | A | Y | | | Yes | | | Yes | | | | Yes | | | Yes |
| **B1G1120B** | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| **B1G951** | E | Y | | | Yes | | | Yes | Yes | | | Yes | | | |
| **B2G1157A** | S | Y | | | Yes | | | Yes | | | | Yes | | | |
| **B2G1157B** | S | Y | | | Yes | | | Yes | | | | Yes | | | |
| **B2G1157C** | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| **B2G1176A** | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| **B2G1176B** | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| **B2G1193** | Q | Y | | Y | Yes | Yes | | Yes | | | | Yes | | | |
| **B2G1194A** | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| **B2G1194B** | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| **B3G1197A** | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| **B3G1197B** | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BCG2788A** | F | Y | Y | | Yes | | | Yes | Yes | | | | | | |
| **BCG2788C** | F | Y | Y | | Yes | | | Yes | Yes | | | | | | |
| **BCG281** | S | Y | Y | | Yes | | | Yes | Yes | | | | | | |
| **BCG282** | S | Y | Y | | Yes | | | Yes | Yes | | | | | | |
| **BCG283** | S | Y | Y | | Yes | | | Yes | Yes | | | | | | |
| **BCG284** | S | Y | Y | | Yes | | | Yes | Yes | | | | | | |
| **BCG2846** | S | Y | Y | | Yes | | | Yes | Yes | | | | | | |
| **BCG285** | S | Y | Y | | Yes | | | Yes | Yes | | | | | | |
| **BCG2860A** | M | Y | Y | Y | Yes | Yes | | Yes | Yes | | | | | | |
| **BCG2860B** | M | Y | Y | Y | Yes | Yes | | Yes | Yes | | | | | | |
| **BCG496** | Q | Y | Y | | Yes | | | Yes | Yes | | | | | | |
| **BCG848** | Q | Y | Y | | Yes | | | Yes | Yes | | | | | | |
| **BCG849** | S | Y | Y | | Yes | | | Yes | Yes | | | | | | |
| **BCG850** | S | Y | Y | | Yes | | | Yes | Yes | | | | | | |
| **BCG851A** | Q | Y | Y | | Yes | | | Yes | Yes | | | | | | |
| **BCG851B** | Q | Y | Y | | Yes | | | Yes | Yes | | | | | | |
| **BCG852** | S | Y | Y | | Yes | | | Yes | Yes | | | | | | |
| **BCP1483** | M | Y | | | Yes | Yes | | Yes | | | | | | | Yes |
| **BCP1483A** | M | | | | | | | | | | | | | | |
| **BCP2738** | V | | | | YES | | | YES | | | | | | | |
| **BCP2739** | M | | | | YES | | | YES | | | | | | | |
| **BCP2741** | M | | | | YES | | | YES | | | | | | | |
| **BCP2743** | M | | | | YES | | | YES | | | | | | | |
| **BCP2750** | M | | | | YES | | | YES | | | | | | | |
| **BCS2730** | A | Y | Y | | Yes | | | Yes | | | | | | | |
| **BCS2731** | A | Y | Y | | Yes | | | Yes | | | | | | | |
| **BCS2732** | A | Y | Y | | Yes | | | Yes | Yes | | | | | | |
| **BCS2733** | A | Y | Y | | Yes | | | Yes | | | | | | | |
| **BCS2734** | A | Y | Y | | Yes | | | Yes | | | | | | | |
| **BCS2834** | S | Y | Y | | Yes | | | Yes | Yes | | | | | | |
| **BCS2835** | S | Y | Y | | Yes | | | Yes | Yes | | | | | | |
| **BCS2836** | S | Y | Y | | Yes | | | Yes | Yes | | | | | | |
| **BCS2837** | S | Y | Y | | Yes | | | Yes | Yes | | | | | | |
| **BCS2838** | S | Y | Y | | Yes | | | Yes | Yes | | | | | | |
| **BCS2845A** | S | Y | Y | | Yes | | | Yes | Yes | | | | | | |
| **BCS2845C** | S | Y | Y | | Yes | | | Yes | Yes | | | | | | |
| **BCS2845D** | S | | | | Yes | | | Yes | Yes | | | | | | |
| **BFG1136B** | E | Y | | | Yes | | | | | | | | | | |
| **BFG1156B** | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BFG1156C** | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BFG1156D** | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BFG1168B** | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BFG1195A** | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BFG1195B** | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BFG1198B** | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BFG1200** | Q | Y | | Y | Yes | Yes | | Yes | | | | Yes | | | |
| **BKG1474B** | F | Y | | | Yes | | | Yes | Yes | Yes | | | | | |
| **BMG2571** | Q | Y | | | Yes | | | Yes | Yes | Yes | Yes | | | | |
| **BMP2712** | S | | | | Yes | | | Yes | Yes | | | | | | |
| **BMP2869** | M | | | Y | Yes | Yes | | Yes | Yes | Yes | Yes | Yes | | Yes | |
| **BMS2864** | Q | Y | | | Yes | Yes | | Yes | | | Yes | Yes | | | |
| **BRG287** | S | | | | Yes | | | Yes | Yes | | | | | | |
| **BRG921** | S | Y | | | Yes | | | Yes | Yes | | | | | | |
| **BRG999** | S | | | | Yes | | | Yes | Yes | | | | | | |

| Site ID | Current Sample Frequency | Hg | CN | Total Metals | Basic | Basic Total Metals | Minor | Major | Trace 1 | Trace 2 | Trace 3 | RA-1 | RA-2 | Trace 1 - Total Metals | Trace 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BRP1476** | S | | | | Yes | | | Yes | Yes | | | | | | |
| **BRP292** | S | Y | | | Yes | | | Yes | Yes | | | | | | |
| **BSG1119B** | S | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG1125B** | A | | | | Yes | | | Yes | | | | | Yes | | |
| **BSG1125C** | E | | | | Yes | | | Yes | | | | | Yes | | |
| **BSG1130A** | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG1130B** | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG1132A** | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG1132B** | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG1133B** | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG1135B** | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG1137A** | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG1137B** | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG1148A** | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG1148B** | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG1153B** | E | Y | | | Yes | | | Yes | | | | | | | Yes |
| **BSG1177A** | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG1177B** | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG1177C** | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG1179B** | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG1179C** | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG1180A** | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG1180B** | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG1180C** | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG1196B** | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG1196C** | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG1201** | Q | Y | | | Yes | | | Yes | Yes | | | Yes | | | |
| **BSG2777A** | S | Y | | | Yes | | | Yes | Yes | | | Yes | | | |
| **BSG2777B** | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG2778A** | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG2778B** | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG2779A** | S | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG2779B** | S | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG2779C** | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG2782A** | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG2782B** | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG2782C** | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG2783A** | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG2783B** | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG2783C** | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG2784** | Q | Y | | | Yes | | | Yes | | | | Yes | | | |
| **BSG2828** | Q | Y | | | Yes | | | Yes | Yes | Yes | | | | | |
| **BYD1090** | M | | | Y | | | | | | | | | | Yes | |
| **BYP2538** | M | | | | YES | | | YES | | | | | | | |
| **CLC452** | Q | | | | Yes | | | Yes | Yes | | | | | | |
| **COG1112A** | E | | | | Yes | | | Yes | | | | | | | |
| **COG1112B** | F | | | | Yes | | | Yes | | | | | | | |
| **COG1149A** | Q | | Y | | Yes | | | Yes | Yes | | | | | | |
| **COG1149B** | Q | | Y | | Yes | | | Yes | Yes | | | | | | |
| **COG1152A** | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| **COG1172** | A | | | | Yes | | | Yes | Yes | | | | | | |
| **COG1175B** | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| **COG1178B** | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| **COG2701** | S | | | | Yes | | | Yes | Yes | | | | | | |
| **COG2806A** | S | | | | Yes | | | Yes | Yes | | | | | | Yes |
| **COG2806B** | S | | | | Yes | | | Yes | Yes | | | | | | Yes |
| **COG2867A** | Q | | Y | | Yes | | | Yes | Yes | | | | | | |
| **COG2867B** | Q | | Y | | Yes | | | Yes | Yes | | | | | | |
| **COG995A** | S | | | | Yes | | | Yes | Yes | | | | | | |
| **COG995B** | S | | | | Yes | | | Yes | Yes | | | | | | |
| **ECG1100A** | Q | | | | yes | | | yes | yes | | | | | | |
| **ECG1100B** | Q | | | | yes | | | yes | yes | | | | | | |
| **ECG1106A** | S | | | | Yes | | | Yes | Yes | | | | | | |
| **ECG1106B** | S | | | | Yes | | | Yes | Yes | | | | | | |
| **ECG1113A** | S | | | | Yes | | | Yes | | | | | Yes | | |
| **ECG1114A** | E | Y | | | Yes | | | Yes | | | | | | | |
| **ECG1114B** | E | Y | | | Yes | | | Yes | | | | | | | |
| **ECG1115A** | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| **ECG1115B** | E | Y | | | Yes | | | Yes | | | | Yes | | | |

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| Site ID | Current Sample Frequency | Hg | CN | Total Metals | Basic | Basic Total Metals | Minor | Major | Trace 1 | Trace 2 | Trace 3 | RA-1 | RA-2 | Trace 1 - Total Metals | Trace 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ECG1115C | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| ECG1115D | F | Y | | | Yes | | | Yes | | | | Yes | | | |
| ECG1116B | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| ECG1117A | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| ECG1117B | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| ECG1118A | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| ECG1118B | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| ECG1121A | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| ECG1121B | F | Y | | | Yes | | | Yes | | | | Yes | | | |
| ECG1124B | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| ECG1124C | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| ECG1128A | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| ECG1128B | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| ECG1131A | E | Y | | | | | | | | | | | | | |
| ECG1131B | E | Y | | | Yes | | | Yes | | | | | | | Yes |
| ECG1131C | E | Y | | | Yes | | | Yes | | | | | | | Yes |
| ECG1144B | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| ECG1145B | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| ECG1145C | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| ECG1146 | Q | Y | | | Yes | | | Yes | | | | Yes | | | |
| ECG1182A | E | Y | | | Yes | | | Yes | | | | | | | |
| ECG1182B | E | Y | | | Yes | | | Yes | | | | | | | |
| ECG1183A | E | | | | Yes | | | Yes | | | | | Yes | | |
| ECG1183B | E | | | | Yes | | | Yes | | | | | | | |
| ECG1184 | A | | | | Yes | | | Yes | Yes | | | | Yes | | |
| ECG1185 | S | | | | Yes | | | Yes | Yes | | | | Yes | | |
| ECG1186 | Q | | | | Yes | | | Yes | Yes | | | | Yes | | |
| ECG1187 | Q | | | | Yes | | | Yes | Yes | | | | Yes | | |
| ECG1188 | Q | | | | Yes | | | Yes | Yes | | | | Yes | | |
| ECG1189 | Q | | | | Yes | | | Yes | Yes | | | | Yes | | |
| ECG1190 | Q | | | | Yes | | | Yes | Yes | | | | Yes | | |
| ECG2787 | Q | Y | | | Yes | | | Yes | Yes | | | | | | |
| ECG2833A | A | | | | Yes | | | Yes | | | | | | | |
| ECG2833B | A | | | | Yes | | | Yes | | | | | | | |
| ECG2833C | A | | | | Yes | | | Yes | | | | | | | |
| ECG2833D | A | | | | Yes | | | Yes | | | | | | | |
| ECG2853A | S | | | | Yes | | | Yes | | | | | | | |
| ECG2853B | S | | | | Yes | | | Yes | | | | | | | |
| ECG2859 | S | | | | Yes | | | Yes | Yes | | | | | | |
| ECG2866A | Q | | | | Yes | | | Yes | Yes | | | | | | |
| ECG2866B | Q | | | | Yes | | | Yes | Yes | | | | | | |
| ECG299 | S | | | | Yes | | | Yes | Yes | | | | | | |
| ECG901 | S | | | | Yes | | | Yes | Yes | | | | | | |
| ECG902 | S | | | | Yes | | | Yes | Yes | | | | | | |
| ECG905 | S | | | | Yes | | | Yes | Yes | | | | | | |
| ECG906 | S | | | | Yes | | | Yes | Yes | | | | | | |
| ECG907 | Q | | | | Yes | | | Yes | Yes | | | | | | |
| ECG916 | S | | | | Yes | | | Yes | Yes | | | | | | |
| ECG917 | Q | | | | Yes | | | Yes | Yes | | | | | | |
| ECG922 | A | | | | Yes | | | Yes | Yes | | | | | | |
| ECG924 | Q | | | | Yes | | | Yes | Yes | | | | | | |
| ECG925 | Q | | | | Yes | | | Yes | Yes | | | | | | |
| ECG928 | S | | | | Yes | | | Yes | Yes | | | | | | |
| ECG931 | S | | | | Yes | | | Yes | Yes | | | | | | |
| ECG932 | S | | | | Yes | | | Yes | Yes | | | | | | |
| ECG933 | A | | | | Yes | | | Yes | Yes | | | | | | |
| ECG934 | S | | | | Yes | | | Yes | Yes | | | | | | |
| ECG935 | S | | | | Yes | | | Yes | Yes | | | | | | |
| ECG936 | S | | | | Yes | | | Yes | Yes | | | | | | |
| ECG937 | S | | | | Yes | | | Yes | Yes | | | | | | |
| ECG938 | S | | | | Yes | | | Yes | Yes | | | | | | |
| ECP2562 | S | Y | | | Yes | | | Yes | Yes | | | | | | |
| ECP2599 | S | Y | | | Yes | | | Yes | Yes | Yes | Yes | | | | |
| ECP2601 | S | | | | Yes | | | Yes | Yes | | | | | | |
| ECP2603A | S | | | | Yes | | | Yes | Yes | | | | | | |
| ECP2603B | S | | | | Yes | | | Yes | | | | | | | |
| ECP2605A | S | | | | Yes | | | Yes | Yes | | | | | | |
| ECP2605B | S | | | | | | | | | | | | | | |
| ECP2606 | S | | | | Yes | | | Yes | Yes | | | | | | |

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| Site ID | Current Sample Frequency | Hg | CN | Total Metals | Basic | Basic Total Metals | Minor | Major | Trace 1 | Trace 2 | Trace 3 | RA-1 | RA-2 | Trace 1 - Total Metals | Trace 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ECP2612 | S | | | | Yes | | | Yes | Yes | | | | | | |
| ECP2614 | S | | | | Yes | | | Yes | Yes | | | | | | |
| ECP2616A | S | | | | | | | | | | | | | | |
| ECP2616B | S | | | | Yes | | | Yes | Yes | | | | | | |
| ECP2618A | S | | | | Yes | | | Yes | | | | | | | |
| ECP2618B | S | | | | Yes | | | Yes | | | | | | | |
| ECP2624A | S | | | | Yes | | | Yes | | | | | | | |
| ECP2624B | S | | | | Yes | | | Yes | | | | | | | |
| ECP2627A | S | | | | Yes | | | Yes | | | | | | | |
| ECP2627B | S | | | | Yes | | | Yes | | | | | | | |
| ECP2629A | S | | | | Yes | | | Yes | | | | | | | |
| ECP2629B | S | | | | Yes | | | Yes | | | | | | | |
| ECP2631 | S | | | | Yes | | | Yes | Yes | | | | | | |
| ECP2648A | S | | | | Yes | | | Yes | | | | | | | |
| ECP2648B | S | | | | Yes | | | Yes | | | | | | | |
| ECP2651A | S | | | | Yes | | | Yes | | | | | | | |
| ECP2651B | S | | | | Yes | | | Yes | | | | | | | |
| ECP2654A | S | | | | Yes | | | Yes | | | | | | | |
| ECP2654B | S | | | | Yes | | | Yes | | | | | | | |
| ECP2662A | S | | | | Yes | | | Yes | | | | | | | |
| ECP2662B | S | | | | Yes | | | Yes | | | | | | | |
| ECP2664 | S | | | | Yes | | | Yes | Yes | | | | | | |
| ECP2668 | S | | | | Yes | | | Yes | | | | | | | |
| ECP2670 | S | | | | Yes | | | Yes | Yes | | | | | | |
| ECP2674 | S | | | | Yes | | | Yes | Yes | | | | | | |
| ECP2682 | S | | | | Yes | | | Yes | Yes | | | | | | |
| ECP2709 | S | | | | Yes | | | Yes | Yes | | | | | | |
| ECP2710 | S | | | | Yes | | | Yes | Yes | | | | | | |
| ECP2719 | S | | | Y | Yes | Yes | | Yes | Yes | | | | | | |
| ECP2740 | Q | | | | Yes | | | Yes | | | | Yes | | | |
| ECP2745 | S | | | Y | Yes | Yes | | Yes | Yes | | | | | | |
| ECP2771 | S | | | Y | Yes | Yes | | Yes | Yes | | | | | | |
| ECP2772 | S | | | Y | Yes | Yes | | Yes | Yes | | | | | | |
| ECP2796 | M | | | Y | | | | | | | | | | | |
| ECP2856A | S | | | | Yes | | | Yes | | | | | | | |
| ECP2856B | S | | | | Yes | | | Yes | | | | | | | |
| ECP2857A | S | | | | Yes | | | Yes | | | | | | | |
| ECP2857B | S | | | | Yes | | | Yes | | | | | | | |
| ECP2858A | S | | | | Yes | | | Yes | | | | | | | |
| ECP2858B | S | | | | Yes | | | Yes | | | | | | | |
| ECS2715 | S | | | | Yes | | | Yes | Yes | | | | | | |
| EPG1165A | A | | | | Yes | | | Yes | | | | | Yes | | |
| EPG2780B | F | Y | | | Yes | | | Yes | | | | Yes | | | |
| EPG2781A | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| EPG2781B | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| EPG2785A | A | | | | Yes | | | Yes | Yes | | | | | | |
| EPG2785B | A | | | | Yes | | | Yes | Yes | | | | | | |
| EPS2820 | A | | | | Yes | | | Yes | Yes | | | | | | |
| EPS2821 | A | | | | Yes | | | Yes | Yes | | | | | | |
| EPS2822 | A | | | | Yes | | | Yes | Yes | | | | | | |
| EPS2823 | A | | | | Yes | | | Yes | Yes | | | | | | |
| EPS2824 | A | | | | Yes | | | Yes | Yes | | | | | | |
| EPS2825 | A | | | | Yes | | | Yes | Yes | | | | | | |
| EPS2826 | A | | | | Yes | | | Yes | Yes | | | | | | |
| EPS2827 | A | | | | Yes | | | Yes | Yes | | | | | | |
| HCG2861A | Q | Y | Y | Y | Yes | Yes | | Yes | Yes | | | | | | |
| HCG2861B | Q | Y | Y | Y | Yes | Yes | | Yes | Yes | | | | | | |
| HCG2868 | Q | Y | Y | Y | Yes | Yes | | Yes | Yes | | | | | | |
| HMG1122A | E | | | | Yes | | | Yes | | | | | | | |
| HMG1123B | A | | | | Yes | | | Yes | | | | | Yes | | |
| HMG1126B | A | | | | Yes | | | Yes | | | | | Yes | | |
| HMG1163A | F | | | | Yes | | | Yes | | | | | | | |
| HMG1856 | E | | | | Yes | | | Yes | | | | | Yes | | |
| LCS469 | Q | Y | | | Yes | | | Yes | | | | | | | |
| LRG910 | S | Y | | | Yes | | | Yes | Yes | | | Yes | | | |
| LRG911 | S | Y | | | Yes | | | Yes | Yes | | | Yes | | | |
| LRG912 | A | Y | | | Yes | | | Yes | Yes | | | Yes | | | |
| LRP1319 | Q | Y | | | Yes | | | Yes | Yes | | | | | | |
| LRP896 | Q | Y | | | Yes | | | Yes | Yes | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **LSD1078** | Q | Y | | Y | Yes | Yes | | Yes | Yes | Yes | | | | Yes | |
| **LTG1139** | Q | Y | | Y | Yes | Yes | | Yes | Yes | Yes | Yes | | | Yes | |
| **LTG1140B** | A | | | | Yes | | | Yes | | | | | Yes | | |
| **LTG1147** | Q | Y | | Y | Yes | Yes | | Yes | | | | Yes | | | |
| **LTG1167B** | E | | | | Yes | | | Yes | | | | | Yes | | |
| **LTG1191** | Q | Y | | | Yes | | | Yes | Yes | | | | Yes | | |
| **LWP2632** | Q | Y | | | Yes | | | Yes | Yes | Yes | Yes | | | | |
| **LWP2714** | V | Y | | | Yes | | | Yes | Yes | Yes | | | | | |
| **LWS2717** | S | | | | Yes | | | Yes | Yes | | | | | | |
| **MCP1416** | M | Y | | Y | Yes | Yes | | Yes | Yes | | | | | | |
| **MCP2533** | Q | Y | | Y | Yes | Yes | | Yes | Yes | | | | | | |
| **MCP2534** | Q | Y | | Y | Yes | Yes | | Yes | Yes | | | | | | |
| **MCP2536** | M | | | | Yes | | | Yes | Yes | | | | | | |
| **MCP2536A** | M | | | | | | | | | | | | | | |
| **MDP2679** | S | | | | Yes | | | Yes | Yes | | | | | | |
| **NEA634A** | S | | | | Yes | | | Yes | | | | | | | |
| **NED602A** | A | | | | Yes | | | Yes | Yes | | | | | | |
| **NED602B** | A | | | | Yes | | | Yes | Yes | | | | | | |
| **NED604A** | S | | | | Yes | | | Yes | Yes | | | | | | |
| **NED604B** | S | | | | Yes | | | Yes | Yes | | | | | | |
| **NEG484** | Q | | | | Yes | | | Yes | | | | | | | |
| **NEL1312** | Q | | | Y | Yes | Yes | | Yes | | | | | | | |
| **NEL1313** | Q | | | Y | Yes | Yes | | Yes | | | | | | | |
| **NEL1382A** | S | | | | Yes | | | Yes | Yes | | | | | | |
| **NEL1382B** | S | | | | Yes | | | Yes | Yes | | | | | | |
| **NEL1382C** | Q | | | | Yes | | | Yes | Yes | | | | | | |
| **NEL2831** | Q | Y | | Y | Yes | Yes | | Yes | | | | | | Yes | |
| **NEL2870A** | Q | | | | Yes | | | Yes | Yes | | | | | | |
| **NEL2870B** | Q | | | | Yes | | | Yes | Yes | | | | | | |
| **NEL2870C** | Q | | | | Yes | | | Yes | Yes | | | | | | |
| **NEL448** | Q | | | Y | Yes | Yes | | Yes | | | | | | | |
| **NEL532A** | S | | | | Yes | | | Yes | Yes | | | | | | |
| **NEL532B** | Q | | | | Yes | | | Yes | Yes | | | | | | |
| **NEL536A** | A | | | | Yes | | | Yes | Yes | | | | | | |
| **NEL536B** | A | | | | Yes | | | Yes | Yes | | | | | | |
| **NEL536C** | F | | | | Yes | | | Yes | Yes | | | | | | |
| **NEM1387** | S | | | | Yes | | | Yes | Yes | | | | | | |
| **NEM478** | Q | | | | Yes | | | Yes | | | | | | | |
| **NEM637A** | S | | | | Yes | | | Yes | | | | | | | |
| **NEM650A** | S | | Y | | Yes | | | Yes | Yes | | | | | | |
| **NEM651A** | S | | Y | | Yes | | | Yes | Yes | | | | | | |
| **NEM652A** | S | | Y | | Yes | | | Yes | Yes | | | | | | |
| **NEM653A** | S | | | | Yes | | | Yes | Yes | | | | | | |
| **NEM897** | S | | Y | | Yes | | | Yes | Yes | | | | | | |
| **NEM898** | S | | Y | | Yes | | | Yes | Yes | | | | | | |
| **NEM899** | S | | | | Yes | | | Yes | Yes | | | | | | |
| **NEP2847** | V | | | | | | | | | | | | | | |
| **NEP2848** | V | | | | | | | | | | | | | | |
| **NEP2849** | V | | | | | | | | | | | | | | |
| **NEP2850** | V | | | | | | | | | | | | | | |
| **NEP2851** | Weekly | | | | | | | | | | | | | | |
| **NER2545A** | A | | | | Yes | | | Yes | | | | | | | |
| **NER2545B** | A | | | | Yes | | | Yes | | | | | | | |
| **NER2546A** | Q | | | | Yes | | | Yes | | | | | | | |
| **NER2546B** | Q | | | | Yes | | | Yes | | | | | | | |
| **NER2546C** | Q | | | | Yes | | | Yes | | | | | | | |
| **NER2547** | A | | | | Yes | | | Yes | | | | | | | |
| **NER2548** | A | | | | Yes | | | Yes | | | | | | | |
| **NER2549A** | A | | | | Yes | | | Yes | | | | | | | |
| **NER2549B** | A | | | | Yes | | | Yes | | | | | | | |
| **NER2554A** | A | | | | Yes | | | Yes | | | | | | | |
| **NER2554B** | A | | | | Yes | | | Yes | | | | | | | |
| **NER2808** | A | | | | Yes | | | Yes | | | | | | | |
| **NER2811A** | S | | | | Yes | | | Yes | | | | | | | |
| **NER2811B** | S | | | | Yes | | | Yes | | | | | | | |
| **NER2812A** | A | | | | Yes | | | Yes | | | | | | | |
| **NER2812B** | A | | | | Yes | | | Yes | | | | | | | |
| **NER2813A** | S | | | | Yes | | | Yes | | | | | | | |
| **NER2813B** | S | | | | Yes | | | Yes | | | | | | | |

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| Site ID | Current Sample Frequency | Hg | CN | Total Metals | Basic | Basic Total Metals | Minor | Major | Trace 1 | Trace 2 | Trace 3 | RA-1 | RA-2 | Trace 1 - Total Metals | Trace 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NER2813C | S | | | | Yes | | | Yes | | | | | | | |
| NER2816A | V | | | | Yes | | | Yes | | | | | | | |
| NER2816C | A | | | | Yes | | | Yes | | | | | | | |
| NER606A | A | | | | Yes | | | Yes | | | | | | | |
| NER606B | A | | | | Yes | | | Yes | | | | | | | |
| NER607A | A | | | | Yes | | | Yes | | | | | | | |
| NER607B | A | | | | Yes | | | Yes | | | | | | | |
| NER608A | A | | | | Yes | | | Yes | | | | | | | |
| NER608B | A | | | | Yes | | | Yes | | | | | | | |
| NER609A | A | | | | Yes | | | Yes | | | | | | | |
| NER609B | A | | | | Yes | | | Yes | | | | | | | |
| NER610A | A | | | | Yes | | | Yes | | | | | | | |
| NER610B | A | | | | Yes | | | Yes | | | | | | | |
| NER631A | A | | | | Yes | | | Yes | | | | | | | |
| NER631B | A | | | | Yes | | | Yes | | | | | | | |
| NER632A | A | | | | Yes | | | Yes | | | | | | | |
| NER632B | A | | | | Yes | | | Yes | | | | | | | |
| NER633A | A | | | | Yes | | | Yes | | | | | | | |
| NER633B | A | | | | Yes | | | Yes | | | | | | | |
| NER655A | A | | | | Yes | | | Yes | | | | | | | |
| NER708 | Q | | | | Yes | | | Yes | | | | | | | |
| NER709 | A | | | | Yes | | | Yes | | | | | | | |
| NER710A | S | | | | Yes | | | Yes | | | | | | | |
| NER710B | S | | | | Yes | | | Yes | | | | | | | |
| NER711 | A | | | | Yes | | | Yes | | | | | | | |
| NER723 | A | | | | Yes | | | Yes | | | | | | | |
| NER724 | A | | | | Yes | | | Yes | | | | | | | |
| NES1363 | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES1364 | Q | | | | Yes | | | Yes | Yes | | | | | | |
| NES1365 | Q | | | | Yes | | | Yes | Yes | | | | | | |
| NES1366 | Q | | | | Yes | | | Yes | Yes | | | | | | |
| NES1376 | Q | | | | Yes | | | Yes | Yes | Yes | | | | | |
| NES1472A | A | | | | Yes | | | Yes | | | | | | | |
| NES2556 | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES2574 | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES2589 | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES2590 | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES2763 | A | | | | Yes | | | Yes | Yes | | | | | | |
| NES2764 | A | | | | Yes | | | Yes | Yes | | | | | | |
| NES2765 | A | | | | Yes | | | Yes | Yes | | | | | | |
| NES2766 | A | | | | Yes | | | Yes | Yes | | | | | | |
| NES2767 | A | | | | Yes | | | Yes | Yes | | | | | | |
| NES2768 | A | | | | Yes | | | Yes | Yes | | | | | | |
| NES2790 | NS | | | Y | Yes | Yes | | Yes | | | | Yes | | | |
| NES2791 | NS | | | | Yes | Yes | | Yes | | | | Yes | | | |
| NES2792 | NS | | | | Yes | Yes | | Yes | | | | Yes | | | |
| NES2793A | NS | Y | | Y | Yes | | | Yes | | | | Yes | | | |
| NES2793B | S | | | | Yes | | | Yes | | | | Yes | | | |
| NES2793C | NS | | | | Yes | | | Yes | | | | Yes | | | |
| NES2794 | S | Y | | Y | Yes | Yes | | Yes | Yes | Yes | | | | Yes | Yes |
| NES2795 | NS | Y | | Y | Yes | Yes | | Yes | | Yes | | | | | |
| NES2797A | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES2797B | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES2797C | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES2797D | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES2797E | A | | | | Yes | | | Yes | Yes | | | | | | |
| NES2798A | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES2798B | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES2798C | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES2798Z | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES2799A | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES2799B | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES2800A | Q | | | | Yes | | | Yes | Yes | | | | | | |
| NES2800B | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES2801 | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES2802 | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES2803A | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES2803B | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES2804A | Q | | | | Yes | | | Yes | Yes | | | | | | |

| Site ID | Current Sample Frequency | Hg | CN | Total Metals | Basic | Basic Total Metals | Minor | Major | Trace 1 | Trace 2 | Trace 3 | RA-1 | RA-2 | Trace 1 - Total Metals | Trace 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NES2804B | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES2804C | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES2805 | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES2852 | Q | | | | Yes | | | Yes | Yes | | | | | | |
| NES567 | Q | | | | Yes | | | Yes | | | | | | | |
| NES568 | Q | | | | Yes | | | Yes | | | | | | | |
| NES620B | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES621A | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES621B | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES622A | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES622B | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES623A | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES623B | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES656A | F | | | | Yes | | | Yes | | | | | | | |
| NES672 | Q | | | | Yes | | | Yes | | | | | | | |
| NES675 | Q | | | | Yes | | | Yes | | | | | | | |
| NES691 | Q | | | | Yes | | | Yes | | | | | | | |
| NES693 | S | | | | Yes | | | Yes | | | | | | | |
| NES694A | S | | | | Yes | | | Yes | | | | | | | |
| NES694B | S | | | | Yes | | | Yes | | | | | | | |
| NES696 | S | | | | Yes | | | Yes | | | | | | | |
| NES697A | S | | | | Yes | | | Yes | | | | | | | |
| NES697B | S | | | | Yes | | | Yes | | | | | | | |
| NES698A | S | | | | Yes | | | Yes | | | | | | | |
| NES698B | S | | | | Yes | | | Yes | | | | | | | |
| NES700 | Q | | | | Yes | | | Yes | | | | | | | |
| NES701 | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES702 | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES703 | S | | | | Yes | | | Yes | | | | | | | |
| NES705A | S | | | | Yes | | | Yes | | | | | | | |
| NES705B | S | | | | Yes | | | Yes | | | | | | | |
| NES715A | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES715B | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES716 | F | | | | Yes | | | Yes | | | | | | | |
| NES718 | S | | | | Yes | | | Yes | | | | | | | |
| NES725 | S | | | | Yes | | | Yes | Yes | | | | | | |
| NES726A | S | | | | Yes | | | Yes | | | | | | | |
| NES726B | S | | | | Yes | | | Yes | | | | | | | |
| NES728 | Q | | | | Yes | | | Yes | Yes | Yes | | | | | |
| NES729 | S | | | | Yes | | | Yes | Yes | | | | | | |
| NET1380A | S | | | | Yes | | | Yes | Yes | | | | | | |
| NET1380B | A | | | | Yes | | | Yes | Yes | | | | | | |
| NET1381A | S | | | | Yes | | | Yes | Yes | | | | | | |
| NET1381B | S | | | | Yes | | | Yes | Yes | | | | | | |
| NET1383A | S | | | | Yes | | | Yes | Yes | | | | | | |
| NET1383B | S | | | | Yes | | | Yes | Yes | | | | | | |
| NET1384A | S | | | | Yes | | | Yes | Yes | | | | | | |
| NET1384B | S | | | | Yes | | | Yes | Yes | | | | | | |
| NET1385A | S | | | | Yes | | | Yes | Yes | | | | | | |
| NET1385B | S | | | | Yes | | | Yes | Yes | | | | | | |
| NET1386A | A | | | | Yes | | | Yes | Yes | | | | | | |
| NET1386B | Q | | | | Yes | | | Yes | Yes | | | | | | |
| NET1393A | S | | | | Yes | | | Yes | Yes | | | | | | |
| NET1393B | S | | | | Yes | | | Yes | Yes | | | | | | |
| NET1490 | S | | | | Yes | | | Yes | Yes | | | | | | |
| NET1491 | S | | | | Yes | | | Yes | Yes | | | | | | |
| NET1492 | S | | | | Yes | | | Yes | Yes | | | | | | |
| NET2596 | S | | | | Yes | | | Yes | Yes | Yes | | | | | |
| NET646A | Q | | | | Yes | | | Yes | Yes | | | | | | |
| NET646B | S | | | | Yes | | | Yes | Yes | | | | | | |
| NEW1495A | A | | | | Yes | | | Yes | | | | | | | |
| NEW1495B | A | | | | Yes | | | Yes | | | | | | | |
| NEW1495C | A | | | | Yes | | | Yes | | | | | | | |
| NEW1496A | A | | | | Yes | | | Yes | | | | | | | |
| NEW1496B | A | | | | Yes | | | Yes | | | | | | | |
| NEW1496C | A | | | | Yes | | | Yes | | | | | | | |
| NEW2569A | A | | | | Yes | | | Yes | Yes | | | | | | |
| NEW2569B | A | | | | Yes | | | Yes | Yes | | | | | | |
| NEW2569C | A | | | | Yes | | | Yes | Yes | | | | | | |

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| Site ID | Current Sample Frequency | Hg | CN | Total Metals | Basic | Basic Total Metals | Minor | Major | Trace 1 | Trace 2 | Trace 3 | RA-1 | RA-2 | Trace 1 - Total Metals | Trace 4 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NEW2570 | A | | | | Yes | | | Yes | Yes | Yes | Yes | | | | |
| NEW2807A | A | | | | Yes | | | Yes | | | | | | | |
| NEW2807B | A | | | | Yes | | | Yes | | | | | | | |
| NEW2807C | S | | | | Yes | | | Yes | | | | | | | |
| NEW2807D | S | | | | Yes | | | Yes | | | | | | | |
| NEW2807E | S | | | | Yes | | | Yes | | | | | | | |
| NEW2807F | A | | | | Yes | | | Yes | | | | | | | |
| NEW2807G | A | | | | Yes | | | Yes | | | | | | | |
| NEW2809A | A | | | | Yes | | | Yes | | | | | | | |
| NEW2809B | A | | | | Yes | | | Yes | | | | | | | |
| NEW2809C | A | | | | Yes | | | Yes | | | | | | | |
| NEW2809D | S | | | | Yes | | | Yes | | | | | | | |
| NEW2809E | S | | | | Yes | | | Yes | | | | | | | |
| NEW2810A | A | | | | Yes | | | Yes | | | | | | | |
| NEW2810B | A | | | | Yes | | | Yes | | | | | | | |
| NEW2810C | A | | | | Yes | | | Yes | | | | | | | |
| NEW2810D | A | | | | Yes | | | Yes | | | | | | | |
| NEW2810E | A | | | | Yes | | | Yes | | | | | | | |
| NEW2810F | A | | | | Yes | | | Yes | | | | | | | |
| NEW2810G | A | | | | Yes | | | Yes | | | | | | | |
| NEW2810H | A | | | | Yes | | | Yes | | | | | | | |
| NEW2814A | S | | | | Yes | | | Yes | | | | | | | |
| NEW2814B | S | | | | Yes | | | Yes | | | | | | | |
| NEW2814C | A | | | | Yes | | | Yes | | | | | | | |
| NEW2815A | A | | | | Yes | | | Yes | | | | | | | |
| NEW2815B | A | | | | Yes | | | Yes | | | | | | | |
| NEW2815C | A | | | | Yes | | | Yes | | | | | | | |
| NEW2815D | A | | | | Yes | | | Yes | | | | | | | |
| NEW2815E | A | | | | Yes | | | Yes | | | | | | | |
| NEW2815F | A | | | | Yes | | | Yes | | | | | | | |
| NEW612A | A | | | | Yes | | | Yes | | | | | | | |
| NEW612B | A | | | | Yes | | | Yes | | | | | | | |
| NEW613A | S | | | | Yes | | | Yes | | | | | | | |
| NEW613B | S | | | | Yes | | | Yes | | | | | | | |
| NEW614A | A | | | | Yes | | | Yes | | | | | | | |
| NEW614B | A | | | | Yes | | | Yes | | | | | | | |
| NEW615A | A | | | | Yes | | | Yes | | | | | | | |
| NEW615B | A | | | | Yes | | | Yes | | | | | | | |
| NEW616A | A | | | | Yes | | | Yes | | | | | | | |
| NEW616B | A | | | | Yes | | | Yes | Yes | | | | | | |
| NEW617A | A | | | | Yes | | | Yes | | | | | | | |
| NEW617B | A | | | | Yes | | | Yes | | | | | | | |
| NEW639A | Q | | | | Yes | | | Yes | | | | | | | |
| PCG2576 | S | Y | Y | | Yes | | | Yes | Yes | Yes | | | | | |
| RTC450 | V | | | Y | Yes | Yes | | Yes | Yes | Yes | | | | | |
| SLS2769 | A | | | | Yes | | | Yes | Yes | | | | | | |
| SLS2770 | A | | | | Yes | | | Yes | Yes | | | | | | |
| SMP2842 | Q | | | | Yes | | | Yes | | | | | | | |
| SRG946 | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| SRP850 | S | Y | | | Yes | | | Yes | Yes | | | | | | |
| TLP1436 | Q | | | | Yes | | | Yes | Yes | | | | | | |
| TLP1469 | Q | Y | | | Yes | | | Yes | Yes | | | | | | |
| TLP1485A | Q | | | | | | | | | | | | | | |
| TLP1486A | Q | | | | | | | | | | | | | | |
| TLP1487A | Q | | | | | | | | | | | | | | |
| TLP1488A | Q | | | | | | | | | | | | | | |
| TLP2593A | Q | | | | | | | | | | | | | | |
| TLS1426 | S | | | | Yes | | | Yes | Yes | | | | | | |
| TLT2452 | S | | | | Yes | | | Yes | Yes | | | | | | |
| TLT2575A | DRY | | | | Yes | | | Yes | Yes | | | | | | |
| TLT2575B | S | | | | Yes | | | Yes | Yes | | | | | | |
| TLT887 | S | | | | Yes | | | Yes | Yes | | | | | | |
| UPD004 | Q | Y | | Y | Yes | Yes | | Yes | | Yes | Yes | | | Yes | |
| UPD009 | S | Y | | Y | Yes | Yes | | Yes | | Yes | Yes | | | Yes | |
| UPD010 | Q | Y | | Y | Yes | Yes | | Yes | Yes | | | | | Yes | Yes |
| UPD011 | Q | Y | | Y | Yes | Yes | | Yes | Yes | | | | | | |
| USC472 | V | | | Y | Yes | Yes | | Yes | Yes | Yes | | | | | |
| VWK120 | F | | | | Yes | | | Yes | Yes | | | | | | |
| VWK413 | Q | Y | | Y | Yes | Yes | | Yes | Yes | Yes | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VWK414 | Q | Y | | Y | Yes | Yes | | Yes | Yes | Yes | | | | | |
| VWK421 | Q | Y | | Y | Yes | Yes | | Yes | Yes | Yes | | | | | |
| VWK83 | NS | Y | | | Yes | | | Yes | | | | Yes | | | |
| VWK84 | F | | | | Yes | | | Yes | Yes | | | Yes | | | |
| VWK93 | S | Y | | | Yes | | | Yes | | | | | | | |
| VWP190B | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| VWP192B | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| VWP193B | F | Y | | | Yes | | | Yes | | | | Yes | | | |
| VWP194A | E | | | | Yes | | | Yes | | | | | | | |
| VWP194B | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| VWP197B | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| VWP209B | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| VWP220 | S | | | | Yes | | | Yes | Yes | | | | | | |
| VWP225 | S | | | | Yes | | | Yes | Yes | | | | | | |
| VWP228 | Q | | | | Yes | | | Yes | Yes | | | | | | |
| VWP241B | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| VWP241C | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| VWP242 | E | Y | | | Yes | | | Yes | | | | Yes | | | |
| VWP244B | Q | | | | Yes | | | Yes | Yes | | | | | | |
| VWP244C | S | | | | Yes | | | Yes | Yes | | | | | | |
| VWP248A | Q | Y | | | Yes | | | Yes | Yes | | | Yes | | | |
| VWP248B | S | Y | | | Yes | | | Yes | Yes | | | Yes | | | |
| VWP248C | S | Y | | | Yes | | | Yes | Yes | | | Yes | | | |
| VWP251 | F | | | | Yes | | | Yes | | | | | | | |
| VWP252A | F | | | | Yes | | | Yes | | | | | | | |
| VWP252B | F | | | | Yes | | | Yes | | | | | | | |
| VWP252C | F | | | | Yes | | | Yes | | | | | | | |
| VWP253A | F | | | | Yes | | | Yes | | | | | | | |
| VWP255A | F | | | | Yes | | | Yes | | | | | | | |
| VWP257 | F | | | | Yes | | | Yes | | | | | | | |
| VWP258A | F | | | | Yes | | | Yes | | | | | | | |
| VWP259 | F | | | | Yes | | | Yes | | | | | | | |
| VWP263 | E | | | | Yes | | | Yes | | | | | | | |
| VWP264 | F | Y | | | Yes | | | Yes | | | | Yes | | | |
| VWP267B | E | | | | Yes | | | Yes | | | | | | | |
| VWP272 | A | | | | Yes | | | Yes | Yes | | | | | | |
| VWS236 | S | Y | | Y | Yes | Yes | | Yes | Yes | Yes | Yes | Yes | | Yes | |
| VWS314 | V | | | Y | Yes | Yes | | Yes | Yes | Yes | | | | | |
| VWS35 | V | | | Y | Yes | Yes | | Yes | Yes | Yes | | | | | |
| VWW189 | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| VWW22 | A | | | Y | Yes | Yes | | Yes | | | | | Yes | | |
| VWW31 | Q | Y | Y | Y | Yes | Yes | | Yes | Yes | | | | | | |
| VWW325 | E | | | | Yes | | | Yes | | | | | | | |
| VWW363 | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| VWW387 | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| VWW41A | A | | | | Yes | | | Yes | | | | | | | |
| VWW420 | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| WJG1154A | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| WJG1154B | Q | Y | | | Yes | | | Yes | | | | Yes | | | |
| WJG1154C | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| WJG1171A | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| WJG1171B | E | | | | Yes | | | Yes | | | | | | | |
| WJG2819A | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| WJG2819B | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| WJG2819C | A | Y | | | Yes | | | Yes | | | | Yes | | | |
| WJG2862A | Q | Y | Y | Y | Yes | Yes | | Yes | Yes | | | | | | |
| WJG2862B | Q | Y | Y | Y | Yes | Yes | | Yes | Yes | | | | | | |
| WJG2863 | A | | | | Yes | | | Yes | | | | Yes | | | |
| WTS2552 | Q | | | | Yes | | | Yes | | | | | | | |
| WTS2577 | Q | | | Y | Yes | Yes | | Yes | | | | | | | |
| WTS2578 | Q | Y | | Y | Yes | Yes | | Yes | | | | Yes | | | |
| WTS2580 | Q | | | | Yes | | | Yes | | | | | | | |
| WTS2592 | Q | | | | Yes | | | Yes | | | | | | | |

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# TABLE-GCMP 2. DEFINITION OF ANALYTE GROUPS

| | ANALYTE GROUPS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | BASIC | MAJOR ION | MINOR ION | TRACE** METALS ONE | TRACE** METALS TWO | TRACE** METALS THREE | MERCURY (Hg) * | RADIONUCLID | OTHER |
| FIELD | | | | | | | | | |
| PH | X | | | | | | | | |
| Temperature | | | | | | | | | |
| Conductance | X | | | | | | | | |
| Dissolved Oxygen | | | X | | | | | | |
| Eh | | | X | | | | | | |
| Alkalinity | | X | | | | | | | |
| Carbonate | | | | | | | | | X |
| Bi-Carbonate | | | | | | | | | X |
| Ferrous Iron | | | X | | | | | | |
| Sulfide | | | X | | | | | | |
| **INORGANIC INDICATOR PARAMETERS** | | | | | | | | | |
| TDS | X | | | | | | | | |
| TSS | X | | | | | | | | |
| **MAJOR ANIONS** | | | | | | | | | |
| Chloride (Cl) | X | | | | | | | | |
| Fluoride (F) | | | X | | | | | | |
| Sulfate (SO4=) | X | | | | | | | | |
| Nitrate ($NO_3$-N) | | | X | | | | | | |
| Nitrite ($NO_2$-N) | | | X | | | | | | |
| Total Phosphorus | | | X | | | | | | |
| **MAJOR CATIONS** | | | | | | | | | |
| Calcium (Ca) | | X | | | | | | | |
| Magnesium (Mg) | | X | | | | | | | |
| Potassium (K) | | X | | | | | | | |
| Sodium (Na) | | X | | | | | | | |
| *** *TRACE METALS** | | | | | | | | | |
| Aluminum (Al) | | | | | | X | | | |
| Antimony (Sb) | | | | | | X | | | |
| Arsenic (As) | X | | | | | | | | |
| Barium (Ba) | | | | X | | | | | |
| Beryllium (Be) | | | | | | X | | | |

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# TABLE-GCMP 2. DEFINITION OF ANALYTE GROUPS

| | ANALYTE GROUPS | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | BASIC | MAJOR ION | MINOR ION | TRACE** METALS ONE | TRACE** METALS TWO | TRACE** METALS THREE | MERCURY (Hg) * | RADIONUCLID | OTHER |
| Boron (B) | | | | | | X | | | |
| Cadmium (Cd) | X | | | | | | | | |
| Chromium (Cr) | | | | X | | | | | |
| Copper (Cu) | X | | | | | | | | |
| Iron (Fe) | | | | | X | | | | |
| Lead (Pb) | X | | | | | | | | |
| Manganese (Mn) | | | | | X | | | | |
| *Mercury (Hg) | | | | | | | X | | |
| Molybdenum (Mo) | | | | | X | | | | |
| Nickel (Ni) | | | | | X | | | | |
| Selenium (Se) | X | | | | | | | | |
| Silver (Ag) | | | | X | | | | | |
| Thallium (Tl) | | | | | | X | | | |
| Titanium (Ti) | | | | | | X | | | |
| Zinc (Zn) | x | | | | | | | | |
| **RADIONUCLIDES** | | | | | | | | | |
| Radium 226 | | | | | | | | X | |
| Radium 228 | | | | | | | | X | |
| Total Uranium | | | | | | | | X | |
| Gross Alpha | | | | | | | | X | |
| Gross Beta | | | | | | | | X | |
| **ORGANICS** | | | | | | | | | |
| Benzene | | | | | | | | | X |
| Toluene | | | | | | | | | X |
| Ethylene | | | | | | | | | X |
| Naphthalene | | | | | | | | | X |
| Total Petroleum Hydrocarbon | | | | | | | | | X |
| Balance | | | | | | | | | X |

## TABLE-GCMP 3. GROUND WATER CHARACTERIZATION AND MONITORING PLAN SCHEDULE

| Personnel | Plan Review | Audit Field and Data Management Activities | Issue Revised Plan | Issue Quarterly Reports | Annual Reports | Annual Report Review |
|---|---|---|---|---|---|---|
| Senior Environmental BP – RTK | X | | | | | X |
| Principal Advisor, Water Quality | X | | | | | X |
| Advisor Water Quality, Supervisor Sampling | September each year | Periodic unannounced audits of field sampling. Audit report submitted to Project Manager within 30 days of audit | December 31 each year | Within 90 days | March 31 each year | X |
| Environmental Laboratory, Quality Assurance Manager | X | | | | | X |

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PLATES

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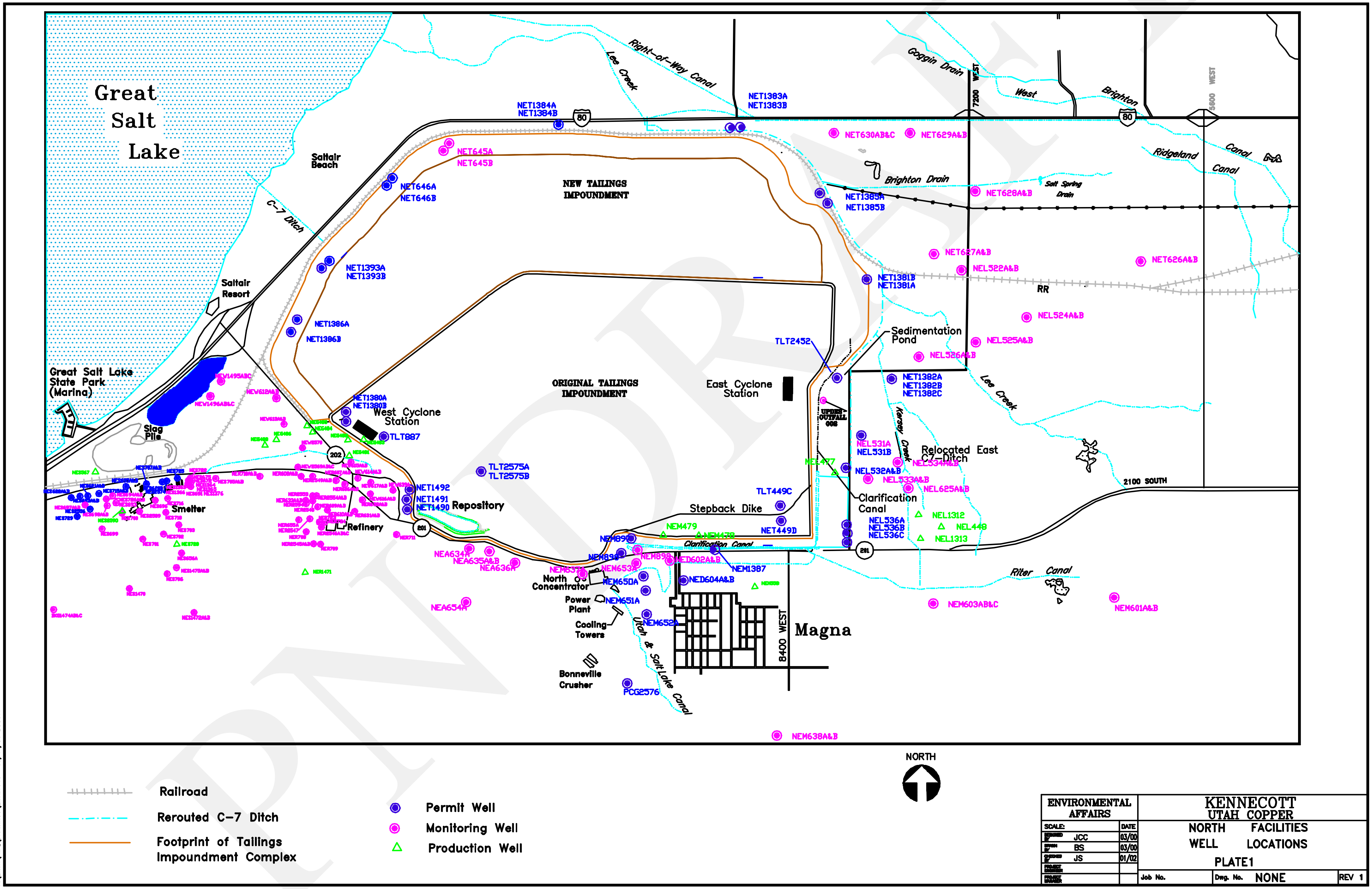
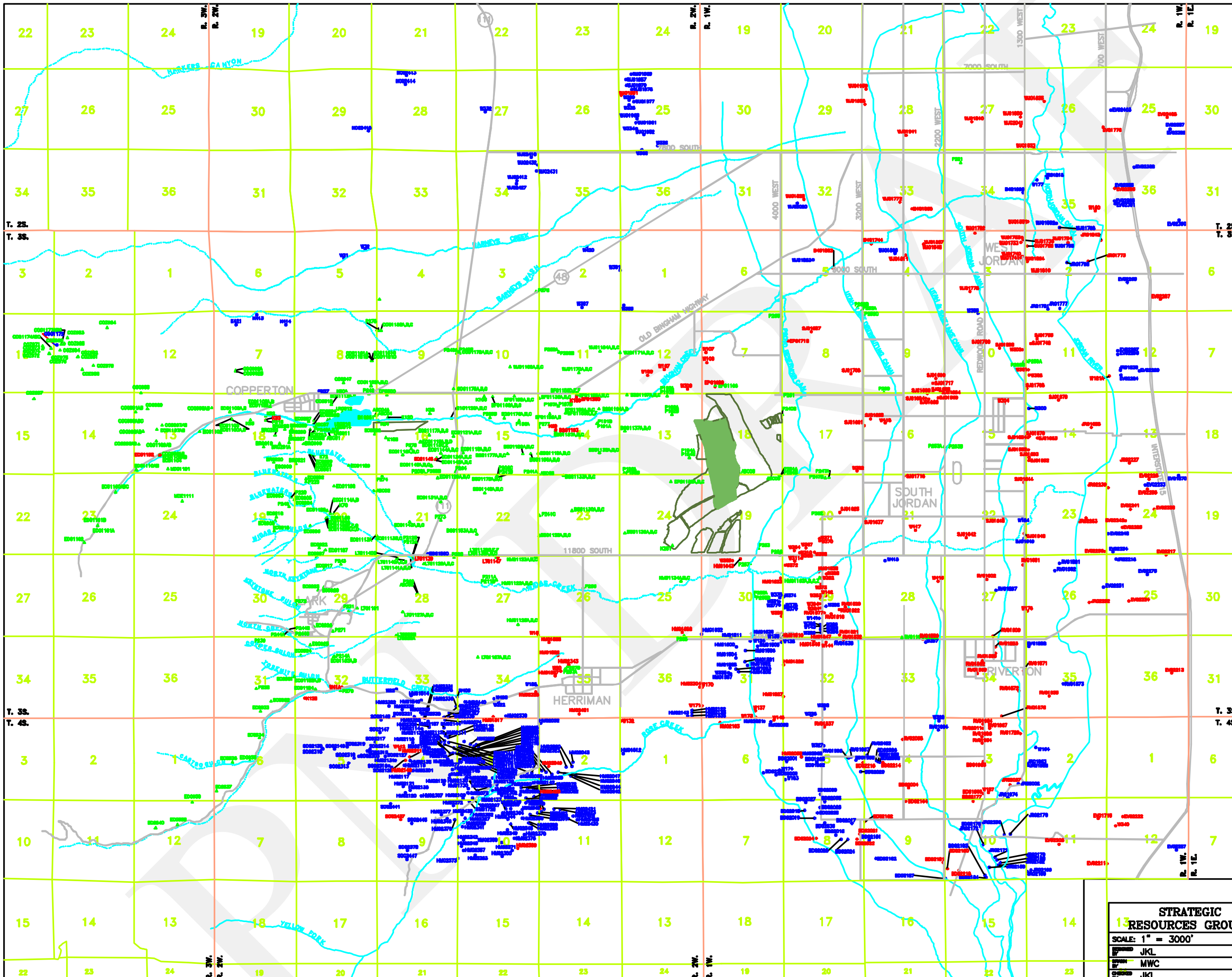


F:\ENVR\RWQ\DRAWINGS\ENVIT015 03/14/00 BSCOTT




## *LEGEND*

### WELL DEFINITION

- EVG2395 DRINKING WATER WELL LOCATION WITH SITE ID
- WJG2041 NON-DRINKING WATER WELL LOCATION WITH SITE ID
- K401 KUC MONITORING WELL LOCATION WITH SITE ID

### MAP FEATURES

- PERENNIAL STREAMS AND CANALS
- EPHEMERAL STREAMS AND GULCHES
- PREVIOUS LOCATION OF TAILINGS, EVAPORATION PONDS AND WASTE ROCK
- LOCATION OF COMPLETED CAPPED AND RECLAIMED SITES

N

GRAPHIC SCALE

( IN FEET )
1 inch = 3000 ft.

Location of KUC monitoring wells from Kennecott Utah Copper surveys.

Location of other wells derived from Kennecott Utah Copper PPC GPS surveys during the 1994–1995 well inventory project.

Location of completed capped and reclaimed sites from Kennecott Utah Copper Surveys, Nov 1994.

Location of old evaporation ponds derived from aerial photographs (Aero Graphics, Inc.) March 1994.

Location of Oquirrh Mountain streams and gulches, reservoirs, and Area tailings area derived from aerial photographs (Aero Graphics, Inc.) October 1993.

Location of valley streams and canals and survey lines from USGS 7.5' Quadrangles (Jordan Narrows, Lark, Midvale, Tickville Spring).

| STRATEGIC RESOURCES GROUP | |
|---|---|
| SCALE: 1" = 3000' | DATE |
| DESIGNED BY JKL | 8/27/01 |
| DRAWN BY MWC | 8/27/01 |
| CHECKED BY JKL | 8/28/01 |
| PROJECT ENGINEER JCC | |
| PROJECT MANAGER | |

# KENNECOTT UTAH COPPER

## SOUTH FACILITIES WELL LOCATION MAP PLATE 2

Job No. ---  Dwg. No. 451-T-2057  REV

N:\DOCUMENTS\451\451????? 08/27/01 kmcook

## Attachment 1. Health and Safety Plan

All RTK employees will adhere to the following documents:

> RTK's Safety and Facilities Standards Manual and the Safety and Health Policy stated therein; and,
>
> RTK's Environmental Response Health and Safety Plan

The sampling crew will attend site-specific training annually or as required at each plant. In general, crewmembers will wear all required PPE and abide to all safety rules and regulations at each plant Existing site information indicates that heavy metals in the soil are not present at hazardous levels that could pose a significant risk to sampling crew while conducting sampling. Historical ground water and surface water monitoring data do not warrant health concerns related to skin exposure or vapor inhalation. Therefore, no special procedures or protective equipment is required during sampling.

Well abandonment and installation activities pose a potentially higher health and safety risk to on-site personnel. Therefore, site-specific health and safety plans will be developed for each project.

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**Attachment 2. Quality Assurance Project Plan**

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**Attachment 3. Standard Operation Procedures for Ground Water Sampling**

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# Standard Operating Procedures for Groundwater Sampling

## Rio Tinto Kennecott

## South Jordan, Utah

Rev: 10

Rev Date: December 2023

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# Version Control

| Issue | Revision No. | Date Issued | Page No. | Description | Reviewed By |
|---|---|---|---|---|---|
| 09 | 09 | October 2023 | All | Initial conversion | Arcadis |
| 10 | 10 | December 2023 | All | Updated formatting and content | Arcadis |
| | | | | | |

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# APPROVAL SIGNATURES

Approved by:

Cassady Kristensen
Senior Environmental BP - RTK

Click or tap to enter a date.
1/11/2024
Date

Approved by:

Erka Naran
Principal Advisor, Water Quality

Click or tap to enter a date.
01/11/2024.
Date

Approved by:

Melissa Olsen
Superintendent, Environmental Laboratory
Quality Assurance Manager

Click or tap to enter a date.
01/08/24
Date

Approved by:

Trevor Paulson
Advisor Water Quality – Supervisor Sampling

Click or tap to enter a date.
01/08/24
Date

# Contents



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**Attachments**

# TABLES



# FIGURES



# PLATES



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# 1 INTRODUCTION

This set of Standard Operating Procedures contains the protocols to be used for Rio Tinto Kennecott (RTK) sampling of groundwater, process water, surface water, and bottom sediments of surface water bodies.

These procedures will be used to collect data for site investigations and other projects requiring information about water quality. The scope of field activities covered by these procedures include documentation; equipment maintenance, decontamination, and calibration; field measurements; sample container preparation; quality control samples; sample collection; and surveying of sample locations.

Sampling locations will be included in the appropriate Project Work Plan or other document directing the sampling program. The following information, as appropriate, will be specified in such a Plan for each known or planned water sample location:

- Actual or estimated survey location (coordinates in feet, Kennecott Mine Datum) or distance from a landmark for each sample point.
- Actual or estimated elevation of the ground surface above mean sea level (feet).
- Sampling method and measurement requirements.
- Sample identification codes to be used.
- Sampling frequency or schedule.
- Special documentation requirements.
- Requirements for surveying; and,
- Analytical parameters.

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# 2 GROUNDWATER SAMPLING

The following sections describe the process and documentation required for collecting groundwater samples at RTK.

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## 2.1 PROCEDURE DC-01 FIELD LOGBOOK

Record appropriate information in a Field Logbook to reconstruct events associated with sampling. Field Logbook entries will be made in indelible ink. Prepare and use Field Logbooks as follows:

1. Obtain a bound book. Consecutively number the pages if they are not already numbered. Store books in Project Files when not in use.
2. Assign a document control number to each book, for example: GCMP-FN-RGM-01, where "GCMP" is an example of a project identification acronym or number, "FN" indicates Field Notebook, "RGM" is an example of owner identification (initials), and "01" is a sequence number for the Book.
3. Enter the following information on the cover of each book:
    - Name of person or organization to whom the Book is assigned.
    - Book
    - Obtain a bound book.
    - Enter the following information on the cover of each book:
    - Name of person or organization to whom the Book is assigned.
    - Book number (sequence number).
    - Site name and number/acronym.
    - Start date.
    - End date.

4. At each sample site, start a new page with the following information:
    - Date and time started.
    - Sample location identification number.
    - Full name of person recording data.
    - Other personnel on site.
    - Sample location identification number (at top of page).
    - Full name of person recording data (at bottom of page).
    - Weather (temperature, wind speed/direction, precipitation).
    - Sample identification numbers which correspond to any samples collected.
    - Sample identification numbers used for duplicates.
    - Equipment maintenance conducted.
    - Equipment problems and how they were corrected.
    - Additional observations about the sampling event or conditions that may affect sample integrity.
    - Identify source and location for any photographs taken.
    - number (sequence number).
    - Site name and number/acronym.

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- Start date.
- End date.

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# 2.2 PROCEDURE DC-02 SAMPLE IDENTIFICATION

A sample coding system will be used to identify each sample collected. This coding system will ensure unique sample identification and provide a tracking record to allow retrieval of information about a particular sample.

All samples will be identified by a sample identification number utilizing a maximum of eight characters. Within this sample identification number is a unique number identifying the site. Alphabetic characters are used to denote general location and sample depth.

For existing sites, the sample identification number will be designated as identified in Table DC-1. Because of past changes in the well identification coding system, the characters preceding the site number may have varied in the past. All future references to the sampling site should be as identified in Table DC-1.

New sampling locations will be designated as discussed below:

**Sample Designation for New Sites:**

The sample identification number will consist of the following components for the eight-letter identification code:

**Area Sample Location Depth Designation Type**

**Please refer to Attachments - Table DC-1 below for a list of approved sample locations.**

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The components of the sample identification number are a two-letter area identification acronym followed by a single letter identifying the medium sampled, followed by a unique four-digit sampling location identification number and a single letter code identifying the depth of sample collection. All sample identification numbers are unique and must be approved by the Sampling Supervisor. The procedures for obtaining a new well identification number are provided in Procedure GF-14.

All samples collected will be identified using this eight-character sample identification number. A specific sample collected at a location will be identified as unique by the date on which the sample was collected. The date will be identified using the following six-digit number:

— — — — — —
Month Day Year

The following sections describe each portion of the sampling point identification number.

Area Designation Acronym

The area designation acronym consists of a two-letter code which identifies a specific area of RTK. Approved area designation codes are identified in Table DC-2.

The locations designated by these codes are shown on Plates 1 through 3. Other letters may be used, with the approval of the Sampling Supervisor, if they are consistent with earlier location names and will create less confusion.

Acronyms and the area represented by the acronym are provided below:

Note: Area locations are shown on Plates 1, 2, and 3

| Acronym | Area Represented by Acronym |
|---|---|
| AN | Anaconda Tailings |
| AR | Arthur |
| B1 | Bingham Creek Channel - Upper Reach |
| B2 | Bingham Creek Channel - Upper Middle Reach |
| B3 | Bingham Creek Channel - Lower Middle Reach |
| B4 | Bingham Creek Channel - Lower Reach |
| BC | Barney's Canyon |
| BD | Bluffdale City |
| BE | Box Elder |
| BF | North of Bingham Creek Channel (Bingham Flats) |
| BM | Bingham Mine |
| BN | Bonneville |
| BR | Bluewater Repository |
| BS | South of Bingham Creek Channel |
| BW | Butterfield Waste Rock |
| CF | Carr Fork |
| CH | Chevron Chemical |
| CO | Copperton |
| CP | East of Small Reservoir C-5 - C7 (Cemetery Pond) |

| Acronym | Area Represented by Acronym |
|---|---|
| DV | Davis County |
| EC | Eastside Collection System |
| EP | Evaporation Ponds |
| EV | East Valley - East of Jordan River |
| GS | Great Salt Lake |
| HC | Harkers Canyon - West of Hwy 111 |
| HM | Herriman |
| JR | Jordan River |
| KC | Kersey Creek |
| KN | Kearns |
| KS | Kessler Creek |
| LC | Lee Creek |
| LR | Large Reservoir |
| LS | Landfills |
| LT | Lark Tailings |
| LW | Lark Waste Rock |
| MC | Magna Concentrator |
| MG | Magna |
| MD | Mine Dump |
| MO | Morton Salt |
| NO | North of I-80 |
| OQ | Oquirrh Mountains |
| PC | Bonneville Power Plant |
| RC | Ridgeland Canal |
| RF | Refinery |
| RV | Riverton |
| RT | Ritter Canal |
| SJ | South Jordan |
| SL | Slag |
| SM | Smelter |
| SO | South Oquirrh Mountains |
| SR | Small Reservoir |
| TL | Tailings |
| TR | Traverse Range |
| WJ | West Jordan City |
| WT | Waste Water Treatment Plant |
| WV | West Valley |

Sample Type

The sample type is a single letter code which identifies the medium sampled. Approved type codes are:



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B Samples Collected of Boring

D Drinking Water

P Process Water

S Surface water
Z Piezometers
G Groundwater

Sample Definition

B Sample Collected of Boring = water collected from an uncased boring – not water from a well

D Drinking Water = water collected on RTK property that is currently used for drinking water

G Ground Water = water pulled from a well-constructed of natural materials

P Process Water = water used in RTK's operations

S Surface Water = water contained on the surface to include runoff, natural creeks, and streams,

Z Piezometers = pressure sensing device used only for measurement of water levels

Other letters may be used, with the approval of the Sampling Supervisor, if they are consistent with earlier location names.

Location
The four-digit location number is unique throughout all RTK monitoring areas and identifies a specific sampling location. This number must be obtained from the Sampling Supervisor.

Depth Code
The single letter depth code identifies the relative depth from which the sample was collected. Shallowest samples are assigned an "A" designation with subsequent letters representing greater depths. Field notes must correlate sampling depth with sampling depth code.

Additional Information

Additional information regarding site identification specific to the media being sampled is provided in procedures GW-01, PW-01, SW-01, and DW-01.

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# 2.3 PROCEDURE DC-03: SAMPLE CONTAINER PRESERVATION

1. Prepare sample containers prior to the sampling event. Use new, laboratory-cleaned sample containers. The containers should be rinsed three times with de-ionized water. Label the containers as directed by Procedure DC-04.
2. Use the proper containers and preservatives for each analytical parameter as specified in Table DC-1
3. Prepare containers for required QC samples.

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# 2.4 PROCEDURE DC-04: SAMPLE LABELLING

Labeling may be done directly on the sample containers with indelible ink or using a stick-on label. Stick-on labels will be waterproof and written on using only indelible ink. An example label is shown in Figure DC-1. Regardless of the method of labeling used, record the following information on the sample container prior to sampling:

- Sample ID #: Identification number for the water sampling location (usually acronym plus sequence number); and,
- Analysis.

Record the following information on the container at the time of sampling:

- Date and Time of Sampling; and,
- Sampler (Signature of person filling container).

| KENNECOTT UTAH COPPER<br>Environmental Laboratory | |
|---|---|
| Sample I.D. # | Preservative: |
| Control # | |
| Analysis: | Date: |
| | Time: |
| Comments: | Sampler: |

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## 2.5 PROCEDURE DC-05: SAMPLE CUSTODY

The Analytical Request Sheet will serve to document the analytical request and Sample Chain of Custody documentation. Data for this form (Figure DC-02) will be entered into field laptops by the sampler at the time of sample collection as follows:

| | |
|---|---|
| Sheet Request No.: | Reserved for laboratory use. |
| Sample Submitted by: | The name of person requesting the sample. |
| Report Results to: | The name of person receiving results. |
| Lab I.D. #: | Laboratory I.D # to be entered by laboratory personnel. |
| Sample ID #: | Sample Identification Number. |
| Date, Time: | Date and time sampling sheet is completed. |
| Analyses Requested: | The analyses to be performed for the sample - The standard suite of analyses to be performed on each sample is coded into the laboratory's computer system. If this standard suite of analyses is to be run, the analyses will be specified by writing GCMP in the analyses requested column of the form. If other analyses are requested, they must be explicitly specified. |
| Sample Preservation: | Samples will be preserved as detailed in Procedure DC-06. The presence of ice in the cooler when shipping will also be noted on the Analytical Request Form. |
| Surrendered by: | The signature of person delivering the sample or the person who has prepared the sample for to the Laboratory. |
| Received by: | The signature of the laboratory staff member receiving the samples. |
| Comments/Special Instructions: | Additional comments or instructions. |

After collection, the sample will be stored in a secure manner and packed in ice until delivered to the laboratory cooler.

Laboratory personnel will note any damaged sample containers or discrepancies between the sample label and information on the form. The presence (or absence) of ice in the cooler will be documented on the Analytical Request Form. The manager of KEL will contact the Field Team Leader or the Supervisor of Environmental Sampling to resolve any problems.

**Please refer to Attachments - An example of the analytical request sheet is presented in Figure DC-2, below:**

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# 2.6 PROCEDURE DC-06: SAMPLE PRESERVATION AND PACKAGING

Table DC-3 contains the required sample containers, preservatives, and allowable holding times for analytical parameters. Holding times start from the moment that the sample is collected.

1. Place samples in coolers with sufficient ice to ensure the sample will be delivered to the lab with ice in the cooler.
2. Place the Analytical Request/Sample Chain of Custody form (see Procedure DC-05, GW-05, PW-04, SW-05, and SS-04) inside or attached to the cooler (sealed in a Ziploc plastic bag to protect from moisture) for shipment to the laboratory.
3. Packaging of samples to be submitted to an external laboratory require additional measures to prevent breakage of sample containers.

**Please refer to Attachments - Table DC-3: Sample Containers, Preservation Techniques, and Holding Times**

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# 2.7 PROCEDURE DC-07: ELECTRONIC FIELD DATA COLLECTION SYSTEM

Laptop/Desktop computers are used for field data documentation. Appropriate information is entered into the computer at each site and regenerated to a hard copy later in the day, at the Environmental Laboratory. Use laptop computers as follows:

1. Obtain a laptop/desktop computer. Be sure it contains the "Groundwater program" by turning on the computer and locating the icon in the Windows program. Re-charge laptop computers when they are not in use.
2. Place the mouse arrow on the icon and double click on the icon with the left mouse button to bring up the main "Groundwater" screen.
3. To enter a sampling site, click on the "New Well" box on the main screen. Scroll down until you find the sample site that you want and then left click on the sample number. You can also enter the Sample site by highlighting the location button and manually typing the site I.D. into the box. You will receive a prompt asking you if you want to "Start a New Well". Click "Yes". The date and time will be automatically inserted with the date and time of that exact moment. Date and time may be edited to give a more accurate arrival time.
4. Enter the following information as indicated by labels on the individual boxes:
    - Samplers Initials
    - Depth to water reading
    - Measured or assumed total depth of well
    - Calculated purge volume (if necessary, no purge volume from table)
    - Select the type of pump used (if no pump used select Grab)
    - Pump identification number (if necessary)
5. At the end of each sampling event, calculate the total volume purged by multiplying the calculated flow rate by the total minutes the water was being purged. Enter the calculated volume in the "Total Volume Pumped" box.
6. To activate the remarks window, place the mouse arrow on the "Remarks window" found in the "Remarks" box and double click with the left mouse button. Record the appropriate information such as other samplers on site, well conditions, changes in flow rate, or any other comments that are believed to be necessary. To close the remarks window, click on the "X" in the box at the upper right-hand corner of the "Remarks" window.
7. Record the number of sample bottles filled and submitted for analysis during the sampling event in the "Number of Bottles" box.
8. Record the time the sampling event was completed in the "Completion Time" box.
9. If the sampler leaves the well for any amount of time during the purge of the well, the time spent away from the well must be recorded in the "Time Spent Away from Well" box.

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10. The “Observation” button creates a new data entry line for each field measurement sampling event. When activated a new line will be created with the date, and time automatically inserted. The date and time may be edited to give a more accurate sampling time. The “Observation” pane is a tool bar that contains the functions used for entering field data.

    Click on the “Observation” box and the observation window will appear. Double click anywhere on the window and a window will appear to enter a single sampling observation. The following are entered in this window:

    - Flow
    - Conductivity
    - Temperature
    - pH
    - Sampling Time
    - Date

Once the desired data has been entered, click on the “Done” button. Repeat this procedure until all sampling observations have been entered and then click “Close” on the main observation screen.

11. The “New Well” button creates a new field data entry screen upon the arrival or start of a new sampling event.

12. To generate a hard copy of the field data sheet and the analytical request sheet and chain of custody the sampler must connect the laptop computer to the KEL server by inserting the LAN (RJ-45) cable to the specified slot in the computer. The user must be logged on to their computer using the user name “Ranch” and the current password to be able to log on the KEL server. Once the cable is connected, the computer will automatically detect the computer and will connect to the server. Open the “Groundwater” program, and then click on the “Utilities” button on the main screen. Then click on the “Check In” button. A screen will then appear giving the options to print “Transfer to Server”, “COC (Chain of Custody)”, and “Field Sheets”, then click on the respective document that you need. When the window of the document appears, you will be prompted that a copy has been placed on the server. To print a copy, click on the “Print” and then you will be prompted with a “Print Setup” screen. Once settings are correct, click on “OK” to print document.

13. To export the data to the RTK lab’s server, return to the “Check-in” screen of the “Utilities” section and click on “Transfer to Server”. A bar graph will show the progress of the transfer. The program will then export the data and give a completed transfer message.

14. After the hard copies have been generated and have been reviewed for any anomalous data and the data has been transferred to the RTK lab’s server, delete the data from the computer’s memory. To delete, select “Utilities” from the main “Groundwater” screen and click on the “Check Out” button. You will be prompted several times asking you if you are sure that your data will be deleted. This will remove the data that has been exported and should refresh the screen and clear all samples saved in the memory.

15. Fill in the appropriate information on the field data sheet such as field logbook reference numbers and circling methods of measurements. Fill in the appropriate information on the analytical request sheets such



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as control numbers, sample submitted by, and conformation of sample being turned in on ice. Sign both documents and submit proper personnel. If any problems are found on the field sheet, after the sample has already been exported, alert the Sampling Supervisory for immediate correction.

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# 3 EQUIPMENT MAINTENANCE AND DECONTAMINATION

This section presents procedures for the activities associated with equipment maintenance and documentation as listed below.

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# 3.1 PROCEDURE MD-01: EQUIPMENT MAINTENANCE

Equipment and instrument maintenance is required to ensure that accurate data are collected during field investigations with minimal equipment problems. This procedure discusses the required field maintenance. Procedure GF-01 includes equipment calibration steps. In addition to these procedures, consult instrument manuals for the proper preventative maintenance and calibration details for each instrument.

Routine daily maintenance procedures will be conducted in the field to ensure that equipment is operable:

1. Remove surface dirt and debris.
2. Replace disposable parts (e.g., probe membranes) as required by equipment manual.
3. Store equipment in a secure, dry place, protected from dust, wind, and precipitation.
4. Large equipment stored outside will be protected by covering sensitive parts to protect them from dust, wind, and precipitation.
5. Inspect equipment and instruments for possible problems (e.g., cracked or clogged lines or tubing, weak batteries) daily, and
6. Charge battery packs for equipment when not in use and when necessary. All equipment maintenance will be documented in the field logbook.

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# 3.2 PROCEDURE MD-02: EQUIPMENT DECONTAMINATION

Decontaminate all non-disposable equipment used for the collection, preparation, preservation, and storage of samples prior to their use and after each subsequent use.

The materials needed for decontamination are dependent upon the equipment to be cleaned. The following is a list of equipment to be used during decontamination:

- Cleaning solutions, tap water, and de-ionized/distilled water for the final rinse.
- Storage vessels to transport large volumes of de-ionized/ distilled water to the site.
- Buckets and wash basins for use in the washing and rinsing of equipment.
- Paper or cloth towels and Chemwipes. For use in cleaning all outside surfaces or surfaces that do not come into contact with the sample; and,
- Plastic garbage bags to contain all disposable items (gloves, paper towels, etc.).

Decontaminate meters measuring general field parameters and glassware as described below:

- Rinse equipment for several seconds with de-ionized/distilled water.
- Rinse two times with the water that is being sampled before collecting a sample for the parameters being measured.
- Periodically, at the sampler’s discretion, glassware will be immersed in a 10% hydrochloric acid solution, followed by manually scrubbing with a non-phosphate detergent.

Decontaminate non-disposable sampling equipment such as stainless-steel buckets, bailers, pumps, and dippers as described below:

- Manually scrub with a non-phosphate detergent. Hot water if the equipment is used in a petroleum contaminated well.
- Rinse with tap water, and then with de-ionized/distilled water.
- Rinse three times with de-ionized/distilled water.
- If sampling for organic compounds, rinse with pesticide-grade acetone or pesticide-grade methanol.
- Air dry equipment; and,
- Place all disposal items into plastic garbage bags and transport to the appropriate garbage receptacle on RTK property.

Larger pieces of equipment require specialized decontamination procedures. The small-diameter evacuation pumps will be decontaminated by rinsing the exterior of the pump, and the portion of the hose that was immersed, with clean tap water. The interior will be decontaminated by placing the pump intake into a five-gallon container filled with clean tap water and by pumping the water through the pump and hose. After the tap water wash, the pump will be appropriately decontaminated as per the above procedures using de-ionized/ distilled water in the second tank.

The tubing used for the Bennett pump will be decontaminated by pumping de-ionized/distilled water through the tubing. The outside of the tubing will be decontaminated by rinsing with de-ionized/ distilled water.

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A pressure sprayer steam cleaning can be used to effectively decontaminate the outside of the pump and tubing. At locations where a clean tap water source is available, the submersible pump will also be decontaminated by pumping 50 to 75-gallons through it and the discharge tubing. A clean 35-gallon or larger, plastic barrel may be used for this purpose.

All disposal items will be placed in plastic garbage bags and transported to the appropriate garbage receptacle on RTK property.

Rinseate will be disposed of as described in Procedure GW-06.

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## 3.3 PROCEDURE MD-03: MAINTENANCE AND CALIBRATION OF WATER LEVEL METERS

All water level meters will be calibrated annually or after any repairs to ensure the marks on the tape used for measurement of the water levels are in the correct position, and that the tape has not slipped. The calibration shall be made to a steel tape. If these measurements show the marking to be incorrect or that the tape has stretched more than 0.1 percent of its length, the wire will be repaired or replaced.

The water level probe will be checked, cleaned, and or replaced whenever a clear and distinct signal is not obtained when making water level measurements. If probe wire repair results in the cutting of the water level meters measurement line, the wire beneath the cut will be replaced with wire containing the proper measuring marks and factory-made splice joints.

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# 4 QUALITY CONTROL SAMPLING

This section presents procedures for general field measurement activities. Quality control (QC) samples will be collected to measure accuracy and precision of analyses as affected by field methodologies. Field QC samples appropriate to water sampling include trip blanks, equipment rinseate blanks, duplicates, and external laboratory duplicates. Rates of QC sample collection is specified in the project plan. QC samples will be documented and handled in the same manner as other samples prior to submittal to the laboratory (see Procedures).

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# 4.1 PROCEDURES QC-01: BLIND DUPLICATES

Duplicates will be collected at a rate specified in the project plan, generally one duplicate will be collected for every twenty (20) sample points. At least one duplicate sample will be collected from each facility that requires ground water monitoring for a Ground Water Discharge Permit each quarter. The sites selected for the collection of duplicate samples will represent the general quality of water recently sampled. Duplicates should represent the range of water quality sampled throughout the year. Additional duplicates will be collected, if there is a concern that special problems may be encountered in particular samples that are not represented by other duplicate samples.

Duplicates will be collected by alternately filling the primary and duplicate sampling containers to ensure that representative samples are collected. The first three letters of the sample name will be "DUP", and the next three numbers will indicate the sequence number for the duplicate sample. For example, “DUP63", where the number “63" indicates the sixty-third duplicate sample collected. Each year the sequence will start over at 01.

The actual name of the sample duplicated will be recorded in the field logbook, and reported to the laboratory after a final Certificate of Analysis is obtained.

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# 4.2 PROCEDURE QC-02: EXTERNAL LABORATORY DUPLICATES

When required External laboratory duplicates will be collected by alternately filling the primary and duplicate sample containers to ensure that representative samples are collected. When requested, an internal duplicate will be collected at each sampling site where an external duplicate is collected. The first three letters of the sample name will be "EXL", and the next three numbers will indicate the sequence number for the duplicate sample. For example, "EXL052", where the number "052" indicates the fifty- second external laboratory duplicate collected. For new year the number sequence will start over and begin at "001".

The Project Plan may require the collection of as many as five external laboratory duplicates during a given sampling event. When multiple sampling duplicates are required, the duplicate sample containers should be alternately filled to ensure representative samples. A letter will be appended to the sample identification number to uniquely identify each sample. For example, EXL052c would represent the third external duplicate.

The actual name of the sample duplicated will be recorded in the field logbook, and reported to the laboratory after a final Certificate of Analysis is obtained.

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# 4.3 PROCEDURE QC-03: MATRIX SPIKE SAMPLES

Matrix spiking will be done at the frequency identified in the Project Plan, generally one (1) a day or one (1) in every twenty (20), whichever is greater. Laboratory personnel will select samples for matrix spiking. Additional samples may be submitted by field personnel for laboratory spiking. Samples collected in the field for laboratory spiking will be assigned a sample identification number starting with the letters "QC" followed by the numeric portion of the sample point identification number and any trailing letters followed by the letters "SK" for the spike sample and "SD" for the spike duplicate. For example, a sample collected from well "NEM478" for spiking would be labeled "QC478SK" and the spike duplicate would be "QC478SD". Any spiking instructions must be clearly identified on the analytical request form. Laboratory personnel will assign control numbers to all spiked samples.

Samples selected for spiking by field personnel will be collected by alternately filling the primary and spike sample containers to ensure that the samples collected are representative of each other.

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# 4.4 PROCEDURE QC-04: TRIP BLANKS

Trip blanks will be collected at the rate specified in the Project Plan. In general, the collection rate will be one (1) for each day an equipment blank is collected and generally one (1) in every twenty (20) samples. Trip blank samples will be submitted and labeled with a special identification number. The first three letters of the sample name will be "TBK", and the next two or three numbers will indicate the sequence number for the trip blank. For example, “TBK23", where the number “23" indicates the twenty-third trip blank collected. Each new year the number sequence will start over and begin at “01". The sample containers will be prepared using the proper preservatives and filled with ultrapure, deionized (Type II) reagent grade water. The containers will accompany the sampling crew that day and will be delivered to the laboratory along with the other samples.

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## 4.5 PROCEDURE QC-05: EQUIPMENT RINSEATE BLANKS

For inorganic samples, a set of sample containers will be prepared (labeled and preserved) for approximately one (1) in every twenty (20) sample points by each sampling device. The rate of equipment rinseate blank sampling will be approximately 1 in 10 for sampling events that require organic analyses. The actual rate will be specified in the Project Plan. The sample containers will be prepared using the proper preservatives and filled with the final rinse water used on the sampling device (i.e., non-dedicated pump or bailer). The water used for this final rinse will be reagent grade, ultrapure (Type II) de-ionized water. The first two or three letters of the sample name will be "EQB", and the next three numbers will indicate the sequence number for the equipment rinseate. For example, “EQB41", where the number “41" indicates the forty-first rinseate blank collected. Each new year the number sequence will start over and begin at “01".

The final rinse of sampling equipment shall be collected as the rinseate blank. The rinsing procedure should, to the extent possible, be the same as normally used during the sampling event. A description of the equipment rinsed, and the name of the location sampled will be recorded on the field sampling form.

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# 5 GENERAL FIELD MEASUREMENTS

This section presents procedures for the general field measurement activities listed below.

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# 5.1 PROCEDURE GF-01: EQUIPMENT CALIBRATION

This procedure discusses the calibration of field equipment. In addition to these procedures, consult instrument manuals for the proper preventative maintenance and calibration details for each instrument.

Calibration solutions must not be reused and must be renewed prior to expiration dates stamped on the manufacturer's container. Equipment calibration ensures that measurements obtained are accurate in reference to a known standard. A calibration schedule is provided below for field equipment and instruments:

TABLE GF-1. Equipment Calibration Schedule

| Instrument | Frequency |
|---|---|
| pH Meter | Prior to each site |
| Specific conductance meter | Prior to each site |
| Dissolved oxygen meter | Prior to each site |
| Turbidity meter | Prior to each site when requested |

## 5.1.1 CALIBRATION OF A PH METER:

1. Calibrate the pH meter prior to use at each sampling site in the field.
2. Use specific calibration techniques according to the manufacturer's instructions using two of the standard buffer solutions (either 4 and 7 or 7 and 10, depending on the expected range of pH). If the meter does not automatically compensate for temperature, the pH values of these buffers will be compensated for temperature according to the values supplied on the manufacturer's bottle label. The temperature at which the sample pH was measured will then be used to compensate for temperature on the meter.
3. Document calibration information in the Field Logbook. Information to be recorded includes all calculations and adjustments made to the meter. The time, standard concentrations, and water temperature, when not using a temperature compensating meter, will also be recorded.

## 5.1.2 CALIBRATION OF TEMPERATURE-COMPENSATING SPECIFIC CONDUCTIVITY METER

1. Calibrate the meter in the field prior to use at each sampling site according to the manufacturer's specifications. Check the calibration according to the manufacturer's recommendation to ensure that proper measurements are taken.
2. In general measure the conductance of the standard using the meter to be calibrated. Make adjustments as directed by the manufacturer's specifications.
3. Record calibration information in the Field Logbook or on the appropriate Field Data Sheet. Information to be recorded includes all calculations, adjustments made to the meter, and accuracy prior to calibration. Documentation will also include time of calibration, standard concentrations, and water temperature.

### 5.1.3 CALIBRATION OF SPECIFIC CONDUCTIVITY METER (WITHOUT TEMPERATURE COMPENSATION

1. Calibrate the specific conductance meter prior to use at each sampling site in the field, and document in the Field Logbook. Documentation will include standard concentration(s), time of calibration, water temperature, and all calculations. Check the calibration as necessary to ensure that proper measurements are taken.
2. Calibrate in the field using a 1,000 mhos/cm (KCl) standard solution. The conductivity probe cell constant will be calculated according to the formula:

$$K = \frac{E}{C}$$

Where:
K = probe cell constant (unitless)
C = measured conductance value of standard (mhos/cm); and
E = expected conductance at observed temperature of standard solution (see Table GF-2).
Using the cell constant calculated above, correct the field specific conductance measurements to 25°C using the following equation:

$$S = \frac{K * C}{1 + [0.02(T - 25)]}$$

Where:
S = specific conductance at 25°C (mhos/cm).
K = cell constant calculated above.
C = specific conductance (mhos/cm) measured in field; and
T = temperature (°C) of sample in which conductance was measured.

3. Document calibration details on the field data sheet. Information to be recorded includes all calculations, adjustments made to meter, and accuracy prior to calibration.

Conductivity Temperature Corrections for 1,000 mhos/com Conductivity Standard

| Temperature C | Conductivity (mhos/cm) |
|---|---|
| 0 | 604 |
| 1 | 616 |
| 2 | 629 |
| 3 | 642 |
| 4 | 655 |
| 5 | 668 |
| 6 | 682 |
| 7 | 696 |
| 8 | 709 |
| 9 | 724 |
| 10 | 739 |
| 11 | 754 |
| 12 | 769 |
| 13 | 785 |
| 14 | 801 |
| 15 | 817 |
| 16 | 834 |
| 17 | 851 |

| | |
|---|---|
| 18 | 868 |
| 19 | 886 |
| 20 | 904 |
| 21 | 922 |
| 22 | 941 |
| 23 | 960 |
| 24 | 980 |
| 25 | 1,000 |
| 26 | 1,020 |
| 27 | 1,040 |
| 28 | 1,061 |
| 29 | 1,082 |
| 30 | 1,104 |
| 31 | 1,126 |
| 32 | 1,148 |
| 33 | 1,171 |
| 34 | 1,194 |
| 35 | 1,218 |

### 5.1.4 CALIBRATION OF DISSOLVED OXYGEN METER

Follow this procedure for the air calibration method for a meter with a membrane probe. Be aware that the calibration can be disturbed by physical shock, touching the membrane, or drying out the probe. If the dissolved oxygen meter does not have a membrane probe (or is not an Orion Research O2 on a pH meter), calibrate the dissolved oxygen meter in accordance with the instruction manual.

1. Adjust the "ZERO" reading while in the "OFF" position.
2. Switch to "RED LINE" and adjust the reading to align with the red line.
3. Switch to "ZERO" and adjust to zero with the zero-control knob.
4. Plug in probe and tighten retainer.
5. Insert probe into the calibration chamber making certain the chamber is slightly moist and the rubber plug is watertight. Place the calibration chamber (with probe in place) into the water being sampled and wait 10-15 minutes for the temperature to stabilize.
6. Switch to "TEMPERATURE" and read.
7. Determine the solubility of oxygen at that temperature from the calibration table included with the instrument.
8. Determine the altitude correction factor and multiply this factor by the solubility figure. This is the corrected saturation value (mg/L).
9. Switch to the appropriate scale and adjust the calibration knob to the corrected saturation value.
10. Wait two minutes to verify the stability of the reading and readjust if necessary.
11. Document calibration details in the Field Logbook or on the appropriate Field Data Sheet. Documentation will include time of calibration, water temperature, and all calculations. The condition of the probe will be checked prior to each measurement.

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### 5.1.5 TURBIDITY METER CALIBRATION

Calibrate the turbidimeter in accordance with this procedure or manufacturer's instructions, as appropriate:

1. Check the zero setting and adjust as necessary with turbidimeter in the "OFF" position.
2. Place the opaque plastic tube into the cell to block all light and allow the zero setting to be calibrated. Calibrate zero at all scale settings.
3. Place a standardized solution (usually provided with the meter) into the cell and cover with light shield. Keep this tube absolutely clean. Wipe with a soft cloth after handling and prior to calibrating. Discard if the tube becomes scratched or etched. Calibrate meter to exactly the reading of the standard solution.
4. Document calibration details in the Field Logbook or on the appropriate Field Data Sheet. Documentation will include time of calibration, water temperature, and all calculations. The condition of the probe will be checked prior to each measurement.

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# 5.2 PROCEDURE GF-02: PH MEASUREMENT

1. If the measurement cannot be made within the water body, collect a sample in a clean beaker. Record the time the sample is collected.
2. Measure the temperature with a clean thermometer and adjust the temperature knob accordingly (for meters which do not compensate for temperature).
3. Rinse the probe with distilled water prior to immersing into the sample.
4. Allow the meter to stabilize (change less than 0.05 units in a one-minute period with no systemic drift). Read and record the pH value on the Field Data Sheet. Record the time the measurement is taken.
5. Repeat steps 1 through 4 if the results are questionable.
6. Verify the accuracy of the measurement, if necessary, by re-testing a buffer solution. This step need not be performed after each measurement if no drift is detected in the meter after an initial test.
7. Rinse the probe.
8. If a digital pH meter is used, add DI water if the electrolyte is not sufficient to cover the electrode.
9. Store the meter according to the manufacturer's recommendations.

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# 5.3 PROCEDURE GF-03: EH MEASUREMENT

The ability of a natural environment to bring about an oxidation or reduction process is measured by a quantity called its redox potential and is designated as Eh. Eh is a measure of the ability of an environment to supply electrons to an oxidizing agent or to take up electrons from a reducing agent.

1. Check the accuracy of the Eh probe:
    a. Prepare equipment according to manufacturer's specifications.
    b. Check the accuracy of electrode system with a reference solution of known Eh (ZoBell solution). Record the following information in the Field Logbook.
    c. Bring the reference ZoBell solution to sample temperature and record the temperature.
    d. Measure potential, in millivolts, of the ZoBell solution at sample temperature (Eh ZoBell(obs)) and check against theoretical value at measured temperature. This value should be + 10 millivolts (EH ZoBell + Ref).
    e. Place electrode in Eh cell or water sample container and allow readings to stabilize (after several minutes).
    f. If using a cell, turn off water flow to prevent streaming potential and immediately take reading.
    g. Record data (Eh) and calculate Eh relative to standard hydrogen electrode.
    h. Calculate system Eh as follows: $Eh^{sys} = EH^{obs} + Eh^{ZoBell+Ref} - Eh\ ZoBell(obs)$.
    i. Record Eh to the nearest + 10 millivolts. (Oil and grease in the sample solution may coat the noble-metal electrode and provide erroneous readings. Note any oil in the Field Logbook.)
2. Take Eh measurements in accordance with the manufacturer's specifications in water sample or cell.
3. Record the measurements on the appropriate Field Data Sheet.
4. Recalibrate and check meter accuracy in accordance with the manufacturer's recommendations.

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# 5.4 PROCEDURE GF-04: SPECIFIC CONDUCTANCE MEASUREMENT

1. If the measurement cannot be made within the water body, collect a sample in a clean beaker. Record the time the sample is collected.
2. Immediately take a temperature measurement and "set" the temperature control if appropriate for the meter used.
3. Immerse the probe into the sample, shake lightly, and allow the reading to stabilize.
4. Record the reading on the Field Data Sheet. Record the time the measurement is taken. If questionable, repeat steps "1" through "3".
5. Rinse the probe thoroughly with distilled water.

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# 5.5 PROCEDURE GF-05: MEASUREMENT OF CARBONATE AND BICARBONATE

This procedure describes the measurements of carbonate and bicarbonate to be conducted at the Environmental Field Laboratory (the Ranch), and laboratory calculations to be conducted at the RTK Environmental Laboratory to determine carbonate and bicarbonate concentrations in water samples.

When alkalinity is due to carbonate or bicarbonate content, the pH at the equivalence point of the titration is determined by the concentration of $CO_2$ at that stage, which, in turn, depends on the total carbonate species originally present and any losses that may have occurred during titration. The following pH values are suggested as expressed equivalents points for the corresponding alkalinity concentrations in milligrams of $CaCO_3$ per liter:

- Phenolphthalein (pH 8.3)
- Bromocresol green (pH 3.8)

<u>Equipment</u>

- Brinkmann 25 ml Digital Buret
- 250 ml glass beaker
- Water Quality Field Data Sheet

<u>Reagent Needed</u>

- 0.1 normal hydrochloric acid (HCl) or sulfuric acid ($H_2SO_4$)

<u>Carbonate</u>

1. Place 100 mL of sample into a borosilicate beaker.
2. If the pH is equal to or greater than 8.3 add phenolphthalein to the sample to obtain a pink color in the sample. If no color is obtained, carbonate is not present. Proceed to the bicarbonate procedure.
3. Slowly titrate using 0.1 normal acid and a Brinkmann 25 ml Digital buret. Add the acid to the sample until the sample becomes clear again.
4. Record molarity and the number of milliliters of acid used to achieve the color change on the Water Quality Field Data Sheet.

<u>Bicarbonate</u>

1. Add bromocresol green to the same 100 ml of sample until it is dark green.
2. Slowly titrate using 0.1 normal acid and the Brinkman 25 ml Digital burette until the color changes to a lime green.
3. Record acid type, molarity, and the number of milliliters of acid added to the sample on the Water Quality Field Data Sheet.

<u>Calculation</u>

The number of milliliters used in both titrations are taken from this sheet in order to calculate milliequivalents of carbonate ($CO_3^{=}$) and bicarbonate ($HCO_3^-$) using the following equations[1]:

<u>Phenolphthalein</u>

50000 = milliequivalent

A = ml of standard acid used

N = normality of acid used

$$\text{Carbonate Alkalinity, mg CaCO3/l} = \frac{A \times N \times 50000}{\text{ml of sample}}$$

<u>Bromocresol Green</u>

50000 = milliequivalent

A = ml of standard acid used

N = normality of acid used

$$\text{Bicarbonate Alkalinity, mg CaCO3/l} = \frac{A \times N \times 50000}{\text{ml of sample}}$$

*[1]American Public Health Association (APHA). 1989. Standard Methods for the Examination of Water and Wastewater. Seventh Edition. Prepared and published jointly by the American Public Health Association, American Water Works Association, and Water Pollution Control Federation. Washington, D.C.*

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# 5.6 PROCEDURE GF-06: DISSOLVED OXYGEN MEASUREMENT

1. If a dissolved oxygen meter with membrane probe is not used, use CHEMets ampoules to measure dissolved oxygen.
2. If an ampoule flow-through cell is available, position ampoule in cell[2]. Divert water flow through the cell. When the cell is filled with water, break the ampoule at the neck. Stop the flow of water and remove the ampoule. Compare the color with the standard ampoules and record the dissolved oxygen concentration by extrapolating between the colors of the standard ampoules to + 0.5 ppm.
3. If a flow-through cell is not available, collect a sample of water in a clean sample cup. Follow the directions provided with the CHEMets ampoules for measuring dissolved oxygen. After waiting the recommended time, but no longer than five minutes, compare the color of the ampoule with the standard ampoules and record oxygen concentration by extrapolating between the colors of the standard ampoules to + 0.5 ppm.
4. Record the value for dissolved oxygen and the test method on the Field Data Sheet. Record the time the sample is collected and the time the measurement is taken.
5. If no color is shown, record the lowest value on the standard ampoule as the detection limit. Do not record zero.

[2]*Reference: Walton-Day, Katherine, Macalady, D.L., Brooks, M.H., and Tate, V.T. 1990. Field Methods for Measurement of Ground Water Redox Chemical Parameters. Ground Water Monitoring Review. Fall issue.*

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# 5.7 PROCEDURE GF-07: FERROUS IRON MEASUREMENT

1. Use CHEMets ampoules to measure ferrous iron. Follow the same procedures as used for dissolved oxygen ampoules.
2. Extrapolate the concentration of dissolved ferrous iron and record to + 0.05 ppm.
3. If the ampoule color is darker than the range of standard ampoules, dilute a fresh sample of well water one-to-one with de-ionized/distilled water and measure ferrous iron immediately. The tested sample must be one-half well water and one half de-ionized/distilled water. The result should be recorded as twice the value of the selected standard.
4. Record the value of ferrous iron, the method used to include any dilutions done, and the final ferrous iron value on the Field Data Sheet. Record the time the sample is collected and the time the measurement is taken.
5. See preceding procedure.

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# 5.8 PROCEDURE GF-08: SULFIDE MEASUREMENT

The following procedures describe the methods used to complete field analyses for sulfide. This procedure is completed in two steps. The first step is the identification of sulfide concentration greater than the detection limit, and the second is the quantification of the concentration of sulfide present, if measurable concentrations are detected.

Step 1 - Presence of detectable concentrations of sulfide.

1. Fill a clear glass container with the water to be analyzed. The container should be filled in a manner that minimizes the disturbance of the sample and does not result in aeration of the sample.
2. Insert a lead acetate strip and check the sample for the presence of a black precipitate on the lead acetate strip.
3. If a black precipitate is present, proceed with Step 2, otherwise record the concentration as less than 0.01.

Step 2 - Use CHEMets ampoules to measure sulfide concentrations as described below. This method uses the K-9503 Vacu-vials using the "methylene blue" colorometric test method. Using the equipment provided in the CHEMets test set complete the analyses as follows:

1. Fill the sample cup to the 25 ml mark with your sample.
2. Add 3 drops of A-9500 Activator Solution. Stir quickly with the top of the Vacu-vial ampoule.

   ***Caution:***

   *A-9500 Activator Solution to ferric chloride in concentrated hydrochloric acid. Avoid contact. Remove from the glass bottle only when in use. In case of contact, flush skin, or eyes with water. Seek prompt medical attention if swallowed. READ MSDS BEFORE USING.*

3. Immediately snap the tip of the Vacu-vial ampoule by placing the tapered tip down in the bottom of the sample cup and pressing the ampoule against the side. The sample will fill the ampoule and begin to mix with the reagent.

   *NOTE: A small bubble of inert gas will remain in the ampoule to facilitate mixing.*

4. Remove the Vacu-vial ampoule from the cup. Mix the contents of the ampoule by inverting it several times, allowing the bubble to travel from end to end each time, until the solution is uniform in color.
5. Wipe all liquid from the exterior of the ampoule and wait 5 minutes.
6. After 5 minutes, read the transmittance of the Vacu-vial ampoule in your spectrophotometer or filter photometer. Use the correct calibration table to obtain analytical results as mg/l sulfide.

For additional information on the test described above, review the instructions provided in the CHEMetric test kit, contact CHEMeterics, Inc. (Phone 1-800-356-3072) or look up the method in APHA Standard Methods, 17, ed., p.4-192, 1989.

# 5.9 PROCEDURE GF-09: TURBIDITY MEASUREMENT

1. Collect a representative, mixed sample of the water to be tested in a clean sample tube. Record the time the sample is collected. Allow sufficient time for bubbles to escape.
2. Carefully wipe the sample tube with a soft cloth to remove water spots and fingerprints. Discard sample tubes if scratched or etched.
3. Place the sample tube into the light cell with the proper orientation. Cover the tube with the light shield.
4. With the scale setting on the highest range (0-100 NTUs), read the meter, and adjust the range setting as needed. Once the reading has stabilized, record the reading on the Field Data Sheet. Record the time the reading is taken.
5. If the reading exceeds 100 NTUs, dilute the sample with distilled water as needed. A 50:50 dilution reflects a reading which is one half the true value.
6. Thoroughly rinse and wipe the sample tube clean after use.

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# 5.10 PROCEDURE GF-10: MEASUREMENT OF LIGHT NON-AQUEOUS PHASE LIQUID (LNAPL)

This procedure applies to detection and measurement of non-aqueous phase liquids, such as petroleum products, which are less dense than water. Use this procedure at monitoring wells suspected of, but not known to contain such contamination.

1. Immediately after removing the well cap and prior to well evacuation, sample the air in the well head for organic vapors using either a photo ionization analyzer or an organic vapor analyzer. Document the time and reading (including units) of the measurement on the Field Data Sheet. This step may be skipped if the well is known to contain hydrocarbons.
2. Lower the interface probe to determine the presence of an immiscible organic layer above the groundwater.
3. Follow the instructions provided with the meter to determine the depth to the top of the liquid layer and the interface between the liquid and the groundwater. Document the time and reading (including units) of the measurements on the Field Data Sheet.
4. Decontaminate the meter prior to and after each use.

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# 5.11 PROCEDURE GF-11: MEASUREMENT OF DEPTH TO WATER AND DEPTH TO BOTTOM

The depth to water and depth to bottom of a monitoring well casing are required in order to calculate purge volumes for evacuation prior to sampling, development of new wells, and in preparation for well abandonment. See Procedure GW-09 for site-wide water-level measurements to determine the potentiometric surface. If water levels are taken independent of a sampling event use the field data sheet shown in Figure GF-1.

<u>Depth to Water</u>

Measure the depth to water prior to well evacuation and at other times, as needed, as follows:

1. Lower the meter probe into the casing and measure to the nearest one-hundredth of a foot below the measuring point elevation (top of PVC casing marked with an indelible ink marker or another method to standardize its location If casing is not marked, use the North side of the PVC). In flowing wells, either use a transducer or standpipe to measure head above top of well. (See Procedure GF-12 and GF-13.)
2. If an oily substance is observed on the meter probe, follow Procedure GF-10 to detect the presence of the floating liquid. Record observations and readings on the Field Data Sheet and arrange to sample for organic constituents as directed by the Project Manager or Project Work Plan.
3. Decontaminate the meter prior to each use with three rinses of de-ionized water.

Measure depth to the bottom of the casing in RTK wells without dedicated pumps at least once per year; every two years in wells with small, removable pumps; and, for larger pumps when serviced, as follows:

1. Remove dedicated pump if it will obstruct the measurement.
2. Insert the decontaminated, weighted depth-to-water meter or steel tape into the casing until the bottom is reached.
3. Measure to the nearest one-tenth of a foot below the measuring point evaluation (top of the protective casing previously marked with an indelible ink marker or another method to standardize its location).
4. Record the depth on the Groundwater Quality Field Data Sheet.
5. Decontaminate the outside of the pump. Inspect the pump for a potential maintenance problem and repair, if required, prior to re-installation according to Procedure MD-02. Record inspection and repairs in the Field Logbook.

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**Field Data Sheet Used for Water Level Measurements Taken Independent of a Sampling Event.**

| Date | Time | Depth of Water | Measured By | Remarks |
|---|---|---|---|---|
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# 5.12 PROCEDURE GF-12: MEASUREMENT OF HHYDRAULIC HEAD USING IN-SITU TRANSDUCER

The following operation and calibration procedures apply to the In-Situ Transducer Model No. PTX-161D and the In-Situ Level head Digital Readout Meter Model No. LH10HE. For additional information, refer to the Level head operator's manual.

Use the following operation procedure to measure feet of head in a flowing well:

1. Slip a 1.5-inch or 2-inch flowing well valve adapter, rubber washer, and coupling over the transducer probe. Place the adapter on the probe and position such that the holes in the black tip are just exposed beneath the inside lip of the adapter. (This will align the tip of the probe with the top of the flowing well valve, which is the measuring point of the well.) Tighten the coupling.

   *NOTE: Flowing well valves on the older wells (with round, yellow protective casing) accept the 2-inch adapter. Flowing well valves on the newer wells (500 series with square, silver, galvanized protective casing) accept the 1.5-inch adapter.*

2. Screw the adapter into the flowing well valve. Attach one end of the connector cable to the Level head meter and the other end of the cable to the faceplate of the transducer reel.

3. Turn on the meter to the proper pressure range indicated on the transducer (10 psi for Model No. PTX-161D). Turn the Zero Adjust Knob until the digital readout equals zero.

   *NOTE: The pressure-sensing diaphragm in the probe is extremely sensitive. Therefore, it is difficult to set the meter on a stabilized zero reading. However, it is possible to set the meter within 0.005 to 0.010 inch.*

4. Open the well valve. Check for leaks in the connections. (Significant leaks will cause lower than actual head measurements due to pressure losses.)

5. While allowing the head to stabilize, note variations in the readout of the meter.

6. Head will be a positive readout on the meter, representing the potentiometric surface or the actual distance in feet above the measuring point of the well that the water would rise in a manometer tube. Record the positive value when the reading has stabilized.

   *NOTE: The 10-psi transducer will not accurately respond to heads greater than +19.6 feet.*

7. Close the valve and remove the instruments from the well.

Use one of the following field or in-house calibration methods to check the accuracy of the transducer and meter prior, or after, each use:

<u>Well Method</u>

1. Zero the meter in air.

2. Lower the probe into a well to a predetermined depth (5, 10, or 15 feet) below the water level.

3. Determine if the instrument is reading the correct depth. This method works best in wells where the water level is visible inside the casing and very close to the measuring point of the well.

   *NOTE: Because depths are not marked on the transducer cable, accurate calibrations in wells with deeper water levels can be performed by taping the wireline of a water level meter to the transducer cable. The correct depth of the water level and the pre-determined calibration depth can then be read off the wireline.*

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4. If the meter requires calibration adjustments, refer to the Level head operator's manual.

Manometer Check

1. Perform head measurements with the transducer and meter using the Operation Procedure described above. Record the stabilized head measurement.
2. Remove the instruments from the well. Install a manometer capable of measuring within the range of the recorded head measurement.
3. Open the valve and allow the water level in the manometer to stabilize.
4. Determine if the instrument readout was the same head measurement as seen in the manometer.
5. If the meter requires calibration adjustments, refer to the Levelhead operator's manual. In-House
6. In the absence of a well or a manometer, a shallow-depth calibration can be performed. Fill a sink or an ice chest with water.
7. Lower the probe to a pre-determined depth. Lower a steel measuring tape to the same depth.

   *NOTE: The zero point on the transducer probe is the top of the probe (not the holes where the diaphragm is located).*
8. Determine if the instrument is reading the same depth below water level as on the measuring tape.
9. If the meter requires calibration adjustments, refer to the Level head operator's manual.

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# 5.13 PROCEDURE GF-13: MEASUREMENT OF HYDRAULIC HEAD IN FLOWING WELLS

This procedure describes the use of manometers and standpipes for the measurement of head in flowing (artisan) wells. The use of a pressure transducer is preferred since it does not require the discharge of water.

The standpipe used in the measurement of these heads is a clear plastic pipe that is screwed into the value on top of the well. After the standpipe is installed, the height to which the water rises in the standpipe is measured with a steel tape, read accurate to 0.01 feet. A minimum of at least 2 measurements must be taken at least 5 minutes apart. If the measured water level changes by more than 0.01 feet, additional measurements must be taken until the measurements stabilize. For slowly recharged wells, this may take hours.

The manometer is a small clear plastic hose that is attached to the valve at the top of the well. The plastic tube is elevated, and the water allowed to rise in the tubing. The height of the water in the tubing measured vertically above the well is measured using a steel tape read accurate to 0.01 feet. A minimum of at least 2 measurements must be taken at least 5 minutes apart. If the measured water level changes by more than 0.01 feet, additional measurements must be taken until the measurements stabilize.

The resulting measurements will be recorded in the field notes. Any significant leakage of water from the well prior to, during, or after the measurements will also be recorded in the field records.

No leakage should be allowed, and if it is not corrected should be reported to the field supervisor.

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# 5.14 PROCEDURE GF-14: REQUESTING NEW SAMPLE LOCATION NUMBER

Each time a new monitoring point is added to the monitoring system, a new sample location number should be requested using the form shown in Figure GF- 2. The request for a new sample location number will be made to the Sampling Supervisor.

Included in this request will be the site location and survey data. If the sampling point is a newly constructed well, the well documentation identified in Procedure GW-11 will be provided to the Sampling Supervisor within 90 days of the well's construction.

Immediately after the first sampling of this site, the site documentation required by Procedures GW-02, SW-02, PW-02, DW-02, or SD-02 will be provided to the Sampling Supervisor.

**Example of Form Used to Request Addition of Sample Number to Sample Authorization Table.**

**SETUP DATA FOR WELL LOCATION AUTHORITY ON TABLE**

| | |
|---|---|
| Division | UCD |
| Program -ID | WTR |
| Region - Area | ______________________ (Refer to SOP-Water Sampling [DC-7] for acronyms) |
| System -ID | ______________________ |
| Alias | ______________________ |
| Date Installed | ______________________ |
| Status | ______________________ |
| Site Use | ______________________ |
| Sample Type | ______________________ (G=Groundwater, S=Surface, P=Process) |
| Report to State | ______________________ |
| Priority | ______________________ (1 through 5; 1=Permit site, 5=general) |
| Total Metals | ______________________ (Yes=Total & Diss: No=Diss only) |
| Sample Frequency | ______________________ (M=Monthly;Q=Quarterly;S=Semi;A=Annual;E= Every other Year;F=Five Years;NS=No Sample) |
| Element Group | Basic__________________ |
| | Minor _________________ |
| | Major Ions______________ |
| | Trace Metals 1___________ |
| | Trace Metals 2___________ |
| | Trace Metals 3___________ |
| | Radionuclides___________ |
| | Organics________________ |
| | Other__________________ |
| Owners Code | ________________________ (K=Kennecott;P=Private) |
| Owners Name | ________________________ |
| Site Description | ________________________ |
| Northing | __ __ __ __ __ __ __ __ __ __ |
| Easting | __ __ __ __ __ __ __ __ __ __ |
| Site Elevation (Ground) | __ __ __ __ __ __ __ __ __ __ |
| Mark Elevation (PVC) | __ __ __ __ __ __ __ __ __ __ |
| Screen Top (Depth from Ground) | __ __ __ __ __ __ __ __ __ |
| Well Depth (Depth from Ground) | __ __ __ __ __ __ __ __ __ __ |

Submitted By:_________________ Date:__________________
Approved

Sampling Supervisor_______________ Lab. Director________________

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# 5.15 PROCEDURE GF-15: TEMPERATURE MEASUREMENTS

Temperature Measurement

1. For flowing runoff water, select a location where the water is moving (at the section of greatest velocity) and well mixed.
2. Stand in a position such that a shadow is cast upon the area chosen for the temperature determination.
3. Hold the thermometer by the top and immerse it in the water in the shadowed area. Allow at least 60 seconds for the thermometer to stabilize.
4. If the water is too rough or turbid to measure in situ, then fill a container and immediately read the temperature. Use a container large enough to allow full immersion of the thermometer. Bring the container to the same temperature as the stream prior to filling with water.
5. Without removing the thermometer from the water, position the thermometer such that the scale can be read. Read the temperature to the nearest 0.5oC and record on the Field Data Sheet.

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# 5.16 PROCEDURE GF-16: PURGE AND RINSEATE WATER HANDLING

Prevent removed water from entering natural surface water bodies.

Use containers to store water until it may be properly disposed of if it has any of the following characteristics:

1. Oil on the water surface.
2. Concentrations of organic and metal constituents at or above the RCRA Characteristic Hazardous Waste threshold values.
3. A pH value of less than 4.0.

Waters that meet the above criteria must be collected and disposed of by the following protocols:

4. Waters containing elevated metal concentrations are to be disposed of in the smelter East Process Water Pond.
5. Waters with a pH below 4.0 are to be collected and disposed of in the Zone 1 Desilting Basin.

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# 6 GROUNDWATER

This section presents procedures for activities associated with ground water sampling as listed below. These procedures generally follow the recommendations given by the EPA in the RCRA Ground Water Monitoring Enforcement Guidance Document (1986).

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# 6.1 PROCEDURE GW-01: PIEZOMETER AND WELL IDENTIFICATION

All RTK ground water sampling locations are identified utilizing a three- or four-letter identification acronym followed by a unique number ranging between 0001 and 0999, and a final letter code. No dashes and/or spaces are used in the well name. Special identification numbers for QC samples are described in Procedures QC-01 through QC-05.

Well names for new wells will be assigned and approved by the Sampling Supervisor. The information listed at the end of Procedure GW-11 must accompany requests for new names.

The procedure for naming new sampling locations is provided in Procedure DC-02. The following sections describe, in general, conventions used in identifying well locations prior to the present system.

<u>Site Identification Acronym</u>

The identification acronym consists of a two-letter code identifying the general location of the sample and a third letter identifying a facility and/or type of well. For example, the acronym "NES" identifies a north end well (NE) located at the Smelter (S).

General location acronyms used to date include:

VW - Valley Well, a well located on the east valley side of the Oquirrh Mountains.

NE - North End, a well located along the north end of the Oquirrh Mountains.

TV - Tooele Valley, a well located along the west end of the Oquirrh Mountains.

TLL - Tailings Lysimeter

Well type and/or facility acronyms used to date include:

A - A well located in the general vicinity of the old Arthur Concentrator.

D - Diving Board Area.

K - A monitoring or production well owned by RTK.

L - RTK well located in the landfill area near Magna.

M - A well located in the general vicinity of the Magna Concentrator or the City of Magna.

P - A large-diameter piezometer.

R - A well located in the general vicinity of the Refinery.

S - A well located in the general vicinity of the Smelter.

T - A well located in the general vicinity of the tailings impoundment.

W - A well located in the general vicinity of the Wastewater Treatment Plant or a privately-owned monitoring or production well. The use of this acronym to identify privately-owned wells is restricted to use in conjunction with the identification acronym "VW".

<u>Sample Location Number</u>

A sequence number or character is associated with each sampling point. That number is unique to the sampling point and will not be used in other well names. Many of the sequence numbers are also reserved for surface water sampling locations.

<u>Final Character</u>

An optional final character may be attached to the well name to indicate well depth. This final character will be assigned to wells installed in a well nest which are drilled to evaluate aquifer changes as a function of depth. The shallowest well will be assigned the letter "A". Successively deeper wells will be assigned sequentially higher alphabetic letters. For example, well VWP272C is the third deepest well at well site VWP272.

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# 6.2 PROCEDURE GW-02: WELL INSPECTION

This procedure describes a general well inspection to be conducted each time a well is sampled and a comprehensive well inspection to be completed once for each well and after any major modification or problem with the well.

**General Well Inspection**

Each time the well is sampled a general well inspection is to be completed. As a minimum, the following items should be checked to determine if a problem exists:

- General condition of the well and well pad.
- Recent damage to the well.
- Well locked on arrival.
- Water flowing from the well.
- Broken or missing well caps; and
- Broken valves on flowing wells.

If this inspection indicates a problem, the problem should be noted and recorded in the Field Logbook. Any serious problems should be reported directly to the Sampling Supervisor.

**Comprehensive**

The comprehensive well inspection is to be completed at least once for each well. This inspection should be done immediately on all wells for which it has not previously been done and after any major modifications or problems with the well. Inspect the well for all items listed on the Well Inspection Report (see Figure GW-1). Unless previously done, prepare a well location map and photographs to document the well location and elevation marker point.

**Map and Photograph**

1. Draw a sketch on the Well Inspection Report, including field-measured distances to permanent or semi-permanent landmarks (natural features and/or man-made structures) and a north arrow.
2. Attach a copy of an existing map, if possible, with notations on distances from map features.
3. Once a map has been sketched for a given well, do not redraw unless landmarks have changed, disappeared, or new landmarks have appeared in the area which would be beneficial in locating the wells.
4. Shoot at least two photographs at each well site for all wells included in the monitoring network. Shoot one photograph with the well in the foreground, and landmarks (shown on the well location map) in the background. Shoot another photograph with the location of the marker point (used to measure depth to water and depth to bottom in the well) clearly visible.
5. Attach photographs to the Well Inspection Report which will be filed in the Water Quality Data Filing System. For domestic and production wells, also provide the Well Inspection Report to the Project Manager or Field Team Leader to attach to these procedures for use in the field.

**Well Inspection**

1. Inspect the locking cap on the protective external casing. Check that the locking hasp is not broken and that the shackle of the lock will not fall out of the hasp. Check the lock for smooth operation. Lubricate if necessary.

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2. Examine the external casing if present. Note its outside diameter and construction material. Check the condition of the paint. Make sure the Well I.D. # is marked on the external casing. Note if the external casing is badly corroded or weathered.
3. Examine the well pad if present. Note its construction material, thickness, and Well I.D.# markings.
4. Inspect the inner casing. Note its outside and inside diameters. Note construction material and type of adapter if present. If no adapter, inspect condition of top of casing for smoothness. Check to see if marker point is present and if it is labeled. Inspect the annular seal for fill height and condition of material.
5. Measure the depth to the bottom of the casing in accordance with Procedure GF-11.
6. Note whether a pump is present. Indicate type of pump if present.
7. If the well is a flowing well, inspect the condition of the shut off valve. Indicate if a head measurement is possible.
8. Note any other pertinent items about the condition of the well, special sampling considerations, or its surroundings not included in the above information.

**Please refer to Attachments - Figure GW-1. Example Well Inspection Report**

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# 6.3 PROCEDURE GW-03: WELL EVACUATION

Determine purge volume using this procedure prior to removing water and measuring field parameters (See Procedure GW-04). Purge volume is calculated as the standing well and sand pack porosity. If an immiscible phase is detected for the first time, collect an immiscible phase sample (Procedure GW-9) prior to any purging activities (see Procedure GF-10).

Purging Well

For monitoring wells of known construction, evacuate a minimum of three (3) standing well casings and sand pack porosity volumes to help ensure the collection of a sample which is representative of the surrounding aquifer. The removal of at least three volumes is believed to result in a sample which is not influenced by stagnant water remaining in the well casing. Limiting the evacuation to five volumes, given that the indicator parameters have stabilized, prevents the pumping of diluted or more concentrated ground water from another area within the aquifer. If the well goes dry during evacuation, allow the water level to recover and re-evacuate, if possible, until at least one and one-half (1.5) volumes are purged. When organic constituents will be analyzed, do not pump or bail the well to dryness if the recharge rate causes formation water to cascade vigorously down the sides of the screen. The pumping rate during the sampling of the well will, to the extent possible, be lowered to provide the lowest possible turbidity achievable at the time of sampling.

<u>Determine Purge Water Volume</u>

The volume of porosity is calculated as follows:

1. Measure the inside diameter of the well casing if not known.
2. Determine the depth to water as described in Procedure GF-11. Enter the measured value at "Measured Initial Depth to Water" on the Ground Water Quality Field Data Sheet. If the well is flowing or the depth cannot be measured, enter the value at "Assumed Initial Depth to Water" on the Sheet. Assume the depth to water for flowing wells is 0.0 ft. Use the previous measurement for the well if conditions do not permit measurement. Decontaminate the water level indicator prior to use in each well as described in Procedure MD-02.
3. Determine the total depth to the bottom of the well from the measuring point at least once per year (see Procedure GF-11). Enter the measured value at "Measured Depth to Bottom of Casing" on the Ground Water Quality Field Data Sheet. If the depth is not measured, enter the previous measurement at "Assumed Depth to Bottom of Casing" on the Sheet.
4. Calculate the number of linear feet of standing water by subtracting the depth to water (WL) from the depth to bottom (WD). Record this value on the Ground Water Quality Field Data Sheet.

$$V = 1.872r[(WD-WL)(D2C)+ 0.3(L)(D2-D2)]$$

5. Calculate the standing water volume in gallons as follows:

Where:
V = Volume of standing water (gallons)

L = Length of screened interval (ft)

0.3 = Assumed porosity of sand pack

WD = Depth to bottom of screen (ft)

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WL = Depth to water (ft)

DB = Diameter of borehole (ft)

DC = Diameter of casing (ft)

$$V = [1.872r(WD-WL)(D2C)]+ V_{SP}$$

If the sand pack volume, $V_{sp}$, is known, calculate the standing water volume as follows:

6. Multiply the standing water volume by three (3) to obtain the minimum purge volume.

The volume of water to be purged from the well may be calculated as indicated above. Record the value for water purged on the Ground Water Quality Field Data Sheet.

Standardize the purging method, flow rate, and purge volume per foot of standing water in well casing for each well, when possible, to ensure that the monitoring results will be comparable from one sampling event to the next.

Pump Operation

In high-yielding, non-flowing wells without dedicated pumps, place the pump near the top of the water column rather than in the screened area. This will ensure evacuation of the standing water above the screen. If well yield is low to moderate, place the pumps at the bottom of the screened interval. For flowing wells, install a spigot to allow measurement of flow rate or volume during purging.

The following procedures describe pump operation:

Dedicated Grundfos (Submersible) Pumps

1. Remove the electric cord and discharge tubing coiled within the well casing.
2. Connect the electric cord from the submersible pump to the power supply. Turn the pump on. When pumping commences, note the time and flow rate on the Ground Water Quality Field Data Sheet. Calculate the time to run the pump using this flow rate and the calculated purge water volume. Measure parameters as per Procedure GW-04.
3. After purging and sampling, turn off the pump. Recoil the electric cord and discharge tubing and place them inside the protective casing. Replace the locking cap and lock the well.

Non-dedicated Grundfos Pumps

1. Rinse the exterior of the pump and tubing with deionized water prior to lowering down the casing. Do not allow rinse water to enter the well casing. Lower the pump and tubing into the well to the desired depth.
2. Follow steps No. 1 and No. 2 for dedicated Grundfos pumps above.
3. After purging and sampling, remove the pump from the well. Rinse with de-ionized water any portion of the tubing that has come in contact with well water.
4. Decontaminate the pump following Procedure MD-02. Shut off the compressor and generator. Replace the locking cap and lock the well.

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Bennett Pump

1. Start the generator and allow it to warm up until the generator is idling at a constant RPM. Plug the air compressor and reel motor into the receptacle outlets. Connect the compressor to the pump and allow the air pressure to build until there is sufficient pressure to activate the pumping action of the Bennett pump.
2. Rinse the exterior of the pump and tubing with deionized water prior to lowering down the casing. Do not allow rinse water to enter the well casing. Lower the pump and tubing into the well to the desired depth.
3. Monitor the discharge of the pump. When pumping commences, note the time and flow rate on the Ground Water Quality Field Data Sheet. Calculate the time to run the pump using this flow rate and the calculated purge water volume. Measure parameters as per Procedure GW-04.
4. After purging and sampling, remove the pump from the well. Rinse with de-ionized water any portion of the tubing that has come in contact with well water.
5. Decontaminate the pump following Procedure MD-02. Shut off the compressor and generator. Replace the locking cap and lock the well.

Peristaltic Pump

1. If a dedicated discharge hose is not present, rinse the new tubing with de-ionized water. Lower the tubing into the well to the desired depth. Do not allow rinse water to enter the well casing.
2. Connect the tubing to the intake side of the peristaltic pump. Connect the peristaltic pump control box to a power source (12-volt battery or 115-volt generator).
3. Turn the control box on. When pumping commences, note the time and flow rate on the Ground Water Quality Field Data Sheet. Calculate the time to run the pump using this flow rate and the calculated purge water volume. Measure parameters as per Procedure GW-04.
4. After purging and sampling, remove the tubing from the well unless the tubing is dedicated to the well. Purge and spray the tubing with de-ionized water. Store the tubing in a clean plastic bag.
5. Decontaminate the pump following Procedure MD-02. Replace the locking cap and lock the well.

# 6.4 PROCEDURE GW-04: FIELD MEASUREMENTS

Measure temperature, pH, and specific conductivity during the pumping for well evacuation. Measure dissolved oxygen, and ferrous iron at the end of pumping, when required.

1. Collect samples in new, laboratory-cleaned or decontaminated containers for measurement with meters.
2. Take readings of temperature, pH, Eh (if required), and specific conductivity immediately upon the start of pumping, and periodically thereafter (e.g., every one-half to one well volume). As the total pumped volume approaches three well volumes, record the readings more frequently. When the pH has stabilized to within 0.05 pH units and other parameters have stabilized to within + 10% for four sequential readings, the well evacuation is complete. Record readings on the laptop Ground Water Quality Field Data Sheet, including comments regarding unsuccessful stabilization of parameters after the removal of five well volumes.
3. Record a physical description of the sample, noting turbidity and general appearance.
4. If required, measure Eh, dissolved oxygen, ferrous iron, and sulfide just before pumping is ceased.
5. If a dissolved oxygen meter with membrane probe is not used, use CHEMets ampoules to measure dissolved oxygen (see Procedure GF-06).
6. Use CHEMets ampoules to measure ferrous iron Procedure GF-07.

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# 6.5 PROCEDURE GW-05: GROUNDWATER QUALITY FIELD DATA SHEETS

A sample Ground Water Quality Field Data Sheet is shown in Figure GW-2. All blanks at the top of the sheet will be filled in (or marked "NA" if the item is not applicable). Each item is described below:

Continued on Sheet Number: Additional Sheets used to record measurements during well evacuation for a particular visit.

Well ID #: Identification number for the well which is being sampled.

Date, Time: Date and time that work began at the well.

| | |
|---|---|
| Meter ID Numbers and Calibration: | Record a reference to a field logbook and page where serial or other numbers and calibration details for the meters used to measure all field parameters has been recorded. |
| Method of Evacuation: | Method of pumping water used to evacuate well. |
| | Measured Initial |
| Depth to Water: | Measured depth to water prior to pumping (when measured). |
| Measured Depth to Bottom of Casing: | Measured depth to the bottom of casing (when measured). |
| Calculated Standing Water Volume: | The volume of standing water calculated by Procedure GW-03. |
| Required Purge Volume (Standing Volume X 3): | The calculated standing water volume (above) multiplied by 3. |
| Total Volume Pumped: | The total volume of water pumped when purging was ceased prior to sample collection. |
| Body of Table: | Time, flow rate, and readings for periodic conductivity, temperature, pH, Eh, and dissolved oxygen measurements during or after well excavation. Enter the method used to measure dissolved oxygen below the table. |
| Carbonate, Bicarbonate, Time: | The titration amounts, acid types, acid molarity, and the time that the work was conducted in the field or the Field Office. |
| Ferrous Iron Measurements: | Measurements of iron, including dilutions and method used. |
| Sulfide Measurements: | Measurements of sulfide and method used. |

A copy of the Ground Water Quality Field Data Sheet is filed in the Water Quality Data Filing System.

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**Example Groundwater Quality Field Data Sheet**

KENNECOTT UTAH COPPER

GROUNDWATER QUALITY
FIELD DATA SHEET

Page ____ of _____

Meter ID Numbers
and Calibration See:
Field Log Book
____________
Page ____________

Well ID #:____________________
Date: _________ Arrival Time: _____
Sampler(s) Initials: _______________

Measured Initial Depth to Water: __________ (ft)

Measured Depth to Bottom of Casing: ___________(ft)

Calculated Standing Water Volume: ___________ (gal)
Required Purge Volume (Standing Volume X 3): ____ ______(gal)
Total volume pumped: _______gal

| Time | Flow Rate gal/min | Conductivity umhos/cm | Temperature OC | pH | Eh | Diss. Oxygen |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

(Continue on a second sheet if needed.)

Dissolved Oxygen Method Used: Colormetric/Probe
Carbonate ($CO_3$): ml $H_2SO_4$ titrate, .1N mg/l Time:_______________ am/pm
Bicarbonate ($HCO_3$):ntl $H_2SO_4$ titrate, .1N mg/1 Time: _______________ am/pm
Ferrous Iron Measurements (Color Metric): __________mg/1__________ am/pm
Time: ______________________________________ am/pm
Remarks:______________________________________

______________________________________

______________________________________

______________________________________

______________________________________

Sampler Signature

Time Sampling Complete

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# 6.6 PROCEDURE GW-06: BAILING

Bailers will be constructed of Teflon or stainless steel. A wire or single untwisted synthetic filament (such as nylon) line will be used*. The following procedure will be followed for bailer use:

1. Lower the bailer into the well, retrieve and empty it once to ensure that the bailer has been rinsed of any decontamination fluids.
2. When collecting the ground water needed for filling the sample bottles, gently lower the bailer sufficiently into the water column to collect a sample unaffected by equilibration with the atmosphere (approximately ten feet, if possible), jerk the bailer gently to ensure that the ball valve is closed, and retrieve the bailer at a steady rate to the surface.
3. When transferring the water from the bailer to the sample containers, take care to avoid agitation to the sample which will promote the loss of volatile constituents and promote chemical oxidation.
4. Do not allow the bailer line or wire to touch the ground or come into contact with any other equipment. Roll up the line or wire on a spool or feed it into a bucket lined with clean plastic.

   *For inorganic samples, the use of a braided or twisted cord is allowed if the used cord is disposed of after each use, and if leachate tests of the cord show no potential to affect the quality of the sample.

6. Decontaminate all equipment and materials coming into contact with the inside casing of the wells or the ground water (Procedure MD-02). Handle rinseate water as described in Procedure GF-16.
7. When sampling for organic constituents only bottom spigot bailers will be used.

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# 6.7 PROCEDURE GW-07: HYDRASLEEVE SAMPLING

Collecting samples from monitoring, domestic, or production wells via HydraSleeve (HS) is described below. Follow the general procedures for documentation, sample handling, and quality control (DC, MD, and QC series procedures).

<u>HydraSleeve Deployment</u>

1. Acquire specific well data such as total depth and screen interval.
2. Decontaminate a calibrated water level meter.
3. Measure the depth to water (DTW) of well in a manner that minimizes disturbance to the water column.
4. Document DTW and screen interval.
5. The HS will be placed so that the top of the sleeve is the length of the HS below the midpoint of the screen interval.
6. With clean nitrile gloves, measure out the necessary tether length. Account for the length of tether that will be securing the HS above the well head.
7. With clean nitrile gloves, open the HS from its packaging and acquire new or decontaminated clips and weight.
8. Attach the weight clip to the bottom of the HS.
9. Attach the weight to the bottom clip.
10. Attach the tether top clip to the top of the HS through the inside of the HS tether clip holes by bending out the reinforcing HS top strips.
11. Secure the premeasured tether to the top clip.
12. Slowly lower the HS down the well in a manner that minimizes disturbance to the water column while ensuring it does not get stuck and tension is felt once completely lowered, indicating it has reached the desired depth.
13. Anchor the tether either through the cap on the well or a secure location near the well head.
14. The HS should be deployed for at least 5 minutes before retrieval for the sleeve to reach equilibrium with groundwater.

<u>HydraSleeve Retrieval</u>

1. Prepare the tether for retrieval.
2. In one smooth motion, pull the tether up the distance of the HS at a rate of about one foot per second or faster. The motion will open the top check valve and allow the HS to fill.
3. Continue to retrieve the HS to the surface.
4. Once the HS has been taken out of the well, squeeze the top near the reinforced strips to remove excess water that is captured above the closed check valve. This water is not part of the sample.
5. Suspend the full HS in a manner that allows for the transfer of sample water to appropriate sample containers.

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6. Use the provided straw to puncture the bottom of the HS and collect the sample. Be careful not to pierce both sides of the sleeve.
7. Collect and document required field parameters.
8. Decontaminate the clips and weight for future use.
9. Replace the locking cap and lock the well.
10. Complete final documentation of the sampling event.

Refer to step by step photo log.

For additional detailed HS instructions, reference; Standard Operating Procedure: Sampling Groundwater with a HydraSleeve, 2016 GeoInsight.

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# 6.8 PROCEDURE GW-08: SAMPLE COLLECTION – GENERAL IONS AND METALS

General Protocol

Collect samples from monitoring wells, domestic wells, or production wells as described below, also following the general procedures for documentation, sample handling, and quality control (DC, MD, and QC series procedures).

Complete well documentation and inspection as required by Procedure GW-02.

Sample Collection from Monitoring Wells

1. Measure the water level in accordance with Procedure GF-11.
2. If an immiscible organic layer is detected above the ground water for the first time, samples will be analyzed for organic constituents using Procedure GW-09 for sampling.
3. Evacuate the well in accordance with Procedure GW-03.
4. Collect samples in prepared containers with the proper preservatives. If required, measure carbonate and bicarbonate in the Environmental Field Sampling Room (Bucking Room) according to Procedure GF-05.
5. Attach the in-line filtering device with a 0.45-micron filter to collect samples which require filtering. Install a peristaltic pump in flowing wells as necessary to provide the pressure for in-line filtering. Follow the manufacturer's instructions for filter use. If field filtering is impossible, fill extra containers (labeled with the Well ID # in indelible ink) for transport to the Field Office for filtering and filling of containers on the same day as sample collection. Note this variance in the field form, Procedure GW-05.
6. If any preservative is lost prior to or during the filling of a sample container (i.e., spilling or overflow), use another prepared container.
7. Thoroughly decontaminate all equipment and instruments used to sample and check the depth to water (Procedure MD-02).

Sample Collection from Domestic Wells

Purge domestic wells in accordance with Procedure GW-03 unless photographs and specific instructions for the well are available. Generally, use the same equipment used for monitoring wells with the exception of pumps and bailers. Use the following procedure in the sampling of domestic wells:

1. Contact the owners or operators of the wells to determine what tools, valves, hoses, etc., will be needed. Wrenches may be needed for opening and closing faucets or spigots.
2. Obtain information about the size of the fittings required and accessibility of the sampling spigot. It may be convenient to attach a section of inert plastic (such as Teflon) tubing to the spigot, especially under very cramped quarters.
3. Collect residential samples from a sampling port or spigot which is positioned as close to the well head as possible, and prior to any type of treatment system, such as a water softener, chlorination or granular activated carbon unit. Residential wells generally have a spigot located at the base of the pressure tank. This is usually the closest tap to the actual well head.

4. When collecting raw samples from the tap off the pressure tank, turn on the cold-water faucet and run a minimum of five minutes and/or until temperature stabilization (two readings within + 10%). Measurements of pH and/or conductivity also can be used to indicate that fresh water is entering the pressure tank.
5. After stabilization has been achieved, continue to run the cold-water faucet, and collect samples from the tap off the pressure tank. This will ensure collection of a representative sample.
6. For most residential wells, collect the samples directly into the sample bottles. Use in-line filters where possible for the appropriate inorganic samples. Use a peristaltic pump to provide the pressure for in-line filtering. Follow the manufacturer's instructions for filter use. If field filtering is impossible, fill extra containers (labeled with the Well ID # in indelible ink) for transport to the Field Office for filtering and filling of containers on the same day as sample collection. Note this variance in the field data sheet.

<u>Sample Collection from Production Wells</u>

Generally, use the same equipment used for monitoring wells with the exception of the pumps and the bailer. Since production wells are high volume water producers, there is no necessity for evacuating the well when the well is in operation. Use the following procedure in the sampling of production wells:

1. Contact the operators of the wells to determine what tools, valves, hoses, etc., will be needed. Wrenches may be needed for opening and closing faucets or spigots. Often spigots on production wells may be too large, resulting in a high-volume flow which will make sampling difficult. In this case, it will be necessary to reduce the flow by using appropriate fittings.
2. Sample production wells during a pumping cycle to ensure that stagnant water is not sampled.
3. Clear the lines between the well and the spigot.
4. Collect samples from a sampling port or spigot which is positioned as close to the well head as possible, and prior to any type of treatment system, such as a water softener, chlorination, or granular activated carbon unit.
5. For most production wells, collect directly into the sample bottles. Use in-line filters where possible for the appropriate inorganic samples. Use a peristaltic pump to provide the pressure for in-line filtering. Follow the manufacturer's instructions for filter use. If field filtering is impossible, fill extra containers (labeled with the Well ID # in indelible ink) for transport to the Field Office for filtering and filling of containers on the same day as sample collection. Note this variance on the Field Data Sheet.

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# 6.9 PROCEDURE GW-09: SAMPLE COLLECTION – ORGANIC COMPOUNDS

1. Measure the water level in accordance with procedure GF-11.

2. If an immiscible organic layer is detected above the ground water for the first time:

   a) Measure the thickness of the immiscible layer according to Procedure GF-10 if not already done.

   b) If a sample of the immiscible phase is to be collected, conduct the sampling as follows:

      If the thickness of the immiscible phase is two feet or greater, collect the immiscible phase sample using a bottom-valve bailer. Lower the bailer slowly into the well until it contacts the surface of the immiscible phase. Continue lowering the bailer to a depth less than the pre-determined thickness of the immiscible layer.

      If the thickness of the immiscible layer is less than two feet, a top filling bailer must be used. The bailer can be weighted with a length of small-diameter stainless steel pipe. Lower the bailer slowly into the well until the top of the bailer is level with the pre-determined top of the immiscible layer. Lower the bailer an additional one-half thickness of the immiscible layer and retrieve the sample.

4. Evacuate the well in accordance with Procedure GW-03.
5. Prior to sample collection, allow the water level in non-flowing wells to recover in order to produce the necessary sample volume. Thoroughly decontaminate instruments used to check the depth to water prior to use in the well and between purging and sampling (Procedure MD-02).
6. When collecting organic samples for VOC analyses with a pump, do not exceed 100 milliliters per minute in pumping rate. If these rates are unattainable, use a bailer for sample collection (see Procedure GW-06). Fill sample containers completely, leaving no head space.
7. Collect samples in prepared containers with the proper preservatives. If required, measure carbonate and bicarbonate according to Procedure GF-05.
8. If any preservative is lost prior to or during the filling of a sample container (i.e., spilling or overflow), use another prepared container.

# 6.10 PROCEDURE GW-10: SITE-WIDE WATER-LEVEL MEASUREMENTS

In order to determine the potentiometric surface for a given aquifer or to determine the gradient between aquifers, take water-level measurements during a relatively short period of time.

1. Measure the depth to water in non-flowing wells using Procedure GF-11.
2. If an oily substance is observed on the meter probe, follow Procedure GF-10 to measure the depth to the immiscible layer and the depth to the oil/water interface.
3. Determine the hydraulic head of flowing wells using a manometer (for heads a few feet above the casing) or transducer Procedures GF-12 and GF-13.
4. If using a manometer, measure the head above the marker point to the nearest 0.10 ft.

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# 6.11 PROCEDURE GW-11: NEW MONITORING WELL CONSTRUCTION

This group of procedures provides a protocol for installing new monitoring wells, including preparation for drilling, installation using various drilling methods (auger, air rotary, mud rotary, and cable tool), surveying, geophysical borehole logging, well development, and well documentation.

Preparation For Monitoring Well Installation

Follow these steps prior to a drilling and well installation project, including preparation of a drilling permit, preparation of a statement of work for the drilling contractor, locating underground utilities, and obtaining necessary field equipment. The regulatory requirements are based on the "State of Utah Administrative Rules for Water Well Drillers", adopted July 15, 1987, which remain in effect as of June 1, 1999. The Water Rights Division at 538-7240 may be contacted for updates.

1. For wells over 30 feet, submit an application for a drilling permit to the Utah Division of Water Rights and allow at least 30 days for a reply. Mail the application to: State Engineer (currently Mr. Robert L. Morgan), Division of Water Rights1594 West North Temple, Suite 220, P.O. Box 146300 Salt Lake City, Utah 84114-6300. The written request must include the following information using the form provided in Figure GW-3:

a) Name, address, and phone number of RTK contact.

b) Current property owner.

c) Total anticipated number of wells to be installed.

d) Diameters, approximate depths, and type of completions (materials to be used for casing, screen, pack and grout).

e) Name, address, and telephone number of Project Manager.

f) General location or common description of the monitoring project.

g) Name and license number of driller contracted to install the wells.

h) Projected start and completion dates.

i) Specific course and distance locations of all requested locations or location by 1/4, 1/4 section.

*Upon written approval from Division of Water Rights, the project will be assigned an approved authorization number to be referenced by the licensed driller on all start cards and well drillers reports as required by Sections 4.1.1 and 4.3 of the "State of Utah Administrative Rules for Water Well Drillers".*

2. Request a sampling point identification number from the Sampling Supervisor.

3. Prepare a statement of work for a licensed drilling contractor including schedule, the number of wells, type of each well, approximate depths, size of boreholes, expected subsurface materials, requirements for borehole geophysical logging, required drilling and decontamination equipment, soil and water sampling requirements, specifications for well construction materials, requirements for self-contained water or power, water source criteria, tanks for recirculation methods, and labor support necessary to complete the wells. Use the appropriate technical specifications, depending on drilling method selected

by the Project Manager or Field Team Leader. Drilling personnel must have current 40-hour OSHA Hazardous Materials training.

4. After the general location for the monitoring well has been determined, check the area for buried utilities using existing site maps and knowledgeable RTK personnel. Contact Bluestakes at 532-5000 at least 48 hours prior to anticipated drilling. Provide Bluestakes with a description of the area to be staked, the drilling company name and address, and your name. Obtain a request number from Bluestakes and record it in the Field Logbook for the project.
5. Acquire necessary equipment for fieldwork as follows:

- Personal protective equipment, including hard hat, safety boots, ear plugs, safety glasses, leather gloves, rubber gloves, and two-way radio.
- Field Logbook, waterproof indelible ink markers, pens, pencils.
- Borehole Log forms, 10X hand lens.
- Plastic bags, sample jars, sample labels.
- Knife, spade, screwdriver or other similar devices to probe split spoon samples.
- Strainer to catch cuttings (rotary drilling).
- Grain size and color charts.
- Buckets (calibrated in gallons or liters).
- Decontamination bucket, wash water, laboratory detergent solution, de-ionized rinse water.
- Steel tape, blue chalk, engineer's tape, or electronic water meter.
- pH meter, conductivity meter, litmus paper.
- Available nearby lithologic or well data.
- Dilute HCl acid (5-10%).
- Map.

**Please refer to Attachments - Figure GW-03. Request for Monitor Well Construction**

<u>Oversight of Drilling and Installation</u>

Follow this procedure when serving as field geologist during installation of ground water monitoring wells. Select the appropriate drilling method based on subsurface materials (unconsolidated or consolidated), requirements for sampling (disturbed or undisturbed), and depth of borehole. Log and sample only the deepest borehole in nested well installations. The drilling of deep boreholes will be interrupted to install a temporary casing and seal in the confining layer (see "Deep Monitoring Well Installation" below). Continue sampling and formation logging upon the resumption of drilling.

1. Use a Borehole Log (see Figure GW-4) during drilling and well construction to record information as discussed below. Also use a Field Logbook to record activities each day (date, time, personnel on site, problems/solutions, drilling conditions).

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2. For drilling techniques which require the collection of undisturbed samples, use a Shelby tube, a split-spoon sampler, or a core barrel to collect soil samples at least every five (5.0) feet and at major changes in material. Record the number of blows required to advance the split spoon one-half (0.5) ft.

3. When drilling through contaminated soils, arrange for the proper containment and disposal of cuttings, regardless of drilling method.

4. If contamination by organic compounds is suspected, place some of the drill cuttings or soil samples into a clean glass jar and cover with aluminum foil. Allow the temperature of the soil to equilibrate with ambient temperature. Insert the probe of a photoionization detector (PID) through the foil and into the glass jar. Record the PID measurement on the Borehole Log at the appropriate depth.

5. Collect soil samples for laboratory analyses in sample jars or leave intact in stainless steel sleeves as directed by the Project Manager or Project Work Plan. Place sample containers in a sealed Ziplock plastic bag. Place the sample in a cooler with ice if organic analyses are planned. Record sample numbers at the depth sampled on the Borehole Log and on the sample label. Include on the sample label and Borehole Log the following:

   - Well I.D.#;
   - Time and date.
   - Depth of sample.
   - Analyses to be done; and
   - The person collecting the sample.

6. Record on the Borehole Log the project name, borehole location, well I.D.#, date and time drilling began, weather conditions (i.e., temperature, wind direction and speed, precipitation), drilling company, drilling method, drilling crew names and your name. Provide a sketch of the well location noting measured distances (approximate) from established landmarks and indicate the north direction.

7. During drilling, collect drill cuttings and record descriptions of soil samples using the Unified Soil Classification System on the Borehole Log. Use standard geologic terminology to classify rock materials. Note the color, moisture, texture, sorting, roundness/angularity, degree of cementation/consolidation, fabric, bedding, orientation, depositional environment, formation name, and any evidence of contamination or other characteristics related to hydrogeologic conditions.

8. Decontaminate the sampling device prior to collecting another sample (see Procedure MD-02).

9. Record the total borehole depth and drilled diameter per depth interval at the top of the Borehole Log. Enter the approximate surface elevation.

<u>Well Construction Oversight</u>

Document well construction activities for each well installed, including all wells in nested sets.

<u>Shallow Monitoring Well Installation</u>

A "shallow" well is one which is drilled to less than 25 ft below the water table.

1. Upon drilling to the desired depth, select the screened interval based on anticipated annual water table fluctuation at the site. Inform the driller of the lengths and intervals of casing and screen to be installed. Measure the slot size and length of each section of screen and casing. Record the length, diameter, type of casing used and screen slot size at the top of the Borehole Log. Locate a single centralizer in the

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middle of the screen to ensure an evenly distributed sand pack. Ensure that the casing and screen are sealed in contaminant-resistant wrappers prior to use and are handled and stored in a manner which prevents contamination.

2. Ensure that the driller installs the PVC screen and casing through the augers or temporary casing, and that care is taken not to contaminate the casing and screen. If an immiscible organic layer is presumed to be present above the potentiometric surface, the top of the screen must be positioned in the well above the potentiometric surface to allow sampling of the immiscible layer. Where well clusters are installed, one well may be screened where the immiscible layer is expected, and another well may be screened in the uppermost portion of the aquifer.
3. The sand must be added slowly to avoid "bridging" in the annulus between the PVC casing and borehole wall. Preferably, use a tremie pipe for sand installation.
4. Confirm the depth to the sand pack ("tag the pack") periodically using a measuring tape with a weight attached.
5. Ensure that the augers or temporary casing are slowly pulled as sand is added to the bottom of the borehole.
6. Tag the pack to see how much sand is lost to the formation.
7. Repeat steps 3 through 6 until sand pack has been installed to two feet above the uppermost slot of the well screen. Record on the Borehole Log the sand grain size and gradation, sand pack interval (depth to top and bottom), and total amount of sand used (volume or weight).
8. Instruct the driller to add bentonite pellets or chips to form a bentonite seal at least two (2.0) feet thick. Record the bentonite seal interval (depth to top and bottom) and the total amount of bentonite pellets or chips used.
9. If the borehole is dry at the top of the sand pack, ensure that the driller adds approximately one gallon of distilled water to swell the bentonite. Record the volume of water added to the borehole.
10. Instruct the driller to grout or concrete the annulus to the surface. Re-fill annulus as necessary to replace concrete lost to porosity in the formation. Record the total amount of grout or concrete used.
11. Instruct the driller to install a protective casing (minimum of two feet above the ground surface, and a locking cap) or manhole cover (sealed with an O-ring gasket) as detailed in the driller's statement of work and specifications. Ensure that a vent hole in the well casing and a drain hole in the protective casing are drilled as per specifications. Arrange for the installation of a grounding rod for pump generators.
12. Ensure that a locking cap is installed on the protective casing. Record key number on the Borehole Log. The driller will also install a concrete pad (with an elevation marker point on the north side of the well) and steel barricades (in high traffic areas) according to specifications.
13. Measure the water level inside the well and record at the top of the Borehole Log. At a minimum, return to the well site in 24 hours to obtain another water level and record it on the Borehole Log.
14. Ensure that the driller steam cleans all down-hole equipment prior to beginning each new borehole. Decontaminate water-level measurement equipment prior to use.
15. Complete the Borehole Log and submit it to the Project Manager or Field Team Leader. File a copy in the Water Quality Data Filing System.

Monitoring Well Installation in Confined Aquifers

A "deep" well is a borehole in which the screened interval must not receive flow from an overlying perched water zone or aquifer. Deep wells are typically drilled through a confining layer in order to sample the confined aquifer and may result in a flowing well.

1. Select temporary casing large enough to allow smaller drill bits or augers to pass through to complete the well. Larger augers may be used in place of temporary casing when the auger method is used.
2. Ensure that the driller installs the temporary casing at least one foot into the confining layer, although not into the confined aquifer.
3. Instruct the driller to check the seal by pulling the drill rods and bailing the temporary casing or augers dry.
4. Ensure that the driller adds a small quantity of bentonite to ensure the viability of the seal.
5. Instruct the driller to allow the temporary casing or augers to sit overnight.
6. Check the water level to ensure the integrity of the seal.
7. If the seal is intact, continue drilling through the confining layer to the desired depth.
8. Inform the driller of the lengths and intervals of casing and screen to be installed. Measure the slot size and length of each section of screen and casing. Record the length, diameter, type of casing used and screen slot size at the top of the Borehole Log. Locate a single centralizer in the middle of the screen to ensure an evenly distributed sand pack. Ensure that the casing and screen are sealed in contaminant-resistant wrappers prior to use and are handled and stored in a manner which prevents contamination.
9. Ensure that the driller installs the PVC screen and casing through the temporary casing or augers, and that care is taken not to contaminate the screen and casing. If an immiscible organic layer is presumed to be present above the potentiometric surface, the top of the screen must be positioned in the well above the potentiometric surface to allow sampling of the immiscible layer. Where well clusters are installed, one well may be screened where the immiscible layer is expected, and another well may be screened in the uppermost portion of the aquifer.
10. The sand must be added slowly to avoid "bridging" in the annulus between the casing and borehole wall. The use of a tremie pipe is mandatory.
11. Confirm the depth to the sand pack ("tag the pack") periodically using a measuring tape with a weight attached or a wire line with a depth counter. Allow the sand to settle (approximately five minutes) to ensure a more accurate top-of-sand measurement.
12. Ensure that you don't pull the temporary casing until you have a good seal at the bottom of confining layer.
13. Tag the pack to see how much sand is lost to the formation.
14. Repeat steps 10 through 13 until sand pack has been installed to two feet above the uppermost slot of the well screen. Record on the Borehole Log the sand grain size and gradation, sand pack interval (depth to top and bottom), and total amount of sand used (volume or weight).
15. Instruct the driller to add bentonite pellets or chips to form a bentonite seal at least two (2.0) feet thick. Record the bentonite seal interval (depth of top and depth of bottom) and the total amount of bentonite

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pellets or chips used. If the bentonite seal must be installed through a column of water greater than 20 feet, install the bentonite seal as a slurry using a tremie pipe.

16. If the borehole is dry at the top of the sand pack, ensure that the driller adds approximately one gallon of distilled water to swell the bentonite. Record the volume of water added to the borehole.

17. Instruct the driller to grout or concrete the annulus to the surface. If the column of water above the top of the bentonite is greater than 20 feet, install the grout using a tremie pipe. Install concrete in lifts of no more than approximately 50 feet to avoid melting of PVC casing during curing. Re-fill annulus as necessary to replace concrete lost to porosity in the formation. Record the total amount of grout or concrete used. If the temporary casing is to be extracted, assure that the grout or concrete seal is at least 1 foot above the bottom of the confining layer before the temporary casing is extracted. This will ensure that no water flows from the upper or perched aquifer into the underlying aquifer.

18. Instruct the driller to install a protective casing (minimum of two feet above the ground surface, and a locking cap) or manhole cover (sealed with an O-ring gasket) as detailed in the driller's statement of work and specifications. Ensure that a vent hole in the well casing and a drain hole in the protective casing are drilled as per specifications. Arrange for the installation of a grounding rod for pump generators.

19. Ensure that a locking cap is installed on the protective casing. Record key number on the Borehole Log. The driller will also install a concrete pad (with an elevation marker point on the north side of the well) and steel barricades (in high traffic areas) according to specifications.

20. Measure the water level inside the well and record at the top of the Borehole Log. At a minimum, return to the well site to obtain another water level 24 hours from the first reading and record on the Borehole Log.

21. Ensure that the driller steam cleans all down-hole equipment prior to beginning each new borehole. Decontaminate water-level measurement equipment prior to use.

22. Complete the Borehole Log and submit it to the Project Manager or Field Team Leader. File a copy in the Water Quality Data Filing System.

**Please refer to Attachments - Figure GW-4. Example Borehole Log**

<u>Surveying</u>

1. Prepare a statement of work for a licensed surveying contractor to determine the location and elevation of the ground surface and the top of the protective casing. The horizontal control will be Kennecott Mine Datum to within + 3 ft (+ 1 meter). The elevation of the monument marker will be surveyed to within + 0.01 foot (+ 0.3 cm) using the National Geodetic Vertical Datum of 1929. Corrected survey data will include loop closure for survey accuracy within these limits.

2. The surveyor's report will include a list of coordinates, elevations, and system used. The report must also include a map, and a description and location of all permanent and semipermanent reference points used for horizontal and vertical control. This report will be filed in the Water Quality Data Filing System.

<u>Geophysical Borehole Logging</u>

Borehole geophysical techniques provide an efficient and cost-effective means to collect lithologic and hydrologic information from wells and borings. These methods provide continuous measurements of physical properties along the entire length of the borehole, supplementing the discrete information gathered by coring.

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1. Calibrate and field-check all logging probes each day prior to beginning work at the site. Conduct testing and calibration according to the manufacturer's recommendations. Document calibration and field-check information for each particular logging probe on the borehole Log Header for that instrument. The required Log Header information is provided in Figure GW-5. An example Log Header is presented in Figure GW-6.
2. When borehole logs will be used for quantitative analyses, check each probe with the field standard before and after the probe is run in the hole. Record the type of field standard used and the field check values on the appropriate Log Header.
3. Choose an appropriate logging speed for each borehole technique based on the type of probe used, noise conditions, and data resolution requirements. Record the logging speed on the Log Header.
4. Choose a vertical log scale based on appropriate resolution requirements, but not greater than 20 feet per inch, or 2.5 meters per centimeter. Choose a horizontal scale to accommodate a reasonable range of signal variation.
5. Reference log starting depth to a surveyed surface point.
6. When probes are used in combination, ensure that no probe shall interfere with the performance of another probe in the same combination. Document the combinations used on the Log Header. Correct the borehole measurements for difference measuring depths between probes. Note the correct logs as such.

<u>Procedures for Specific Borehole Geophysical Techniques</u>

1. Electrical Logs: Measure and record the temperature of a sample of the drilling fluid on the Log Header. If the logs are used in an augured hole, measure a sample of the borehole fluid immediately after logging.
2. SP Logs: Do not use SP logs for quantitative analysis except for the special case of no log response. Do not adjust the shale baseline on an SP log while the log is being recorded.
3. Resistivity Logs: When resistivity logs will be used for quantitative analysis, apply the corrections to the analyzed intervals. Make corrections appropriate to the type and make of probe used and document the corrections. For short-normal resistivity logs, use probes with measurement electrode spacings of no greater than 16 inches. For long-normal resistivity logs, use probes with measurement electrode spacings of no greater than 64 inches.
4. Caliper Logs: Use a caliper probe with a minimum of three measuring arms. The arms should be of the finger type and possess sufficient length to record the entire range of diameter change within a given borehole.
5. Nuclear Logs: The logging supervisor will ensure that the individual performing the borehole geophysical logging with probes containing radioisotopes shall be in compliance with all state and federal regulations for handling, storing, and using radioactive sources. Run all other borehole logs chosen as part of the logging suite prior to running any nuclear probes containing a radioisotope source. Use SPI units of measurement on all nuclear logs. When using analog equipment, choose a time constant appropriate to the data needs and site conditions, but which does not exceed 15 seconds. Choose a logging speed appropriate to the data needs and site conditions which does not exceed 30 feet per minute. Correct the data from the nuclear log for lag effects. Record the time constant, logging speed, and correction method on the log header.



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6. Acoustic Televiewer Logs: When an ATV log is deeper than 100 feet and will be quantitatively analyzed, correct the ATV log using the data obtained from a borehole deviation log of the same borehole.

**REQUIRED LOG READER INFORMATION**

- WELL INFORMATION
- Well Name/Number
- Location/Site Name
- Surface Elevation
- Casing Height (above surface)
- Depth Reference (description)
- Borehole Diameter
- Casing Information (Type, Diameter, Location)
- Drilling Fluid Description (Type, Resistivity, Temperature)
- Construction Information (Locations cement, perforations, screen)
- Drilling Information (Date Drilled, Name of Driller, Drilling
- Methods, Drilled Depth
- LOG INFORMATION
- Type of Log
- Run Number
- Name(s) of Operators, Observers
- Date Logged
- Probe Description (Name, Serial Number)
- Logging Speed
- Recorder Scale
- Module/Panel Settings
- Calibration Data
- Listing of all other logs run on same date.
- Miscellaneous Information
- Additional comments (e.g., adverse weather, logging conditions, any irregularities in calibration, logging procedure)

*Note: Log header information required for all borehole geophysical logs. Header information must be as complete as possible. Missing information must be so noted on the header form (Keys, 1989).*

**Please refer to Attachments - Figure GW-6. Example Log Header**

Monitoring Well Documentation

The following information will be documented for all wells used in the monitoring network. This information will be published in the GCMP upon its next revision. Supporting documentation for this information, as well as Well Inspection Reports (Procedure GW-02), will be filed in the Water Quality Data Filing System.

- Well Identification Number.
- Alias Well Identification Number.
- Survey location (Kennecott Mine Coordinates, feet) and elevation of collar (feet).



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- Elevation of the ground surface above mean sea level (feet).
- Elevation of protective casing (feet).
- Location of marker point used to measure depth to water (feet).
- Elevation of marker point.
- Depth to water (feet), a recent measurement.
- Total depth to the bottom of the casing (feet).
- Borehole diameter (feet).
- Casing diameter (feet).
- Depth to top of screen (feet).
- Depth to bottom of screen (feet).
- Depth to top of sand (feet).
- Depth to pump setting for dedicated or portable pumps (feet).
- Pack purge volume (gallons).
- One purge volume (gallons).
- Sampling frequency (per year).
- Frequency of site-wide water-level measurements for potentiometric surface (per year)
- Analytical suite.
- Slug test permeability (ft/day).

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# 6.12 PROCEDURE GW-12: WELL ABANDONMENT

Follow this procedure for permanent abandonment of monitoring wells which have been determined to be no longer useable or will be destroyed due to construction activities.

<u>Preparation</u>

Prepare a statement of work for a licensed drilling contractor to completely fill the well in a manner to prevent vertical movement of water within the borehole and annular space surrounding the well casing. Include the following requirements3 in the specifications:

1. The following materials may be used:

a) Neat Cement conforming to ASTM standard C150-94 of sufficient weight (not less than 15 lbs/gallon) to prevent the flow of any water into the hole from any aquifer penetrated.

b) Cement grout consisting of equal parts of cement conforming to ASTM standard C150 and sand/aggregate with no more than six (6) gallons of water per 94lb sack of cement.

c) Bentonite-based products specifically designed for permanent well abandonment, which are mixed and placed according to manufacturer's recommended procedures (i.e., Plug-Gel, Shur-Gel, Benseal etc.).

d) The uppermost ten feet of the abandoned well casing or borehole shall consist of neat cement or cement grout.

e) The liquid phase of the abandonment fluid shall be non-saline water containing no chemicals or toxic materials or other substances which may decompose or possibly contaminate the ground water supply.

f) Abandonment materials placed opposite any non-water bearing intervals shall be at least as impervious as the formation prior to penetration during the drilling process.

2. The casing will be pulled, if feasible and possible, while neat cement and cement grout are introduced at the bottom of the wells and placed progressively upward using a grout pipe, tremie line or dump bailer in order to avoid segregation, dilution, or bridging of materials. If the casing cannot be pulled and the seal is of questionable integrity, the casing should be perforated. The screened and perforated intervals will be pressure grouted. Bentonite-based products shall be mixed and placed according to manufacturer's recommended procedures.

3. In flowing wells, a cement or grout plug will be placed in the confining stratum overlying the artesian zone. The remainder of the well will be filled with cement grout, concrete, or bentonite products.

4. The casing, if left in place, shall be severed a minimum of two (2.0) feet below either the natural ground surface adjacent to the well or at the collar of the hole, whichever is lower. A minimum of two feet of compacted native material shall be placed above the abandoned well upon completion.

5. Upon completion, the site will be cleaned, and waste materials will be disposed of properly.

   [3]*This list is based on the "State of Utah Administrative Rules for Water Wells Drillers", adopted July 15, 1987. As of January 25, 1991, these rules remain in effect. Contact the Water Rights Division at 538-7240 for updates.*

6. A report will be submitted to the Division of Water Rights by the driller within 30 days of completion of well abandonment activities in accordance with Section 12.7 of the "State of Utah Administrative Rules For Water Well Drillers".

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7. If wells are to be abandoned in areas that may encounter hazardous materials, all personnel must have current 40-hour OSHA Hazardous Materials training.

Oversight

An on-site engineer or geologist will:

1. Verify the water level and depth to the bottom of the well prior to abandonment activities using Procedure GF-11.
2. Observe and verify all abandonment activities performed by the driller and document the information as listed in the next section, "Documentation".
3. Twenty-four hours after abandonment is completed, check the borehole for settlement. Arrange for the addition of grout and check in 24 hours, repeating until grout remains firm up to a point two (2.0) feet below the surface. Arrange for the placement of two (2.0) feet of compacted native soil above the abandoned borehole. Alternatively, if so directed by the Project Manager or Project Work Plan, arrange for the installation of a concrete plug with a metal marker such that the borehole may be located in the future.

Documentation

1. Document all field events for the well abandonment process in a Field Logbook, including the following information:

a) Well I.D.# and Water Right or Drilling Permit Number.

b) Location with respect to the replacement well or to the nearest landmark.

c) Water level and depth to bottom prior to grouting and date measured.

d) Date, time and duration of each field event associated with the abandonment.

e) Description and amount of grout used initially and for each interval.

f) Description and daily quantities of grout used to compensate for settlement.

g) Drilling method.

h) Names of all on-site personnel and licensed drillers.

i) Explicit descriptions of problems encountered and/or any deviations from the planned approach.

j) Casing and materials (e.g., tremie pipes) left in hole (depth, composition, and size).

2. File a copy of the above field notes, as well as a diagram of the abandoned well column (materials/depth), with the original borehole log in the Water Quality Filing System.

3. Ensure that the driller submits the required report to the Division of Water Rights within 30 days of completion of well abandonment procedures.

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# 6.13 PROCEDURE GW-13: WELL DEVELOPMENT

Well development is necessary to restore the natural hydraulic conductivity of the surrounding formation and remove all foreign sediment. All new wells will be developed prior to sampling. Existing wells producing turbid samples may also require development. Use this procedure after the monitoring well has been constructed.

1. Develop monitoring wells within 48 hours after well installation.
2. Measure the depth to water and the depth to the bottom of the well according to Procedure GF-11.
3. Subtract the depth to water from the depth to bottom to obtain the number of linear feet of standing water. For flowing wells, the depth to water used in this calculation will be 0.0 ft. Calculate the volume of standing water (casing and sand pack volume) as described in Procedure GW-03. Remove at least five volumes by pumping. Development will be considered complete when the turbidity has substantially decreased and the pH, temperature, and specific conductivity have stabilized.
4. Contain purged waters in the proper drums if contamination is suspected (see also Procedure GW-06).
5. Decontaminate the pump or bailer (if a non-disposable bailer is used) prior to developing another well.
6. Document all measurements and activities in the Field Logbook. The method of development, pH, conductivity of casing water, removed volume of water during development, and length of time spent developing the well will be recorded.

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# 6.14 PROCEDURE GW-14: SAMPLE COLLECTION - RADIONUCLIDES

This procedure is for the collection of radionuclides to include Gross Alpha, Gross Beta, Radium 226, Radium 228, and Uranium.

Follow general procedures for sample documentation, sample handling, and equipment decontamination as directed in Procedures DC-01, DC-03, DC-04, DC-05, MD-01, and MD-02.

1. Prepare all sample containers in accordance with Procedure DC-03.
2. Label the sample containers in accordance with Procedure DC-04.
3. The prepared sample containers should already be rinsed and contain appropriate preservatives, if not, rinse three times with sample water and preserve according to Table DC-3. Fill the following container directly from the pump discharge hose:
4. 1 - half gallon plastic container
5. Handle the samples and documentation in accordance with Procedures DC-05 and DC-06.

5\. Since all of these, except for Uranium, must be shipped to an outside laboratory for analysis, the following MDL's have been set:

| | | |
|---|---|---|
| · | Gross Alpha | Dependent on TDS |
| · | Gross Beta | Dependent on TDS |
| · | Radium 226 | 2 pCi/L |
| · | Radium 228 | 1 pCi/L |
| · | Uranium | 0.005 mg/L |

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# 6.15 PROCEDURE GW-15: SAMPLE COLLECTION - LYSIMETER

LYSIMETER IDENTIFICATION

All RTK soil moisture lysimeter sampling locations are identified utilizing a three-letter identification acronym followed by a unique number ranging between 4100 and 4199. The site letter acronym identifies the general location of the lysimeter as outlined in the procedures in GW-01.

LYSIMETER INSPECTION

Each time a lysimeter is to be sampled the inspection procedures outlined in GW-02 are to be followed. However, additional troubleshooting may be required. For instance, if there is no remaining suction and no sample, follow-up corrective action may be required. The status of the lysimeter is to be recorded as described in GW-02, as well as on the lysimeter record keeping field form, using the appropriate lysimeter status number outlined in the troubleshooting section.

TROUBLESHOOTING

The following is a troubleshooting guide for suction lysimeter field sampling:

Lysimeter Status No.

1. Lysimeter has vacuum remaining that ranges from 20 to 50 centibar, sample volume is greater than 100ml. Meaning: Lysimeter is operating properly, if soil matrix potential is much less than applied suction. Correction Action: None.
2. Lysimeter has vacuum remaining that ranges from 20 to 50 centibars, sample volume collected is 10 to 100ml. Meaning: Lysimeter is operating properly, if soil matrix potential is near applied suction. Corrective Action: None; however, special precautions are needed to be observed in the analysis of low volume samples. Prioritize analytical request.
3. Lysimeter has vacuum remaining that is greater than 20 centibars, no sample. Meaning: Lysimeter is operating properly, if soil matrix potential is greater than the applied suction. Corrective Action: None.
4. Lysimeter has no vacuum remaining, no sample. Meaning: Soil matrix potential is less than the air entry value or the lysimeter leaks. Corrective Action: Compare to water content records and to other lysimeters at the same depth to see if it possible for the suction to be less than -2 bars. If not, inject 50ml of deionized water and reapply vacuum. If vacuum is gone within an hour, replace lysimeter.

FIELD MEASUREMENTS

Field measurements will be collected during the procedure outlined in GW-04, including pH, specific conductance, temperature, dissolved oxygen, ferrous iron, and sulfide (see CHEMets ampoules due to limited sampling volume). Also, nitrites and nitrates are required for field measurements, using CHEMets ampoules specified for these analyses. Follow the instructions provided with these CHEMets sample kits. A sample volume estimation is also required after sample collection (0-700ml).

SAMPLING PROCEDURES - SAMPLE CONTAINER PREPARATION

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1. Prepare sample containers prior to the sampling event. Use new laboratory-cleaned sample containers. The containers should be rinsed three times with deionized water. Label the containers as directed by procedure DC-04.
2. Use the proper containers and preservatives for each analytical parameter as specified in lysimeter analysis priority table. Note: Due to the small amount of sample available, smaller containers are sufficient for collection.

<u>APPLYING VACUUM</u>

1. Remove the cap from the PVC casing. Lightly pull on the two tubings found inside of casing. Be careful to not pull the connected end of the tubings out of the lysimeter. Remove the plastic O-rings from the free ends of the tubing.
2. Connect the hose of the nitrogen bottle regulator to the black tubing of the lysimeter. Open the regulator valve, allowing no more than 15 lbs. pressure through the lysimeter. Purge lysimeter with nitrogen gas until all stagnant water is evacuated and the gas is coming out of the white tubing.
3. Disconnect the regulator tubing from the lysimeter, bend the black neoprene end of the white tubing and replace the O-ring--this restricts any inflow of air into the lysimeter.
4. Connect the black tubing of the lysimeter to the pressure-vacuum hand pump (Model 1920K1) on the vacuum valve (valve must have vacuum dial gauge) at the bottom of the pump. Apply a vacuum to the lysimeter until a stable 60 centibars is read on the vacuum dial gauge. Observe the gauge for a few seconds to make sure lysimeter is holding the vacuum. Record the time, date, and the vacuum applied (centibars) as indicated on the record keeping field form.
5. Before removing the black tubing from the hand pump, bend the neoprene end of the black tubing, and replace the O-ring so it restricts any inflow of air. This will maintain the vacuum inside the lysimeter.
6. Replace both tubing's back into the PVC casing. Replace cap on the casing head. Wait 24 hours to let lysimeter collect a sufficient sample.

<u>COLLECTING SAMPLE</u>

1. Remove PVC cap from the head of the lysimeter casing. Lightly pull on the tubing, being careful to not pull the connected ends out of the lysimeter.
2. Before removing the O-rings from the tubing, connect the black tubing to the vacuum valve of the pressure-vacuum hand pump. Remove the O-ring and record the remaining value in the indicated space on the record keeping field form.
3. Remove the O-ring from the white tubing. Thoroughly rinse the black neoprene endings of both tubes with deionized water.
4. Connect the hose of the nitrogen bottle regulator to the end of the black tubing. Open the regulator valve, allowing no more than 15 lbs. pressure through the lysimeter. Purge the lysimeter with nitrogen gas until all the sample water is evacuated. Collect the sample in the pre-washed bottles required. Fill the unpreserved bottle first. This will provide the fluid for field measurements. Be sure to take the samples temperature upon purging the lysimeter to ensure it is a representative reading. NOTE: Take the temperature from the sample in the unpreserved bottle--chemical reactions can affect the temperature reading, giving an incorrect number.

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5. When all the sample water is evacuated and collected, turn the nitrogen pressure off and remove the hose from the black tubing. Replace the O-rings on the neoprene ends of the tubing, bending the ends to prevent contamination of the lysimeter.
6. Replace both tubing back into the lysimeter PVC casing and replace cap on the casing head.

**Please refer to Attachments - FIGURE GW-7: EXAMPLE LYSIMETER RECORD KEEPING FIELD FORM**

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# 7 PROCESS WATER SAMPLING

This section presents procedures associated with process water sampling activities.

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# 7.1 PROCEDURE PW-01: SAMPLE POINT IDENTIFICATION

New process water sampling locations are identified utilizing a three- or four-letter identification acronym followed by a unique number ranging between 0001 and 9999, and a final letter code. No dashes and/or spaces are used in the well name. Special identification numbers for QC samples are described in Procedures QC-01 through QC-05.

Names for new process water sampling points will be assigned or approved by the Sampling Supervisor. The requirements for naming new sampling sites are identified in Procedure DC-02.

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# 7.2 PROCEDURE PW-02: SITE INSPECTION

This procedure describes sampling site inspections. Two types of site inspections are to be completed at each site, one a general site investigation to be conducted each time a sample is collected and the other a comprehensive inspection to be performed when the site is first designated, or for existing sites, as soon as possible. These inspections are to be done in addition to other inspections that may be required by specific procedures.

General Site Inspection

Upon arrival at each process water sampling site, the site will be inspected. The purpose of this inspection is to document the sampling point is functional, the sampling equipment dedicated to the site (if any) is operating correctly, and that the sampling point and/or equipment has not been tampered with. Any problems identified at the site will be noted in the Field Logbook or designated Field Data Sheet and any equipment problems corrected. Any major equipment problems or evidence of tampering will be reported to the Sampling Supervisor.

Comprehensive Inspection

The purpose of the comprehensive inspection is to document the sampling site. Sufficient detail and description is to be provided to allow the exact location of the sampling site and the identification of sampling equipment present at the site. A map of the site is to be drawn that locates all major features related to the sampling point. Photographs of the site and sampling equipment will be taken to show sampling points, all measuring points, and permanent sampling equipment. Any pertinent items concerning the condition of the sampling point, sampling equipment, special sampling considerations, or its surroundings not included in the above information will be noted.

For open water or seeps, the documentation required by Procedure SW-02 will also be provided. Process water samples collected from wells will be documented as described in Procedure GW-02.

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# 7.3 PROCEDURE PW-03: FIELD MEASUREMENTS

Field measurements will be collected using Procedure SW-03 or GW-04 as indicated by media type. The specific sampling procedure for the process water sampling point will be reviewed to ensure that any modifications to the above procedures are noted and followed. Field measurements will be conducted according to the specific procedure requirements.

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# 7.4 PROCEDURE PW-04: FIELD DATA SHEETS

A Field Data Sheet will be completed for each process water sample collected. This sheet is described in Procedure GW-05, if the sample is collected from a well or well like device, as identified in procedure SW-05 for an open water, and/or as indicated on the specific sampling procedures and/or plans.

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# 7.5 PROCEDURE PW-05: SAMPLE COLLECTION - SMALL RESERVOIR AND LEAK DETECTION SUMPS

This procedure is for the collection of water samples representative of the Small Reservoir and the Small Reservoir leak detection sumps. These sites will be sampled to fulfill the requirements of the Small Reservoir groundwater discharge permit and associated water quality sampling plan.

Follow Procedure DC-01 to keep a Field Logbook of all sampling activities conducted at the Small Reservoir. The following sample identification numbers will be used for the Small Reservoir sampling sites:

| **Sample Site** | **Sample Identification** |
|---|---|
| Small Reservoir | SRP850 |
| Lower Leak Detection Sump (east sump) | SRP851 |
| Pressure Relief Sump (west sump) | SRP852 |

Follow general procedures for sample container preparation, DC-03; sample labeling, DC-04; sample custody, DC-05; sample preservation and packaging, DC-06; equipment maintenance, MD-01; equipment decontamination, MD-02; quality control sampling, QC-01 through QC-05; equipment calibration, GF-01; pH measurement, GF-02; specific conductance measurement, GF-04; carbonate and bicarbonate measurement, GF-05.

Small Reservoir Sampling

1. Prepare sample containers in accordance with Procedure DC-03.
2. Coordinate sample collection with the South Area Water Services (SAWS) personnel.
3. SAWS personnel will accompany the samplers during sample collection to ensure the best possible represented sample is collected.
4. Label sample containers in accordance with Procedure DC-04.
5. The prepared containers should already be rinsed and contain appropriate preservatives, if not, rinse three times with sample water and preserve according to Table DC-3. Fill the following sample containers directly from the tap:

- 1 - half gallon plastic containers for major ions analyses,
- 1-8oz plastic container for total metal analyses; and,
- 1–16-oz plastic container for sulfate when pH is less than 4.5.

6. Collect an additional sample in either a stainless-steel bucket or a clean plastic bottle for the field measurements of temperature, pH, and electrical conductivity, and for preparing a filtered sample for dissolved metal analyses.
7. Collect the dissolved metal sample from the stainless-steel bucket using a peristaltic pump and an in-line filtering device with a 0.45-micron filter. The peristaltic pump will provide the pressure for in-line filtering. Fill 8 ounces into a plastic container for dissolved metal analyses.
8. Handle the samples and documentation in accordance with Procedures DC-05 and DC-06.

9. Collect QA/QC samples in accordance with the GCMP. Name the duplicate as described in Procedure QC-01.
10. Close the sample tap securely.

Lower Leak Collection Sump and Pressure Relief Sump Sampling

1. Prepare sample containers in accordance with Procedure DC-03.
2. Obtain access to the Small Reservoir area from Mine Personnel.
3. Obtain a confined space entry permit from the Mine Safety Officer. Turn on the down hole fan and lights and wait for at least 5 minutes. Do not enter the sump until air quality has been verified. A watch person must always be stationed at the surface of the sump during all sampling activities.
4. If the sumps are full and liquid is flowing through the v-notch weir(s) in the sump, catch a water sample as water flows out the weir. If water is not flowing out the weir, sample using a peristaltic pump with either new clean vinyl tubing or vinyl tubing dedicated to the sump. Pump enough water through the tubing to rinse it thoroughly before collecting a sample. In cases where a peristaltic pump is not available, a clean dipper can be used; the dipper will be rinsed three times with sump water before filling the sample bottles.
5. Label sample containers in accordance with Procedure DC-04.
6. The prepared sample containers should already be rinsed and contain appropriate preservatives, if not, rinse three times with sample water and preserve according to Table DC-3. Fill the following sample containers:

- 1-half gallon plastic containers for major ions analyses,

  At least 8-ounces into a plastic container for total metal analyses,
- at least 8-ounces into a plastic container for dissolved metal analyses; and
- at least 8 ounces into a plastic container for sulfate when pH is less than 4.5.

7. Collect additional samples in either a stainless-steel bucket or a clean plastic bottle for the field measurements of temperature, pH, and electrical conductivity, when necessary, for filtering for dissolved metals.
8. Collect the dissolved metal sample from the stainless-steel bucket using a peristaltic pump and an in-line filtering device with an 0.45-micron filter. The peristaltic pump will be used to provide the pressure for in-line filtering. If a peristaltic pump is already being used, collect the sample directly from the end of vinyl tubing and filtering device. Fill at least 8 ounces into a plastic container for dissolved metal analyses.
9. Handle the samples and documentation in accordance with Procedures DC-05 and DC-06.
10. Collect QA/QC samples in accordance with the GCMP. Name the duplicate as described in Procedure QC-01.
11. Take precautions in bringing the samples and equipment out of the sump.
12. Secure the lid to the sump and turn off the down hole fan and lights.

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# 7.6 PROCEDURE PW-06: SAMPLE COLLECTION - LARGE RESERVOIR (DESILTING BASIN, ZONE 1 AND ZONE 2 RESERVOIR AND LEAK DETECTION SUMPS)

This procedure is for the collection of representative samples of the Desilting Basin, Zone 1, and Zone 2 Reservoirs and Zone 1 and Zone 2 leak detection sumps. These sites will be sampled to fulfill the requirements of the Large Reservoir Groundwater Discharge Permit and the associated water quality sampling plan.

There are three chambers located within the Desilting Basin and there are five leak detection sumps located within the Zone 1 Reservoir liner system and five leak detection sumps located within the Zone 2 Reservoir liner system. Each individual sump has a dedicated monitoring pipe set that extends between the liners and emerges above the surface of the Divider Dike crest. Sump samples will be collected via the monitoring pipe sets, generally with the use of a Grundfos pump.

Follow Procedure DC-01 to keep a Field Logbook of all sampling activities conducted at the Desilting Basin, Zone 1, and Zone 2 Reservoirs. The following sample identification numbers will be used for the Desilting Basin, Zone 1, and Zone 2 Reservoir sampling sites:

| Sample Site | Sample Identification |
|---|---|
| Desilting Basin No. 1 (west pond) | LRP1320 |
| Desilting Basin No. 2 (north pond) | LRP1321 |
| Desilting Basin No. 3 (south pond) | LRP1322 |
| Zone 1 Reservoir | LRP896 |
| Sump 01 (north sump) | LRP891 |
| Sump 02 | LRP892 |
| Sump 03 | LRP893 |

| Sample Site | Sample Identification |
|---|---|
| Sump 04 | LRP894 |
| Sump 05 (south sump) | LRP895 |
| Zone 2 Reservoir | LRP1319 |
| Sump 01 (north sump) | LRP1314 |
| Sump 02 | LRP1315 |
| Sump 03 | LRP1316 |
| Sump 04 | LRP1317 |
| Sump 05 | LRP1318 |

Follow general procedures for sample container preparation, DC-03; sample labeling, DC-04; sample custody, DC-05; sample preservation and packaging, DC-06; equipment maintenance, MD-01; equipment decontamination, MD-02; quality control sampling, QC-01 through QC-05; equipment calibration, GF-01; pH

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measurement, GF-02; specific conductance measurement, GF-04; carbonate and bicarbonate measurement, GF-05.

Desilting Basin, Zone 1, and Zone 2 Reservoirs

1. Prepare all sample containers in accordance with Procedure DC-03.

   Coordinate sample collection with South Area Water services (SAWS) personnel.

2. SAWS personnel will accompany the samplers during sample collection to ensure the best possible represented sample is collected.
3. Label the sample containers in accordance with Procedure DC-04.
4. The prepared containers should already be rinsed and contain appropriate preservations, if not, rinse three times with sample water and preserve according to Table DC-3. The following containers will be filled:

- 1- half gallon plastic containers for major ions analyses,
- At least 8 ounces into a plastic container for total metal analyses,
- At least 8 ounces into a plastic container for dissolved metal analyses.

5. Collect the dissolved metal sample from the stainless-steel bucket using a peristaltic pump and an in-line filtering device with an 0.45-micron filter. The peristaltic pump will provide the pressure for in-line filtering. Fill 1–8-ounce plastic containers for dissolved metal analyses.

Handle the samples and documentation in accordance with Procedures DC-05 and DC-06.

Leak Detection Sumps

1. Prepare sample containers in accordance with Procedure DC-03.
2. Water quality samples will be collected from the pumping device used to conduct the sump pump test. A sample will be collected if a 3.5 gpm (5000 gallons per day) pumping rate is maintained for one hour.
3. Label the sample containers in accordance with Procedure DC-04.
4. The prepared sample containers should already be rinsed and contain appropriate preservatives, if not, rinse three times with sample water and preserve according to Table DC-3. Fill the following containers directly from the pump discharge hose:

- 1/2 gal. plastic containers for major ions analyses,
- At least 8 ounces into a plastic container for total metal analyses,
- At least 8 ounces into a plastic container for dissolved metal analyses.

5. Collect additional samples in either a stainless-steel bucket or clean plastic bottles for the field measurements of temperature, pH, and electrical conductivity and possibly for the dissolved metal sample.
6. Collect the dissolved metal sample by attaching an in-line filtering device with an 0.45-micron filter attached to the end of the Grundfos discharge line. Fill at least 8 ounces into a plastic container for dissolved metal analyses. If desired, a dissolved metal sample can alternately be collected from a stainless-steel bucket as described in Step 6 of Zone 1 Reservoir Sampling.

7. Handle the samples and documentation in accordance with Procedures DC-05 and DC-06.

## 7.7 PROCEDURE PW-07: SAMPLE COLLECTION - SMELTER INTERIM PROCESS WATER POND

This procedure is for the collection of a representative sample of the Smelter Interim Pond. Follow general procedures for sample documentation, sample handling, and equipment decontamination as directed in Procedures DC-01, DC-03, DC-04, DC-05, MD-01, and MD-02.

1. Prepare all sample containers in accordance with Procedure DC-03.
2. Collect water samples quarterly from the Interim Pond by lowering either a Grundfos or Bennett pump down the pond liner until the pump is submerged and begin pumping.
3. Allow the water to flow freely for several minutes to ensure adequate flushing of the pump hoses.
4. Label sample containers in accordance with Procedure DC-04 prior to sampling.
5. The prepared sample containers should already be rinsed and contain appropriate preservatives, if not, rinse three times and preserve according to Table DC-3. Fill the following containers:

- 1/2 gal. plastic containers for major ions analyses,
- At least 8 ounces into a plastic container for total metal analyses,
- An 8-ounce amber glass bottle for mercury analyses.

6. Collect additional samples in either a stainless-steel bucket or clean plastic bottles for the field measurements of temperature, pH, and electrical conductivity and for filtering for dissolved metals. Collect the dissolved metal sample from the stainless-steel bucket using a peristaltic pump to provide pressure for an in-line filtering device. The filtering device will contain an 0.45-micron filter.
7. Handle the samples and documentation in accordance with Procedures DC-05 and DC-06.

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# 7.8 PROCEDURE PW-08: SAMPLE COLLECTION - BLUEWATER REPOSITORY SUMP

This procedure is for the collection of water samples representative of the Bluewater Repository sump to fulfill requirements of the Bluewater Repository Groundwater Discharge Permit and associated water quality sampling plan.

Follow Procedure DC-01 to keep a Field Logbook of all sampling activities conducted at the Bluewater Repository. The sample identification number for the Bluewater sump is BRP292.

Follow general procedures for sample container preparation, DC-03; sample labeling, DC-04; sample custody, DC-05; sample preservation and packaging, DC-06; equipment maintenance, MD-01; equipment decontamination, MD-02; quality control sampling, QC-01 through QC-05; equipment calibration, GF-01; pH measurement, GF-02; specific conductance measurement, GF-04; carbonate and bicarbonate measurement, GF-05.

1. Prepare sample containers in accordance with Procedure DC-03.
2. When it has been determined that flow is present in the sump, a sample will be collected from the bucket in the sump which is located at the end of the seepage collection pipe.
3. Label containers in accordance with Procedure DC-04.
4. The prepared containers should already be rinsed and contain appropriate preservatives, if not, rinse three times with sample water and preserve according to Table DC-3. Fill the following sample containers directly from the sump bucket:

- 1 - half gallon plastic container for major ions analyses,
- At least 8 ounces into a plastic container for total metal analyses,
- At least 8 ounces into a plastic container for sulfate when pH is less than 4.5.

5. Collect an additional sample for field measurements of temperature, pH, and electrical conductivity.
6. Collect the dissolved metal sample directly from the dedicated sump bucket using a peristaltic pump and an in-line filtering device with an 0.45-micron filter. The peristaltic pump will provide the pressure for the in-line filtering. Fill at least 8 ounces into a plastic container for dissolved metal analyses.
7. Handle the samples and documentation in accordance with Procedures DC-05 and DC-06.
8. Collect QA/QC samples in accordance with the GCMP. Name the duplicate as described in Procedure QC-01.
9. Empty the bucket, rinse it with de-ionized water, and return it to collect any water from the seepage collection pipe.
10. Secure the man-hole lid.

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# 7.9 PROCEDURE PW-09: SAMPLE COLLECTION - UPDES (GENERAL)

This procedure is for the collection of water samples at permitted UPDES outfalls to C-7 Ditch and drainages to the Great Salt Lake and Bingham Creek.

1. Prepare sample containers in accordance with Procedure DC-03.
2. Complete UPDES Field Data Sheet (Figure PW-1).
3. Place sample containers on flat, stable surfaces for receiving samples.
4. Remove the large sample container from the automatic sampling unit and shake to mix the composite sample. Continue to agitate the composite sample to ensure a homogeneous sample is collected.
5. Rinse the sample containers at least three times using the water to be sampled (unless previously prepared with preservatives).
6. Transfer the sample until the containers are completely filled.
7. For samples to be submitted to an external laboratory, secure the cap tightly.
8. If sample site does not have an identification number, assign a sample identification number in accordance with Procedure PW-01.
9. Label samples in accordance with Procedure DC-04.
10. Handle the sample as described in Procedures DC-05 and DC-06.
11. Collect QA samples and process in the same manner as other samples with respect to documentation and handling.

**Please refer to Attachments - Figure PW-1. UPDES Field Log Sheet**

PN DRAFT

# 7.10 PROCEDURE PW-10: SAMPLE COLLECTION - UPDES (ORGANIC)

The following procedure will be followed to collect process water samples for organics (VOC). Follow general procedures for sample documentation, sample handling, and equipment decontamination as directed in Procedures DC-01, DC-03, DC-04, DC-05, DC-06, MD-01, and MD-02.

1. Prepare sampling equipment and sample containers, (Procedure DC-03) prior to visiting sample site.
2. Remove the acid vial, transfer pipette and one sample vial from the kit. Avoid contamination of any part of the collection kit from petroleum products or cleaning solvents.
3. Remove the cap on the first sample vial keeping the cap away from any sources of contamination.
4. Fill the sample vial to overflowing but take care not to flush out the preservative. No air bubbles should pass through the sample as the bottle is filled or be trapped in the sample when the vial is sealed.
5. The pH of the sample must be adjusted to a pH of <2 by carefully adding two drops of acid from the acid vial. Highly buffered water may require more acid. Samples received are tested for pH prior to testing and will be discarded for a pH of 2 or greater.
6. Following the addition of acid, the vial must be sealed with the Teflon face down, shaken vigorously for one (1) minute, and store at 4EC (40EF) until received by the Division of Laboratory Services.
7. The process is repeated for the remaining three sample vials.

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# 7.11 PROCEDURE PW-11: SAMPLE COLLECTION – BARGE

1. Prepare all sampling equipment and sample containers, including QC samples (Procedure DC-03), prior to visiting the station.
2. Place sample containers on flat, stable surfaces for receiving samples.
3. Remove the large sample container from the automatic sampling unit and shake in order to mix the composite sample.
4. Rinse the sample container at least three times using the water to be sampled (unless previously prepared with preservatives).
5. Transfer the sample until the container is completely filled.
6. For samples to be submitted to an external laboratory, secure the cap tightly.
7. Assign a sample identification number in accordance with Procedure PW-01.
8. Label samples in accordance with Procedure DC-04.
9. Handle the sample as described in Procedures DC-05 and DC-06.
10. Collect QA samples and process in the same manner as other samples with respect to documentation and handling.

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# 7.12 PROCEDURE PW-12: SAMPLE COLLECTION - TAILINGS POND RETURN

Follow general procedures for sample documentation, and sample handling as directed in Procedures PW-01, DC-04, DC-05, and DC-06.

1. Prepare sample containers in accordance with DC-04 prior to visiting the sample site.
2. Samples can be collected as needed directly from the return canal at the Southeast corner of the tailings impoundment using a sample dipper.
3. The dipper should be rinsed three times with the sample water prior to collecting the sample.

   The prepared containers should already be rinsed and contain appropriate preservatives, if not, rinse three times with sample water and preserve according to Table DC-3. Fill the following sample containers directly from the dipper:

   - 1 - half gallon plastic container for major ions analyses,
   - At least 8 ounces into a plastic container for total metal analyses,
   - At least 8 ounces into a plastic container for sulfate when pH is less than 4.5.
4. Handle the samples and documentation in accordance with Procedures DC-05 and DC-06.

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# 7.13 PROCEDURE PW-13: SAMPLE COLLECTION - TAILINGS POND SEEPS

The following procedure will be followed to collect samples of seeps and drainage water from the tailings pond, or samples of similar type elsewhere on RTK property (i.e., tunnels).

1. Perform site inspection described in Procedure SW-02.
2. Prior to sample collection, review the general sampling protocol presented in Procedure SW-06.
3. Draw a sketch of the sampling point (to scale, if possible) on the Surface Water Quality Field Data Sheet and complete the field sheet as required in Procedure SW-05. Note distances from fixed landmarks such that the site may be located again.
4. Collect and record field measurements as required in Procedure SW-05.
5. Collect sample by holding the sample container under the flowing seep as described in Procedure SW-07. If the flowing seep is not exposed, sample the standing water in accordance with Procedure SW-06.
6. Assign a sample identification number in accordance with Procedure DW-01.
7. Label samples in accordance with Procedure DC-04.
8. Handle the sample as described in Procedure DC-05 and DC-06.
9. Collect QC samples as directed by Procedures QC-01 through QC-05. Process these samples in the same manner as other samples with respect to documentation and handling.
10. Arrange for the surveying of new sample locations if required by the Project Work Plan or the Project Manager (see Procedure DW-01).

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# 7.14 PROCEDURE PW-14: SAMPLE COLLECTION - TAILINGS POND DRAINS

The following procedure will be followed to collect samples of seeps and drainage water from the tailings pond, or samples of similar type elsewhere on RTK property (i.e., tunnels).

1. Perform site inspection described in Procedure SW-02.
2. Prior to sample collection, review the general sampling protocol presented in Procedure SW-03.
3. Draw a sketch of the sampling point (to scale, if possible) on the Surface Water Quality Field Data Sheet and complete the field sheet as required in Procedure SW-05. Note distances from fixed landmarks such that the site may be located again.
4. Collect and record field measurements as required in Procedure SW-05.
5. Collect sample by holding the sample container under the flowing drainpipe.
6. Assign a sample identification number in accordance with Procedure DW-01.
7. Label samples in accordance with Procedure DC-04.
8. Handle the sample as described in Procedures DC-05 and DC-06.
9. Collect QC samples as directed by Procedures QC-01 through QC-05. Process these samples in the same manner as other samples with respect to documentation and handling.
10. Arrange for the surveying of new sample locations, if required, by the Project Work Plan or the Project Manager (see Procedure DW-01).

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# 7.15 PROCEDURE PW-15: SAMPLE COLLECTION - SMELTER PROCESS WATER SUMPS

This procedure is for the collection of water samples representative of the Smelter Process Water sumps to fulfill requirements of the Smelter Ground Water Discharge Permit and associated water quality sampling plan.

Follow Procedure DC-01 to keep a Field Logbook of all sampling activities conducted at the Smelter Process Water sumps.

Follow general procedures for sample container preparation, DC-03; sample labeling, DC-04; sample custody, DC-05; sample preservation and packaging, DC-06; equipment maintenance, MD-01; equipment decontamination, MD-02; quality control sampling, QC-01 through QC-05; equipment calibration, GF-01; pH measurement, GF-02; specific conductance measurement, GF-04.

1. Prepare sample containers in accordance with Procedure DC-03.
2. Smelter operations will determine when there is sufficient water present in the sump for a sample to be collected.
3. Procure a sample by removing water from the sump with a portable pump or a dedicated pump if provided.
4. Label containers in accordance with Procedure DC-04.
5. The prepared containers should already be rinsed and contain appropriate preservatives, if not, rinse three times with sample water and preserve according to Table DC-3. Fill the following sample containers from the pump discharge hose:

- 1/2-gallon plastic container for major ions analyses,
- At least 8 ounces into a plastic container for total metal analyses,
- 1-gallon stainless steel bucket for procuring a dissolved metal sample and for field measurements of temperature, pH, and electrical conductivity.

6. Collect the dissolved metal sample directly from the stainless-steel bucket using a peristaltic pump and an in-line filtering device with an 0.45-micron filter. A peristaltic pump will provide the pressure for the in-line filtering. Fill at least 8 ounces into a plastic container for dissolved metal analyses.
7. Handle the samples and documentation in accordance with Procedures DC-05 and DC-06.
8. Collect QA/QC samples in accordance with the GCMP. Name the duplicate as described in Procedure QC-01.

PRELIMINARY DRAFT

# 8 DRINKING WATER SAMPLING

This section presents procedures associated with drinking water sampling activities.

PN DRAFT

# 8.1 PROCEDURE DW-01: SAMPLE POINT IDENTIFICATION AND LOCATION

Drinking water sampling locations are identified utilizing acronyms listed below:

| Sample Identification | Number Location |
|---|---|
| - BMD1009 | Freeman Culinary Tank After Chlorination |
| - BMD1010 | Mine 6290 Office Janitor's Mop Sink |
| - BMD1011 | Mine Visitor Center Men's Restroom Wash Basin |
| - BMD1012 | Mine 6290 Change House Washroom Sink |
| - BMD1013 | Mine 6190 Truck Shop Washroom |
| - BMD1014 | Mine 6190 Truck Shop Foreman's Restroom |
| - BMD1015 | Copperfield Tire Shop Sink |
| - BMD1016 | Mine 6190 Bull Gang Restroom Wash Basin |
| - BMD1017 | Mine 6190 Redi Room Men's Restroom Wash Basin |
| - BMD1018 | Mine 6190 Redi Room Women's Restroom Wash Basin |
| - BMD1019 | Mine 6190 Office Building Lunchroom Wash Basin |
| - BMD1020 | Mine 6190 Office Building Ladies Restroom Wash Basin |
| - BMD1021 | Markum Shop Kitchen Sink |
| - BMD1022 | Mine Safety Office Janitor's Mop Sink |
| - BMD1023 | Mine Dry Fork Shops Women's Restroom Wash Basin |
| - BMD1024 | Mine Dry Fork Shops Electrical Foreman's Restroom Wash Basin |
| - BMD1025 | Mine Dry Fork Shops Welding Shop West Sink |
| - BMD1026 | Mine Dry Fork Shops Electrical Office Test Area Wash Room |
| - BMD1027 | Mine Dry Fork Shops Lineman Trailer Wash Basin |
| - BMD1028 | Mine Dry Fork Shops Dozer Repair Lunchroom Wash Basin |
| - BMD1029 | Mine Dry Fork Shops Car Shop Lunchroom Wash Basin |
| - BMD1036 | Bingham Mine Safety Office Rest Room Wash Basin |
| - BMD1037 | 6190 Admin Conference Room Kitchen Sink |
| - BMD1038 | 6190 Admin Office Women's Rest Room Wash Basin |
| - BMD1039 | 6190 Admin Office Men’s Rest Room Wash Basin |
| - BMD1040 | 6190 Admin Office Kitchen Sink Faucet |
| - ECD1030 | SAWs Plant Control Room Mop Sink |
| - ECD1031 | SAWS Plant Foreman's Washroom Wash Basin |
| - ECD1032 | SAWS Plant Janitor's Mop Sink |
| - ECD1033 | Mine Car Whacker Restroom Wash Basin |
| - ECD1034 | Mine Copperton Tower Restroom Wash Basin |
| - ECD1035 | Barney Tunnel Culinary Tank |
| - SMD1045 | Smelter Environmental Monitoring Center |
| - SMD1046 | Smelter #8 Acid Plant Repair Building Mop Sink |

| Sample Identification | Number Location |
|---|---|
| - SMD1047 | Smelter Change house Downstairs Mop Sink |
| - SMD1048 | Smelter Central Warehouse Outside Tap Dock |
| - SMD1049 | Smelter Mechanic Shop Wash Basin |

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- SMD1068 Smelter #8 Acid Plant Field Repair Restroom Wash Basin
- SMD1069 Smelter Safety Office Exam Room Wash Basin
- SMD1070 Smelter Environmental Office Restroom Wash Basin
- SMD1071 Refinery Administration Building. Men's Rest Room Wash Basin
- SMD1075 Smelter Engineering Kitchen Sink
- SMD1095 Smelter Upstairs Lunch Room in Maintenance Building Kitchen Sink
- SMD1096 Smelter EDX Building Men’s Rest Room Wash Basin
- SMD1097 Smelter Flash Furnace Building Level 3 Men’s Rest Room Wash Basin
- SMD1098 Smelter Filter Plant Maintenance Building Women’s Rest Room Wash Basin
- RFD1051 Refinery Administration Building Janitor's Room Mop Sink
- RFD1052 Refinery Maintenance Shops Foreman's Restroom Wash Basin
- RFD1053 Refinery Warehouse Wash Basin
- RFD1054 Refinery Field Repair Foreman's Office Sink
- RFD1055 Refinery Boiler Plant Upstairs Restroom Wash Basin
- RFD1094 Refinery P.M. Building Women’s Rest Room Wash Basin
- MCD1056 Magna Pipe Shop Shower
- MCD1057 Magna Central Garage Washroom
- MCD1058 Magna Safety Office Rear Washroom Wash Basin
- MCD1059 Magna Flotation Sample Department Storage Room Wash Basin
- MCD1060 Magna Central Change Building Women's Washroom Wash Basin
- MCD1073 Magna Pipe Shop Lunchroom Sink
- PCD1041 Power Plant 3rd Floor Rest Room Wash Basin
- PCD1042 Power Plant 5th Floor Rest Room Wash Basin
- PCD1061 Bonneville Grind Building Control Room Restroom
- PCD1062 Bonneville Dumper Building Furnace Room Mop Sink
- PCD1067 Bonneville Dumper Building. Control Washroom
- ARD1063 Arthur Carpenters Shop Shower
- ARD1064 Arthur Administration Building Furnace Room Mop Sink
- ARD1066 Arthur Administration Downstairs Women's Washroom Basin
- ARD1074 Arthur Central Shop Restroom Wash Basin
- LSD1078 Section 21 Pump House Combined After Chlorination
- BYD1080 Copperton Concentrator Changehouse Janitor's Sink
- BYD1081 Copperton Concentrator Outside Services Kitchen Tap
- BYD1082 Copperton Concentrator Grinding Plant Millwrights Kitchen Tap
- BYD1083 Copperton Concentrator Grinding Plant Operations Kitchen Tap
- BYD1084 Copperton Concentrator Moly Plant Systems Kitchen Tap
- BYD1085 Copperton Concentrator Grinding Plant Electrical Kitchen Sink
- BYD1086 Copperton Concentrator Met Lab Kitchen Sink
- BYD1087 Copperton Concentrator Moly Operations Kitchen Sink
- BYD1088 Copperton Concentrator Flotation Plant Millwright Kitchen Sink
- BYD1089 Copperton Concentrator Recordkeeping Center Bathroom Wash Sink
- BYD1090 Copperton Concentrator Culinary Tank After Chlorination
- WTD1065 Garfield Security Restroom Wash Basin
- ECP2796 Zone A RO Product Water

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Sample identification names for new drinking water sampling points will be assigned and approved by the Sampling Supervisor.

*Not Valid Points

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# 8.2 PROCEDURE DW-02: SITE INSPECTION

The purpose of the inspection is to document the sampling site. Sufficient detail and description is to be provided to allow identification of the exact sampling site. A map of the site is to be drawn that locates all major features related to the sampling point. Photographs of the site should be taken to show the sampling point. Note any pertinent items concerning the condition of the sampling point, special sampling considerations, or its surroundings.

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# 8.3 PROCEDURE DW-03: FIELD MEASUREMENTS

The following procedure will be followed for field measurements of pH, temperature, and specific conductivity for drinking water.

1. Begin written documentation as appropriate (see Procedure DC-01, and DW-04).
2. Allow water to flow for at least 5 to 10 minutes from the designated sample point to ensure adequate flushing of the immediate supply pipes.
3. Collect samples in new, laboratory-cleaned, or decontaminated containers for measurement with meters.
4. Follow Standard Operating Procedures GF-01, GF-02, and GF-04 for calibrating and measuring pH and specific conductance.

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# 8.4 PROCEDURE DW-04: FIELD DATA SHEETS

A Drinking Water Field Data Sheet will be completed for each sample collected that is analyzed for drinking water parameters only. A sample Drinking Water Field Data Sheet is shown in Figure DW-01.

For samples collected from a well for the purpose of monitoring drinking water sources, Procedure GW-05 will be followed for the completion of a Field Data Sheet.

**Please refer to Attachments - Figure DW-1. Drinking Water Field Data Sheet**

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# 8.5 PROCEDURE DW-05: SAMPLE COLLECTION - DRINKING WATER

**BACTERIOLOGICAL EXAMINATION**

The following procedure will be followed to test drinking water samples for residual chlorine, and to collect samples for bacterial counts:

1. Begin written documentation as appropriate (see Procedure DC-01 and Figure DW-02).
2. Assign a sample identification number in accordance with Procedure DW-01.
3. Decontaminate tap using antibacterial wipes and holding an open flame under the tap. Allow cold water to run freely for five to ten minutes prior to sampling. While water is flowing, the sampler should wash hands in a separate sink, if possible, to help minimize sample contamination.
4. Collect a sample for bacterial count by filling two sterile plastic bottles from the tap. Prevent contact by any object (including sampler's hands) on the bottle opening or interior.
5. Label and handle samples in accordance with Procedures DC-01 through DC-05.
6. Measure residual free chlorine by following instructions provided in a Chlorine Colorimetric sample kit. Record the residual chlorine concentration on the Utah State Department of Health Form (Figure DW-02) and in the Sample Logbook in the Field Office.
7. Place samples in coolers with ice for immediate shipment to KEL and the State Health Laboratory for analysis.

**Please refer to Attachments - Figure DW-2. Example Utah State Form for Bacteriological Examination**

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# 8.6 PROCEDURE DW-06: SAMPLE COLLECTION - DRINKING WATER

The following procedure will be followed to collect drinking water samples with the exception of samples collected for first draw analyses of lead and copper and samples collected for organic analyses.

Follow general procedures for sample documentation, sample handling, and equipment decontamination as directed in Procedures DC-01, DC-03, DC-04, DC-05, DC-06, MD-01, and MD-02.

1. Prepare all sampling equipment and sample containers, (Procedure DC-03) prior to visiting sample site.

2. Samples should be collected at the well, or at a point in the system where different water sources blend. Sample point will be prior to any water treatment process (does not include chlorination) and before entry into the distribution line.

3 Sample should be collected directly from spigot or sample port. If a hose is attached, it should be removed prior to collecting sample.

3. Allow water to flow freely from the designated sample point for at least 5-10 minutes to ensure adequate flushing of the immediate pipes. This is necessary in order to procure a representative sample.

4. Label sample containers in accordance to Procedure DC-04 prior to sampling.

5. Handle the samples and documentation in accordance with Procedures DC-05 and DC-06.

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# 8.7 PROCEDURE DW-07: SAMPLE COLLECTION - DRINKING WATER LEAD AND COPPER FIRST DRAW TAP SAMPLING

The following procedure will be followed to collect drinking water samples for lead and copper first draw tap sampling:

Follow general procedures for sample documentation, sample handling, and equipment decontamination as directed in Procedures DC-01, DC-03, DC-04, DC-05, DC-06, MD-01, and MD-02.

1. Arrange sampling schedule with appropriate plant supervisor prior to the day of sampling.
2. At least six hours prior to sample collection, locate each site to be sampled and thoroughly flush the lines by turning on the faucet for a minimum of 5 minutes.
3. After sufficient flushing of the supply line, post each individual site by securely attaching a DO NOT USE tag to the faucet.
4. Prepare all sample containers in accordance with Procedure DC-03) prior to visiting the sites. Sample containers will be acidified with 4 mL of HN03 to ensure sample preservation.
5. Label sample containers in accordance with Procedure DC-04.
6. After the six hour "minimum" waiting period, remove the tag from each location immediately prior to collecting a sample.
7. Always collect the first water coming from the tap and always collect a one-liter sample in one container only.
8. Handle the samples and documentation in accordance with Procedures DC-05 and DC-06.

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# 8.8 PROCEDURE DW-08: SAMPLE COLLECTION - COLIFORM BACTERIA

## 8.8.1 INTRODUCTION

This plan is for the collection of coliform bacteria samples for KUC drinking water systems as required by U.A.C. R309-104-4.5.4.d.

RTK has five (5) public drinking water systems. All are classified as non-community, non-transient systems. The following table lists the system name and identification number, bacteriological sample frequency, and area served for each system.

| SYSTEM ID AND NAME | FREQUENCY | SERVICE AREA |
|---|---|---|
| 18003 Section 21 | Monthly | All North End Facilities |
| 18136 Copperton Concentrator | Quarterly | Copperton Concentrator Area |
| 18141 Utah Metals Tunnel | Quarterly | Bingham Canyon |
| 18152 Lark System | Quarterly | Mine Entrance |
| 18161 Zone A RO | Monthly | Municipal |

## 8.8.2 PROJECT RESPONSIBILITIES

The KUC Environmental Sampling Supervisor will have overall responsibility for the sampling and compliance program, quality control, and reporting. The KUC Environmental Technicians will have the responsibility of collecting, handling, and documenting of all water samples.

## 8.8.3 WATER QUALITY SAMPLING LOCATIONS

Sample sites and sample identifications are listed for the five systems in the attached KUC Standard Operating Procedure DW-01. Sample site locations shall be rotated within each system according to the sampling frequency for each water system. Sample identification numbers beginning in: "BMD" applies to the Utah Metals Tunnel System; “BYD” to the Copperton Concentrator System LTG to the Lark System; ECP to the Zone A RO and all others apply to Section 21 System.

## 8.8.4 WATER QUALITY SAMPLING PROCEDURES

All bacteriological water samples will be taken in accordance with the attached KUC Standard Operating Procedures DW-02, DW-04, and DW-05.

# 8.9 PROCEDURE DW-09: SAMPLE COLLECTION - ORGANICS (VOC)

The following procedure will be followed to collect drinking water samples for organics (VOC). Follow general procedures for sample documentation, sample handling, and equipment decontamination as directed in Procedures DC-01, DC-03, DC-04, DC-05, DC-06, MD-01, and MD-02.

1. Prepare sampling equipment and sample containers, (Procedure DC-03) prior to visiting sample site.
2. Allow water to flow freely from the designated sample point for at least 5-10 minutes to ensure adequate flushing of the immediate pipes. This is necessary in order to procure a representative sample.
3. Remove the acid vial, transfer pipet and one sample vial from the kit. Avoid contamination of any part of the collection kit from petroleum products or cleaning solvents.
4. Remove the cap on the first sample vial keeping the cap away from any source of contamination.
5. Fill the sample vial to overflowing but take care not to flush out the preservative. No air bubbles should pass through the sample as the bottle is filled or be trapped in the sample when the vial is sealed.
6. The pH of the sample must be adjusted to a pH of <2 by carefully adding two drops of acid from the acid vial. Highly buffered water may require more acid. Samples received are tested for pH prior to testing and will be discarded for a pH of 2 or greater.
7. Following the addition of the acid, the vial must be sealed with the Teflon face down, shaken vigorously for one (1) minute, and store at 4EC (40EF) until received by the Division of Laboratory Services.
8. The process is repeated for the remaining three sample vials.

For all other organic sampling, bottles should be procured from an independent laboratory and their sampling procedures should be followed for sample collection.

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# 8.10 PROCEDURE SW-01: SAMPLE POINT IDENTIFICATION

All permanent surface water sampling locations are identified utilizing a three-letter identification acronym followed by a unique number ranging between 0001 and 9999. No dashes and/or spaces are to be used in the sample name. Special identification numbers for QC samples are described in Procedures QC-01 through QC-03.

Names for new sampling points will be assigned and approved by the Sampling Supervisor. The information listed in Procedure SW-02 will accompany requests for new names.

Procedures to be used for naming new sampling points are provided in Procedure DC-02. A sample point identification must be obtained for all new sampling points, whether permanent or not, to assure that if this site is ever sampled again in the future the data from past sampling events can be identified. Prior to the selection of a new sampling point, consideration should be given to the use of an existing sampling point. Existing sampling points are identified in Table DC-01.

The following sections describe the general conventions used in identifying surface water sampling points prior to the implementation of the present system.

Site Identification Acronym

The identification acronym consists of a three-letter code identifying the general location of the sample. For example, the acronym "LCS" identifies a surface sampling point on Lee Creek.

<u>General location acronyms used to date include:</u>

| | | |
|---|---|---|
| VWS | - | Surface water sampling point located on the valley side of the Oquirrh Mountains. |
| LCS | - | Lee Creek. |
| RTC | - | Riter Canal. |
| BDC | - | Brighton Drain. |
| RWC | - | Right-of-Way Canal. |
| SZS | - | Spitz Spring |
| CSC | - | C-7 Ditch |
| CWC | - | C-7 Ditch (west) |
| KCS | - | Kersey Creek |
| RSC | - | Ridgeway South Canal |
| CLC | - | Clarification Canal |

<u>Sample Location Number</u>

A sequence number or character is associated with each sampling point. That number is unique to the sampling point and will not be used in other points.

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# 8.11 PROCEDURE SW-02: SAMPLE POINT DESCRIPTION

Mark and survey each sample point for the first time. Follow this procedure to enable surveying. As directed by the specific Project Work Plan, some points may require permanent markers.

1. Drive a pre-painted, orange wooden stake (2x2x24 inches) 12 to 14 inches into the ground. Use a waterproof, indelible ink pen or place a metal label on the stake containing the sample identification number.
2. Measure the location of the stake using a compass and range finder or surveying equipment. Record the location in coordinates or a compass bearing and distance from a permanent object or from a section corner on a USGS map. For non-permanent sampling points, locate the site on a USGS topographic or another suitable map.
3. Document the sample point location on the Surface Water Quality Field Data Sheet.
4. Use a camera with date and time indicator if possible. Check current date and time to ensure accuracy.
5. Shoot a picture of the stake with reference points in the background. Reference points include stationary objects used in locating the point. Shoot a picture of the stake relative to the overall site if site conditions are relevant to the study.
6. Shoot a picture of the gauge used in measuring water level, as well as the location at which samples are collected.
7. Record the picture numbers and roll number on the Surface Water Quality Field Data Sheet, as well as the direction facing when taken.
8. Take other pictures as deemed necessary and record the above information on the Field Data Sheet.
9. Arrange for the installation of a temporary marker or permanent marker at the sampling location, depending on the type of sampling point, as directed by the Project Work Plan.
10. If survey coordinates are to be obtained, prepare a statement of work for a licensed surveying contractor to determine the location and elevation of the ground surface and permanent monument marker. The horizontal control will be Kennecott Mine Datum to within + 3 ft (+ 1 meter). The elevation of the monument marker will be surveyed to within + 0.01 foot (+ 0.3 cm) using the National Geodetic Vertical Datum of 1929. Corrected survey data will include loop closure for survey accuracy within these limits.
11. The surveyor's report will include a list of coordinates, elevations, and system used. The report must also include a map, and a description and location of all permanent and semipermanent reference points used for horizontal and vertical control. This report will be filed in the Water Quality Data Filing System.

# 8.12 PROCEDURE SW-03: GENERAL PROTOCOL

1. Record pertinent site observations. Include a sketch and photographic documentation for first-time visits to the site (Procedure SW-02). Identify sample location on the Surface Water Quality Field Data Sheet.
2. Measure the water levels relative to the monument marker described in Procedure SW-02. Measurement should be accurate to 0.01 feet.
3. Thoroughly decontaminate instruments used in the sampling process. (Procedure MD-02).
4. Place sample containers on flat, stable surfaces for receiving samples.
5. Plan to collect samples first from those areas suspected of being the least contaminated to minimize the risk of cross contamination.
6. Measure field parameters (pH, temperature, conductivity, etc.) as required by the Project Work Plan. Measure these parameters at the source rather than in containers when possible. Record the time the sample is collected and the time the field measurements are measured.
7. Collect samples in prepared containers with the proper preservatives. If required, measure carbonate and bicarbonate according to Procedure GF-05.
8. Collect sample and securely close containers as quickly as feasible, eliminating any air space.
9. Attach the in-line filtering device with a 0.45-micron filter to collect samples which require filtering. Follow the manufacturer's instructions for filter use. If field filtering is impossible, fill extra containers (labeled with the Well ID # in indelible ink) for transport to the Field Office for filtering and filling of containers on the same day as sample collection.
10. If any preservative is lost prior to or during the filling of a sample container (i.e., spilling or overflow), use another prepared container.

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# 8.13 PROCEDURE SW-04: FLOW MEASUREMENT

Flow Measurement Using Floats

The measurement of discharge volumes using floats can be performed within an accuracy range of + 10 percent under good conditions. The estimate may be as much as 25 percent in error if a poor reach is selected and an inadequate number of float runs are conducted.

1. Prepare a surface float by partially filling a bottle with water. A rod float may also be used (ie., a wooden rod with a weighted end) if the water is deep enough such that the rod will not touch the stream bed.
2. Select two cross sections in the channel which are separated by a travel time of approximately two (2.0) seconds. Shorter travel times may be used if a straight stretch is not available.
3. Measure the float time between the two cross sections several times at several sections across the stream width.
4. Calculate the mean velocity of a given section as follows:

$$VS = VF\,(0.85)$$

where: VS = Mean velocity of section (feet per second);

VF= Float velocity (feet per second); and

0.85 = Coefficient to allow for the vertical velocity profile and

relative depth of immersion.

5. Calculate the area of each section (AS) as shown in Figure 1. This requires the measurement of depth at each section center (i.e.., the location at which the float was placed).
6. Measure the water level relative to the monument marker.
7. Calculate the discharge for each section as follows:

$$DS = AS\,(VS)$$

$$Dg = Ds\,(60)\,(7.485)$$

where: DS = Discharge of section (cubic feet per second);

AS = Area of section (square feet); and

VS = Velocity in section (feet per second).

Dg = Discharge in gallons per minute

8. Calculate the total discharge rate for the channel by summing all sectional discharge rates.

Flow Measurement Using a Container

1. Calibrate container (e.g., 5-gallon bucket, 2-liter beaker, graduated cylinder)

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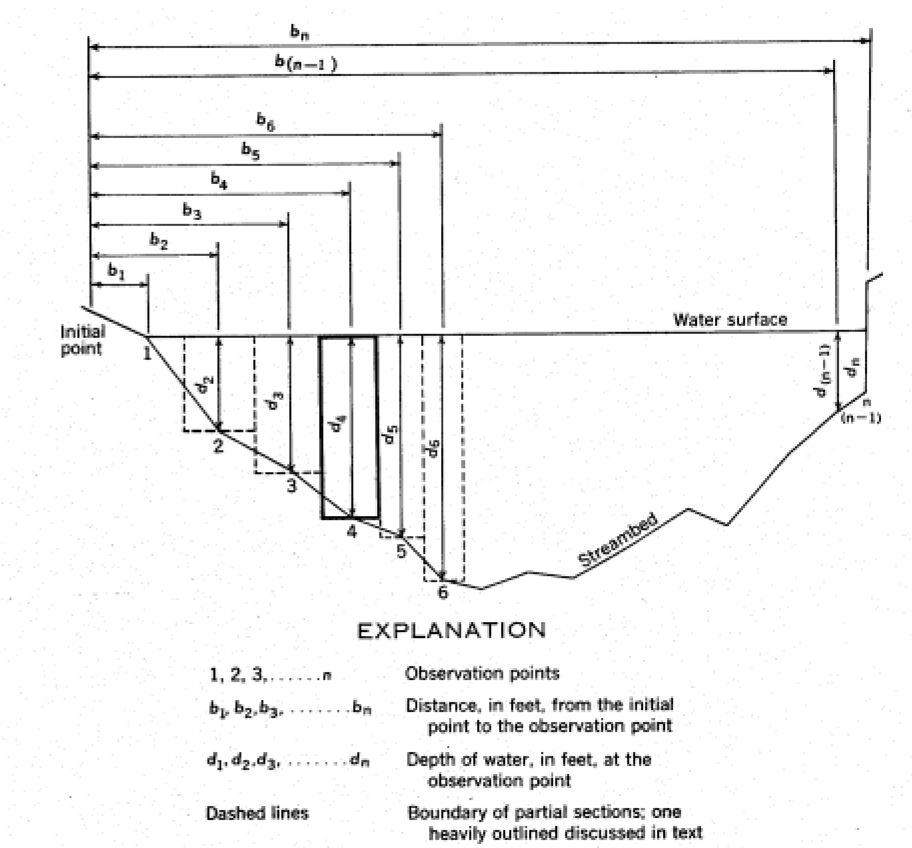


Measurements (Buchanan and Somers. 1976).

2. Place container opening under the entire flow stream, if possible.

3. Record the time to fill container using a stopwatch or wristwatch with second hand.

4. Calculate the flow rate (Q) where:

Q= VT

Q = flow rate, gpm

V = captured volume, gallons

T = time required to capture V, minutes

<u>Measurement of Surface Water Flow Velocity with A Pygmy Water Current Meter</u>

The Pygmy Water Current Meter measures velocities between 0.5 and 3.0 feet/second (ft/sec) and is recommended for use in shallow streams, flumes, and canals where low velocities and/or shallow water are encountered. Options for use include a earphone and battery for counting bucket wheel revolutions or digital readout for determining velocity. Velocity in ft/sec equals the revolutions of the bucket wheel per second.

1. Assemble the current meter and test for proper operation in accordance with the manufacturer's instructions.

2. Partition stream into sections (with tagline or bridge railing), visually observing the velocity and general flow of the stream. Establish enough stations to prevent more than 10 percent of the total discharge from

passing through any individual partial section. Check the measurements and if necessary, readjust the partitioned sections to upgrade the quality of the readings. Where possible, try to use the same cross section throughout the study period and during all stream calibrations. However, the number and position of stations within the cross section may be changed, if necessary, to accommodate changing flow conditions.

3. Record stream gauge as indicated by one of the staff gauges (mark monument described in Procedure SW-02) and record this value on the water level recorder chart at the point of pen contact.

4. Record a minimum of the following items on the data form or in the Field Logbook:

- Sample Identification Number.
- Site
- Date
- Time at start of measurements
- Stream stage at start of measurements
- Approximate wind direction and speed
- General stream condition (e.g., turbid, clear, low level, floating debris, water temperature, type of streambed material, etc.)
- Other factors having a bearing on discharge measurements
- Location of initial point
- Total width of stream to be measured
- Type of current meter and conversion factor, if applicable; and
- Name of field staff taking above reading

5. Determine the depth and mean velocity at the first station or "initial point" if possible and record this information. Always hold the wading rod vertical. When practical, make all measurements standing behind and well to the side of the meter. Avoid disturbing or standing along the streambed beneath the cross-sectional measuring points.

6. Measure the depth at the second station from initial point and record. Record the observed velocity at a point 0.6 (60%) of the total depth below the surface as the mean velocity for the vertical. This method (six-tenths depth method) works best for depths between 0.3 to 2.5 feet and is the measurement of choice when measurements must be made quickly.

7. Perform the same procedure at each successive station as rapidly as possible.

8. Determine the depth and mean velocity at the last station, or endpoint, and record.

9. Record the ending time of this series of measurements and the stage.

10. Enter the ending stage value on the recorder chart at the point of pen contact. This information will illustrate the interval of time and stage variations during the cross-sectional measurements. Also enter the date and indicate that a calibration has taken place over this interval.

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11. Remove the tagline (if used); rinse the current meter in clean water, if necessary; allow the current meter to dry; then pack it away in its carrying case.

12. To determine the volumetric flow through each subsection per unit of time, multiply the mean velocity of each stream subsection by the area of that subsection. To determine the total discharge rate, sum all the volumetric flows for each subsection across the entire cross section of the stream. To determine average stream velocity, divide the total discharge rate by the total cross-sectional area.

Measurement of Surface Water Flow Velocity Using Pitot Tubes

Pitot tubes can be used to measure flow velocities in open channels because the difference in pressure between an upstream reading and a downstream reading is directly related to flow velocity at the point of measurement. Pitot tubes should be used where velocities are high enough to generate readable differences in pressure. They are inaccurate at velocities less than one ft/sec. They are not reliable for streams carrying high concentrations of suspended matter because the tube inlet plugs easily. Measurements are best made when the upstream straight section is 15 to 20 times the channel width.

1. Partition the stream into subsections and position the Pitot tubes according to manufacturer's specifications.
2. Determine the upstream pressure at the first station and record the value as P2.
3. Determine the downstream pressure at the first station and record the value as P1.
4. Repeat Steps No. 2 and 3 for each subsection of the stream.

5. To calculate the discharge rate:

$$Q = AV$$

Where Q is flow in ft3/sec, A is cross-sectional area of separate subsections of the channel in ft2, and V is flow velocity in ft/sec.

6. To calculate V:

$$V = [2g(P2-P1)/d]0.5$$

Where g = 32.2 ft/sec, P2-P1 is the change in pressure in lb/ft2, and d is 62.4 in lb/ft3 (the density of water). Substituting values for the two constants gives:

$$V = 1.02\ (P2-P1)0.5$$

7. To determine the total discharge rate for the entire cross-sectional area, sum the discharge rates of the individual subsections.

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# 8.14 PROCEDURE SW-05: SURFACE WATER QUALITY FIELD DATA SHEET

An example Surface Water Quality Field Data Sheet is shown in Exhibit 8. Each item is described below:

Sample Location ID #: Identification number for the water sampling location (acronym plus sequence number).

Date and Time: Date and time work began at site.

Sampling Personnel: Names of sampling personnel on site.

Site Sketch: A sketch of the site with a map showing major features and landmarks in the area. Note north direction.

Site Description: A description of the site with sufficient details such that the site may be located again.

Photograph: Roll number, photograph (frame) number and direction faced while photograph was taken.

Sample Description: Identification number for the sample, time of collection, depth of collection, reference point used to measure depth, and disturbances of sediment during sampling.

Sampling Method: Sampling device and method or procedure used.

Field Parameters: Meter I.D. # and readings for all field measurements, including temperature, pH, conductivity, dissolved oxygen (method used in determining) and turbidity. Titration amounts, titrate type, and molarity for carbonate and bicarbonate analyses. Include time of titration. Include time readings were made.

Ferrous Iron Measurements: Measurements of iron, including dilutions and method used.

Sulfide: Measurements of sulfide including dilutions.

Discharge Measurement: Method or procedure used, and measurements and calculations made to arrive at discharge rate (including units).

Signature: The sampler or samplers will sign the Sheet prior to submittal of the samples to the laboratory.

A copy of the Surface Water Quality Field Data Sheet will be submitted to the laboratory with the Chain of Custody form (see Procedure DC-05). A copy is also filed in the Water Quality Data Filing System.

**Please refer to Attachments - Figure SW-2. Example Surface Water Quality Field Data Sheet**

# 8.15 PROCEDURE SW-06: SAMPLE COLLECTION - STANDING WATER

1. Prior to sample collection, review the general sampling protocol presented in Procedure SW-03.
2. Locate non-permanent sample sites on a parcel map and aerial photograph.
3. Travel to the site and mark the sample point in accordance with Procedure SW-01 if the sample site is to be surveyed.
4. Begin written and photographic (for first-time visits) documentation as directed in Procedure SW-02.
5. Note distances from fixed landmarks such that site may be located again.
6. Avoid surface scum, and sample far enough from the shoreline to avoid variations from inflowing tributaries or waste discharges.
7. Measure the water level relative to a permanent gauge if available.
8. If wading, minimize disturbance in the area to be sampled. Do not wade in greater than 3.0 feet of water.
9. Rinse the bottle (to be used with the sampling device) at least three times using the water to be sampled.
10. Submerge a stainless-steel dipper or other suitable device with minimal surface disturbance. Do not disturb bottom sediments. Record the approximate depth and location of the sample source on the Surface Water Quality Field Data Sheet.
11. Allow the device to fill slowly and continuously.
12. Retrieve the dipper or device from the surface water with minimal disturbance.
13. Remove the cap from the prepared sample container and slightly tilt the mouth of the bottle below the dipper or device edge.
14. Empty the dipper or device slowly, allowing the sample stream to flow gently down the side of the container with minimal entry turbulence.
15. Continue delivery of the sample until the container is completely filled.
16. Secure the cap tightly.
17. Assign a sample identification number in accordance with Procedure SW-01.
18. Label samples in accordance with Procedure DC-04.
19. Place the properly labeled sample container in an appropriate carrying case or cooler. Pack with ice when required as a preservative.
20. Dismantle the sampler. Follow Procedure MD-02 for proper decontamination of equipment.
21. Handle the sample as described in Procedure DC-05 and DC-06.
22. Collect QA samples, as described in Procedures QC-01 through QC-05, and process in the same manner as other samples with respect to documentation and handling.

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# 8.16 PROCEDURE SW-07: SAMPLE COLLECTION - SPRINGS

1. Prior to sample collection, review the general sampling protocol presented in Procedure SW-03.
2. Locate non-permanent sample sites on a parcel map and aerial photograph.
3. Travel to the site and mark the sample point in accordance with Procedure SW-02 if the sample site is to be surveyed.
4. Begin written and photographic (for first-time visits) documentation as directed in Procedure SW-02.
5. Note distances from fixed landmarks such that site may be located again.
6. Collect samples by holding the sample container under the flowing spring if possible. If the spring is not exposed, sample the standing water in accordance with Procedure SW-06. Use a shovel to carefully deepen the pond if necessary. Allow sediments to settle and clear prior to sampling.
7. Assign a sample identification number in accordance with Procedure SW-01.
8. Label samples in accordance with Procedure DC-04.
9. Handle the sample as described in Procedures DC-05 and DC-06.
10. Collect QA samples, as described in Procedures QC-01 through QC-05, and process in the same manner as other samples with respect to documentation and handling.
11. Arrange for the surveying of new sample locations if required by the Project Work Plan or the Project Manager.

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# 8.17 PROCEDURE SW-08: SAMPLE COLLECTION - RUN-OFF

Follow this procedure to collect run-off water samples from stockpiled tailings, soil and/or waste rock with a sampling device which allows the transfer of samples into prepared sample containers.

1. Prior to sample collection, review the general sampling protocol presented in Procedure SW-03.
2. Locate non-permanent sample sites on a parcel map and aerial photograph.
3. Travel to the site and mark the sample point in accordance with Procedure SW-01 if the sample site is to be surveyed.
4. Begin written and photographic (for first-time visits) documentation as directed in Procedure SW-02.
5. Note distances from fixed landmarks such that site may be located again.
6. Select a sampling location where run-off water is in direct contact with subject material, i.e. tailings, waste rock etc.
7. Measure and record the appropriate field parameters (e.g., temperature, pH, dissolved oxygen and estimated flow rate) of the runoff discharge at the time the first flush sample is collected as described in Procedure SW-04.
8. Collect a first flush grab sample within thirty minutes of the initiation of runoff discharge (storm event). If possible, collect grab samples directly from the downstream end of the runoff into the storage bottles. If this is not possible due to sampling access, collect the sample using a sampling device such as a beaker with a long handle and transfer the sample into the storage bottle.
9. Submerge the storage bottle or other suitable sample collection device with minimal surface disturbance. Do not disturb surface sediments. Record the approximate location of the sample source on the Surface Water Quality Field Data Sheet.
10. Allow the device to fill slowly and continuously.
11. Retrieve the sample bottle or device from the runoff water with minimal disturbance.
12. If transferring the sample, remove the cap from the prepared sample container and slightly tilt the mouth of the bottle below the sampling devices edge.
13. Empty the device slowly, allowing the sample stream to flow gently down the side of the container with minimal entry turbulence.
14. Continue delivery of the sample until the container is completely filled.
15. Secure the cap tightly.
16. Assign a sample identification number in accordance with Procedure SW-01.
17. Label samples in accordance with Procedure DC-04.
18. Place the properly labeled sample container in an appropriate carrying case or cooler. Pack with ice when required as a preservative and handle the sample as described in Procedures DC-05 and DC-06.

19. Collect one grab sample and take a flow measurement every 20 minutes during the first three hours of the discharge, with the first portion of sample collected 20 minutes after initiation of discharge. (If the discharge ceases before three hours, sampling will end with the end of discharge).

20. At the end of sampling, prepare a table including time intervals and flow rate information to determine the volume of sample which will be taken each from each 20-minute sampling interval to make up the flow-proportional composite. A sample procedure and work sheet for determining composite volume are presented in Figure SW-3.

20. Remove the appropriate volume of preserved sample from each preservative bottle into an unpreserved bottle of identical type (e.g. amber glass, plastic) to yield the composite sample for analysis. Do not attempt to composite samples collected in VOA vials for volatile organic analysis in the field. This must be done in the laboratory under controlled conditions. Do not mix samples that have been preserved with different preservatives.

22. Collect QA samples, as identified in Procedures QC-01 through QC-05, and process in the same manner as other samples with respect to documentation and handling.

23. Dismantle the sampler and wipe. Follow Procedure MD-02 for proper decontamination of equipment.

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# 8.18 PROCEDURE SW-09: SAMPLE COLLECTION - FLOWING WATER

The following procedure will be used to collect water samples from streams and canals with a sampling device which allows the transfer of samples into prepared sample containers.

1. Prior to sample collection, review the general sampling protocol presented in Procedure SW-03.
2. Locate non-permanent sample sites on a parcel map and aerial photograph.
3. Travel to the site and mark the sample point in accordance with Procedure SW-01 if the sample site is to be surveyed.
4. Begin written and photographic (for first-time visits) documentation as directed in Procedure SW-02.
5. Note distances from fixed landmarks such that site may be located again.
6. Select a sampling location where stream flow is well-mixed and away from inflow tributaries.
7. Measure the water level relative to a permanent gauge if available. Measure the flow (discharge rate) according to Procedure SW-04.
8. Collect samples upstream of the area to be walked through. Be aware of the disturbances upstream which may affect the sediment concentrations at the sampling location. Note

   any disturbances on the Surface Water Quality Field Data Sheet.
9. Collect the sample by wading if the estimated product of depth (ft) and velocity (ft/sec) is less than 10.0 and the depth is less than 3.0 feet. Wear a suitable flotation device while wading.
10. Use a depth-integrating sampler, if possible. Use the dip sampling procedure, as follows, if: 1) the stream velocity is too high for the sampler to integrate; 2) the stream is less than six inches deep; and 3) large floating and submerged debris are present.
11. Rinse the bottle (to be used with the sampling device) at least three times using the water to be sampled.
12. Submerge a stainless-steel dipper or other suitable device with minimal surface disturbance. Do not disturb bottom sediments. Record the approximate depth and location of the sample source on the Surface Water Quality Field Data Sheet.
13. Allow the device to fill slowly and continuously.
14. Retrieve the dipper or device from the surface water with minimal disturbance.
15. Remove the cap from the prepared sample container and slightly tilt the mouth of the bottle below the dipper or device edge.
16. Empty the dipper or device slowly, allowing the sample stream to flow gently down the side of the container with minimal entry turbulence.
17. Continue delivery of the sample until the container is completely filled.
18. Secure the cap tightly.
19. Assign a sample identification number in accordance with Procedure SW-01.

20. Label the sample container in accordance with Procedure DC-04.
21. Place the properly labeled sample container in an appropriate carrying case or cooler. Pack with ice when required as a preservative.
22. Dismantle the sampler. Follow Procedure MD-02 for proper decontamination of equipment.
23. Handle the sample as described in Procedures DC-05 and DC-06.
24. Collect QA samples, as identified in Procedures QC-01 through QC-05, and process in the same manner as other samples with respect to documentation and handling.

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# 9 SEDIMENT SAMPLING

This section presents procedures associated with sediment sampling done in conjunction with water quality sampling.

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# 9.1 PROCEDURE SS-01: SAMPLE POINT IDENTIFICATION

Sediment can be defined as any matter which settles to the bottom of a liquid, ie; water body. All sediment sampling locations are identified utilizing a three-letter identification acronym followed by a unique number ranging from 0001 and 9999. No dashes and/or spaces are to be used in the sample name. Special identification numbers for QC samples are described in Procedures QC-01 through QC-03.

Names for new sampling points will be assigned and approved by the Sampling Supervisor. The information listed in Procedure SW-02 will accompany requests for new names.

Procedures to be used for naming new sampling points are provided in Procedure DC-02. A sample point identification must be obtained for all new sampling points, whether permanent or not, to assure that if this site is ever sampled again in the future the data from past sampling events can be identified. Prior to the selection of a new sampling point, consideration should be given to the use of an existing sampling point. Existing sampling points are identified in Table DC-02.

The following sections describe the general conventions used in identifying sediment sampling points prior to the implementation of the present system.

<u>Site Identification Acronym</u>

The identification acronym consists of a three-letter code identifying the general location of the sample. For example, the acronym "LCS" identifies a surface sampling point on Lee Creek.

General location acronyms used to date include:

VWS - Surface water sampling point located on the valley side of the Oquirrh Mountains.

LCS - Lee Creek.

RTC - Riter Canal.

BDC - Brighton Drain.

RWC - Right-of-Way Canal.

SZS - Spitz Spring

CSC - C-7 Ditch

CWC - C-7 Ditch (west)

KCS - Kersey Creek

RSC - Ridgeway South Canal

<u>Sample Location Number</u>

A sequence number or character is associated with each sampling point. That number is unique to the sampling point and will not be used in other points.

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# 9.2 PROCEDURE SS-02: SAMPLE POINT DESCRIPTION

Marking and surveying each sample point for the first time, follow this procedure to enable surveying. As directed by the specific Project Work Plan, some points may require permanent markers.

1. Drive a pre-painted, orange wooden stake (2x2x24 inches) 12 to 14 inches into the ground. Use a waterproof, indelible ink pen or place a metal label on the stake containing the sample identification number.
2. Measure the location of the stake using a compass and range finder or surveying equipment. Record the location in coordinates or a compass bearing and distance from a permanent object or from a section corner on a USGS map. For non-permanent sampling points, locate the site on a USGS topographic or another suitable map.
3. When using a compass, avoid interferences from massive metal objects (steel towers, tanks, drums etc.).
4. Document the sample point location on the Surface Water Quality Field Data Sheet.
5. Use a camera with date and time indicator if possible. Check current date and time to ensure accuracy.
6. Shoot a picture of the stake with reference points in the background. Reference points include stationary objects used in locating the point. Shoot a picture of the stake relative to the overall site if site conditions are relevant to the study.
7. Shoot a picture of the gauge used in measuring water level, as well as the location at which samples are collected.
8. Record the picture numbers and roll number on the Surface Water Quality Field Data Sheet, as well as the direction facing when taken.
9. Take other pictures as deemed necessary and record the above information in the Field Log Book.
10. Arrange for the installation of a temporary marker or permanent marker at the sampling location, depending on the type of sampling point, as directed by the Project Work Plan.
11. Prepare a statement of work for a licensed surveying contractor to determine the location and elevation of the ground surface and the monument marker. The horizontal control will be Kennecott Mine Datum to within + 3 ft (+ 1 meter). The elevation of the permanent monument marker will be surveyed to within + 0.01 foot (+ 0.3 cm) using the National Geodetic Vertical Datum of 1929. Corrected survey data will include loop closure for survey accuracy within these limits.
12. The surveyor's report will include a list of coordinates, elevations, and system used. The report must also include a map, and a description and location of all permanent and semipermanent reference points used for horizontal and vertical control. This report will be filed in the Water Quality Data Filing System.

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# 9.3 PROCEDURE SS -03: FIELD EQUIPMENT AND GENERAL PROTOCOL

General Sampling Protocol

1. Record pertinent site observations. Include a sketch and photographic documentation for first-time visits to the site (Procedure SS-02). Identify sample location on the Surface Water Quality Field Data Sheet.
2. Place sample containers on flat, stable surfaces for receiving samples.
3. Plan to collect samples first from those areas suspected of being the least contaminated to minimize the risk of cross contamination.
4. Collect sample and securely close containers as quickly as feasible.
5. Measure field parameters (pH, temperature, etc.) as required by the Project Work Plan. Measure these parameters at the source rather than in containers when possible. Record the time the sample is collected and the time the field measurements are measured.

# 9.4 PROCEDURE SS-04: SEDIMENT SAMPLE FIELD DATA SHEET

An example Sediment Sample Field Data Sheet is shown in Figure SS-01. Each item is described below:

Sample Location ID #: Identification number for the sediment sampling location (usually acronym plus sequence number).

Date, Time: Date and time that sample was collected.

Sampling Personnel: Names of sampling personnel on site.

Photograph: File name and direction faced while photograph was taken of the staked sampling point with a reference object in the background.

Sediment Description: Identify sampling intervals and provide a physical description of the sediment. The textural description of sediments will be based on the

Unified Soil Classification System: Use standard geologic terminology to classify rock materials. Note the color, moisture, texture, sorting, roundness/angularity, degree of cementation/consolidation, fabric, bedding, orientation, depositional environment, formation name, and any evidence of contamination or other characteristics related to hydrogeologic conditions.

Site Description: A description of the site. The description must have sufficient details such that the site may be located again. The description will also include vegetative conditions nearby, as well as any features or conditions which may impact the study.

Site Sketch/Cross Section: A sketch of the site with a map showing major features and landmarks in the area. Reference an existing site map by number or document. Note north direction. Include a cross section showing horizons on the sediment face of surface sediment hole or trench.

Signature: The Field Team Leader or the Supervisor, Environmental Sampling will sign the Sheet.

The Sediment Sample Field Data Sheet (Figure SS-1) will be filed in the project file.

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**Example Sediment Sample Field Data Sheet**

KENNECOTT UTAH COPPER

Sheet ___ of ___

SEDIMENT SAMPLE
FIELD DATA SHEET

SAMPLE LOCATION ID #: ____________________

DATE:____________ TIME: ________am/pm

SAMPLING PERSONNEL: ________________
________________
________________

WATER QUALITY SAMPLING COMPLETED ON:________________________
SAMPLING METHOD:____________________________________________
SAMPLE DESCRIPTION:__________________________________________
______________________________________________________________
______________________________________________________________

PHOTOGRAPH: Roll #: ___ Photo #: ___ Direction Faced: ________

SITE SKETCH/CROSS SECTION:

Existing Site Map Number: _______
SITE DESCRIPTION______________________________________________
______________________________________________________________
REMARKS______________________________________________________

SIGNATURE____________________

# 9.5 PROCEDURE SS-05: SAMPLE COLLECTION – GENERAL IONS AND METALS

1. For samples not collected in stainless steel sleeves, use glass containers with Teflon-lined lids if sample will be submitted for chemical analyses.
2. First, collect sediment samples in areas expected to be the least contaminated and up-gradient from any suspected contaminant source. Then, collect samples furthest down-gradient of the suspected source. Finally, collect samples from the area closest to any suspected sources of contamination.
3. Avoid cross-contamination during sediment sampling. Sediment samples for laboratory analyses will contact only stainless-steel sleeves, sleeve caps, the instruments used to extrude the sediment, glass sample containers, or sampling devices. Decontaminate these and other sampling equipment between samples and sampling locations according to Procedure 6.
4. Extrude the sediment from the sampler and quickly seal the sample containers (filled completely) to minimize exposure of the sample and container to potential airborne contaminants and to minimize volatilization of organic constituents and moisture.

<u>Collection of Sediment Samples</u>

Use the following procedure to collect samples of sediment from stream beds or the bottom of standing water bodies.

1. Prior to sample collection, review the general sampling protocol presented above in Procedure SW-03.
2. Locate non-permanent sample sites on a parcel map and aerial photograph.
3. Travel to the site and mark the sample point in accordance with Procedure SS-02.
4. Collect shallow samples using a hand corer. (This device consists of a two-inch diameter vertical PVC tube approximately 24 to 36 inches long. Attached to the upper end is a handle used when applying downward force in collecting the sample. Attached to the lower end of the tube is a tapered nosepiece to ease penetration into the sediment. Inside the nosepiece are teeth or slips to retain the sample inside the tube when retrieving the core.) Force the corer into the sediment using a smooth continuous motion. Twist the core and withdraw with a single smooth motion. Semi-solid sediments near the shore or above the water line may be sampled using polypropylene scoops, trowels or dippers.
5. Collect samples from down-stream to up-stream locations to minimize sediment disturbance.
6. Collect sediments from deep (large streams or lakes) with a specialized sampler (e.g., Eckman or Ponar dredge). Attach the necessary length of sample line. Measure and mark the distance to the top of the sediment on the sample line. Open sampler jaws until latched. Support the sampler by its lift line. Tie the free end of sampler to fixed support to prevent accidental loss of the sampler. Lower the sampler until the depth mark is reached. Slowly descend the sampler through the last three feet until contact is felt. Allow sample line to slack several inches. Slowly raise dredge.
7. Collect sediments from sumps using a very small sampling utensil, e.g., a suction pipette. If the sediment is stratified, sample equal portions of all identifiable layers.
8. Collect four samples at each sample location.

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9. Describe color, texture, consistency, moisture content, and pH using indicator paper.
10. Allow time for settling to occur. Decant the free water. Homogenize the samples in a stainless-steel bowl to composite the sample.
11. Transfer the composite sample into an appropriate sample bottle with a stainless-steel laboratory spoon, scoop, or spatula.
12. Label samples in accordance with Procedure DC-04.
13. Handle the sample as described in Procedures DC-05 and DC-06.
14. Collect QC samples, as discussed in Procedures QC-01 to QC-04, and process in the same manner as other samples with respect to documentation and handling.

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# 10 REFERENCES

EPA (1986). RCRA Ground Water Monitoring Technical Enforcement Guidance Document (Final), September 1986.

GeoInsight (2016). Standard Operating Procedure: Sampling Groundwater with a HydraSleeve

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# Tables

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TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| ABC1 | W491 | WTR | VW | LR | South end Adrian Brown Consultants | OK | Yes | - - - | - - - | - - - |
| UPD1 | | WTR | | | UPDES PERMIT | NA | - - - | Yes | - - - | - - - |
| VWS1 | S1 | WTR | VW | JR | JORDAN RIVER AT 9000 So. | OK | - - - | Yes | - - - | - - - |
| ABC2 | W492 | WTR | VW | EC | South end Adrian Brown Consultants | OK | Yes | - - - | - - - | - - - |
| UPD2 | | WTR | | | UPDES PERMIT | OK | - - - | Yes | - - - | - - - |
| VWS2 | S2 | WTR | VW | JR | JORDAN RIVER AT 12300 SOUTH | OK | - - - | Yes | - - - | - - - |
| ABC3 | W493 | WTR | VW | EP | South end Adrian Brown Consultants | OK | Yes | - - - | - - - | - - - |
| ABC4 | W494 | WTR | VW | B1 | South end Adrian Brown Consultants | OK | Yes | - - - | - - - | - - - |
| ABC4A | W495 | WTR | VW | B1 | South end Adrian Brown Consultants | OK | Yes | - - - | - - - | - - - |
| UPD4 | | WTR | NE | | UPDES PERMIT | OK | - - - | - - - | - - - | Yes |
| VWW4 | W4 | WTR | VW | WJ | 1420 WEST 7800 SOUTH | D | Yes | - - - | - - - | - - - |
| ABC5 | W496 | WTR | VW | BS | South end Adrian Brown Consultants | OK | Yes | - - - | - - - | - - - |
| UPD5 | | WTR | | | UPDES PERMIT | D | - - - | Yes | - - - | - - - |
| VWW5 | W5 | WTR | VW | BF | 9130 SOUTH 4330 WEST | D | Yes | - - - | - - - | - - - |
| ABC6 | W497 | WTR | VW | LT | South end Adrian Brown Consultants | OK | Yes | - - - | - - - | - - - |
| VWW6 | | WTR | VW | | 9299 SOUTH 4000 WEST | NA | Yes | - - - | - - - | - - - |
| ABC7 | W498 | WTR | VW | EC | South end Adrian Brown Consultants | OK | Yes | - - - | - - - | - - - |
| UPD7 | | WTR | | | UPDES PERMIT | OK | - - - | Yes | - - - | - - - |
| VWW7 | W7 | WTR | VW | B4 | 3590 WEST 9000 SOUTH | D | Yes | - - - | - - - | - - - |
| ABC8 | W499 | WTR | VW | EP | South end Adrian Brown Consultants | OK | Yes | - - - | - - - | - - - |
| UPD8 | | WTR | | | UPDES PERMIT | OK | - - - | Yes | - - - | - - - |
| VWW8 | W8 | WTR | VW | EP | 9800 SOUTH 4000 WEST - GLENMOORE GOLF | D | Yes | - - - | - - - | - - - |
| RM8M | | WTR | BC | | Ground water well located in barneys canyon | | Yes | - - - | - - - | - - - |
| UPD9 | | WTR | | | UPDES PERMIT | OK | - - - | - - - | - - - | Yes |
| VWW9 | W9 | WTR | VW | SJ | 10607 SOUTH 2700 WEST | NU | Yes | - - - | - - - | - - - |
| UPD10 | | WTR | VW | | UPDES PERMIT | OK | - - - | - - - | - - - | Yes |
| UPD11 | | WTR | NE | | UPDES PERMIT | OK | - - - | - - - | - - - | Yes |
| VWW11 | W11 | WTR | VW | SJ | 9860 SOUTH 2700 WEST | NU | Yes | - - - | - - - | - - - |
| UPD12 | | WTR | NE | | UPDES PERMIT | OK | - - - | - - - | - - - | Yes |
| VWW15 | W15 | WTR | VW | HM | 8215 SOUTH 1800 WEST (SLCWCD) | C | Yes | - - - | - - - | - - - |
| VWW16 | W16 | WTR | VW | HM | 8215 SOUTH 1800 WEST (SLCWCD) | NU | Yes | - - - | - - - | - - - |
| VWW17 | W17 | WTR | VW | HM | 11946 SOUTH 3600 WEST | NU | Yes | - - - | - - - | - - - |
| VWW18 | W18 | WTR | VW | HM | 12600 SOUTH 6400 WEST | NU | Yes | - - - | - - - | - - - |
| VWW19 | W19 | WTR | VW | HM | 12800 SOUTH 6000 WEST | NU | Yes | - - - | - - - | - - - |
| VWW20 | W20 | WTR | VW | HM | 12960 SOUTH 6210 WEST | NU | Yes | - - - | - - - | - - - |
| VWS21 | S21 | WTR | VW | HM | BUTTERFIELD CREEK | OK | Yes | Yes | - - - | - - - |
| VWS21A | S21A | WTR | VW | HM | BINGHAM MINE PORTAL | C | - - - | Yes | - - - | - - - |
| VWS21B | S21B | WTR | VW | HM | BUTTERFIELD CREEK & BINGHAM PORTAL | C | - - - | Yes | - - - | - - - |
| VWS22A | S22A | WTR | VW | EC | LARK TOWN SPRING | OK | - - - | Yes | - - - | - - - |
| VWS22B | S22B | WTR | VW | EC | BUTTERFIELD CREEK SPRING | OK | - - - | Yes | - - - | - - - |
| VWW22 | W22 | WTR | VW | HM | 13055 SOUTH 7756 WEST | OK | Yes | - - - | - - - | - - - |
| VWS23 | | WTR | VW | | Dumont (Lark) | D | - - - | Yes | - - - | - - - |
| VWW23 | W23 | WTR | VW | EC | 12075 SOUTH HIGHWAY 111 | D | Yes | - - - | - - - | - - - |
| VWW24 | W24 | WTR | VW | LT | 11980 SOUTH 7650 WEST | D | Yes | - - - | - - - | - - - |
| VWS25 | S25 | WTR | VW | SJ | Same as VWW321 | OK | - - - | Yes | - - - | - - - |
| VWK26 | K26 | WTR | VW | B1 | Below Proler Steel | CB | Yes | - - - | - - - | - - - |
| VWW27 | W27 | WTR | VW | CO | 501 WEST STATE HIGHWAY 48 | OK | Yes | - - - | - - - | - - - |
| VWS29 | S29 | WTR | VW | EC | | NU | - - - | Yes | - - - | - - - |
| VWS31 | | WTR | VW | BC | NO S31, WAS VWW31 | | - - - | Yes | - - - | - - - |
| VWW31 | W31 | WTR | VW | BY | 8300 W 8850 S (BARNEYS CREEK) COPP IMPR | OK | Yes | - - - | - - - | - - - |
| VWS32 | S32 | | VW | | 8100 W 8800 S COPPERTON IMPROVEMENT DIST | OK | - - - | Yes | - - - | - - - |
| VWW32 | W32 | WTR | VW | BC | | OK | Yes | Yes | - - - | - - - |
| VWS33 | S33 | WTR | VW | BD | PROVO RESERVOIR CANAL - 16150 SO. | OK | - - - | Yes | - - - | - - - |
| VWS34 | S34 | WTR | VW | BD | UTAH LAKE DISTRICT CANAL | OK | - - - | Yes | - - - | - - - |

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| VWS35 | S35 | WTR | VW | BD | UTAH AND SALT LAKE CANAL | OK | - - - | Yes | - - - | - - - |
| VWS36 | S36 | WTR | VW | | SOUTH JORDAN CANAL | OK | - - - | Yes | - - - | - - - |
| VWS37 | S37 | WTR | VW | SJ | BECKSTEAD DITCH | OK | - - - | Yes | - - - | - - - |
| VWS38 | S38 | WTR | VW | JR | JORDAN RIVER - 10600 SO. | OK | - - - | Yes | - - - | - - - |
| VWS39 | S39 | WTR | VW | | Old Trip Blank No. | OK | - - - | Yes | - - - | - - - |
| VWS40 | S40 | WTR | VW | EC | BUTT. CANYON SPRING - OLD SCOUT CAMP | OK | - - - | Yes | - - - | - - - |
| VWS41 | | WTR | VW | EC | | | - - - | Yes | - - - | - - - |
| VWW41 | S41 | WTR | VW | HM | | OK | Yes | - - - | - - - | - - - |
| VWW41A | W41A | WTR | VW | EC | WEST LARK - 13200 SOUTH 8300 WEST | D | Yes | - - - | - - - | - - - |
| VWW42 | W42 | WTR | VW | SJ | 8312 S. 2700 WEST (TURF FARM ASSOC) | NU | Yes | - - - | - - - | - - - |
| VWW43 | W43 | WTR | VW | RV | 13325 SOUTH 3600 WEST | NU | Yes | - - - | - - - | - - - |
| VWW44 | W44 | WTR | VW | WJ | 9200 SOUTH 3400 WEST | NU | Yes | - - - | - - - | - - - |
| VWS45 | | WTR | VW | AR | Old C-7 Ditch Sample | NU | - - - | Yes | - - - | - - - |
| VWS45A | S45A | | VW | | ARTHUR ADVERSE WATER | NU | - - - | Yes | - - - | - - - |
| VWS45B | S45B | | VW | | MAGNA ADVERSE WATER | NU | - - - | Yes | - - - | - - - |
| VWS45C | S45C | | VW | | TAILING RETURN (TPR) | OK | - - - | Yes | - - - | - - - |
| VWS46 | S46 | WTR | VW | MC | REFINERY DRAIN | NU | - - - | Yes | - - - | - - - |
| VWS47 | S47 | WTR | VW | MD | | D | - - - | Yes | - - - | - - - |
| VWS48 | S48 | WTR | VW | MD | | D | - - - | Yes | - - - | - - - |
| VWS49 | S49 | WTR | VW | MD | | D | - - - | Yes | - - - | - - - |
| VWS50 | S50 | WTR | VW | MD | | D | - - - | Yes | - - - | - - - |
| VWS52 | S52 | WTR | VW | MD | | D | - - - | Yes | - - - | - - - |
| VWS52A | S52A | WTR | VW | MD | | D | - - - | Yes | - - - | - - - |
| VWS53 | | WTR | VW | EC | BUTTERFIELD PORTAL (UPDES010) | OK | - - - | Yes | - - - | - - - |
| VWS54 | S54 | WTR | VW | EV | JORDAN RIVER - 6400 South | OK | - - - | Yes | - - - | - - - |
| VWS55 | S55 | WTR | VW | JR | JORDAN RIVER - 10600 SO. | OK | - - - | Yes | - - - | - - - |
| VWS56 | S56 | WTR | VW | WJ | NORTH BINGHAM CREEK | OK | - - - | Yes | - - - | - - - |
| VWS57 | S57 | WTR | VW | B4 | SO. BINGHAM CREEK - 8393 S. 1300 W. | OK | - - - | Yes | - - - | - - - |
| VWS58 | S58 | WTR | VW | B4 | Wilkinson Drain | OK | - - - | Yes | - - - | - - - |
| VWS59 | S59 | WTR | VW | CO | CARROLL DRAIN | OK | - - - | Yes | - - - | - - - |
| VWK60 | K60 | WTR | VW | B2 | COPPERTON MAKE-UP WATER (Now B2G1193) | OK | Yes | - - - | - - - | - - - |
| VWK61 | K61 | WTR | VW | CO | | D | Yes | - - - | - - - | - - - |
| VWK62 | K62 | WTR | VW | BR | | D | Yes | - - - | - - - | - - - |
| VWK63 | K63 | WTR | VW | EC | | D | Yes | - - - | - - - | - - - |
| VWK64 | K64 | WTR | VW | EC | | D | Yes | - - - | - - - | - - - |
| VWK65 | K65 | WTR | VW | MD | | D | Yes | - - - | - - - | - - - |
| VWK66 | K66 | WTR | VW | EC | | D | Yes | - - - | - - - | - - - |
| VWK67 | K67 | WTR | VW | MD | | D | Yes | - - - | - - - | - - - |
| VWK67A | K67A | WTR | VW | MD | | D | Yes | - - - | - - - | - - - |
| VWK67R | K67R | WTR | VW | EC | | D | Yes | - - - | - - - | - - - |
| VWK68 | K68 | WTR | VW | EC | | D | Yes | - - - | - - - | - - - |
| VWK69 | K69 | WTR | VW | MD | | D | Yes | - - - | - - - | - - - |
| VWK70 | K70 | WTR | VW | EC | | OK | Yes | - - - | - - - | - - - |
| VWK71 | K71 | WTR | VW | EC | | OK | Yes | - - - | - - - | - - - |
| VWK72 | K72 | WTR | VW | EC | | OK | Yes | - - - | - - - | - - - |
| VWK73 | K73 | WTR | VW | EC | South end monitor well | OK | Yes | - - - | - - - | - - - |
| VWK74 | K74 | WTR | VW | EC | | P | Yes | - - - | - - - | - - - |
| VWK75 | K75 | WTR | VW | EC | | OK | Yes | - - - | - - - | - - - |
| VWK76 | K76 | WTR | VW | EC | | P | Yes | - - - | - - - | - - - |
| VWK77 | K77 | WTR | VW | EC | | P | Yes | - - - | - - - | - - - |
| VWK78 | K78 | WTR | VW | CO | | P | Yes | - - - | - - - | - - - |
| VWK79 | K79 | WTR | VW | CO | | AB | Yes | - - - | - - - | - - - |
| VWK80 | K80 | WTR | VW | CO | | OK | Yes | - - - | - - - | - - - |
| VWK81 | K81 | WTR | VW | BC | | OK | Yes | - - - | - - - | - - - |

PN DRAFT

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| VWK82 | K82 | WTR | VW | EC | | OK | Yes | - - - | - - - | - - - |
| VWK83 | K83 | WTR | VW | EC | | OK | Yes | - - - | - - - | - - - |
| VWK84 | K84 | WTR | VW | B1 | | OK | Yes | - - - | - - - | - - - |
| VWK85 | K85 | WTR | VW | B1 | | OK | Yes | - - - | - - - | - - - |
| VWK86 | K86 | WTR | VW | AN | | R | Yes | - - - | - - - | - - - |
| VWK87 | K87 | WTR | VW | B2 | | OK | Yes | - - - | - - - | - - - |
| VWK88 | K88 | WTR | VW | CP | PROLLER STEEL | G | Yes | - - - | - - - | - - - |
| VWK89 | K89 | WTR | VW | EC | | P/R | Yes | - - - | - - - | - - - |
| VWK90 | K90 | WTR | VW | CO | | P | Yes | - - - | - - - | - - - |
| VWK91 | K91 | WTR | VW | EC | | P | Yes | - - - | - - - | - - - |
| VWK92 | K92 | WTR | VW | B1 | | B | Yes | - - - | - - - | - - - |
| VWK93 | K93 | WTR | VW | EC | | P | Yes | - - - | - - - | - - - |
| VWK94 | K94 | WTR | VW | B1 | | AB | Yes | - - - | - - - | - - - |
| VWK95 | K95 | WTR | VW | CO | | G | Yes | - - - | - - - | - - - |
| VWW95 | | WTR | VW | | | OK | - - - | - - - | - - - | - - - |
| VWK96 | K96 | WTR | VW | B1 | | AB | Yes | - - - | - - - | - - - |
| VWK97 | K97 | WTR | VW | CO | | B | Yes | - - - | - - - | - - - |
| VWK98 | K98 | WTR | VW | MD | | D | Yes | - - - | - - - | - - - |
| VWK99 | K99 | WTR | VW | EP | | R,G | Yes | - - - | - - - | - - - |
| VWK100 | K100 | WTR | VW | B1 | | AB | Yes | - - - | - - - | - - - |
| VWK101 | K101 | WTR | VW | CP | | P | Yes | - - - | - - - | - - - |
| VWK102 | K102 | WTR | VW | CO | | G | Yes | - - - | - - - | - - - |
| VWK103 | K103 | WTR | VW | CP | | G | Yes | - - - | - - - | - - - |
| VWK104 | K104 | WTR | VW | B1 | | AB | Yes | - - - | - - - | - - - |
| VWK105 | K105 | WTR | VW | EC | | OK | Yes | - - - | - - - | - - - |
| VWK106 | K106 | WTR | VW | BF | Deep Well East of Proler Steel | OK | Yes | - - - | - - - | - - - |
| VWW107 | W107 | WTR | VW | B3 | 9800 S. 4000 W.-GLENMOORE GOLF COURSE | NU | Yes | - - - | - - - | - - - |
| VWW108 | W108 | WTR | VW | EP | 9800 S. 4000 W.-GLENMOORE GOLF COURSE | OK | Yes | - - - | - - - | - - - |
| VWK109 | K109 | WTR | VW | BF | COPPERTON MAKEUP WATER replaced with BFG1200 | OK | Yes | - - - | - - - | - - - |
| VWK110 | K110 | WTR | VW | CP | | AB | Yes | - - - | - - - | - - - |
| VWK111 | K111 | WTR | VW | AN | | C | Yes | - - - | - - - | - - - |
| VWK112 | K112 | WTR | VW | AN | | OK | Yes | - - - | - - - | - - - |
| VWK113 | K113 | WTR | VW | B1 | | AB | Yes | - - - | - - - | - - - |
| VWK114 | K114 | WTR | VW | AN | | OK | Yes | - - - | - - - | - - - |
| VWK115 | K115 | WTR | VW | B1 | | AB | Yes | - - - | - - - | - - - |
| VWK116 | K116 | WTR | VW | B1 | | AB | Yes | - - - | - - - | - - - |
| VWK117 | K117 | WTR | VW | B1 | | AB | Yes | - - - | - - - | - - - |
| VWK117A | K117A | WTR | VW | B1 | | C | Yes | - - - | - - - | - - - |
| VWK118 | K118 | WTR | VW | B1 | | OK | Yes | - - - | - - - | - - - |
| VWK119 | K119 | WTR | VW | B1 | | AB | Yes | - - - | - - - | - - - |
| VWK120 | K120 | WTR | VW | B1 | | OK | Yes | - - - | - - - | - - - |
| VWS121 | S121 | | VW | | | OK | - - - | Yes | - - - | Yes |
| VWK122 | K122 | WTR | VW | EC | | OK | Yes | - - - | - - - | - - - |
| VWK123 | K123 | WTR | VW | MD | | D | Yes | - - - | - - - | - - - |
| VWW124 | W124 | WTR | VW | BC | 8825 SOUTH 7350 WEST | D | Yes | - - - | - - - | - - - |
| VWK125 | W125 | WTR | VW | SO | 8650 WEST BUTTERFIELD CANYON | D | Yes | - - - | - - - | - - - |
| VWW126 | W126 | WTR | VW | HM | 7756 WEST 13055 SOUTH | D | Yes | - - - | - - - | - - - |
| VWW127 | W127 | WTR | VW | LT | 12300 SOUTH 8350 WEST (LARK) | CF | Yes | - - - | - - - | - - - |
| VWW128 | W128 | WTR | VW | B4 | 9299 SOUTH 4000 WEST | NU | Yes | - - - | - - - | - - - |
| VWW129 | W129 | WTR | VW | SJ | 11625 SOUTH 3175 WEST | D | Yes | - - - | - - - | - - - |
| VWW130 | W130 | WTR | VW | HM | 7400 WEST HIGHWAY 111 | NU | Yes | - - - | - - - | - - - |
| VWW131A | W131A | WTR | VW | HM | 5140 WEST 12800 SOUTH | D | Yes | - - - | - - - | - - - |
| VWW131B | W131B | WTR | VW | HM | 5140 WEST 12800 SOUTH | D | Yes | - - - | - - - | - - - |
| VWW131C | W131C | WTR | VW | HM | 5140 WEST 12800 SOUTH | C | Yes | - - - | - - - | - - - |

PN DRAFT

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| VWW132 | W132 | WTR | VW | HM | 13400 SOUTH 5600 WEST | NU | Yes | - - - | - - - | - - - |
| VWW133 | W133 | WTR | VW | WJ | 8940 SOUTH 4167 WEST | OK | Yes | - - - | - - - | - - - |
| VWW134 | W134 | WTR | VW | RV | 4311 WEST 12600 SOUTH | OK | Yes | - - - | - - - | - - - |
| VWW135 | W135 | WTR | VW | RV | 4091 WEST 12600 SOUTH | OK | Yes | - - - | - - - | - - - |
| VWW136 | W136 | WTR | VW | RV | 12765 SOUTH 1400 WEST | OK | Yes | - - - | - - - | - - - |
| VWW137 | W137 | WTR | VW | HM | 4585 WEST 13400 SOUTH | OK | Yes | - - - | - - - | - - - |
| VWW138 | W138 | WTR | VW | WJ | 8700 SOUTH 3650 WEST | NU | Yes | - - - | - - - | - - - |
| VWW139 | W139 | WTR | VW | WJ | 8390 SOUTH OLD BINGHAM HIGHWAY | NU | Yes | - - - | - - - | - - - |
| VWW140 | W140 | WTR | VW | WJ | 8525 SOUTH OLD BINGHAM HIGHWAY | OK | Yes | - - - | - - - | - - - |
| VWW141 | W141 | WTR | VW | RV | 12408 SOUTH 3600 WEST | OK | Yes | - - - | - - - | - - - |
| VWW142 | W142 | WTR | VW | RV | 12191 SOUTH 3600 WEST | OK | Yes | - - - | - - - | - - - |
| VWW143 | W143 | WTR | VW | RV | 12484 SOUTH 3600 WEST | OK | Yes | - - - | - - - | - - - |
| VWW144 | W144 | WTR | VW | RV | 12653 SOUTH 3600 WEST | OK | Yes | - - - | - - - | - - - |
| VWW145 | W145 | WTR | VW | RV | 4091 WEST 13400 SOUTH | OK | Yes | - - - | - - - | - - - |
| VWW146 | W146 | WTR | VW | BD | 14400 SOUTH 3598 WEST | OK | Yes | - - - | - - - | - - - |
| VWW147 | W147 | WTR | VW | WJ | 8600 SOUTH 2400 WEST | OK | Yes | - - - | - - - | - - - |
| VWW148 | W148 | WTR | VW | WJ | 9000 SOUTH 2550 WEST | OK | Yes | - - - | - - - | - - - |
| VWW149 | W149 | WTR | VW | WJ | 9380 SOUTH 2200 WEST | OK | Yes | - - - | - - - | - - - |
| VWW150 | W150 | WTR | VW | RV | 13400 SOUTH 3000 WEST | OK | Yes | - - - | - - - | - - - |
| VWW151 | W151 | WTR | VW | WJ | 9120 SOUTH REDWOOD ROAD | NU,AB | Yes | - - - | - - - | - - - |
| VWW152 | W152 | WTR | VW | SJ | 10826 SOUTH 1300 WEST | D | Yes | - - - | - - - | - - - |
| VWW153 | W153 | WTR | VW | SJ | 11558 SOUTH 1700 WEST | D | Yes | - - - | - - - | - - - |
| VWW154 | W154 | WTR | VW | RV | 11400 SOUTH 1327 WEST | OK | Yes | - - - | - - - | - - - |
| VWW155 | W155 | WTR | VW | RV | 12600 SOUTH 1700 WEST | G | Yes | - - - | - - - | - - - |
| VWW156 | W156 | WTR | VW | RV | 13592 SOUTH 1300 WEST | OK | Yes | - - - | - - - | - - - |
| VWW157 | W157 | WTR | VW | BD | 14129 SOUTH 1700 WEST | OK | Yes | - - - | - - - | - - - |
| VWW158 | W158 | WTR | VW | RV | 14590 SOUTH 1690 WEST | NU | Yes | - - - | - - - | - - - |
| VWW159 | W159 | WTR | VW | KN | 5300 SOUTH 3650 WEST | D | - - - | Yes | - - - | - - - |
| VWW160 | W160 | WTR | VW | KN | 6200 SOUTH 3200 WEST | CF | Yes | - - - | - - - | - - - |
| VWW161 | W161 | WTR | VW | KN | 6115 SOUTH 1300 WEST | CF | Yes | - - - | - - - | - - - |
| VWW162 | W162 | WTR | VW | SJ | 10153 SOUTH 1000 WEST | D | Yes | - - - | - - - | - - - |
| VWW163 | W163 | WTR | VW | SJ | 10357 SOUTH 1000 WEST | D | Yes | - - - | - - - | - - - |
| VWW164 | W164 | WTR | VW | RV | 13650 SOUTH 1200 WEST | OK | Yes | - - - | - - - | - - - |
| VWW165 | W165 | WTR | VW | EV | 14270 SOUTH 700 WEST | OK | Yes | - - - | - - - | - - - |
| VWS166 | S166 | WTR | VW | JR | JORDAN RIVER - 14600 SOUTH | OK | - - - | Yes | - - - | - - - |
| VWW167 | W167 | WTR | VW | B3 | MULCH PLANT AT9850 SOUTH 5300 WEST | OK | Yes | - - - | - - - | - - - |
| VWW170 | W170 | WTR | VW | HM | 4358 WEST 13400 SOUTH | NU | Yes | - - - | - - - | - - - |
| VWW171 | W171 | WTR | VW | HM | 4258 WEST 13400 SOUTH | OK | Yes | - - - | - - - | - - - |
| VWW172 | W172 | WTR | VW | RV | 13000 SOUTH 3380 WEST (OAKDALE EGG FARM) | OK | Yes | - - - | - - - | - - - |
| VWW173 | W173 | WTR | VW | RV | 4258 WEST 13400 SOUTH | OK | Yes | - - - | - - - | - - - |
| VWW174 | W174 | WTR | VW | BD | 13850 SOUTH 4000 WEST | DA | Yes | - - - | - - - | - - - |
| VWW175 | W175 | WTR | VW | BD | 3301 WEST 13800 SOUTH | OK | Yes | - - - | - - - | - - - |
| VWW176 | W176 | WTR | VW | RV | 12347 SOUTH 1300 WEST | OK | Yes | - - - | - - - | - - - |
| VWK177 | | | VW | | SEE VWW177 | OK | Yes | - - - | - - - | - - - |
| VWW177 | W177 | WTR | VW | B4 | 8065 SOUTH 1300 WEST | NU | Yes | - - - | - - - | - - - |
| VWW178 | W178 | WTR | VW | WJ | 8446 SOUTH 1300 WEST | OK | Yes | - - - | - - - | - - - |
| VWW179 | W179 | WTR | VW | JR | 8700 SOUTH 700 WEST - FUR BREEDERS | OK | Yes | - - - | - - - | - - - |
| VWW180 | W180 | WTR | VW | JR | 8700 SOUTH 700 WEST - FUR BREEDERS | OK | Yes | - - - | - - - | - - - |
| VWW181 | W181 | WTR | VW | EV | 10200 SOUTH 300 WEST | D | Yes | - - - | - - - | - - - |
| VWW182 | W182 | WTR | VW | WJ | 10200 SOUTH 455 WEST | NU | Yes | - - - | - - - | - - - |
| VWW183 | W183 | WTR | VW | RV | 14401 SOUTH 4000 WEST | OK | Yes | - - - | - - - | - - - |
| VWW184 | W184 | WTR | VW | RV | 12600 SOUTH 2577 WEST | OK | Yes | - - - | - - - | - - - |
| VWW185 | W185 | WTR | VW | HM | 12400 SOUTH 6400 WEST | OK | Yes | - - - | - - - | - - - |
| VWW186 | W186 | WTR | VW | HM | 1166 W. MAIN, HERRIMAN | OK | Yes | - - - | - - - | - - - |

PRELIMINARY DRAFT

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| VWW187 | W187 | WTR | VW | B4 | 9100 SOUTH 3590 WEST | OK | Yes | - - - | - - - | - - - |
| VWW188 | W188 | WTR | VW | HM | 12640 SOUTH 3975 WEST | NA | Yes | - - - | - - - | - - - |
| VWW189 | W189 | WTR | VW | BF | INTERSTATE BRICK9780 SOUTH 5200 WEST | OK | Yes | - - - | - - - | - - - |
| VWP190A | P190A | WTR | VW | BS | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP190B | P190B | WTR | VW | BS | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP191A | P191A | WTR | VW | B2 | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP191B | P191B | WTR | VW | B2 | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP192A | P192A | WTR | VW | EP | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP192B | P192B | WTR | VW | EP | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP193A | P193A | WTR | VW | EP | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP193B | P193B | WTR | VW | EP | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP194A | P194A | WTR | VW | EP | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP194B | P194B | WTR | VW | EP | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP195 | P195 | WTR | VW | EP | REPLACED BY P210 | AB | Yes | - - - | - - - | - - - |
| VWP196 | | WTR | VW | B2 | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP196A | P196A | WTR | VW | B2 | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP196B | P196B | WTR | VW | B2 | valley monitoring well | G | Yes | - - - | - - - | - - - |
| VWP197A | P197A | WTR | VW | BF | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP197B | P197B | WTR | VW | BF | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP198 | P198 | WTR | VW | EP | valley monitoring well | D | Yes | - - - | - - - | - - - |
| VWP199 | P199 | WTR | VW | EP | valley monitoring well | G | Yes | - - - | - - - | - - - |
| VWS200 | S200 | WTR | VW | LR | valley monitoring well | OK | - - - | Yes | - - - | - - - |
| VWK201 | K201 | WTR | VW | EP | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP202A | P202A | WTR | VW | BS | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP202B | P202B | WTR | VW | BS | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP202C | P202C | WTR | VW | BS | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWK203 | K203 | WTR | VW | BR | valley monitoring well | AB | Yes | - - - | - - - | - - - |
| VWK204 | K204 | WTR | VW | BR | valley monitoring well | D | Yes | - - - | - - - | - - - |
| VWK205 | K205 | WTR | VW | EC | valley monitoring well | D | Yes | - - - | - - - | - - - |
| VWK206 | K206 | WTR | VW | BR | valley monitoring well | D | Yes | - - - | - - - | - - - |
| VWP207A | P207A | WTR | VW | EP | valley monitoring well | D | Yes | - - - | - - - | - - - |
| VWP207B | P207B | WTR | VW | EP | valley monitoring well | D | Yes | - - - | - - - | - - - |
| VWP208A | P208A | WTR | VW | EC | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP208B | P208B | WTR | VW | EC | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP209A | | WTR | VW | B2 | valley monitoring well | G | Yes | - - - | - - - | - - - |
| VWP209B | P209B | WTR | VW | B2 | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP210B | P210B | WTR | VW | EP | valley monitoring well | AB | Yes | - - - | - - - | - - - |
| VWP211 | P211 | WTR | VW | LT | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP211A | P211A | WTR | VW | LT | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP211B | P211B | WTR | VW | LT | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP212A | P212A | WTR | VW | LT | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP212B | P212B | WTR | VW | LT | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP213 | | WTR | VW | B1 | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP213A | P213A | WTR | VW | B1 | valley monitoring well | DRY | Yes | - - - | - - - | - - - |
| VWP213B | P213B | WTR | VW | B1 | valley monitoring well | D | Yes | - - - | - - - | - - - |
| VWP213C | P213C | WTR | VW | B1 | valley monitoring well | D | Yes | - - - | - - - | - - - |
| VWP214A | P214A | WTR | VW | EC | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP214B | P214B | WTR | VW | EC | valley monitoring well | D | Yes | - - - | - - - | - - - |
| VWP215 | P215 | WTR | VW | EP | valley monitoring well | D | Yes | - - - | - - - | - - - |
| VWP216 | P216 | WTR | VW | EC | valley monitoring well | AB | Yes | - - - | - - - | - - - |
| VWP217 | | WTR | VW | EC | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP218 | P218 | WTR | VW | EC | valley monitoring well | D | Yes | - - - | - - - | - - - |
| VWP219 | P219 | WTR | VW | EC | valley monitoring well | AB | Yes | - - - | - - - | - - - |
| VWP220 | P220 | WTR | VW | EC | valley monitoring well | OK | Yes | - - - | - - - | - - - |

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| VWP221 | P221 | WTR | VW | EC | valley monitoring well | D | Yes | - - - | - - - | - - - |
| VWP222 | P222 | WTR | VW | EC | valley monitoring well | D | Yes | - - - | - - - | - - - |
| VWP223 | P223 | WTR | VW | EC | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP224 | P224 | WTR | VW | EC | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP225 | P225 | WTR | VW | EC | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP226 | | WTR | VW | BR | valley monitoring well | AB | Yes | - - - | - - - | - - - |
| VWP227 | P227 | WTR | VW | BR | valley monitoring well | AB | Yes | - - - | - - - | - - - |
| VWP228 | P228 | WTR | VW | EC | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP229 | | WTR | VW | EC | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP231 | P231 | WTR | VW | LW | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP233 | P233 | WTR | VW | EC | valley monitoring well | D | Yes | - - - | - - - | - - - |
| VWP234 | P234 | WTR | VW | EC | valley monitoring well | G | Yes | - - - | - - - | - - - |
| VWP235 | P235 | WTR | VW | MD | valley monitoring well | D | Yes | - - - | - - - | - - - |
| VWS236 | S236 | WTR | VW | LR | LEACH FLUID | OK | - - - | Yes | - - - | - - - |
| VWS237 | S237 | WTR | VW | BM | PIT WATER | OK | - - - | Yes | - - - | - - - |
| VWS238 | S238 | WTR | VW | B2 | evap ponds inlet same as S354 | C | - - - | Yes | - - - | - - - |
| VWP239 | P239 | WTR | VW | EC | REPLACEMENT NEAR OLD K67R | OK | Yes | - - - | - - - | - - - |
| VWP240A | P240A | WTR | VW | EP | REPLACEMENT NEAR OLD P198A | OK | Yes | - - - | - - - | - - - |
| VWP240B | P240B | WTR | VW | EP | REPLACEMENT NEAR OLD P198B | OK | Yes | - - - | - - - | - - - |
| VWP241A | P241A | WTR | VW | BS | REPLACEMENT NEAR OLD P202A | OK | Yes | - - - | - - - | - - - |
| VWP241B | P241B | WTR | VW | BS | REPLACEMENT NEAR OLD P202B | OK | Yes | - - - | - - - | - - - |
| VWP241C | P241C | WTR | VW | BS | REPLACEMENT NEAR OLD P202C | OK | Yes | - - - | - - - | - - - |
| VWP242 | P242 | WTR | VW | SR | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP243 | P243 | WTR | VW | EC | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP244A | P244A | WTR | VW | EC | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP244B | P244B | WTR | VW | EC | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP244C | P244C | WTR | VW | EC | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP245 | P245 | WTR | VW | EC | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP246 | P246 | WTR | VW | EC | valley monitoring well | DRY | Yes | - - - | - - - | - - - |
| VWP247A | P247A | WTR | VW | SJ | valley monitoring well | AB | Yes | - - - | - - - | - - - |
| VWP247B | P247B | WTR | VW | SJ | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP248A | P248A | WTR | VW | EC | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP248B | P248B | WTR | VW | EC | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP248C | P248C | WTR | VW | EC | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP249A | P249A | WTR | VW | WJ | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP249B | P249B | WTR | VW | WJ | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP250A | P250A | WTR | VW | WJ | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP250B | P250B | WTR | VW | WJ | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP251 | P251 | WTR | VW | WJ | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP252A | P252A | WTR | VW | WJ | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP252B | P252B | WTR | VW | WJ | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP252C | P252C | WTR | VW | WJ | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP253A | P253A | WTR | VW | SJ | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP253B | P253B | WTR | VW | SJ | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP254A | P254A | WTR | VW | EP | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP254B | P254B | WTR | VW | EP | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| NEB2557 | | WTR | NE | | Brovo Gate | OK | Yes | - - - | - - - | - - - |
| VWP255A | P255A | WTR | VW | HM | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP255B | P255B | WTR | VW | HM | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP256 | P256 | WTR | VW | EP | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP257 | P257 | WTR | VW | HM | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP258A | P258A | WTR | VW | SJ | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP258B | P258B | WTR | VW | SJ | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP259 | P259 | WTR | VW | SJ | valley monitoring well | OK | Yes | - - - | - - - | - - - |

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| VWP260 | P260 | WTR | VW | EP | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP261 | P261 | WTR | VW | EP | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP262 | P262 | WTR | VW | SJ | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP263 | P263 | WTR | VW | EP | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP264 | P264 | WTR | VW | EC | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP265 | P265 | WTR | VW | HM | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP266 | P266 | WTR | VW | HM | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP267A | P267A | WTR | VW | HM | valley monitoring well | DRY | Yes | - - - | - - - | - - - |
| VWP267B | P267B | WTR | VW | HM | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP268 | P268 | WTR | VW | LT | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP269 | P269 | WTR | VW | LT | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP270 | P270 | WTR | VW | SO | valley monitoring well | P | Yes | - - - | - - - | - - - |
| VWP270A | P270A | WTR | VW | HM | valley monitoring well | C | Yes | - - - | - - - | - - - |
| VWP271 | P271 | WTR | VW | LU | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP272 | P272 | WTR | VW | EC | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP273 | P273 | WTR | VW | BS | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP274 | P274 | WTR | VW | EC | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP275 | P275 | WTR | VW | CO | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP276 | P276 | WTR | VW | WJ | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP277 | P277 | WTR | VW | B2 | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP278A | | WTR | VW | | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP278B | P278B | WTR | VW | BC | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| VWP279 | P279 | WTR | VW | EC | valley monitoring well | OK | Yes | - - - | - - - | - - - |
| BCG280 | BC280 | WTR | VW | BC | BARNEY CANYON PRODUCTION WELL | OK | Yes | - - - | - - - | - - - |
| BCG281 | BC281 | WTR | VW | BC | OLD BC148 | OK | Yes | - - - | - - - | - - - |
| BCG282 | BC282 | WTR | VW | BC | Barneys canyon monitoring well | OK | Yes | - - - | - - - | - - - |
| BCG283 | BC283 | WTR | VW | BC | Barneys canyon monitoring well | OK | Yes | - - - | - - - | - - - |
| BCG284 | BC284 | WTR | VW | BC | Barneys canyon monitoring well | OK | Yes | - - - | - - - | - - - |
| BCG285 | BC285 | WTR | VW | BC | Barneys canyon monitoring well | OK | Yes | - - - | - - - | - - - |
| BRG286 | VWBR286 | WTR | VW | BR | REPOSITORY WELL - OLD BR-1 | OK | Yes | - - - | - - - | - - - |
| BRG287 | VWBR287 | WTR | VW | BR | REPOSITORY WELL - OLD BR-2 | OK | Yes | - - - | - - - | - - - |
| BRG288 | VWBR288 | WTR | VW | BR | | OK | Yes | - - - | - - - | - - - |
| BRG289 | VWBR289 | WTR | VW | BR | | OK | Yes | - - - | - - - | - - - |
| BRG290 | VWBR290 | WTR | VW | BR | | OK | Yes | - - - | - - - | - - - |
| BRG291 | | WTR | VW | BR | | OK | Yes | - - - | - - - | - - - |
| BRG291A | BRG291 | WTR | VW | BR | | OK | Yes | - - - | - - - | - - - |
| BRP292 | BRG292 | WTR | VW | BR | BLUEWATER NORTH REPOSITORY SUMP | OK | - - - | Yes | - - - | Yes |
| ECG293 | EC293 | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG294 | EC294 | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG295B | EC295B | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG296 | EC296 | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG297 | EC297 | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG298A | EC298A | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG298B | EC298B | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG299 | ES299 | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| VWW300 | W300 | WTR | VW | WJ | 10353 SOUTH 1300 WEST | OK | Yes | - - - | - - - | - - - |
| VWW301 | W301 | WTR | VW | WJ | 9945 SOUTH 1300 WEST | OK | Yes | - - - | - - - | - - - |
| VWW302 | W302 | WTR | VW | WJ | 9786 SOUTH 1300 WEST | OK | Yes | - - - | - - - | - - - |
| VWW303 | W303 | WTR | VW | WJ | 9381 SOUTH 1300 WEST | D | Yes | - - - | - - - | - - - |
| VWW304 | W304 | WTR | VW | SJ | 10315 SOUTH 1540 WEST | OK | Yes | - - - | - - - | - - - |
| VWW305 | W305 | WTR | VW | SJ | 1795 WEST 9400 SOUTH | OK | Yes | - - - | - - - | - - - |
| VWW306 | W306A | WTR | VW | SJ | 10025 SOUTH 1300 WEST | OK | Yes | - - - | - - - | - - - |
| VWW307 | W307 | WTR | VW | SJ | 10806 SOUTH 2700 WEST | OK | Yes | - - - | - - - | - - - |
| VWW308 | W308 | WTR | VW | EP | 10150 SOUTH 4975 WEST | NU | Yes | - - - | - - - | - - - |

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| VWW309 | W309 | WTR | VW | RV | 4475 WEST 11800 SOUTH | OK | Yes | - - - | - - - | - - - |
| VWS310 | S310 | | VW | | 3842 WEST 11800 SOUTH | OK | - - - | Yes | - - - | - - - |
| VWW310 | W310 | WTR | VW | RV | 3842 WEST 11800 SOUTH | OK | Yes | - - - | - - - | - - - |
| VWW311 | W311 | WTR | VW | RV | 3883 WEST 11800 SOUTH | OK | Yes | - - - | - - - | - - - |
| VWW312 | W312 | WTR | VW | EP | 11168 SOUTH 3800 WEST | OK | Yes | - - - | - - - | - - - |
| VWS313 | S313 | WTR | VW | SJ | JORDON RIVER - 4800 SOUTH | OK | - - - | Yes | - - - | - - - |
| VWS314 | S314 | WTR | VW | KN | NORTH JORDON CANAL - 5800 S. 1300 W. | OK | - - - | Yes | - - - | - - - |
| VWS315 | S315 | WTR | VW | JP | BUTTERFIELD CREEK | OK | - - - | Yes | - - - | - - - |
| VWS316 | S316 | WTR | VW | BC | CRYSTAL SPRINGS | OK | - - - | Yes | - - - | - - - |
| VWS317 | S317 | WTR | VW | EC | DRAINAGE SO. MINE DUMPS | OK | - - - | Yes | - - - | - - - |
| VWS318 | S318 | WTR | VW | BC | BARNEY'S SPRING | OK | - - - | Yes | - - - | - - - |
| VWS319 | S319 | WTR | VW | HC | MAPLE SPRING | OK | - - - | Yes | - - - | - - - |
| VWS320 | S320 | WTR | VW | RV | BUTTERFIELD CREEK | OK | - - - | Yes | - - - | - - - |
| VWS321 | S321 | WTR | VW | SJ | MIDAS CREEK- 11500 S.1300 W. | OK | - - - | Yes | - - - | - - - |
| VWW322 | W322 | WTR | VW | HM | 1105 WEST MAIN ST., HERRIMAN | OK | Yes | - - - | - - - | - - - |
| VWW323 | W323 | WTR | VW | HM | 5626 WEST 14200 SOUTH | OK | Yes | - - - | - - - | - - - |
| VWS324 | S324 | WTR | VW | HM | ROSE CREEK - 6400 W. 14000 S. | OK | - - - | Yes | - - - | - - - |
| VWW325 | W325 | WTR | VW | HM | 12948 S. 4400 W. - RIVERTON CITY | OK | Yes | - - - | - - - | - - - |
| VWW326 | W326 | WTR | VW | RV | 13400 S. 3800 W. - RIVERTON CITY | OK | Yes | - - - | - - - | - - - |
| VWW327 | W327 | WTR | VW | RV | 13600 S. 3600 W. - RIVERTON CITY | OK | Yes | - - - | - - - | - - - |
| VWW328 | W328 | WTR | VW | RV | 13400 S. 2290 W. - RIVERTON CITY | OK | Yes | - - - | - - - | - - - |
| VWW329 | W329 | WTR | VW | BD | 14847 SOUTH CAMP WILLIAMS ROAD | OK | Yes | - - - | - - - | - - - |
| VWS330 | S330 | WTR | VW | TV | JORDAN RIVER - 9400 S. 1200 W. | OK | - - - | Yes | - - - | - - - |
| VWW331 | W331 | WTR | VW | RV | 12256 SOUTH 4000 WEST | OK | Yes | - - - | - - - | - - - |
| VWW332 | W332 | WTR | VW | CO | 7400 SOUTH STATE HIGHWAY 110 | OK | Yes | - - - | - - - | - - - |
| VWW333 | W333 | WTR | VW | WV | 5892 SOUTH HIGHWAY 111 | OK | Yes | - - - | - - - | - - - |
| VWW334 | W334 | WTR | VW | WJ | 7551 SOUTH 5490 WEST | OK | Yes | - - - | - - - | - - - |
| VWW335 | W335 | WTR | VW | WJ | 7374 SOUTH 5490 WEST | OK | Yes | - - - | - - - | - - - |
| VWW336 | W336 | WTR | VW | WJ | 7800 SOUTH 5250 WEST | G | Yes | - - - | - - - | - - - |
| VWW337 | W337 | WTR | VW | SJ | 3564 WEST 11010 SOUTH | OK | Yes | - - - | - - - | - - - |
| VWW338 | W338 | WTR | VW | SJ | 11000 SOUTH 3500 WEST - EAGLE RANCH | NU | Yes | - - - | - - - | - - - |
| VWW339 | W339 | WTR | VW | HM | 12009 SOUTH 4000 WEST | OK | Yes | - - - | - - - | - - - |
| VWW340 | W340 | WTR | VW | RV | 634 WEST 14600 SOUTH - UTAH ROSES | OK | Yes | - - - | - - - | - - - |
| VWW341 | W341 | WTR | VW | EV | 50 EAST 5050 SOUTH - MURRAY CITY | OK | Yes | - - - | - - - | - - - |
| VWW342 | W342 | WTR | VW | EV | 30 EAST 5150 SOUTH - MURRAY FAIRGROUNDS | OK | Yes | - - - | - - - | - - - |
| VWS343 | S343 | WTR | VW | WJ | 1300 WEST 7353 SOUTH | OK | Yes | Yes | - - - | - - - |
| VWS344 | S344 | WTR | VW | WJ | NORTH JORDAN CANAL 7560 S. 1200 W. | OK | - - - | Yes | - - - | - - - |
| VWW345 | W345 | WTR | VW | EV | 10400 SOUTH 300 WEST | NU | Yes | - - - | - - - | - - - |
| VWW346 | W346 | WTR | VW | EV | PINE HOLLOW TREE FARM-7500 S. 720 E. | OK | Yes | - - - | - - - | - - - |
| VWW347 | W347 | WTR | VW | WJ | 5060 SOUTH 1250 WEST | OK | Yes | - - - | - - - | - - - |
| VWW348 | W348 | WTR | VW | WJ | 2906 WEST 7000 SOUTH | OK | Yes | - - - | - - - | - - - |
| VWK349 | K349 | WTR | VW | HC | KENNECOTT ENVIRONMENTAL RANCH | OK | Yes | - - - | - - - | - - - |
| VWS350 | S350 | WTR | VW | ED | EVAP PONDS #3, #4, #5 | C | - - - | Yes | - - - | - - - |
| VWS351 | S351 | WTR | VW | EP | 4000 W. POND | C | - - - | Yes | - - - | - - - |
| VWS352 | S352 | WTR | VW | EP | SOUTH EVAP PONDS | C | - - - | Yes | - - - | - - - |
| VWS353 | S353 | WTR | VW | CP | SMALL RESEROVIR | OK | - - - | Yes | - - - | - - - |
| VWS354 | S354 | WTR | VW | AN | TREATED MINE STREAM | C | - - - | Yes | - - - | - - - |
| VWS355 | S355 | WTR | VW | EC | NOSE & MINE COMBO STREAM | C | - - - | Yes | - - - | - - - |
| VWS356 | S356 | WTR | VW | EP | 80 ACRE CLAY LINED POND | C | - - - | Yes | - - - | - - - |
| VWS357 | S357 | WTR | VW | TV | JORDAN RIVER EFF. | OK | - - - | Yes | - - - | - - - |
| VWS358 | S358 | WTR | VW | CO | CEMETARY POND | C | - - - | Yes | - - - | - - - |
| VWS359 | S359 | WTR | VW | ?? | HERCLUES EAGLE ROCK | OK | - - - | Yes | - - - | - - - |
| VWW360 | W360 | WTR | VW | WJ | 5388 WEST 7800 SOUTH | OK | Yes | - - - | - - - | - - - |
| VWW361 | W361 | WTR | VW | WJ | 5600 WEST 9000 SOUTH - W. JORDAN CITY | OK | Yes | - - - | - - - | - - - |

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| VWW362 | W362 | WTR | VW | SJ | 1340 WEST 11030 SOUTH | NU | Yes | - - - | - - - | - - - |
| VWW363 | W363 | WTR | VW | WJ | 5595 WEST 9351 SOUTH - W. JORDAN CITY | OK | Yes | - - - | - - - | - - - |
| VWW364 | W364 | WTR | VW | EP | 3892 WEST 11800 SOUTH | OK | Yes | - - - | - - - | - - - |
| VWW365 | W365 | WTR | VW | EP | 3864 WEST 11800 SOUTH | OK | Yes | - - - | - - - | - - - |
| VWW366 | W366 | WTR | VW | RV | 3807 WEST 11800 SOUTH | OK | Yes | - - - | - - - | - - - |
| VWW367 | W367 | WTR | VW | RV | 11723 SOUTH 3800 WEST | OK | Yes | - - - | - - - | - - - |
| VWW368 | W368 | WTR | VW | RV | 3668 WEST 11800 SOUTH | OK | Yes | - - - | - - - | - - - |
| VWW369 | W369 | WTR | VW | RV | 11766 SOUTH 3600 WEST | OK | Yes | - - - | - - - | - - - |
| VWW370 | W370 | WTR | VW | RV | 11676 SOUTH 3600 WEST | OK | Yes | - - - | - - - | - - - |
| VWW371 | W371 | WTR | VW | SJ | 11630 SOUTH 3600 WEST | OK | Yes | - - - | - - - | - - - |
| VWW372 | W372 | WTR | VW | HM | 11887 SOUTH 4000 WEST | OK | Yes | - - - | - - - | - - - |
| VWW373 | W373 | WTR | VW | HM | 12090 SOUTH 3600 WEST | OK | Yes | - - - | - - - | - - - |
| VWW374 | W374 | WTR | VW | HM | 12211 SOUTH 4000 WEST | OK | Yes | - - - | - - - | - - - |
| VWW375 | W375 | WTR | VW | HM | 12210 SOUTH 4000 WEST | OK | Yes | - - - | - - - | - - - |
| VWW376 | W376 | WTR | VW | HM | 12256 SOUTH 4000 WEST | OK | Yes | - - - | - - - | - - - |
| VWW377 | W377 | WTR | VW | HM | 12260 SOUTH 4000 WEST | OK | Yes | - - - | - - - | - - - |
| VWW378 | W378 | WTR | VW | HM | 12299 SOUTH 4000 WEST | OK | Yes | - - - | - - - | - - - |
| VWW379 | W379 | WTR | VW | HM | 12311 SOUTH 4000 WEST | OK | Yes | - - - | - - - | - - - |
| VWW380 | W380 | WTR | VW | HM | 12395 SOUTH 4000 WEST | OK | Yes | - - - | - - - | - - - |
| VWW381 | W381 | WTR | VW | B4 | 8200 SOUTH 2150 WEST - W. JORDAN CITY | OK | Yes | - - - | - - - | - - - |
| VWW382 | W382 | WTR | VW | HM | 12012 SOUTH 3600 WEST | OK | Yes | - - - | - - - | - - - |
| VWW383 | W383 | WTR | VW | HM | 12222 SOUTH 3600 WEST | OK | Yes | - - - | - - - | - - - |
| VWW384 | W384 | WTR | VW | HM | 12400 SOUTH 3600 WEST | NU | Yes | - - - | - - - | - - - |
| VWW385 | W385 | WTR | VW | HM | 12464 SOUTH 3600 WEST | OK | Yes | - - - | - - - | - - - |
| VWW386 | W386 | WTR | VW | HM | 12554 SOUTH 3600 WEST | OK | Yes | - - - | - - - | - - - |
| VWW387 | W387 | WTR | VW | WJ | 6000 WEST 9350 SOUTH - W. JORDAN CITY | OK | Yes | - - - | - - - | - - - |
| VWW388 | W388 | WTR | VW | RV | 11977 SOUTH 3600 WEST | OK | Yes | - - - | - - - | - - - |
| VWW389 | W389 | WTR | VW | HM | 12502 SOUTH 3600 WEST | OK | Yes | - - - | - - - | - - - |
| VWW390 | W390 | WTR | VW | HM | 12518 SOUTH 3600 WEST | OK | Yes | - - - | - - - | - - - |
| VWW391 | W391 | WTR | VW | RV | 12241 SOUTH 3600 WEST | OK | Yes | - - - | - - - | - - - |
| VWW392 | W392 | WTR | VW | HM | 11980 SOUTH 3600 WEST | OK | Yes | - - - | - - - | - - - |
| VWW393 | W393 | WTR | VW | RV | 12191 SOUTH 3600 WEST | OK | Yes | - - - | - - - | - - - |
| VWW394 | W394 | WTR | VW | HM | 12262 SOUTH 3600 WEST | OK | Yes | - - - | - - - | - - - |
| VWW395 | W395 | WTR | VW | RV | 12281 SOUTH 3600 WEST | OK | Yes | - - - | - - - | - - - |
| VWW396 | W396 | WTR | VW | HM | 12536 SOUTH 3600 WEST | OK | Yes | - - - | - - - | - - - |
| VWW397 | W397 | WTR | VW | RV | 12750 SO. 2550 W. - RIVERTON CITY | OK | Yes | - - - | - - - | - - - |
| VWW398 | W398 | WTR | VW | RV | 13325 SO. 3600 W. - RIVERTON CITY | OK | Yes | - - - | - - - | - - - |
| VWW399 | W399 | WTR | VW | WJ | 7322 SOUTH 5490 WEST | OK | Yes | - - - | - - - | - - - |
| VWS400 | S400 | WTR | VW | | BINGHAM TUNNEL CULINARY WATER | C | - - - | Yes | - - - | - - - |
| VWK401 | K401 | WTR | VW | | KMC - OLD RANCH | OK | Yes | - - - | - - - | - - - |
| VWW402 | W402 | WTR | VW | HM | 13600 SOUTH 6000 WEST - (SLCWCD) | OK | Yes | - - - | - - - | - - - |
| VWW403 | W403 | WTR | VW | HM | 13400 SOUTH 6000 WEST - (SLCWCD) | OK | Yes | - - - | - - - | - - - |
| VWK404 | | WTR | VW | | SEE VWW404 | OK | - - - | - - - | - - - | - - - |
| VWW404 | W404 | WTR | VW | HM | 13055 SOUTH 7756 WEST | OK | Yes | - - - | - - - | - - - |
| VWK405 | | WTR | VW | | SEE VWW405 | OK | - - - | - - - | - - - | - - - |
| VWW405 | W405 | WTR | VW | HM | 7198 WEST 13090 SOUTH | OK | Yes | - - - | - - - | - - - |
| VWW406 | W406 | WTR | VW | | 13200 SOUTH 7200 WEST (DANSIE) | OK | Yes | - - - | - - - | - - - |
| VWW407 | W407 | WTR | VW | HM | 12800 SOUTH 7900 WEST (DANSIE) | OK | Yes | - - - | - - - | - - - |
| VWW408 | W408 | WTR | VW | HM | 1166 WEST MAIN STREET (DANSIE) | OK | Yes | - - - | - - - | - - - |
| VWW409 | W409 | WTR | VW | HM | 13500 SOUTH 7200 WEST (DANSIE) | OK | Yes | - - - | - - - | - - - |
| VWW410 | W410 | WTR | VW | HM | 12875 SOUTH 6620 WEST (DANSIE) | OK | Yes | - - - | - - - | - - - |
| VWW411 | W411 | WTR | VW | HM | 13025 SOUTH 6610 WEST (DANSIE) | OK | Yes | - - - | - - - | - - - |
| VWW412 | W412 | WTR | VW | HM | 13710 SOUTH 7750 WEST (DANSIE) | OK | Yes | - - - | - - - | - - - |
| VWK413 | W413 | WTR | VW | BC | MODERNIZATION WELL #1 Middle | OK | Yes | - - - | - - - | - - - |

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| VWK414 | W414 | WTR | VW | BC | MODERNIZATION WELL #2 East | OK | Yes | - - - | - - - | - - - |
| VWW415 | W415 | WTR | VW | RV | 2893 WEST 11800 SOUTH | OK | Yes | - - - | - - - | - - - |
| VWW416 | W416 | WTR | VW | RV | 12064 SOUTH 2240 WEST | OK | Yes | - - - | - - - | - - - |
| VWW417 | W417 | WTR | VW | SJ | 11563 SOUTH 2570 WEST | OK | Yes | - - - | - - - | - - - |
| VWW418 | W418 | WTR | VW | SJ | 2917 WEST 10460 SOUTH | OK | Yes | - - - | - - - | - - - |
| VWW419 | W419 | WTR | VW | SJ | 3192 WEST 10400 SOUTH | OK | Yes | - - - | - - - | - - - |
| VWW420 | W420 | WTR | VW | WJ | 5950 WEST 8750 SOUTH - W. JORDAN CITY | OK | Yes | - - - | - - - | - - - |
| VWK421 | K421 | WTR | VW | BC | MODERNIZATION WELL #3 West | OK | Yes | - - - | - - - | - - - |
| NEL448 | Well 11 | WTR | NE | LS | Sec 21 Well #11 | CERT | Yes | - - - | - - - | - - - |
| NET449D | NETL449D | WTR | NE | TL | Tailings Water | OK | Yes | - - - | - - - | - - - |
| TLT449A | DH911065C | WTR | NE | TL | Tailings Water | OK | - - - | - - - | - - - | Yes |
| TLT449B | DH911065B | WTR | NE | TL | Tailings Water | OK | - - - | - - - | - - - | Yes |
| TLT449C | DH911065A | WTR | NE | TL | Tailings Water | OK | - - - | - - - | - - - | Yes |
| TLT449E | NETL449P | WTR | NE | TL | Tailings Water | OK | - - - | - - - | - - - | Yes |
| RTC450 | RTCN450 | WTR | VW | MG | RITTER CANAL AT 8000 WEST | OK | - - - | Yes | - - - | - - - |
| RTC451 | | WTR | VW | MG | RITTER CANAL | OK | - - - | Yes | - - - | - - - |
| CLC452 | CLCN452 | WTR | VW | TL | CLARIFICATION CANAL NEAR 001 OUTFALL | OK | - - - | Yes | - - - | Yes |
| CSC453 | CSCH453 | WTR | VW | LS | | OK | - - - | Yes | - - - | - - - |
| CSC454 | CSCN454 | WTR | VW | TL | | OK | - - - | Yes | - - - | - - - |
| CSC455 | CSCN455 | WTR | VW | MO | | OK | - - - | Yes | - - - | - - - |
| CSC456 | | WTR | VW | MO | | OK | - - - | Yes | - - - | - - - |
| CSC457 | CSCN457 | WTR | VW | MO | WEST C-7 NORTH OF I-80 | OK | - - - | Yes | - - - | - - - |
| KCS458 | KCSW458 | WTR | VW | LS | KERSEY CREEK AT 7800 WEST NORTH OF 201 | OK | - - - | Yes | - - - | - - - |
| KCS459 | KCSW459 | WTR | VW | LS | KERSEY CREEK | OK | - - - | Yes | - - - | - - - |
| KCS460 | KCSW460 | WTR | VW | LS | KERSEY CREEK | OK | - - - | Yes | - - - | - - - |
| LCS461 | LCSW461 | WTR | VW | LS | LEE CREEK | OK | - - - | Yes | - - - | - - - |
| LCS462 | LCSW462 | WTR | VW | LS | LEE CREEK | OK | - - - | Yes | - - - | - - - |
| RSC463 | RXCN463 | WTR | VW | LS | WEST OF 5600 W. CANAL CROSSING LANDFILL | OK | - - - | Yes | - - - | - - - |
| LCS464 | LCSW464 | WTR | VW | MO | Lee Creek | OK | - - - | Yes | - - - | - - - |
| BDC465 | BDCN465 | WTR | VW | RC | EAST OF 7200 WEST AT BRIGHTON DRAIN CROS | OK | - - - | Yes | - - - | - - - |
| SZS466 | SZSP466 | WTR | VW | WT | SPITZ SPRINGS SOUTHEAST OF #4 P.S. | OK | - - - | Yes | - - - | - - - |
| RWC467 | RWCN467 | WTR | VW | NO | WEST SIDE OF RADIO STAT. ACCESS ~8900 W. | OK | - - - | Yes | - - - | - - - |
| LCS468 | LCSW468 | WTR | VW | NO | Lee creek | OK | - - - | Yes | - - - | - - - |
| LCS469 | LCSW469 | WTR | VW | GS | LEE CREEK | OK | - - - | Yes | - - - | - - - |
| ADS470 | ADSP470 | WTR | VW | TL | ADAMSON SPRING EAST OF #1 P.S. ROAD | OK | - - - | Yes | - - - | Yes |
| CWS471 | CWSW471 | WTR | VW | TL | C-7 WEST NORTH EAST OF GYPSTACK | OK | - - - | Yes | - - - | - - - |
| USC472 | USCN472 | WTR | VW | MG | UTAH/SALT LAKE CANAL S.E. 201 8100 W. | OK | - - - | Yes | - - - | - - - |
| CSC473 | CSCN473 | WTR | VW | LS | TWO WITH SAME NUMBER 473 | OK | - - - | Yes | - - - | - - - |
| BDC474 | BDCN474 | | VW | | EAST END BRIGHTON DRAIN 7200 WEST CROSSI | OK | - - - | Yes | - - - | - - - |
| BDC474Z | | WTR | VW | LS | OLD BIOWEST BDCN474. JAN95 PUT NEL474 | OK | - - - | Yes | - - - | - - - |
| NEL476 | Well 8 | WTR | NE | | Well #8 | AB | Yes | - - - | - - - | - - - |
| NEL477 | Well 9 | WTR | NE | LS | WELL #9 | OK | Yes | - - - | - - - | - - - |
| NEM478 | Well 10 | WTR | NE | TL | WELL #10 | OK | Yes | - - - | - - - | - - - |
| NEM479 | Well 12 | WTR | NE | TL | WELL #12 | OK | Yes | - - - | - - - | - - - |
| NEG481 | GF1 | WTR | NE | WT | GARFIELD WELL | OK | Yes | - - - | - - - | - - - |
| NEG482 | GF2 | WTR | NE | WT | GARFIELD WELL | OK | Yes | - - - | - - - | - - - |
| NEG483 | GF3 | WTR | NE | WT | GARFIELD WELL | OK | Yes | - - - | - - - | - - - |
| NEG484 | GF4 | WTR | NE | WT | GARFIELD WELL | OK | Yes | - - - | - - - | - - - |
| NEG485 | GF5 | WTR | NE | WT | GARFIELD WELL | AB | Yes | - - - | - - - | - - - |
| NEG486 | GF6 | WTR | NE | WT | GARFIELD WELL | AB | Yes | - - - | - - - | - - - |
| NEG487 | GF7 | WTR | NE | WT | GARFIELD WELL | AB | Yes | - - - | - - - | - - - |
| NEG488 | GF6A | WTR | NE | WT | GARFIELD WELL | AB | Yes | - - - | - - - | - - - |
| NEG489 | GF5(OLD) | WTR | NE | WT | GARFIELD WELL | C | Yes | - - - | - - - | - - - |
| NEG490 | GF3(OLD) | WTR | NE | WT | GARFIELD WELL | C | Yes | - - - | - - - | - - - |

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TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| BCG496 | | WTR | VW | BY | South end Adrian Brown Consultants | OK | Yes | | | |
| NET500A | | WTR | NE | TL | Old tailings perimiter | AB | Yes | - - - | - - - | - - - |
| NET500B | | WTR | NE | TL | Old tailings perimiter | AB | Yes | - - - | - - - | - - - |
| NET501A | | WTR | NE | TL | Old tailings perimiter | AB | Yes | - - - | - - - | - - - |
| NET501B | | WTR | NE | TL | Old tailings perimiter | AB | Yes | - - - | - - - | - - - |
| NET502A | | WTR | NE | TL | Old tailings perimiter | AB | Yes | - - - | - - - | - - - |
| NET502B | | WTR | NE | TL | Old tailings perimiter | AB | Yes | - - - | - - - | - - - |
| NET502C | | WTR | NE | TL | Old tailings perimiter | AB | Yes | - - - | - - - | - - - |
| NET503A | | WTR | NE | TL | Old tailings perimiter | AB | Yes | - - - | - - - | - - - |
| NET503B | | WTR | NE | TL | Old tailings perimiter | AB | Yes | - - - | - - - | - - - |
| NET504A | | WTR | NE | TL | Old tailings perimiter | AB | Yes | - - - | - - - | - - - |
| NET504B | | WTR | NE | TL | Old tailings perimiter | AB | Yes | - - - | - - - | - - - |
| NET505 | CHVR10A | WTR | NE | CH | CHEVRON MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NET506 | CHVR11A | WTR | NE | CH | CHEVRON MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NET507 | CHVR12A | WTR | NE | CH | CHEVRON MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NET508 | CHVR13A | WTR | NE | CH | CHEVRON MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NET509 | CHVR14A | WTR | NE | CH | CHEVRON MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NET510 | CHVR15A | WTR | NE | CH | CHEVRON MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NET511 | CHVR16A | WTR | NE | CH | CHEVRON MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NET512 | CHVR17A | WTR | NE | CH | CHEVRON MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NET513 | CHVR1A | WTR | NE | CH | CHEVRON MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NET514 | CHVR3A | WTR | NE | CH | CHEVRON MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NET515 | CHVR | WTR | NE | CH | CHEVRON MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NET516 | CHVR4A | WTR | NE | CH | CHEVRON MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NET517 | CHVR6A | WTR | NE | CH | CHEVRON MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NET518 | CHVR7A | WTR | NE | CH | CHEVRON MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NET519 | CHVR8A | WTR | NE | CH | CHEVRON MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NET520 | CHVR9A | WTR | NE | CH | CHEVRON MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NEL521A | CH1A | WTR | NE | LS | CHEVRON MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NEL521B | CH1B | WTR | NE | LS | CHEVRON MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NEL522A | CH2A | WTR | NE | LS | CHEVRON MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NEL522B | CH2B | WTR | NE | LS | CHEVRON MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NEL523A | CH3A | WTR | NE | LS | CHEVRON MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NEL523B | CH3B | WTR | NE | LS | CHEVRON MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NEL523C | CH3C | WTR | NE | LS | CHEVRON MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NEL524A | CH4A | WTR | NE | LS | CHEVRON MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NEL524B | CH4B | WTR | NE | LS | CHEVRON MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NEL525A | CH5A | WTR | NE | LS | CHEVRON MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NEL525B | CH5B | WTR | NE | LS | CHEVRON MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NEL526A | CH6A | WTR | NE | LS | CHEVRON MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NEL526B | CH6B | WTR | NE | LS | CHEVRON MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NET527 | CHVRP1 | WTR | NE | CH | CHEVRON MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NET528 | CHVRP2 | WTR | NE | CH | CHEVRON MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NEL529A | CH9A | WTR | NE | LS | CHEVRON MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NEL529B | CH9B | WTR | NE | LS | CHEVRON MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NEL529C | CH9C | WTR | NE | LS | CHEVRON MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NET530 | CHVRP3? | WTR | NE | CH | CHEVRON MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NEL531A | CH11A | WTR | NE | LS | North End east of tailings impoundment | OK | Yes | - - - | - - - | - - - |
| NEL531B | CH11B | WTR | NE | LS | North End east of tailings impoundment | OK | Yes | - - - | - - - | - - - |
| NEL532A | CH12A | WTR | NE | LS | North End east of tailings impoundment | OK | Yes | - - - | - - - | - - - |
| NEL532B | CH12B | WTR | NE | LS | North End east of tailings impoundment | OK | Yes | - - - | - - - | - - - |
| NEL533A | CH13A | WTR | NE | LS | North End east of tailings impoundment | OK | Yes | - - - | - - - | - - - |
| NEL533B | CH13B | WTR | NE | LS | North End east of tailings impoundment | OK | Yes | - - - | - - - | - - - |
| NEL534A | CH14A | WTR | NE | LS | North End east of tailings impoundment | OK | Yes | - - - | - - - | - - - |

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| NEL534B | CH14B | WTR | NE | LS | North End east of tailings impoundment | OK | Yes | - - - | - - - | - - - |
| NEL536A | CH16A | WTR | NE | LS | North End east of tailings impoundment | OK | Yes | - - - | - - - | - - - |
| NEL536B | CH16B | WTR | NE | LS | North End east of tailings impoundment | OK | Yes | - - - | - - - | - - - |
| NEL536C | CH16C | WTR | NE | LS | North End east of tailings impoundment | OK | Yes | - - - | - - - | - - - |
| NET537 | CHVRP4 | WTR | NE | CH | CHEVRON MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NEL538 | MKLNDFA | WTR | NE | LS | MACKAY LANDFILL | OK | Yes | - - - | - - - | - - - |
| NEL539 | MKLNDFB | WTR | NE | LS | MACKAY LANDFILL | OK | Yes | - - - | - - - | - - - |
| NEL540 | MKLNDFC | WTR | NE | LS | MACKAY LANDFILL | OK | Yes | - - - | - - - | - - - |
| NEL541 | A | WTR | NE | LS | COUNTY LANDFILL | OK | Yes | - - - | - - - | - - - |
| NEL542 | B | WTR | NE | LS | COUNTY LANDFILL | OK | Yes | - - - | - - - | - - - |
| NEL543 | C | WTR | NE | LS | COUNTY LANDFILL | OK | Yes | - - - | - - - | - - - |
| NEL544 | D | WTR | NE | LS | COUNTY LANDFILL | OK | Yes | - - - | - - - | - - - |
| NEL545 | E | WTR | NE | LS | COUNTY LANDFILL | OK | Yes | - - - | - - - | - - - |
| NEL546 | F | WTR | NE | LS | COUNTY LANDFILL | OK | Yes | - - - | - - - | - - - |
| NEL547 | G | WTR | NE | LS | COUNTY LANDFILL | OK | Yes | - - - | - - - | - - - |
| NEL548 | H | WTR | NE | LS | COUNTY LANDFILL | AB | Yes | - - - | - - - | - - - |
| NEL549 | I | WTR | NE | LS | COUNTY LANDFILL | OK | Yes | - - - | - - - | - - - |
| NEL550 | J | WTR | NE | LS | COUNTY LANDFILL | OK | Yes | - - - | - - - | - - - |
| NEL551 | K | WTR | NE | LS | COUNTY LANDFILL | OK | Yes | - - - | - - - | - - - |
| NEL552 | L | WTR | NE | LS | COUNTY LANDFILL | OK | Yes | - - - | - - - | - - - |
| NEL553 | M | WTR | NE | LS | COUNTY LANDFILL | OK | Yes | - - - | - - - | - - - |
| NEL554 | N | WTR | NE | LS | COUNTY LANDFILL | OK | Yes | - - - | - - - | - - - |
| NEL555 | O | WTR | NE | LS | COUNTY LANDFILL | OK | Yes | - - - | - - - | - - - |
| NEL556 | P | WTR | NE | LS | COUNTY LANDFILL | OK | Yes | - - - | - - - | - - - |
| NEL557 | Q | WTR | NE | LS | COUNTY LANDFILL | OK | Yes | - - - | - - - | - - - |
| NEM558 | MGOLFC | WTR | NE | MG | MAGNA GOLF COURSE | OK | Yes | - - - | - - - | - - - |
| NEM559 |  | WTR | NE | MG |  | OK | Yes | - - - | - - - | - - - |
| NEM560 |  | WTR | NE | MG |  | OK | Yes | - - - | - - - | - - - |
| NES567 | Sec17E | WTR | NE | SL | SECTION 17-E | OK | Yes | - - - | - - - | - - - |
| NES568 | Sec17W | WTR | NE | SL | SECTION 17-W | OK | - - - | Yes | - - - | - - - |
| NEL569 | SEC16 | WTR | NE | LS | SECTION 16 | OK | Yes | - - - | - - - | - - - |
| NEM570 | MGB1 | WTR | NE | MG |  | OK | Yes | - - - | - - - | - - - |
| NEM571 | MGB2 | WTR | NE | MG |  | OK | Yes | - - - | - - - | - - - |
| NEM572 | MGB3 | WTR | NE | MG |  | OK | Yes | - - - | - - - | - - - |
| NEM573 | MGB4 | WTR | NE | MG |  | OK | Yes | - - - | - - - | - - - |
| NEM574 | MGH1 | WTR | NE | MG |  | OK | Yes | - - - | - - - | - - - |
| NEM575 | MGH2 | WTR | NE | MG |  | OK | Yes | - - - | - - - | - - - |
| NEM576 | MGH3 | WTR | NE | MG |  | OK | Yes | - - - | - - - | - - - |
| NEM577 | MGH4 | WTR | NE | MG |  | OK | Yes | - - - | - - - | - - - |
| NEM578 | MGH5 | WTR | NE | MG |  | OK | Yes | - - - | - - - | - - - |
| NEM579 | MGH6 | WTR | NE | MG |  | OK | Yes | - - - | - - - | - - - |
| NEM580 | MGH7 | WTR | NE | MG |  | OK | Yes | - - - | - - - | - - - |
| NEM581 | MGH8 | WTR | NE | MG |  | OK | Yes | - - - | - - - | - - - |
| NET582 | MORT1 | WTR | NE | MO | mortan salt | OK | Yes | - - - | - - - | - - - |
| NET583 | OTH1 | WTR | NE | NO | ortho plant under tails | Abandon | Yes | - - - | - - - | - - - |
| NET584 | OTH2 | WTR | NE | NO | ortho plant under tails | Abandon | Yes | - - - | - - - | - - - |
| NET585 | OTH3 | WTR | NE | NO | ortho plant under tails | Abandon | Yes | - - - | - - - | - - - |
| NET586 |  | WTR | NE | NO |  |  | Yes | - - - | - - - | - - - |
| NET587 | OTH5 | WTR | NE | NO | ortho plant under tails | Abandon | Yes | - - - | - - - | - - - |
| NET588 | OTH6 | WTR | NE | NO | ortho plant under tails | Abandon | Yes | - - - | - - - | - - - |
| NET589 | OTH7 | WTR | NE | NO | ortho plant under tails | Abandon | Yes | - - - | - - - | - - - |
| NET591 | OTH9 | WTR | NE | LS | ortho plant under tails | Abandon | Yes | - - - | - - - | - - - |
| NET592 | OTH10 | WTR | NE | MG | ortho plant under tails | Abandon | Yes | - - - | - - - | - - - |
| NET593 | OTH11 | WTR | NE | MG | ortho plant under tails | Abandon | Yes | - - - | - - - | - - - |

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| NET594 | OTH12 | WTR | NE | MG | ortho plant under tails | Abandon | Yes | - - - | - - - | - - - |
| NET595 | OTH13 | WTR | NE | MG | ortho plant under tails | Abandon | Yes | - - - | - - - | - - - |
| NET596 | OTH14 | WTR | NE | RC | ortho plant under tails | Abandon | Yes | - - - | - - - | - - - |
| NET597 | OTH15 | WTR | NE | NO | ortho plant under tails | Abandon | Yes | - - - | - - - | - - - |
| NEM601A | NEMG601A | WTR | NE | MG | North End (south of Rocks café) | OK | Yes | - - - | - - - | - - - |
| NEM601B | NEMG601B | WTR | NE | MG | North End (south of Rocks café) | OK | Yes | - - - | - - - | - - - |
| NED602A | NEDB602A | WTR | NE | TL | North end diving doard | OK | Yes | - - - | - - - | - - - |
| NED602B | NEDB602B | WTR | NE | TL | North end diving doard | OK | Yes | - - - | - - - | - - - |
| NEM603A | NEMG603A | WTR | NE | MG | North End near Dan Lewis' house | Abandon | Yes | - - - | - - - | - - - |
| NEM603B | NEMG603B | WTR | NE | MG | North End near Dan Lewis' house | Abandon | Yes | - - - | - - - | - - - |
| NEM603C | NEMG603C | WTR | NE | MG | North End near Dan Lewis' house | Abandon | Yes | - - - | - - - | - - - |
| NED604A | NEDB604A | WTR | NE | TL | North end diving doard | OK | Yes | - - - | - - - | - - - |
| NED604B | NEDB604B | WTR | NE | TL | North end diving doard | OK | Yes | - - - | - - - | - - - |
| NED605A | NEDB605A | WTR | NE | TL | North end diving doard | AB | Yes | - - - | - - - | - - - |
| NED605B | NEDB605B | WTR | NE | TL | North end diving doard | AB | Yes | - - - | - - - | - - - |
| NER606A | | WTR | NE | RF | REFINERY MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NER606B | | WTR | NE | RF | REFINERY MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NER607A | | WTR | NE | RF | REFINERY MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NER607B | | WTR | NE | RF | REFINERY MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NER608A | | WTR | NE | RF | REFINERY MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NER608B | | WTR | NE | RF | REFINERY MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NER609A | | WTR | NE | RF | REFINERY MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NER609B | | WTR | NE | RF | REFINERY MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NER610A | | WTR | NE | RF | REFINERY MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NER610B | | WTR | NE | RF | REFINERY MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NEW611A | | WTR | NE | WT | North end  Tailings admin | AB | Yes | - - - | - - - | - - - |
| NEW611B | | WTR | NE | WT | North end  Tailings admin | AB | Yes | - - - | - - - | - - - |
| NEW612A | | WTR | NE | WT | North end  Tailings admin | OK | Yes | - - - | - - - | - - - |
| NEW612B | | WTR | NE | WT | North end  Tailings admin | OK | Yes | - - - | - - - | - - - |
| NEW613A | | WTR | NE | WT | North end  Tailings admin | OK | Yes | - - - | - - - | - - - |
| NEW613B | | WTR | NE | WT | North end  Tailings admin | OK | Yes | - - - | - - - | - - - |
| NEW614A | | WTR | NE | WT | North end waste water | OK | Yes | - - - | - - - | - - - |
| NEW614B | | WTR | NE | WT | North end waste water | OK | Yes | - - - | - - - | - - - |
| NEW615A | | WTR | NE | WT | North end waste water | OK | Yes | - - - | - - - | - - - |
| NEW615B | | WTR | NE | WT | North end waste water | OK | Yes | - - - | - - - | - - - |
| NEW616A | | WTR | NE | WT | North end waste water | OK | Yes | - - - | - - - | - - - |
| NEW616B | | WTR | NE | WT | North end waste water | OK | Yes | - - - | - - - | - - - |
| NEW617A | | WTR | NE | WT | North end waste water | OK | Yes | - - - | - - - | - - - |
| NEW617B | | WTR | NE | WT | North end waste water | OK | Yes | - - - | - - - | - - - |
| NES618A | | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NES618B | | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NES619A | | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NES619B | | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NES620A | | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NES620B | | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES621A | | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES621B | | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES622A | | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES622B | | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES623A | | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES623B | | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES624A | | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NES624B | | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NEL625A | NET625A | WTR | NE | LS | North end near magna water | OK | Yes | - - - | - - - | - - - |



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TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| NEL625B | NET625B | WTR | NE | LS | North end near magna water | OK | Yes | - - - | - - - | - - - |
| NET626A | | WTR | NE | RC | North end tailings monitor well | OK | Yes | - - - | - - - | - - - |
| NET626B | | WTR | NE | RC | North end tailings monitor well | OK | Yes | - - - | - - - | - - - |
| NET627A | | WTR | NE | MO | North end tailings monitor well | OK | Yes | - - - | - - - | - - - |
| NET627B | | WTR | NE | MO | North end tailings monitor well | OK | Yes | - - - | - - - | - - - |
| NET628A | | WTR | NE | MO | North end tailings monitor well | OK | Yes | - - - | - - - | - - - |
| NET628B | | WTR | NE | MO | North end tailings monitor well | OK | Yes | - - - | - - - | - - - |
| NET629A | | WTR | NE | MO | North end tailings monitor well | OK | Yes | - - - | - - - | - - - |
| NET629B | | WTR | NE | MO | North end tailings monitor well | OK | Yes | - - - | - - - | - - - |
| NET630A | | WTR | NE | MO | North end tailings monitor well | OK | Yes | - - - | - - - | - - - |
| NET630B | | WTR | NE | MO | North end tailings monitor well | OK | Yes | - - - | - - - | - - - |
| NET630C | | WTR | NE | MO | North end tailings monitor well | OK | Yes | - - - | - - - | - - - |
| NER631A | | WTR | NE | RF | REFINERY MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NER631B | | WTR | NE | RF | REFINERY MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NER632A | | WTR | NE | RF | REFINERY MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NER632B | | WTR | NE | RF | REFINERY MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NER633A | | WTR | NE | RF | REFINERY MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NER633B | | WTR | NE | RF | REFINERY MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NEA634A | | WTR | NE | AR | North End Arthur | OK | Yes | - - - | - - - | - - - |
| NEA635A | | WTR | NE | AR | North End Arthur | OK | Yes | - - - | - - - | - - - |
| NEA635B | | WTR | NE | AR | North End Arthur | OK | Yes | - - - | - - - | - - - |
| NEA636A | | WTR | NE | AR | North End Arthur | OK | Yes | - - - | - - - | - - - |
| NEM637A | | WTR | NE | MC | North end east of central lab | OK | Yes | - - - | - - - | - - - |
| NEM638A | NET638A | WTR | NE | MG | North End monitor well near Mcdonalds | AB | Yes | - - - | - - - | - - - |
| NEM638B | NET638B | WTR | NE | MG | North End monitor well near Mcdonalds | AB | Yes | - - - | - - - | - - - |
| NEW639A | | WTR | NE | WT | North end waste water (dead mans cave) | OK | Yes | - - - | - - - | - - - |
| NET640A | | WTR | NE | CH | Tailings impoundment monitor well | AB | Yes | - - - | - - - | - - - |
| NET640B | | WTR | NE | CH | Tailings impoundment monitor well | AB | Yes | - - - | - - - | - - - |
| NET641A | | WTR | NE | CH | Tailings impoundment monitor well | AB | Yes | - - - | - - - | - - - |
| NET641B | | WTR | NE | CH | Tailings impoundment monitor well | AB | Yes | - - - | - - - | - - - |
| NET642A | | WTR | NE | CH | Tailings impoundment monitor well | AB | Yes | - - - | - - - | - - - |
| NET642B | | WTR | NE | CH | Tailings impoundment monitor well | AB | Yes | - - - | - - - | - - - |
| NET643A | | WTR | NE | MO | Tailings impoundment monitor well | AB | Yes | - - - | - - - | - - - |
| NET643B | | WTR | NE | MO | Tailings impoundment monitor well | AB | Yes | - - - | - - - | - - - |
| NET644A | | WTR | NE | MO | Tailings impoundment monitor well | AB | Yes | - - - | - - - | - - - |
| NET644B | | WTR | NE | MO | Tailings impoundment monitor well | AB | Yes | - - - | - - - | - - - |
| NET645A | | WTR | NE | MO | Tailings impoundment monitor well | OK | Yes | - - - | - - - | - - - |
| NET645B | | WTR | NE | MO | Tailings impoundment monitor well | OK | Yes | - - - | - - - | - - - |
| NET645C | | WTR | NE | MO | Tailings impoundment monitor well | OK | Yes | - - - | - - - | - - - |
| NET646A | | WTR | NE | MO | Tailings impoundment monitor well | OK | Yes | - - - | - - - | - - - |
| NET646B | | WTR | NE | MO | Tailings impoundment monitor well | OK | Yes | - - - | - - - | - - - |
| NET647A | | WTR | NE | MO | Tailings impoundment monitor well | AB | Yes | - - - | - - - | - - - |
| NET647B | | WTR | NE | MO | Tailings impoundment monitor well | AB | Yes | - - - | - - - | - - - |
| NET648A | | WTR | NE | MO | Tailings impoundment monitor well | AB | Yes | - - - | - - - | - - - |
| NET648B | | WTR | NE | MO | Tailings impoundment monitor well | AB | Yes | - - - | - - - | - - - |
| NET649A | | WTR | NE | MO | Tailings impoundment monitor well | AB | Yes | - - - | - - - | - - - |
| NET649B | | WTR | NE | MO | Tailings impoundment monitor well | AB | Yes | - - - | - - - | - - - |
| NEM650A | | WTR | NE | MC | North End monitor well near diving doard | OK | Yes | - - - | - - - | - - - |
| NEM651A | | WTR | NE | MC | North End monitor well near diving doard | OK | Yes | - - - | - - - | - - - |
| NEM652A | | WTR | NE | MC | North End monitor well near diving doard | OK | Yes | - - - | - - - | - - - |
| NEM653A | | WTR | NE | MC | North end east of central lab | OK | Yes | - - - | - - - | - - - |
| NEA654A | | WTR | NE | AR | North end east of central lab | OK | Yes | - - - | - - - | - - - |
| NER655A | | WTR | NE | RF | REFINERY MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES656A | | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |

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TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| NET657A | | WTR | NE | M0 | Tailings impoundment | AB | Yes | - - - | - - - | - - - |
| NET657B | | WTR | NE | M0 | Tailings impoundment | AB | Yes | - - - | - - - | - - - |
| NEA658 | PA1 | WTR | NE | AR | North end piezo | OK | Yes | - - - | - - - | - - - |
| NEA659 | PA2 | WTR | NE | AR | North end piezo | OK | Yes | - - - | - - - | - - - |
| NEB660 | PB1 | WTR | NE | PC | North end piezo | AB | Yes | - - - | - - - | - - - |
| NEB661 | PB2 | WTR | NE | PC | North end piezo | OK | Yes | - - - | - - - | - - - |
| NEB662 | PB3 | WTR | NE | PC | North end piezo | AB | Yes | - - - | - - - | - - - |
| NEM663 | PM1 | WTR | NE | MC | North end piezo | OK | Yes | - - - | - - - | - - - |
| NER664 | PR1 | WTR | NE | RF | North end piezo | OK | Yes | - - - | - - - | - - - |
| NER665 | PR2 | WTR | NE | RF | North end piezo | OK | Yes | - - - | - - - | - - - |
| NES666 | PS1 | WTR | NE | SM | North end piezo | OK | Yes | - - - | - - - | - - - |
| NES667 | PS2 | WTR | NE | SM | North end piezo | B | Yes | - - - | - - - | - - - |
| NEM668 | S1A | WTR | NE | MG | North end piezo | OK | Yes | - - - | - - - | - - - |
| NEM669 | S2A | WTR | NE | MG | North end piezo | OK | Yes | - - - | - - - | - - - |
| NET670 | S3A | WTR | NE | TL | North end piezo | OK | Yes | - - - | - - - | - - - |
| NET671 | S4A | WTR | NE | TL | North end piezo | AB | Yes | - - - | - - - | - - - |
| NES672 | B10W | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES673 | B14W | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NES674 | B15W | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NES675 | B16W | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES676 | B17W | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NES677 | B20W | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NES678 | B21W | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NES679 | B22W | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NES680 | B23W | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NES681 | B24W | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NES682 | B25W | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NES683 | B26W | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NES684 | SH&B2A | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NES685 | TF-1 | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NES686 | TF-2 | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES687 | TF-3 | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NES688 | TF-4 | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NES689 | TF-5 | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NES690 | TF-6 | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NES691 | TF-7 | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES692 | TF-LS1 | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NES693 | LS-8 | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES694A | LS-7 | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES694B | LS-9 | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES695A | AP-1 | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES695B | AP-2 | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES696 | AP-3 | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES697A | SC-1 | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES697B | SC-2 | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES698A | SC-3 | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES698B | SC-4 | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES699 | SC-5 | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES700 | SW-1 | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES701 | SW-2 | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES702 | SW-3 | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES703 | SW-4 | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES704 | SW-5 | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NES705A | SW-6 | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| NES705B | SW-7 | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES706 | SW-8 | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES707A | AP-4 | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES707B | AP-5 | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NER708 | SW-8 | WTR | NE | RF | REFINERY MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NER709 | SW-8 | WTR | NE | RF | REFINERY MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NER710A | SW-8 | WTR | NE | RF | REFINERY MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NER710B | SW-8 | WTR | NE | RF | REFINERY MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NER711 | SW-8 | WTR | NE | RF | REFINERY MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES712 | | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NES713 | | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NES714 | | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES715A | | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES715B | | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES716 | | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES718 | | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES719 | | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NES720 | | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NES721 | | WTR | NE | SM | SMELTER MONITORING WELL | AB | Yes | - - - | - - - | - - - |
| NES722 | | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NER723 | | WTR | NE | RF | Refinery MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NER724 | | WTR | NE | RF | Refinery MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES725 | | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES726A | | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| NES726B | | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| SMP727 | | WTR | NE | SM | SMELTER INTERIM PROCESS WATER POND | OK | - - - | - - - | - - - | Yes |
| NES728 | | WTR | NE | SM | SMELTER PRODUCTION WELL | OK | Yes | - - - | Yes | - - - |
| NES729 | | WTR | NE | SM | SMELTER MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| SMP730 | Seep | | NE | SM | | OK | - - - | - - - | - - - | Yes |
| SMP731 | Pump | | NE | SM | | OK | - - - | Yes | - - - | Yes |
| SMP732 | West | | NE | SM | WEST PROCESS POND (WEST CELL SUMP) | OK | - - - | Yes | - - - | Yes |
| SMP733 | East | | NE | SM | WEST PROCESS POND (EAST CELL SUMP) | OK | - - - | Yes | - - - | Yes |
| NEL815 | V | WTR | NE | | Salt lake county well | OK | Yes | - - - | - - - | - - - |
| NEL816 | W | WTR | NE | LS | Salt lake county well | OK | Yes | - - - | - - - | - - - |
| NEL817 | X | WTR | NE | LS | Salt lake county well | OK | Yes | - - - | - - - | - - - |
| NEL818 | Y | WTR | NE | LS | Salt lake county well | OK | Yes | - - - | - - - | - - - |
| NEL821 | R | WTR | NE | LS | Salt lake county well | OK | Yes | - - - | - - - | - - - |
| NEL822 | S | WTR | NE | LS | Salt lake county well | OK | Yes | - - - | - - - | - - - |
| NEL823 | T | WTR | NE | LS | Salt lake county well | OK | Yes | - - - | - - - | - - - |
| NEL824 | U | WTR | NE | LS | Salt lake county well | OK | Yes | - - - | - - - | - - - |
| NEL825 | BW-5A | WTR | NE | LS | | OK | Yes | - - - | - - - | - - - |
| NEL826 | BW-5B | WTR | NE | LS | | OK | Yes | - - - | - - - | - - - |
| NEL827 | BW-5C | WTR | NE | LS | | OK | Yes | - - - | - - - | - - - |
| NEW828 | BW-6A | WTR | NE | WT | | OK | Yes | - - - | - - - | - - - |
| NEW829 | BW-6B | WTR | NE | WT | | OK | Yes | - - - | - - - | - - - |
| NEW830 | BW-7A | WTR | NE | WT | | OK | Yes | - - - | - - - | - - - |
| NEW831 | BW-7B | WTR | NE | WT | | OK | Yes | - - - | - - - | - - - |
| NET832 | BW-8A | WTR | NE | MO | | AB | Yes | - - - | - - - | - - - |
| NET833 | BW-8B | WTR | NE | MO | | AB | Yes | - - - | - - - | - - - |
| NET834 | BW-8C | WTR | NE | MO | | AB | Yes | - - - | - - - | - - - |
| NEL835 | BW-4A | WTR | NE | LS | | OK | Yes | - - - | - - - | - - - |
| NEL836 | BW-4B | WTR | NE | LS | | OK | Yes | - - - | - - - | - - - |
| NEL837 | BW-4C | WTR | NE | LS | | OK | Yes | - - - | - - - | - - - |
| NET838 | BW-2A | WTR | NE | MO | | OK | Yes | - - - | - - - | - - - |

DRAFT

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| NET839 | BW-2B | WTR | NE | MO | | OK | Yes | - - - | - - - | - - - |
| NET840 | BW-2C | WTR | NE | MO | | OK | Yes | - - - | - - - | - - - |
| NET841 | BW-3A | WTR | NE | MO | | OK | Yes | - - - | - - - | - - - |
| NET842 | BW-3B | WTR | NE | MO | | OK | Yes | - - - | - - - | - - - |
| NET843 | BW-1A | WTR | NE | RC | | OK | Yes | - - - | - - - | - - - |
| NET844 | BW-1B | WTR | NE | RC | | OK | Yes | - - - | - - - | - - - |
| NET845 | BW-1C | WTR | NE | RC | | OK | Yes | - - - | - - - | - - - |
| NET846 | BW-9A | WTR | NE | NO | | OK | Yes | - - - | - - - | - - - |
| NET847 | BW-9B | WTR | NE | NO | | OK | Yes | - - - | - - - | - - - |
| BCG848 | BCG474 | WTR | VW | BC | BARNEY CANYON MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| BCG849 | BCG475 | WTR | VW | BC | BARNEY CANYON MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| BCG850 | | WTR | VW | BC | BARNEY CANYON MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| SRP850 | SMRES | WTR | VW | SR | SMALL RESERVOIR | OK | - - - | - - - | - - - | Yes |
| BCG851A | | WTR | VW | BC | BARNEY CANYON MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| BCG851B | | WTR | VW | BC | BARNEY CANYON MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| SRP851 | SMRESLLDS | WTR | VW | SR | SMALL RESERVOIR-leak detection sump | OK | - - - | - - - | - - - | Yes |
| BCG852 | | WTR | VW | BC | BARNEY CANYON MONITORING WELL | OK | Yes | - - - | - - - | - - - |
| SRP852 | SMRESPRS | WTR | VW | SR | SMALL RESERVOIR-leak detection sump | OK | - - - | - - - | - - - | Yes |
| TLT860 | NETL860 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT861 | NETL861 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT862 | NETL862 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT863 | NETL863 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT864 | NET864 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT865A | TLT865A | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT865B | TLT865B | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT865C | TLT865C | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT866 | TLT866 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT867 | TLT867 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT868 | TLT868 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT869 | TLT869 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT870 | TLT870 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT871 | TLT871 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT872 | TLT872 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT873 | TLT873 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT874 | TLT874 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT875 | TLT875 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT876 | TLT876 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT877 | TLT877 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT878 | TLT878 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT879 | TLT879 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT880 | TLT880 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT881 | TLT881 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT882 | TLT882 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT883 | TLT883 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT884 | TLT884 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT885 | TLT885 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT886 | TLT886 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT887 | TLT887 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT888 | TLT888 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT889 | TLT889 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| TLT890 | TLT890 | WTR | NE | TL | TAILINGS WATER | OK | - - - | - - - | - - - | Yes |
| LRP891 | LRP0891 | WTR | VW | LR | ZONE 1-LARGE RESERVOIR (SUMP NO. 1) | OK | - - - | - - - | - - - | Yes |
| LRP892 | LRP0892 | WTR | VW | LR | ZONE 1-LARGE RESERVOIR (SUMP NO. 2) | OK | - - - | - - - | - - - | Yes |
| LRP893 | LRP0893 | WTR | VW | LR | ZONE 1-LARGE RESERVOIR (SUMP NO. 3) | OK | - - - | - - - | - - - | Yes |

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| LRP894 | LRP0894 | WTR | VW | LR | ZONE 1-LARGE RESERVOIR (SUMP NO. 4) | OK | - - - | - - - | - - - | Yes |
| LRP895 | LRP0895 | WTR | VW | LR | ZONE 1-LARGE RESERVOIR (SUMP NO. 5) | OK | - - - | - - - | - - - | Yes |
| LRP896 | LRP0896 | WTR | VW | LR | ZONE 1-LARGE RESERVOIR | OK | - - - | - - - | - - - | Yes |
| NEM897 | NEM897 | WTR | NE | MC | Magna area | OK | Yes | - - - | - - - | - - - |
| NEM898 | NEM898 | WTR | NE | MC | Magna area | OK | Yes | - - - | - - - | - - - |
| NEM899 | NEM899 | WTR | NE | MC | Magna area | OK | Yes | - - - | - - - | - - - |
| ECG900 | ES900 | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG901 | ES901 | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG902 | EC902 | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG903 | EC903 | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG904 | EC904 | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG905 | EC905 | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG906 | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG907 | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG908 | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG909 | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| LRG910 | | WTR | VW | LR | LARGE RESERVOIR | OK | Yes | - - - | - - - | - - - |
| LRG911 | | WTR | VW | LR | LARGE RESERVOIR | OK | Yes | - - - | - - - | - - - |
| LRG912 | | WTR | VW | LR | LARGE RESERVOIR | OK | Yes | - - - | - - - | - - - |
| LRG914 | | WTR | VW | LR | LARGE RESERVOIR | OK | Yes | - - - | - - - | - - - |
| ECG915 | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG916 | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG917 | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| COG918 | | WTR | VW | CO | COPPERTON CITY | OK | Yes | - - - | - - - | - - - |
| BRG919 | | WTR | VW | BR | BLUEWATER REPOSITORY | OK | Yes | - - - | - - - | - - - |
| BRG920 | | WTR | VW | BR | BLUEWATER REPOSITORY | OK | Yes | - - - | - - - | - - - |
| BRG921 | | WTR | VW | BR | BLUEWATER REPOSITORY | OK | Yes | - - - | - - - | - - - |
| ECG922 | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG923 | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG924 | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG925 | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG926 | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG928 | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| LTG929A | | WTR | VW | LT | LARK TAILINGS | OK | Yes | - - - | - - - | - - - |
| LTG929B | | WTR | VW | LT | LARK TAILINGS | OK | Yes | - - - | - - - | - - - |
| LTG930B | | WTR | VW | | LARK TAILINGS | OK | Yes | - - - | - - - | - - - |
| ECG931 | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG932 | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG933 | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG934 | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG935 | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG936 | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG937 | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG938 | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG939 | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG940 | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| SRG945 | | WTR | VW | SR | SMALL RESERVOIR | OK | Yes | - - - | - - - | - - - |
| SRG946 | | WTR | VW | SR | SMALL RESEROVIR | OK | Yes | - - - | - - - | - - - |
| COG947 | | WTR | VW | CO | COPPERTON CITY | OK | Yes | - - - | - - - | - - - |
| CPG950 | | WTR | VW | CP | CEMETERY POND | OK | Yes | - - - | - - - | - - - |
| B1G951 | BIG951 | WTR | VW | B1 | BINGHAM CREEK SEGMENT #1 | OK | Yes | - - - | - - - | - - - |
| ECG952 | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| COZ971 | | | VW | CO | DRYFORK | OK | - - - | - - - | - - - | - - - |
| COZ972 | | | VW | CO | DRYFORK | OK | - - - | - - - | - - - | - - - |

DRAFT

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| COZ973 | | | VW | CO | GW UPGRADIENT OF PROPOSED CUMPS | OK | - - - | - - - | - - - | - - - |
| COZ974 | | | VW | CO | DRYFORK | OK | - - - | - - - | - - - | - - - |
| COZ975 | | | VW | CO | DRYFORK | OK | - - - | - - - | - - - | - - - |
| COZ976 | | | VW | CO | DRYFORK | OK | - - - | - - - | - - - | - - - |
| COZ977 | | | VW | CO | DRYFORK | OK | - - - | - - - | - - - | - - - |
| COZ978 | | | VW | CO | DRYFORK | OK | - - - | - - - | - - - | - - - |
| COZ979 | | | VW | CO | DRYFORK | OK | - - - | - - - | - - - | - - - |
| COZ980 | | | VW | CO | DRYFORK | OK | - - - | - - - | - - - | - - - |
| COZ981 | | | VW | CO | DRYFORK | OK | - - - | - - - | - - - | - - - |
| COZ982 | | | VW | CO | DRYFORK | OK | - - - | - - - | - - - | - - - |
| COZ983 | | | VW | CO | DRYFORK | OK | - - - | - - - | - - - | - - - |
| COZ984 | | | VW | CO | DRYFORK | OK | - - - | - - - | - - - | - - - |
| COZ985 | | | VW | CO | MELCO DUMP INFLUENCE | OK | - - - | - - - | - - - | - - - |
| COZ986 | | | VW | CO | MELCO DUMP INFLUENCE | OK | - - - | - - - | - - - | - - - |
| COZ987 | | | VW | CO | REGIONAL DRYFORK WATER LEVEL | OK | - - - | - - - | - - - | - - - |
| COG988 | | | VW | CO | LOWER DRYFORK | OK | - - - | - - - | - - - | - - - |
| COG989 | | | VW | CO | LOWER DRYFORK | OK | - - - | - - - | - - - | - - - |
| COG990A | | | VW | CO | LOWER DRYFORK | OK | - - - | - - - | - - - | - - - |
| COG990B | | | VW | CO | LOWER DRYFORK | OK | - - - | - - - | - - - | - - - |
| COG990C | | | VW | CO | LOWER DRYFORK | OK | - - - | - - - | - - - | - - - |
| COG991A | | | VW | CO | LOWER DRYFORK | OK | - - - | - - - | - - - | - - - |
| COG991B | | | VW | CO | LOWER DRYFORK | OK | - - - | - - - | - - - | - - - |
| COG992A | | | VW | CO | RANGE FRONT MONITORING | OK | - - - | - - - | - - - | - - - |
| COG992B | | | VW | CO | RANGE FRONT MONITORING | OK | - - - | - - - | - - - | - - - |
| COG993A | | | VW | CO | UPGRADIENT DRYFORK PUMPS | OK | - - - | - - - | - - - | - - - |
| COG993B | | | VW | CO | UPGRADIENT DRYFORK PUMPS | OK | - - - | - - - | - - - | - - - |
| COZ994 | | | VW | CO | REGIONAL DRYFORK WATER LEVEL | OK | - - - | - - - | - - - | - - - |
| COG995A | | | VW | CO | LOWER DRYFORK MONITORING | OK | Yes | - - - | - - - | - - - |
| COG995B | | | VW | CO | LOWER DRYFORK MONITORING | OK | Yes | - - - | - - - | - - - |
| ECG996A | | WTR | VW | | BINGHAM CREEK/DRYFORK MONITORING | OK | Yes | - - - | - - - | - - - |
| ECG996B | | WTR | VW | | BINGHAM CREEK/DRYFORK MONITORING | OK | Yes | - - - | - - - | - - - |
| COG997A | | WTR | VW | CO | LOWER DRYFORK MONITORING | OK | Yes | - - - | - - - | - - - |
| COG997B | | WTR | VW | CO | LOWER DRYFORK MONITORING | OK | Yes | - - - | - - - | - - - |
| COG998A | | WTR | VW | CO | LOWER DRYFORK MONITORING | OK | Yes | - - - | - - - | - - - |
| COG998B | | WTR | VW | CO | LOWER DRYFORK MONITORING | OK | Yes | - - - | - - - | - - - |
| BRG999 | | WTR | VW | BR | BLUEWATER REPOSITORY | OK | Yes | - - - | - - - | - - - |
| CFG1001 | CF#1 | | VW | | CARR FORK | OK | Yes | - - - | - - - | - - - |
| CFG1002 | CF#2 | | VW | | CARR FORK | OK | Yes | - - - | - - - | - - - |
| CFG1003 | CF#3 | | VW | | CARR FORK | OK | Yes | - - - | - - - | - - - |
| CFG1004 | CF#4 | | VW | | CARR FORK | OK | Yes | - - - | - - - | - - - |
| CFS1005 | BIG SPG | | VW | | CARR FORK | OK | - - - | Yes | - - - | - - - |
| CFS1006 | AD TNL | | VW | | CARR FORK | OK | - - - | Yes | - - - | - - - |
| BMD1009 | Pb & Cu | WSD | VW | BM | Freeman CLNRY TNK AFTER CHLOR | ACTIV | - - - | - - - | Yes | - - - |
| BMD1010 | Pb & Cu | WSD | VW | BM | MINE 6290 OFFICE, JANITORS MOP SINK | Gone | - - - | - - - | Yes | - - - |
| BMD1011 | Pb & Cu | WSD | VW | BM | MINE VISITOR CNTR, MENS ROOM BASIN | Gone | - - - | - - - | Yes | - - - |
| BMD1012 | Pb & Cu | WSD | VW | BM | MINE 6290 OFFICE, MENS ROOM BASIN | Gone | - - - | - - - | Yes | - - - |
| BMD1013 | Pb & Cu | WSD | VW | BM | MINE 6190 CHANGE HOUSE WASHROOM | ACTIV | - - - | - - - | Yes | - - - |
| BMD1014 | Pb & Cu | WSD | VW | BM | MINE 6190 TRUCK SHOP FOREMENS RESTRM | Gone | - - - | - - - | Yes | - - - |
| BMD1015 | Pb & Cu | WSD | VW | BM | MINE 6190 COPPERFIELD Tire shop SINK | ACTIV | - - - | - - - | Yes | - - - |
| BMD1016 | Pb & Cu | WSD | VW | BM | MINE 6190 BULLGANG RESTROOM BASIN | Gone | - - - | - - - | Yes | - - - |
| BMD1017 | Pb & Cu | WSD | VW | BM | MINE 6190 REDI ROOM MENS RSTRM BASIN | ACTIV | - - - | - - - | Yes | - - - |
| BMD1018 | Pb & Cu | WSD | VW | BM | MINE 6190 REDI ROOM WOMN RSTRM BASIN | ACTIV | - - - | - - - | Yes | - - - |
| BMD1019 | Pb & Cu | WSD | VW | BM | MINE 6190 OFFICE BLD LUNCH ROOM BASIN | ACTIV | - - - | - - - | Yes | - - - |
| BMD1020 | Pb & Cu | WSD | VW | BM | MINE OFFICE BLD LADIES RSTROOM BASIN | ACTIV | - - - | - - - | Yes | - - - |

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| BMD1021 | Pb & Cu | WSD | VW | BM | MINE CODE 80 MARKHAM SHOP SINK | ACTIV | - - - | - - - | Yes | - - - |
| BMD1022 | Pb & Cu | WSD | VW | BM | MINE SAFETY OFFICE JANITORS MOP SINK | Gone | - - - | - - - | Yes | - - - |
| BMD1023 | Pb & Cu | WSD | VW | BM | MINE DRYFORK SHOP FOREMEN RSTRM BASIN | Gone | - - - | - - - | Yes | - - - |
| BMD1024 | Pb & Cu | WSD | VW | BM | MINE DRYFORK SHOP ELT FRMR RSTRM BASN | Gone | - - - | - - - | Yes | - - - |
| BMD1025 | Pb & Cu | WSD | VW | BM | MINE DRYFORK WELDING SHOP WEST SINK | Gone | - - - | - - - | Yes | - - - |
| BMD1026 | Pb & Cu | WSD | VW | BM | MINE DRYFORK ELCT OFF RST ARRA BASIN | Gone | - - - | - - - | Yes | - - - |
| BMD1027 | Pb & Cu | WSD | VW | BM | MINE DRYFORK LINEMAN TRAILER BASIN | Gone | - - - | - - - | Yes | - - - |
| BMD1028 | Pb & Cu | WSD | VW | BM | MINE DRYFORK DOZER LUNCH ROOM BASIN | Gone | - - - | - - - | Yes | - - - |
| BMD1029 | Pb & Cu | WSD | VW | BM | MINE DRYFORK CAR LUNCH ROOM BASIN | Gone | - - - | - - - | Yes | - - - |
| ECD1030 | Pb & Cu | WSD | VW | EC | MINE SAWS CONTROL ROOM MOP SINK | INACT | - - - | - - - | Yes | - - - |
| ECD1031 | Pb & Cu | WSD | VW | EC | MINE SAWS FOREMAN WASHROOM BASIN | INACT | - - - | - - - | Yes | - - - |
| ECD1032 | Pb & Cu | WSD | VW | EC | MINE SAWS JANITORS MOP SINK | INACT | - - - | - - - | Yes | - - - |
| ECD1033 | Pb & Cu | WSD | VW | EC | MINE CAR WHACKER RESTROOM WASH BASIN | INACT | - - - | - - - | Yes | - - - |
| ECD1034 | Pb & Cu | WSD | VW | EC | MINE COPPERTON TOWER RESTROOM BASIN | Gone | - - - | - - - | Yes | - - - |
| ECD1035 | Pb & Cu | WSD | VW | EC | BARNEY TUNNEL CULINARY TNK AFTER CHLO | Gone | - - - | - - - | Yes | - - - |
| BMD1036 | Pb & Cu | WSD | VW | BM | MINE SAFETY OFFICE RESTROOM BASIN | Gone | - - - | - - - | Yes | - - - |
| BMD1037 | Pb & Cu | WSD | VW | BM | 6190 admin.CNFRNCE RM KITCHEN SINK | ACTIV | - - - | - - - | Yes | - - - |
| BMD1038 | Pb & Cu | WSD | VW | BM | 6190 Admin WOMENS RESTROOM BASIN | ACTIV | - - - | - - - | Yes | - - - |
| BMD1039 | | | | BM | 6190 Admin mens Rest Room | ACTIV | - - - | - - - | Yes | - - - |
| BMD1040 | | | | BM | 6190 Admin Kitchen sink | ACTIV | - - - | - - - | Yes | - - - |
| PCD1041 | Pb & Cu | WSD | NE | UPP | Power plant 3rd floor RR wash basin | ACTIV | - - - | - - - | Yes | - - - |
| PCD1045 | Pb & Cu | WSD | NE | UPP | Power plant 5th floor RR wash basin | ACTIV | - - - | - - - | Yes | - - - |
| SMD1045 | Pb & Cu | WSD | NE | SM | SMELTER ENVRNMNTL MONITORING CENTER | ACTIV | - - - | - - - | Yes | - - - |
| SMD1046 | Pb & Cu | WSD | NE | SM | SMLTR #8 ACID REPAIR BLDG MOP SINK | ACTIV | - - - | - - - | Yes | - - - |
| SMD1047 | Pb & Cu | WSD | NE | SM | SMLTR CHANGE HOUSE DOWNSTRS MOP SINK | ACTIV | - - - | - - - | Yes | - - - |
| SMD1048 | Pb & Cu | WSD | NE | SM | SMLTR CNTRL WRHSE OUTSIDE TAP DOCK | ACTIV | - - - | - - - | Yes | - - - |
| SMD1049 | Pb & Cu | WSD | NE | SM | SMLTR MECHANIC SHOP WASH BASIN | ACTIV | - - - | - - - | Yes | - - - |
| RFD1051 | Pb & Cu | WSD | NE | RF | REFN ADMIN BLDG JANITORS RM MOP SINK | ACTIV | - - - | - - - | Yes | - - - |
| RFD1052 | Pb & Cu | WSD | NE | RF | REFN MAINT SHOP FOREMAN RESTRM BASIN | ACTIV | - - - | - - - | Yes | - - - |
| RFD1053 | Pb & Cu | WSD | NE | RF | REFN WAREHOUSE WASH BASIN | ACTIV | - - - | - - - | Yes | - - - |
| RFD1054 | Pb & Cu | WSD | NE | RF | REFN MTC lunchroom sink | ACTIV | - - - | - - - | Yes | - - - |
| RFD1055 | Pb & Cu | WSD | NE | RF | REFN BOILER PLT UPSTAIRS RESTRM SINK | ACTIV | - - - | - - - | Yes | - - - |
| LTD1056 | Pb & Cu | WSD | SE | LT | IS&T mens rest room sink | ACTIV | - - - | - - - | Yes | - - - |
| LTD1057 | Pb & Cu | WSD | SE | LT | Lark security office kicthen | ACTIV | - - - | - - - | Yes | - - - |
| LTD1058 | Pb & Cu | WSD | SE | LT | Lark security outside womans rest room | ACTIV | - - - | - - - | Yes | - - - |
| LTD1059 | Pb & Cu | WSD | SE | LT | Crusher re-locate office womans RR sink LARK | ACTIV | - - - | - - - | Yes | - - - |
| LTD1060 | Pb & Cu | WSD | SE | LT | Lark contractor trailer kicthen sink | ACTIV | - - - | - - - | Yes | - - - |
| PCD1061 | Pb & Cu | WSD | NE | PC | BNVL GRIND BLDG CONTROL ROOM RESTROOM | Gone | - - - | - - - | Yes | - - - |
| PCD1062 | Pb & Cu | WSD | NE | PC | BNVL DUMP BLDG FURNACE ROOM MOP SINK | Gone | - - - | - - - | Yes | - - - |
| ARD1063 | Pb & Cu | WSD | NE | AR | ARTHR CARPENTERS SHOP SHOWER | Gone | - - - | - - - | Yes | - - - |
| ARD1064 | Pb & Cu | WSD | NE | AR | ARTHR ADMN BLDG FURNACE ROOM MOP SINK | Gone | - - - | - - - | Yes | - - - |
| WTD1065 | Pb & Cu | WSD | NE | WT | GARFLD SECURITY RESTROOM WASH BASIN | ACTIV | - - - | - - - | Yes | - - - |
| ARD1066 | Pb & Cu | WSD | NE | AR | ARTHR ADMN DOWNSTR WOMEN WASHRM BASIN | Gone | - - - | - - - | Yes | - - - |
| PCD1067 | Pb & Cu | WSD | NE | PC | BNVL DUMPER BLDG CONTROL WASHROOM | Gone | - - - | - - - | Yes | - - - |
| SMD1068 | Pb & Cu | WSD | NE | SM | SMLT #8 ACID FIELD REPAIR RSTRM BASIN | ACTIV | - - - | - - - | Yes | - - - |
| SMD1069 | Pb & Cu | WSD | NE | SM | SMLT SAFETY OFFICE EXAM ROOM BASIN | ACTIV | - - - | - - - | Yes | - - - |
| SMD1070 | Pb & Cu | WSD | NE | SM | SMLT ENVR OFFICE RESTROOM WASH BASIN | ACTIV | - - - | - - - | Yes | - - - |
| SMD1071 | Pb & Cu | WSD | NE | SM | REFN ADMN BLDG MEN RESTROOM BASIN | ACTIV | - - - | - - - | Yes | - - - |
| MCD1073 | Pb & Cu | WSD | NE | MC | MAGNA PIPE SHOP LUNCHROOM SINK | Gone | - - - | - - - | Yes | - - - |
| ARD1074 | Pb & Cu | WSD | NE | AR | ARTHR CENTRAL SHOP RESTROOM WSH BASIN | Gone | - - - | - - - | Yes | - - - |
| SMD1075 | Pb & Cu | WSD | NE | SM | SMLTR ENGINEERING KITCHEN SINK | ACTIV | - - - | - - - | Yes | - - - |
| LSD1078 | Pb & Cu | WSD | NE | LS | SEC21 PUMP HOUSE COMBINED AFTER CHLOR | ACTIV | - - - | - - - | Yes | - - - |
| BYD1080 | Pb & Cu | WSD | VW | BY | CPPRTN CONC CHNG HOUSE JAINITOR SINK | ACTIV | - - - | - - - | Yes | - - - |
| BYD1081 | Pb & Cu | WSD | VW | BY | CPPRTN CONC PLANNING GROUP KITCHEN TAP | ACTIV | - - - | - - - | Yes | - - - |



PRELIMINARY DRAFT

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| BYD1082 | Pb & Cu | WSD | VW | BY | CPPRTN CONC GRIND MILLWRGHT REST ROOM | ACTIV | - - - | - - - | Yes | - - - |
| BYD1083 | Pb & Cu | WSD | VW | BY | CPPRTN CONC GRIND OPERATION KTCHN TAP | ACTIV | - - - | - - - | Yes | - - - |
| BYD1084 | Pb & Cu | WSD | VW | BY | CPPRTN CONC MOLY PLT SYSTEM REST ROOM TAP | ACTIV | - - - | - - - | Yes | - - - |
| BYD1085 | Pb & Cu | WSD | VW | BY | CPPRTN CONC GRIND ELECTRICL KTCHN TAP | ACTIV | - - - | - - - | Yes | - - - |
| BYD1086 | Pb & Cu | WSD | VW | BY | CPPRTN CONC MET LAB KITCHEN SINK | ACTIV | - - - | - - - | Yes | - - - |
| BYD1087 | Pb & Cu | WSD | VW | BY | CPPRTN CONC MOLY OPERATION KTCHN SINK | ACTIV | - - - | - - - | Yes | - - - |
| BYD1089 | Pb & Cu | WSD | VW | BY | CPPRTN CONC RECORD CENTER RSTRM SINK | ACTIV | - - - | - - - | Yes | - - - |
| BYD1090 | | WSD | VW | BY | CPPRTN CONC CULINARY TANK AFTER CHLOR | ACTIV | - - - | - - - | Yes | - - - |
| ECG1092 | BW#2 | WTR | VW | EC | BARRIER WELL PW#2 IN BINGHAM CREEK | ABAND | Yes | - - - | - - - | - - - |
| ECG1093 | BW#3 | WTR | VW | EC | BARRIER WELL PW#3 IN BINGHAM CREEK | ABAND | Yes | - - - | - - - | - - - |
| RFD1094 | Pb & Cu | WTR | NE | RF | Refinery PM building womans RR sink | ACTIV | - - - | - - - | Yes | - - - |
| SMD1095 | Pb & Cu | WTR | NE | | Smelter admin. 2nd floor day pay kicten | ACTIV | - - - | - - - | Yes | - - - |
| SMD1096 | Pb & Cu | WTR | NE | | Smelter EDX mens RR sink | ACTIV | - - - | - - - | Yes | - - - |
| SMD1097 | Pb & Cu | WTR | NE | | Smelter flash furnace 3rd floor RR sink | Activ | - - - | - - - | Yes | - - - |
| SMD1098 | Pb & Cu | WTR | NE | | Smelter filter plant maintenance Bldg. womans RR sink | | - - - | - - - | Yes | - - - |
| ECG1100A | | WTR | VW | | BINGHAM CANYON MOUTH | OK | - - - | - - - | - - - | - - - |
| ECG1100B | | WTR | VW | | BINGHAM CANYON MOUTH | OK | - - - | - - - | - - - | - - - |
| MDG1101 | | WTR | VW | | BINGHAM CREEK/DRYFORK MONITORING | OK | - - - | - - - | - - - | - - - |
| ECG1102 | | WTR | VW | | BINGHAM CREEK ALLUVIAL | OK | - - - | - - - | - - - | - - - |
| ECG1103 | | WTR | VW | | BINGHAM CREEK ALLUVIAL | OK | - - - | - - - | - - - | - - - |
| ECG1104 | | WTR | VW | | BINGHAM CREEK ALLUVIAL | OK | - - - | - - - | - - - | - - - |
| ECG1105A | | WTR | VW | | BINGHAM CREEK ALLUVIAL | OK | - - - | - - - | - - - | - - - |
| ECG1105B | | WTR | VW | | BINGHAM CREEK BEDROCK | OK | - - - | - - - | - - - | - - - |
| ECG1106A | | WTR | VW | | BINGHAM CREEK BEDROCK | OK | - - - | - - - | - - - | - - - |
| ECG1106B | | WTR | VW | | BINGHAM CREEK BEDROCK | OK | - - - | - - - | - - - | - - - |
| COG1107A | | WTR | VW | CO | LOWER DRYFORK MONITORING | OK | - - - | - - - | - - - | - - - |
| COG1107B | | WTR | VW | CO | LOWER DRYFORK MONITORING | OK | - - - | - - - | - - - | - - - |
| ECG1108A | | WTR | VW | | BINGHAM CREEK/DRYFORK MONITORING | OK | - - - | - - - | - - - | - - - |
| ECG1108B | | WTR | VW | | BINGHAM CREEK/DRYFORK MONITORING | OK | - - - | - - - | - - - | - - - |
| COG1109A | | WTR | VW | CO | LOWER DRYFORK MONITORING | OK | - - - | - - - | - - - | - - - |
| COG1109B | | WTR | VW | CO | LOWER DRYFORK MONITORING | OK | - - - | - - - | - - - | - - - |
| ECG1110A | | WTR | VW | | BINGHAM CREEK BEDROCK | OK | - - - | - - - | - - - | - - - |
| ECG1110B | | WTR | VW | | BINGHAM CREEK BEDROCK | OK | - - - | - - - | - - - | - - - |
| MDZ1111 | | WTR | VW | | EASTSIDE DUMP GROUND WATER LEVEL | OK | - - - | - - - | - - - | - - - |
| COG1112A | | WTR | VW | CO | COPPERTON ALLUVIAL | OK | - - - | - - - | - - - | - - - |
| COG1112B | | WTR | VW | CO | COPPERTON ALLUVIAL | OK | - - - | - - - | - - - | - - - |
| ECG1113A | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1113B | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1113C | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1114A | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1114B | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1115A | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1115B | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1115C | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1115D | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1115E | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1116A | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1116B | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1116C | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1117A | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1117B | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1117C | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1118A | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1118B | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |

DRAFT

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| ECG1118C | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| BSG1119A | | WTR | VW | BS | BASTIAN SINK | CB | Yes | - - - | - - - | - - - |
| BSG1119B | | WTR | VW | BS | BASTIAN SINK | OK | Yes | - - - | - - - | - - - |
| BSG1119C | | WTR | VW | BS | BASTIAN SINK | OK | Yes | - - - | - - - | - - - |
| B1G1120A | | WTR | VW | B1 | BINGHAM CREEK SEGMENT #1 | OK | Yes | - - - | - - - | - - - |
| B1G1120B | | WTR | VW | B1 | BINGHAM CREEK SEGMENT #1 | OK | Yes | - - - | - - - | - - - |
| B1G1120C | | WTR | VW | B1 | BINGHAM CREEK SEGMENT #1 | OK | Yes | - - - | - - - | - - - |
| ECG1121A | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1121B | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1121C | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| HMG1122A | | WTR | VW | HM | HERRIMAN | OK | Yes | - - - | - - - | - - - |
| HMG1122B | | WTR | VW | HM | HERRIMAN | OK | Yes | - - - | - - - | - - - |
| HMG1122C | | WTR | VW | HM | HERRIMAN | OK | Yes | - - - | - - - | - - - |
| HMG1123A | | WTR | VW | HM | HERRIMAN | OK | Yes | - - - | - - - | - - - |
| HMG1123B | | WTR | VW | HM | HERRIMAN | OK | Yes | - - - | - - - | - - - |
| HMG1123C | | WTR | VW | HM | HERRIMAN | OK | Yes | - - - | - - - | - - - |
| ECG1124A | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1124B | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1124C | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| BSG1125A | | WTR | VW | BS | BASTIAN SINK | OK | Yes | - - - | - - - | - - - |
| BSG1125B | | WTR | VW | BS | BASTIAN SINK | OK | Yes | - - - | - - - | - - - |
| BSG1125C | | WTR | VW | BS | BASTIAN SINK | OK | Yes | - - - | - - - | - - - |
| HMG1126A | | WTR | VW | HM | HERRIMAN | OK | Yes | - - - | - - - | - - - |
| HMG1126B | | WTR | VW | HM | HERRIMAN | OK | Yes | - - - | - - - | - - - |
| HMG1126C | | WTR | VW | HM | HERRIMAN | OK | Yes | - - - | - - - | - - - |
| LTG1127A | | WTR | VW | LT | LARK TAILINGS | OK | Yes | - - - | - - - | - - - |
| LTG1127B | | WTR | VW | LT | LARK TAILINGS | OK | Yes | - - - | - - - | - - - |
| LTG1127C | | WTR | VW | LT | LARK TAILINGS | OK | Yes | - - - | - - - | - - - |
| ECG1128A | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1128B | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1128C | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| LTG1129A | | WTR | VW | LT | LARK TAILINGS | OK | Yes | - - - | - - - | - - - |
| LTG1129B | | WTR | VW | LT | LARK TAILINGS | OK | Yes | - - - | - - - | - - - |
| LTG1129C | | WTR | VW | LT | LARK TAILINGS | OK | Yes | - - - | - - - | - - - |
| BSG1130A | | WTR | VW | BS | BASTIAN SINK | OK | Yes | - - - | - - - | - - - |
| BSG1130B | | WTR | VW | BS | BASTIAN SINK | OK | Yes | - - - | - - - | - - - |
| BSG1130C | | WTR | VW | BS | BASTIAN SINK | OK | Yes | - - - | - - - | - - - |
| ECG1131A | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1131B | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1131C | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| BSG1132A | | WTR | VW | BS | BASTIAN SINK | OK | Yes | - - - | - - - | - - - |
| BSG1132B | | WTR | VW | BS | BASTIAN SINK | OK | Yes | - - - | - - - | - - - |
| BSG1132C | | WTR | VW | BS | BASTIAN SINK | OK | Yes | - - - | - - - | - - - |
| BSG1133A | | WTR | VW | BS | BASTIAN SINK | OK | Yes | - - - | - - - | - - - |
| BSG1133B | | WTR | VW | BS | BASTIAN SINK | OK | Yes | - - - | - - - | - - - |
| BSG1133C | | WTR | VW | BS | BASTIAN SINK | OK | Yes | - - - | - - - | - - - |
| HMG1134A | | WTR | VW | HM | HERRIMAN | OK | Yes | - - - | - - - | - - - |
| HMG1134B | | WTR | VW | HM | HERRIMAN | OK | Yes | - - - | - - - | - - - |
| HMG1134C | | WTR | VW | HM | HERRIMAN | OK | Yes | - - - | - - - | - - - |
| BSG1135A | | WTR | VW | BS | BASTIAN SINK | OK | Yes | - - - | - - - | - - - |
| BSG1135B | | WTR | VW | BS | BASTIAN SINK | OK | Yes | - - - | - - - | - - - |
| BSG1135C | | WTR | VW | BS | BASTIAN SINK | OK | Yes | - - - | - - - | - - - |
| BFG1136A | | WTR | VW | BS | BASTIAN FLATS | OK | Yes | - - - | - - - | - - - |
| BFG1136B | | WTR | VW | BS | BASTIAN FLATS | OK | Yes | - - - | - - - | - - - |

PRELIMINARY DRAFT

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| BFG1136C | | WTR | VW | BS | BASTIAN FLATS | OK | Yes | - - - | - - - | - - - |
| BSG1137A | | WTR | VW | BS | BASTIAN SINK | OK | Yes | - - - | - - - | - - - |
| BSG1137B | | WTR | VW | BS | BASTIAN SINK | OK | Yes | - - - | - - - | - - - |
| BSG1137C | | WTR | VW | BS | BASTIAN SINK | OK | Yes | - - - | - - - | - - - |
| LTG1138A | | WTR | VW | LT | LARK TAILINGS | OK | Yes | - - - | - - - | - - - |
| LTG1138B | | WTR | VW | LT | LARK TAILINGS | OK | Yes | - - - | - - - | - - - |
| LTG1138C | | WTR | VW | LT | LARK TAILINGS | OK | Yes | - - - | - - - | - - - |
| LTG1138D | | WTR | VW | LT | LARK TAILINGS | OK | Yes | - - - | - - - | - - - |
| LTG1138E | | WTR | VW | LT | LARK TAILINGS | OK | Yes | - - - | - - - | - - - |
| LTG1138F | | WTR | VW | LT | LARK TAILINGS | AB | Yes | - - - | - - - | - - - |
| LTG1139 | | WTR | VW | LT | Clean water Well/LARK TAILINGS | OK | Yes | - - - | - - - | - - - |
| LTG1140A | | WTR | VW | LT | LARK TAILINGS | OK | Yes | - - - | - - - | - - - |
| LTG1140B | | WTR | VW | LT | LARK TAILINGS | OK | Yes | - - - | - - - | - - - |
| LTG1140C | | WTR | VW | LT | LARK TAILINGS | OK | Yes | - - - | - - - | - - - |
| LTG1140D | | WTR | VW | LT | LARK TAILINGS | OK | Yes | - - - | - - - | - - - |
| LTG1141A | | WTR | VW | LT | LARK TAILINGS | OK | Yes | - - - | - - - | - - - |
| LTG1141B | | WTR | VW | LT | LARK TAILINGS | OK | Yes | - - - | - - - | - - - |
| LTG1141C | | WTR | VW | LT | LARK TAILINGS | OK | Yes | - - - | - - - | - - - |
| ECG1142A | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1142B | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1142C | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1143A | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1143B | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1143C | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1144A | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1144B | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1144C | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1145A | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1145B | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1145C | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| ECG1146 | | WTR | VW | EC | EASTSIDE COLLECTION | OK | Yes | - - - | - - - | - - - |
| LTG1147 | | WTR | VW | LT | LARK TAILINGS | OK | Yes | - - - | - - - | - - - |
| BSG1148A | | WTR | VW | BS | Bastian sink area (south area ground Water) | OK | Yes | - - - | - - - | - - - |
| BSG1148B | | WTR | VW | BS | Bastian sink area (south area ground Water) | OK | Yes | - - - | - - - | - - - |
| BSG1148C | | WTR | VW | BS | Bastian sink area (south area ground Water) | OK | Yes | - - - | - - - | - - - |
| BCG1149A | | WTR | VW | | | OK | Yes | - - - | - - - | - - - |
| BCG1149B | | WTR | VW | | | OK | Yes | - - - | - - - | - - - |
| BCG1149C | | WTR | VW | | | OK | Yes | - - - | - - - | - - - |
| BCG1150A | | WTR | VW | | | OK | Yes | - - - | - - - | - - - |
| BCG1150B | | WTR | VW | | | OK | Yes | - - - | - - - | - - - |
| BCG1150C | | WTR | VW | | | OK | Yes | - - - | - - - | - - - |
| COG1151A | | WTR | VW | CO | south area ground water plume | OK | Yes | - - - | - - - | - - - |
| COG1151B | | WTR | VW | CO | south area ground water plume | OK | Yes | - - - | - - - | - - - |
| COG1151C | | WTR | VW | CO | south area ground water plume | OK | Yes | - - - | - - - | - - - |
| COG1151D | | WTR | VW | CO | south area ground water plume | OK | Yes | - - - | - - - | - - - |
| COG1152A | | WTR | VW | CO | south area ground water plume | OK | Yes | - - - | - - - | - - - |
| COG1152B | | WTR | VW | CO | south area ground water plume | OK | Yes | - - - | - - - | - - - |
| COG1152C | | WTR | VW | CO | south area ground water plume | OK | Yes | - - - | - - - | - - - |
| BSG1153A | | WTR | VW | BS | Bastian sink area (south area ground Water) | OK | Yes | - - - | - - - | - - - |
| BSG1153B | | WTR | VW | BS | Bastian sink area (south area ground Water) | OK | Yes | - - - | - - - | - - - |
| BSG1153C | | WTR | VW | BS | Bastian sink area (south area ground Water) | OK | Yes | - - - | - - - | - - - |
| WJG1154A | | WTR | VW | WJ | West Jordan ground water | OK | Yes | - - - | - - - | - - - |
| WJG1154B | | WTR | VW | WJ | West Jordan ground water | OK | Yes | - - - | - - - | - - - |
| WJG1154C | | WTR | VW | WJ | West Jordan ground water | OK | Yes | - - - | - - - | - - - |



DRAFT

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| BFG1155A | | WTR | VW | BF | Bingham flat south of old hwy | OK | Yes | - - - | - - - | - - - |
| BFG1155B | | WTR | VW | BF | Bingham flat south of old hwy | OK | Yes | - - - | - - - | - - - |
| BFG1155C | | WTR | VW | BF | Bingham flat south of old hwy | OK | Yes | - - - | - - - | - - - |
| BFG1155D | | WTR | VW | BF | Bingham flat south of old hwy | OK | Yes | - - - | - - - | - - - |
| BFG1155E | | WTR | VW | BF | Bingham flat south of old hwy | OK | Yes | - - - | - - - | - - - |
| BFG1155F | | WTR | VW | BF | Bingham flat south of old hwy | OK | Yes | - - - | - - - | - - - |
| BFG1156A | | WTR | VW | BF | Bingham flat south of old hwy | OK | Yes | - - - | - - - | - - - |
| BFG1156B | | WTR | VW | BF | Bingham flat south of old hwy | OK | Yes | - - - | - - - | - - - |
| BFG1156C | | WTR | VW | BF | Bingham flat south of old hwy | OK | Yes | - - - | - - - | - - - |
| BFG1156D | | WTR | VW | BF | Bingham flat south of old hwy | OK | Yes | - - - | - - - | - - - |
| BFG1156E | | WTR | VW | BF | Bingham flat south of old hwy | OK | Yes | - - - | - - - | - - - |
| BFG1156F | | WTR | VW | BF | Bingham flat south of old hwy | OK | Yes | - - - | - - - | - - - |
| B2G1157A | | WTR | VW | | Bingham creek (south ground water | OK | Yes | - - - | - - - | - - - |
| B2G1157B | | WTR | VW | | Bingham creek (south ground water | OK | Yes | - - - | - - - | - - - |
| B2G1157C | | WTR | VW | | Bingham creek (south ground water | OK | Yes | - - - | - - - | - - - |
| BCG1158A | | WTR | VW | | | OK | Yes | - - - | - - - | - - - |
| BCG1158B | | WTR | VW | | | OK | Yes | - - - | - - - | - - - |
| BCG1158C | | WTR | VW | | | OK | Yes | - - - | - - - | - - - |
| BCG1159 | | WTR | VW | | | OK | Yes | - - - | - - - | - - - |
| HMG1163A | | WTR | VW | HM | Herriman area ground water | OK | Yes | - - - | - - - | - - - |
| HMG1163B | | WTR | VW | HM | Herriman area ground water | OK | Yes | - - - | - - - | - - - |
| HMG1163C | | WTR | VW | HM | Herriman area ground water | OK | Yes | - - - | - - - | - - - |
| RVG1164A | | WTR | VW | RV | Herriman area ground water | AB | Yes | - - - | - - - | - - - |
| RVG1164B | | WTR | VW | RV | Herriman area ground water | AB | Yes | - - - | - - - | - - - |
| RVG1164C | | WTR | VW | RV | Herriman area ground water | OK | Yes | - - - | - - - | - - - |
| EPG1165A | | WTR | VW | EP | Day break area | OK | Yes | - - - | - - - | - - - |
| EPG1165B | | WTR | VW | EP | Day break area | OK | Yes | - - - | - - - | - - - |
| EPG1165C | | WTR | VW | EP | Day break area | OK | Yes | - - - | - - - | - - - |
| EPG1166 | | WTR | VW | EP | Day break area | OK | Yes | - - - | - - - | - - - |
| LTG1167A | | WTR | VW | LT | Day break area | OK | Yes | - - - | - - - | - - - |
| LTG1167B | | WTR | VW | LT | Day break area | OK | Yes | - - - | - - - | - - - |
| LTG1167C | | WTR | VW | LT | Day break area | OK | Yes | - - - | - - - | - - - |
| BFG1168A | | WTR | VW | BF | Bingham flat south of old hwy | OK | Yes | - - - | - - - | - - - |
| BFG1168B | | WTR | VW | BF | Bingham flat south of old hwy | OK | Yes | - - - | - - - | - - - |
| BFG1168C | | WTR | VW | BF | Bingham flat south of old hwy | OK | Yes | - - - | - - - | - - - |
| WJG1169A | | WTR | VW | WJ | West Jordan ground water | OK | Yes | - - - | - - - | - - - |
| WJG1169B | | WTR | VW | WJ | West Jordan ground water | OK | Yes | - - - | - - - | - - - |
| WJG1169C | | WTR | VW | WJ | West Jordan ground water | OK | Yes | - - - | - - - | - - - |
| WJG1170A | | WTR | VW | WJ | West Jordan ground water | AB | Yes | - - - | - - - | - - - |
| WJG1170B | | WTR | VW | WJ | West Jordan ground water | AB | Yes | - - - | - - - | - - - |
| WJG1170C | | WTR | VW | WJ | West Jordan ground water | AB | Yes | - - - | - - - | - - - |
| WJG1171A | | WTR | VW | WJ | West Jordan ground water | OK | Yes | - - - | - - - | - - - |
| WJG1171B | | WTR | VW | WJ | West Jordan ground water | OK | Yes | - - - | - - - | - - - |
| WJG1171C | | WTR | VW | WJ | West Jordan ground water | OK | Yes | - - - | - - - | - - - |
| COG1172 | | WTR | VW | CO | Upper Dry Fork (PICNIC FLATS) | ok | Yes | - - - | - - - | - - - |
| COG1173A | | WTR | VW | CO | Upper Dry Fork | ok | Yes | - - - | - - - | - - - |
| COG1173B | | WTR | VW | CO | Upper Dry Fork | ok | Yes | - - - | - - - | - - - |
| COG1173C | | WTR | VW | CO | Upper Dry Fork | ok | Yes | - - - | - - - | - - - |
| COG1174A | | WTR | VW | CO | Upper Dry Fork | ok | Yes | - - - | - - - | - - - |
| COG1174B | | WTR | VW | CO | Upper Dry Fork | ok | Yes | - - - | - - - | - - - |
| COG1174C | | WTR | VW | CO | Upper Dry Fork | ok | Yes | - - - | - - - | - - - |
| COG1175A | | WTR | VW | CO | south area ground water plume | OK | Yes | - - - | - - - | - - - |
| COG1175B | | WTR | VW | CO | south area ground water plume | OK | Yes | - - - | - - - | - - - |
| COG1175C | | WTR | VW | CO | south area ground water plume | OK | Yes | - - - | - - - | - - - |

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| B2G1176A | | WTR | VW | B2 | Bingham creek (south ground water | OK | Yes | - - - | - - - | - - - |
| B2G1176B | | WTR | VW | B2 | Bingham creek (south ground water | OK | Yes | - - - | - - - | - - - |
| B2G1176C | | WTR | VW | B2 | Bingham creek (south ground water | OK | Yes | - - - | - - - | - - - |
| BSG1177B | | WTR | VW | BS | Bastian sink area (south area ground Water) | OK | Yes | - - - | - - - | - - - |
| BSG1177C | | WTR | VW | BS | Bastian sink area (south area ground Water) | OK | Yes | - - - | - - - | - - - |
| COG1178A | | WTR | VW | CO | | OK | Yes | - - - | - - - | - - - |
| COG1178B | | WTR | VW | CO | | OK | Yes | - - - | - - - | - - - |
| COG1178C | | WTR | VW | CO | | OK | Yes | - - - | - - - | - - - |
| BSG1179A | | WTR | VW | BS | Bastian sink area (south area ground Water) | OK | Yes | - - - | - - - | - - - |
| BSG1179B | | WTR | VW | BS | Bastian sink area (south area ground Water) | OK | Yes | - - - | - - - | - - - |
| BSG1179C | | WTR | VW | BS | Bastian sink area (south area ground Water) | OK | Yes | - - - | - - - | - - - |
| BSG1180A | | WTR | VW | BS | Bastian sink area (south area ground Water) | OK | Yes | - - - | - - - | - - - |
| BSG1180B | | WTR | VW | BS | Bastian sink area (south area ground Water) | OK | Yes | - - - | - - - | - - - |
| BSG1180C | | WTR | VW | BS | Bastian sink area (south area ground Water) | OK | Yes | - - - | - - - | - - - |
| ECX1181 | | WTR | | | | | Yes | - - - | - - - | - - - |
| ECG1182A | | WTR | VW | EC | Eastside collection monitoring | OK | Yes | - - - | - - - | - - - |
| ECG1182B | | WTR | VW | EC | Eastside collection monitoring | OK | Yes | - - - | - - - | - - - |
| ECG1183A | | WTR | VW | EC | Eastside collection monitoring | OK | Yes | - - - | - - - | - - - |
| ECG1183B | | WTR | VW | EC | Eastside collection monitoring | OK | Yes | - - - | - - - | - - - |
| ECG1184 | | WTR | VW | EC | Eastside collection monitoring | OK | Yes | - - - | - - - | - - - |
| ECG1185 | | WTR | VW | EC | Copperton Channel Extraction Well | OK | Yes | - - - | - - - | - - - |
| ECG1186 | | WTR | VW | EC | Eastside collection monitoring | OK | Yes | - - - | - - - | - - - |
| ECG1187 | | WTR | VW | EC | East Side Collection | OK | Yes | - - - | - - - | - - - |
| ECG1188 | | WTR | VW | EC | East Side Collection | OK | Yes | - - - | - - - | - - - |
| ECG1189 | | WTR | VW | EC | East Side Collection | OK | Yes | - - - | - - - | - - - |
| ECG1190 | | WTR | VW | EC | East Side Collection | OK | Yes | - - - | - - - | - - - |
| LTG1191 | | WTR | VW | EC | Lark Tailings Area | OK | Yes | - - - | - - - | - - - |
| ECG1192 | | WTR | VW | EC | Dry Fork Extraction Well | OK | Yes | - - - | - - - | - - - |
| B2G1193 | K 60 | WTR | VW | B2 | New well for well 60 | OK | Yes | - - - | - - - | - - - |
| B2G1194A | | WTR | VW | | Bingham creek (south ground water | OK | Yes | - - - | - - - | - - - |
| B2G1194B | | WTR | VW | | Bingham creek (south ground water | OK | Yes | - - - | - - - | - - - |
| B2G1195A | | WTR | VW | | Bingham creek (south ground water | OK | Yes | - - - | - - - | - - - |
| B2G1195B | | WTR | VW | | Bingham creek (south ground water | OK | Yes | - - - | - - - | - - - |
| BSG1196A | | WTR | VW | BS | Bastian sink area (south area ground Water) | OK | Yes | - - - | - - - | - - - |
| BSG1196B | | WTR | VW | BS | Bastian sink area (south area ground Water) | OK | Yes | - - - | - - - | - - - |
| BSG1196C | | WTR | VW | BS | Bastian sink area (south area ground Water) | OK | Yes | - - - | - - - | - - - |
| B3G1197A | | WTR | VW | | Bingham creek (south ground water | OK | Yes | - - - | - - - | - - - |
| B3G1197B | | WTR | VW | | Bingham creek (south ground water | OK | Yes | - - - | - - - | - - - |
| B3G1197C | | WTR | VW | | Bingham creek (south ground water | OK | Yes | - - - | - - - | - - - |
| BFG1198A | | WTR | VW | BF | Bingham flat south of old hwy | OK | Yes | - - - | - - - | - - - |
| BFG1198B | | WTR | VW | BF | Bingham flat south of old hwy | OK | Yes | - - - | - - - | - - - |
| BFG1198C | | WTR | VW | BF | Bingham flat south of old hwy | OK | Yes | - - - | - - - | - - - |
| ECG1199B | | WTR | WV | EC | Sonic Drilled Monitoring | OK | Yes | - - - | - - - | - - - |
| ECG1199A | | WTR | VW | EC | Sonic drilled monitoring well | OK | Yes | - - - | - - - | - - - |
| ECG1199C | | WTR | VW | EC | Sonic Drilled Well | OK | Yes | - - - | - - - | - - - |
| ECG1199D | | WTR | VW | EC | Sonic drilled well | OK | Yes | - - - | - - - | - - - |
| ECG1199E | | WTR | VW | EC | Sonic drilled well | OK | Yes | - - - | - - - | - - - |
| ECG1199F | | WTR | VW | EC | Sonic drilled well | OK | Yes | - - - | - - - | - - - |
| ECG1199G | | WTR | VW | EC | Sonic drilled well | OK | Yes | - - - | - - - | - - - |
| BFG1200 | K109 | WTR | VW | | Bingham flat south of old hwy | OK | Yes | - - - | - - - | - - - |
| BSG1201 | | WTR | VW | | Bastian sink area (south area ground Water) | OK | Yes | - - - | - - - | - - - |
| ECG1203 | | WTR | VW | | | OK | Yes | - - - | - - - | - - - |
| COG1204A | | WTR | VW | | south area ground water plume | OK | Yes | - - - | - - - | - - - |
| COG1204B | | WTR | VW | | south area ground water plume | OK | Yes | - - - | - - - | - - - |

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| NET1300 | NET1300 | WTR | NE | CH | TAILINGS WATER | AB | Yes | --- | --- | --- |
| NET1300B | NET1300 | WTR | NE | CH | TAILINGS WATER | AB | Yes | --- | --- | --- |
| NET1300C | NET1300 | WTR | NE | CH | TAILINGS WATER | AB | Yes | --- | --- | --- |
| CHT1301 | CHT1301 | WTR | NE | CH | TAILINGS WATER | OK | Yes | --- | --- | Yes |
| CHT1302 | CHT1302 | WTR | NE | CH | TAILINGS WATER | OK | Yes | --- | --- | Yes |
| CHT1303 | CHT1303 | WTR | NE | CH | TAILINGS WATER | OK | Yes | --- | --- | Yes |
| TLT1304 | TLT891 | WTR | NE | TL | TAILINGS WATER | OK | --- | --- | --- | Yes |
| TLT1305 | TLT892 | WTR | NE | TL | TAILINGS WATER | OK | --- | --- | --- | Yes |
| TLT1306 | TLT893 | WTR | NE | TL | TAILINGS WATER | OK | --- | --- | --- | Yes |
| TLT1307 | TLT894 | WTR | NE | TL | TAILINGS WATER | OK | --- | --- | --- | Yes |
| TLT1308 | TLT895 | WTR | NE | TL | TAILINGS WATER | OK | --- | --- | --- | Yes |
| NEL1309 | MNN | WTR | NE | LS | TAILINGS WATER | OK | Yes | --- | --- | --- |
| NEL1310 | MNS | WTR | NE | LS | TAILINGS WATER | OK | Yes | --- | --- | --- |
| NET1311 | off morton | WTR | NE | MO | 1 MILE W OF 7200 W ON ACCESS ROAD | OK | Yes | --- | --- | --- |
| NEL1312 | Well 15 | WTR | NE | LS | ALIAS NEL474-NORTH END LANDFILL | OK | Yes | --- | --- | --- |
| NEL1313 | Well 14 | WTR | NE | LS | ALIAS NEL475-NORTH END LANDFILL M | OK | Yes | --- | --- | --- |
| LRP1314 | | WTR | VW | LR | ZONE II-LARGE RESERVOIR (SUMP NO. 1) | NEW | --- | --- | --- | Yes |
| LRP1315 | | WTR | VW | LR | ZONE II-LARGE RESERVOIR (SUMP NO. 2) | NEW | --- | --- | --- | Yes |
| LRP1316 | | WTR | VW | LR | ZONE II-LARGE RESERVOIR (SUMP NO. 3) | NEW | --- | --- | --- | Yes |
| LRP1317 | | WTR | VW | LR | ZONE II-LARGE RESERVOIR (SUMP NO. 4) | NEW | --- | --- | --- | Yes |
| LRP1318 | | WTR | VW | LR | ZONE II-LARGE RESERVOIR (SUMP NO. 5) | NEW | --- | --- | --- | Yes |
| LRP1319 | | WTR | VW | LR | ZONE II-LARGE RESERVOIR | NEW | --- | --- | --- | Yes |
| LRP1320 | | WTR | VW | LR | DESILTING BASIN #1-CHAMBER 1 (W POND) | NEW | --- | --- | --- | Yes |
| LRP1321 | | WTR | VW | LR | DESILTING BASIN #2-CHAMBER 2 (N POND) | NEW | --- | --- | --- | Yes |
| LRP1322 | | WTR | VW | LR | DESILTING BASIN #3-CHAMBER 3 (S POND) | NEW | --- | --- | --- | Yes |
| NOG1323 | | WTR | NE | NO | WETLANDS PROJECT SOUTH WELL | OK | Yes | --- | --- | --- |
| NOG1324 | | WTR | NE | NO | WETLANDS PROJECT CENTRAL WELL | OK | Yes | --- | --- | --- |
| NOG1325 | b1219aca1 | WTR | NE | NO | WETLANDS PROJECT | OK | Yes | --- | --- | --- |
| NOS1326 | | WTR | NE | NO | WETLANDS PROJECT NORTH POINT CONSOLIDA | OK | --- | Yes | --- | --- |
| NOS1327 | | WTR | NE | NO | WETLANDS PROJECT BLACKHAWK POND | OK | --- | Yes | --- | --- |
| NOS1328 | | WTR | NE | NO | WETLANDS PROJECT GOGGINS DRAIN | OK | --- | Yes | --- | --- |
| ECS1329 | | WTR | VW | EC | BINGHAM CREEK, 1ST EMERGENCE OF WATER | OK | --- | Yes | --- | --- |
| ECS1330 | | WTR | VW | EC | AMSTERDAM TUNNEL | OK | --- | Yes | --- | --- |
| ECS1331 | | WTR | VW | EC | FREEMAN DUMP COLLECTION BOX | OK | --- | Yes | --- | --- |
| ECS1332 | | WTR | VW | EC | LION HEAD GULCH COLLECTION BOX | OK | --- | Yes | --- | --- |
| ECS1333 | | WTR | VW | EC | MARKHAM TUNNEL | OK | --- | Yes | --- | --- |
| ECS1334 | | WTR | VW | EC | SMELTER GULCH COLLECTION BOX | OK | --- | Yes | --- | --- |
| ECS1335 | | WTR | VW | EC | TIEWAUKEE COLLECTION BOX | OK | --- | Yes | --- | --- |
| ECS1336 | | WTR | VW | EC | AMSTERDAM TUNNEL BOX | OK | --- | Yes | --- | --- |
| SMP1337 | | WTR | NE | SM | SMELTER EAST PROCESS POND | OK | --- | --- | --- | Yes |
| BFS1338 | | WTR | VW | BF | PROVO RESERVOIR CANAL-9000 S BING HWY | OK | --- | Yes | --- | --- |
| EPS1339 | | WTR | VW | EP | PROVO RESERVOIR CANAL-10400 S 3800 W | OK | --- | Yes | --- | --- |
| HMS1340 | | WTR | VW | HM | PROVO RESERVOIR CANAL-12300 S | OK | --- | Yes | --- | --- |
| BDS1341 | | WTR | VW | BD | PROVO RESERVOIR CANAL-15100 S 3200 W | OK | --- | Yes | --- | --- |
| WJS1342 | | WTR | VW | WJ | UTAH LAKE DIST CANAL-9000 S 3400 W | OK | --- | Yes | --- | --- |
| SJS1343 | | WTR | VW | SJ | UTAH LAKE DIST CANAL-10400 S 2710 W | OK | --- | Yes | --- | --- |
| RVS1344 | | WTR | VW | RV | UTAH LAKE DIST CANAL-12600 S | OK | --- | Yes | --- | --- |
| BDS1345 | | WTR | VW | BD | UTAH LAKE DIST CANAL-14980 S 2200 W | OK | --- | Yes | --- | --- |
| WJS1346 | | WTR | VW | WJ | UTAH & SALT LAKE CANAL-9000 S 2050 W | OK | --- | Yes | --- | --- |
| SJS1347 | | WTR | VW | SJ | UTAH & SALT LAKE CANAL-10400 S 1300 W | OK | --- | Yes | --- | --- |
| RVS1348 | | WTR | VW | RV | UTAH & SALT LAKE CANAL-12600 S | OK | --- | Yes | --- | --- |
| BDS1349 | | WTR | VW | BD | UTAH & SALT LAKE CANAL-14645 S CAMP W | OK | --- | Yes | --- | --- |
| WJS1350 | | WTR | VW | WJ | SOUTH JORDAN CANAL-9000 S 1800 W | OK | --- | Yes | --- | --- |
| SJS1351 | | WTR | VW | SJ | SOUTH JORDAN CANAL-10420 S 1200 W | OK | --- | Yes | --- | --- |

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TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| RVS1352 | | WTR | VW | RV | SOUTH JORDAN CANAL-12600 S | OK | - - - | Yes | - - - | - - - |
| BDS1353 | | WTR | VW | BD | SOUTH JORDAN CANAL-14660 S 1690 W | OK | - - - | Yes | - - - | - - - |
| BYS1354 | BCSPC | WTR | VW | BY | BARNEY'S CANYON PIT WTR TO COPPERTON | OK | - - - | Yes | - - - | - - - |
| BMS1355 | | WTR | VW | BM | CARR FORK EXHAUST SHAFT | OK | Yes | Yes | - - - | - - - |
| BMS1356 | | WTR | TV | CF | CARR FORK FRESH AIR SHAFT | OK | Yes | Yes | - - - | - - - |
| NOS1357 | | WTR | NE | NO | BHP CENTRAL (WETLANDS PROJECT) | OK | Yes | Yes | - - - | - - - |
| NOS1358 | | WTR | NE | NO | BHP EAST (WETLANDS PROJECT) | OK | Yes | Yes | - - - | - - - |
| WTS1359 | | WTR | NE | WT | CORRIGATED PIPE DISCHARGING TO SM RTN CL | OK | Yes | Yes | - - - | - - - |
| WTS1360 | | WTR | NE | WT | HDPE PIPE DISCHARGTING TO CANAL | OK | Yes | Yes | - - - | - - - |
| WTS1361 | | WTR | NE | WT | CORREGATED PIPE DISCHARGING TO CANAL | OK | Yes | Yes | - - - | - - - |
| WTS1362 | | WTR | NE | WT | DISCHARGE THROUGH DIKE | OK | Yes | Yes | - - - | - - - |
| NES1363 | | WTR | NE | SM | PRAXAIR O2 PLANT | OK | Yes | - - - | - - - | - - - |
| NES1364 | | WTR | NE | SM | PRAXAIR 0X PLANT | OK | Yes | - - - | - - - | - - - |
| NES1365 | | WTR | NE | SM | PRAXAIR O2 PLANT | OK | Yes | - - - | - - - | - - - |
| NES1366 | | WTR | NE | SM | PRAXAIR O2 PLANT | OK | Yes | - - - | - - - | - - - |
| NEM1367 | ARTESIAN 1 | WTR | NE | MG | ARTESIAN WELL - SECTION 21 | OK | Yes | - - - | Yes | - - - |
| NEM1368 | ARTESIAN 2 | WTR | NE | MG | ARTESIAN WELL - SECTION 21 | OK | Yes | - - - | Yes | - - - |
| MGD1369 | SEC 21 ADT | WTR | NE | MG | PART OF ARETESIAN WELL SYSTEM - SEC 21 | OK | - - - | - - - | Yes | - - - |
| WTS1370 | | WTR | NE | WT | CORRIGATED PIPE DISC TO SM RETURN CANAL | OK | - - - | Yes | - - - | - - - |
| WTS1371 | | WTR | NE | WT | CORRIGATED PIPE DISC TO SM RETURN CANAL | OK | - - - | Yes | - - - | - - - |
| SLS1372 | | WTR | NE | SL | SPRING DISH AFTER PASSING THRU CULVERT | OK | - - - | Yes | - - - | - - - |
| WTS1373 | | WTR | NE | WT | SPRING AT BASE OF OUTLET WORKS | OK | - - - | Yes | - - - | - - - |
| WTS1374 | | WTR | NE | WT | OLD UPDES DISCHARGE WEIR 006 | OK | - - - | Yes | - - - | - - - |
| TLS1375 | | WTR | NE | TL | | OK | - - - | Yes | - - - | - - - |
| NES1376 | | WTR | NE | SM | PRAXAIR O2 PLANT | OK | Yes | - - - | - - - | - - - |
| SLS1377 | | WTR | NE | SM | WEST POND-BRIDGE | OK | - - - | Yes | - - - | - - - |
| SLS1378 | | WTR | NE | SM | WEST POND - HAZLETON PUMP | OK | - - - | Yes | - - - | - - - |
| SLS1379 | | WTR | NE | SM | WEST POND - FENCE POST | OK | - - - | Yes | - - - | - - - |
| NET1380A | | WTR | NE | | ground water well (tailings area | OK | Yes | - - - | - - - | - - - |
| NET1380B | | WTR | NE | | ground water well (tailings area | OK | Yes | - - - | - - - | - - - |
| NET1381A | | WTR | NE | | ground water well (tailings area | OK | Yes | - - - | - - - | - - - |
| NET1381B | | WTR | NE | | ground water well (tailings area | OK | Yes | - - - | - - - | - - - |
| NEL1382A | | WTR | NE | LS | ground water well (tailings area | OK | Yes | - - - | - - - | - - - |
| NEL1382B | | WTR | NE | | ground water well (tailings area | OK | Yes | - - - | - - - | - - - |
| NEL1382C | | WTR | NE | LS | ground water well (tailings area | OK | Yes | - - - | - - - | - - - |
| NET1383A | | WTR | NE | | ground water well (tailings area | OK | Yes | - - - | - - - | - - - |
| NET1383B | | WTR | NE | | ground water well (tailings area | OK | Yes | - - - | - - - | - - - |
| NET1384A | | WTR | NE | | ground water well (tailings area | OK | Yes | - - - | - - - | - - - |
| NET1384B | | WTR | NE | | ground water well (tailings area | OK | Yes | - - - | - - - | - - - |
| NET1385A | | WTR | NE | | ground water well (tailings area | OK | Yes | - - - | - - - | - - - |
| NET1385B | | WTR | NE | | ground water well (tailings area | OK | Yes | - - - | - - - | - - - |
| NET1386A | | WTR | NE | | ground water well (tailings area | OK | Yes | - - - | - - - | - - - |
| NET1386B | | WTR | NE | | ground water well (tailings area | OK | Yes | - - - | - - - | - - - |
| NEM1387 | | WTR | NE | MG | Ground water well magna golf | OK | Yes | - - - | - - - | - - - |
| SMS1388 | | WTR | NE | SM | KESSLER CREEK NORTH | OK | - - - | Yes | - - - | - - - |
| SMS1389 | | WTR | NE | SM | SMELTER STROM DRAINAGE | OK | - - - | Yes | - - - | - - - |
| SMS1390 | | WTR | NE | SM | JAP SPRINGS NO. 1 | OK | - - - | Yes | - - - | - - - |
| SMS1391 | | WTR | NE | SM | JAP SPRINGS NO. 2 | OK | - - - | Yes | - - - | - - - |
| SMS1392 | | WTR | NE | SM | JAP SPRINGS NO. 3 | OK | - - - | Yes | - - - | - - - |
| NET1393A | | WTR | NE | | ground water well (tailings area | OK | Yes | - - - | - - - | - - - |
| NET1393B | | WTR | NE | | ground water well (tailings area | OK | Yes | - - - | - - - | - - - |
| ARD1394 | | WTR | NE | | New process lab drinking fountian | OK | - - - | - - - | Yes | - - - |
| ARD1395 | | WTR | NE | | New process lab kitchen sink | OK | - - - | - - - | Yes | - - - |
| SMP1396 | | WTR | NE | SM | SMELTER WEST PROCESS POND - WEST CELL | OK | - - - | - - - | - - - | Yes |

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| SMP1397 | | WTR | NE | SM | WEST PROCESS POND - EAST CELL | OK | - - - | - - - | - - - | Yes |
| SMP1398 | | WTR | NE | SM | EAST PRCOESS POND - NORTH CELL | OK | - - - | - - - | - - - | Yes |
| SMP1399 | | WTR | NE | SM | EAST PROCESS POND - SOUTH CELL | OK | - - - | - - - | - - - | Yes |
| SMP1400 | | WTR | NE | SM | EAST PROCESS POND - NORTH CELL SUMP | OK | - - - | - - - | - - - | Yes |
| SMP1401 | | WTR | NE | SM | EAST PROCESS POND - SOUTH CELL SUMP | OK | - - - | - - - | - - - | Yes |
| SMP1402 | | WTR | NE | SM | EAST PROCESS POND SUMP | OK | - - - | - - - | - - - | Yes |
| SMP1403 | | WTR | NE | SM | GRANULATION COOLING TOWER-LEAK DET. SUMP | OK | - - - | - - - | - - - | Yes |
| SMP1404 | | WTR | NE | SM | ACID PLANT COOLING TWR - LEAK DET. SUMP | OK | - - - | - - - | - - - | Yes |
| SMP1405 | | WTR | NE | SM | POWERHOUSE COOLING WATER BASIN | OK | - - - | - - - | - - - | Yes |
| SMP1406 | | WTR | NE | SM | ACID PLANT PUMPHOUSE-LEAK DETECTION SUMP | OK | - - - | - - - | - - - | Yes |
| SMP1407 | | WTR | NE | SM | POWERHOUSE PUMPHOUSE LEAK DETECTION SUMP | OK | - - - | - - - | - - - | Yes |
| SMP1408 | | WTR | NE | SM | GRANULATION PUMPHOUSE LEAK DETECT SUMP | OK | - - - | - - - | - - - | Yes |
| SMP1409 | | WTR | NE | SM | WATER JACKET PUMPHOUSE LEAK DETECT SUMP | OK | - - - | - - - | - - - | Yes |
| SMP1410 | | WTR | NE | SM | VEHICLE WASH LEAK DETECTION SUMP | OK | - - - | - - - | - - - | Yes |
| SMP1411 | | WTR | NE | SM | VEHICLE REPAIR SHOP LEAK DETECTION SUMP | OK | - - - | - - - | - - - | Yes |
| CFS1412 | | WTR | TV | CF | TROUT POND (BIG SPRINGS) | OK | - - - | Yes | - - - | - - - |
| CFS1413 | | WTR | TV | CF | CARR FORK DRAINAGE (PROPERTY LINE) | OK | - - - | Yes | - - - | - - - |
| NOG1414 | b1219aca3 | WTR | NE | NO | WETLANDS PROJECT | OK | Yes | - - - | - - - | - - - |
| NOG1415 | b1219aca2 | WTR | NE | NO | WETLANDS PROJECT | OK | Yes | - - - | - - - | - - - |
| MCP1416 | | WTR | NE | MC | Magna process water reservoir #3 ps infl | OK | - - - | - - - | - - - | Yes |
| BNP1417 | | WTR | NE | BN | BONNEVILLE PROCESS WATER RESERVOIR | OK | - - - | - - - | - - - | Yes |
| BNP1418 | | WTR | NE | BN | LAST CHANCE DITCH PUMP STATION - BONNEVI | OK | - - - | - - - | - - - | Yes |
| BNS1419 | | WTR | NE | BN | FINAL CATCH POND - BONNEVILLE (LV) | OK | - - - | Yes | - - - | - - - |
| PCP1420 | | WTR | NE | PC | POWER PLANT COOLING TOWER NO. 1 | OK | - - - | - - - | - - - | Yes |
| PCP1421 | | WTR | NE | PC | POWER PLANT COOLING TOWER NO. 2 | OK | - - - | - - - | - - - | Yes |
| PCP1422 | | WTR | NE | PC | POWER PLANT COOLING TOWER NO. 3 | OK | - - - | - - - | - - - | Yes |
| PCP1423 | | WTR | NE | PC | POWER PLANT COOLING TOWER NO. 4 | OK | - - - | - - - | - - - | Yes |
| PCP1424 | | WTR | NE | PC | POWER PLANT SERVICE STATION COOLING TWR | OK | - - - | - - - | - - - | Yes |
| MDP1425 | | WTR | VW | MD | MIDAS POND-LEACH WATER COLLECTION POND | OK | - - - | - - - | - - - | Yes |
| TLS1426 | 1 | WTR | NE | TL | TPS #1 - TAILINGS POND SEEP | OK | - - - | Yes | - - - | - - - |
| TLS1427 | 2 | WTR | NE | TL | TPS #2 - TAILINGS POND SEEP | DRY | - - - | yes | - - - | - - - |
| TLS1428 | 3 | WTR | NE | TL | TPS #3 - TAILINGS POND SEEP | DRY | - - - | yes | - - - | - - - |
| TLS1429 | 4 | WTR | NE | TL | TPS #4 - TAILINGS POND SEEP | DRY | - - - | yes | - - - | - - - |
| TLS1430 | 5 | WTR | NE | TL | TPS #5 - TAILINGS POND SEEP | DRY | - - - | yes | - - - | - - - |
| TLS1431 | 6 | WTR | NE | TL | TPS #6 - TAILINGS POND SEEP | OK | - - - | Yes | - - - | - - - |
| TLS1432 | 7 | WTR | NE | TL | TPS #7 - TAILINGS POND SEEP | DRY | - - - | yes | - - - | - - - |
| TLS1433 | 8 | WTR | NE | TL | TPS #8 - TAILINGS POND SEEP | Burried | - - - | yes | - - - | - - - |
| TLS1434 | 9 | WTR | NE | TL | TPS #9 - TAILINGS POND SEEP | Burried | - - - | yes | - - - | - - - |
| TLS1435 | 10 | WTR | NE | TL | TPS #10 - TAILINGS POND SEEP | | - - - | yes | - - - | - - - |
| TLP1436 | | WTR | NE | TL | TOE COLLECTION DITCH NEAR 007 OUTFALL | OK | - - - | - - - | - - - | Yes |
| SMP1437 | | WTR | NE | SM | HYDROMET PLANT-LIME STORAGE AREA SUMP | OK | - - - | - - - | - - - | Yes |
| SMP1438 | | WTR | NE | SM | HYDROMET PLANT-LIME AREA SUMP | OK | - - - | - - - | - - - | Yes |
| SMP1439 | | WTR | NE | SM | HYDROMET PLANT-COPPER PRECIP. AREA SUMP | OK | - - - | - - - | - - - | Yes |
| SMP1440 | | WTR | NE | SM | HYDROMET PLANT-NAHS STORAGE AREA SUMP | OK | - - - | - - - | - - - | Yes |
| SMP1441 | | WTR | NE | SM | HYDROMET PLANT-ACID LEACH AREA SUMP | OK | - - - | - - - | - - - | Yes |
| SMP1442 | | WTR | NE | SM | HYDRO PL-BISMUTH PRECIP FILTER AREA SUMP | OK | - - - | - - - | - - - | Yes |
| SMP1443 | | WTR | NE | SM | HYDRO PLT-BISUMTH PRECIP THICKENER SUMP | OK | - - - | - - - | - - - | Yes |
| SMP1444 | | WTR | NE | SM | HYDROMET PLT-CU PRECIP FILTER AREA SUMP | OK | - - - | - - - | - - - | Yes |
| SMP1445 | | WTR | NE | SM | HYDROMET PLT-AS/CD PRECIP THICKENER SUMP | OK | - - - | - - - | - - - | Yes |
| SMP1446 | | WTR | NE | SM | HYDRO PLT-IRON PRECIP REACTOR AREA SUMP | OK | - - - | - - - | - - - | Yes |
| SMP1447 | | WTR | NE | SM | HYDRO PLT-REFINERY BLEEDS STORAGE SUMP | OK | - - - | - - - | - - - | Yes |
| SMP1448 | | WTR | NE | SM | HYDROMET PLANT-LIME SLAKING AREA SUMP | OK | - - - | - - - | - - - | Yes |
| SMP1449 | | WTR | NE | SM | HYDROMET PLANT-LIME UNLOADING AREA SUMP | OK | - - - | - - - | - - - | Yes |
| SMP1450 | | WTR | NE | SM | HYDROMET PLANT-CAUSTIC TANK AREA SUMP | OK | - - - | - - - | - - - | Yes |

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TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| SMP1451 | | WTR | NE | SM | HYDRO PLT-SULFURIC ACID TRK UNLOAD SUMP | OK | - - - | - - - | - - - | Yes |
| SMP1453 | | WTR | NE | SM | HYDRO PLT-SODIUM BISULFATE TRUCK UNLOAD | OK | - - - | - - - | - - - | Yes |
| SMP1454 | | WTR | NE | SM | ANODE CASTING AREA-ANODE COOLING WATER | OK | - - - | - - - | - - - | Yes |
| SMP1455 | | WTR | NE | SM | NEW ACID PLANT-FSG AREA SUMP | OK | - - - | - - - | - - - | Yes |
| SMP1456 | | WTR | NE | SM | NEW ACID PLANT-FCG AREA SUMP | OK | - - - | - - - | - - - | Yes |
| SMP1457 | | WTR | NE | SM | NEW ACID PLANT-STRONG ACID AREA SUMP | OK | - - - | - - - | - - - | Yes |
| SMP1458 | | WTR | NE | SM | NEW ACID PLANT-ESP AREA SUMP | OK | - - - | - - - | - - - | Yes |
| PCP1459 | | WTR | NE | PC | POWER PLANT MAKEUP WATER STORAGE | OK | - - - | - - - | - - - | Yes |
| NEL1460 | | WTR | NE | LS | OLD ABANDONED WELL THAT WAS DUG UP | AB | Yes | - - - | - - - | - - - |
| SMP1461 | | WTR | NE | SM | GRANULATION CLARIFIER | OK | - - - | - - - | - - - | Yes |
| SMP1462 | | WTR | NE | SM | GRANULATION TANKS | OK | - - - | - - - | - - - | Yes |
| SMP1463 | | WTR | NE | SM | GRANULATION COOLING TOWER BASIN | OK | - - - | - - - | - - - | Yes |
| SMP1464 | | WTR | NE | SM | SLAG COOLING AREA (DRAINAGE TROUGH) | OK | - - - | - - - | - - - | Yes |
| SMP1465 | | WTR | NE | SM | POWERHOUSE COOLING BASIN-NONCONTACT SYS | OK | - - - | - - - | - - - | Yes |
| SMP1466 | | WTR | NE | SM | FRESH WATER RESERVOIRS (TWO WEST CELLS) | OK | - - - | - - - | - - - | Yes |
| SMP1467 | | WTR | NE | SM | SMELTER FIRE WATER POND | OK | - - - | - - - | - - - | Yes |
| NEL1468 | | WTR | NE | TL | 3" Well Abandoned (landfill) | ABAND | - - - | - - - | - - - | - - - |
| TLP1469 | | WTR | NE | TL | Tailings toe drain | OK | - - - | - - - | - - - | Yes |
| NES1470 | | WTR | NE | SM | Old provo shoreline | OK | Yes | - - - | - - - | - - - |
| NER1471 | | WTR | NE | RF | Old provo shoreline | OK | Yes | - - - | - - - | - - - |
| NES1472A | | WTR | NE | SM | SW corner of kessler cyn. | OK | Yes | - - - | - - - | - - - |
| NES1472B | | WTR | NE | SM | SW corner of kessler cyn. | OK | Yes | - - - | - - - | - - - |
| SMP1473 | | WTR | NE | SM | East process pump collection | OK | - - - | - - - | - - - | Yes |
| BKG1474A | | WTR | NE | BK | West side of black rk.cyn. | OK | Yes | - - - | - - - | - - - |
| BKG1474B | | WTR | NE | BK | West side of black rk.cyn. | OK | Yes | - - - | - - - | - - - |
| BKG1474C | | WTR | NE | BK | West side of black rk.cyn. | OK | Yes | - - - | - - - | - - - |
| NES1475A | | WTR | NE | SM | kessler cyn. so. of landfill | OK | Yes | - - - | - - - | - - - |
| NES1475B | | WTR | NE | SM | kessler cyn. so. of landfill | OK | Yes | - - - | - - - | - - - |
| BRP1476 | | WTR | VW | BR | Bluewater south rep. collection | OK | - - - | - - - | - - - | Yes |
| SMS1477 | | WTR | NE | SM | Smelter Slag Seep | OK | - - - | Yes | - - - | - - - |
| NEA1478 | | WTR | NE | AR | South of Arthur Central Shops | OK | Yes | - - - | - - - | - - - |
| NEA1479 | | WTR | NE | AR | | | | | | |
| MCP1480 | Fly Ash | EPA | NE | MC | FLY ASH DISPOSAL | OK | - - - | - - - | - - - | Yes |
| MCP1480A | Fly Ash | EPA | NE | MC | FLY ASH DISPOSAL -SOLIDS | OK | - - - | - - - | - - - | Yes |
| MCP1480S | Fly Ash | EPA | NE | MC | FLY ASH DISPOSAL -SOLIDS | OK | - - - | - - - | - - - | Yes |
| MCP1480T | Fly Ash | EPA | NE | MC | FLY ASH DISPOSAL -SOLIDS | OK | - - - | - - - | - - - | Yes |
| SMP1481 | Slag Tails | EPA | NE | MC | SLAG TAILINGS | OK | - - - | - - - | - - - | Yes |
| SMP1481A | Slag Tails | EPA | NE | MC | SLAG TAILINGS -SOLIDS | OK | - - - | - - - | - - - | Yes |
| SMP1481S | Slag Tails | EPA | NE | MC | SLAG TAILINGS -SOLIDS | OK | - - - | - - - | - - - | Yes |
| SMP1481T | Slag Tails | EPA | NE | MC | SLAG TAILINGS -SOLIDS | OK | - - - | - - - | - - - | Yes |
| SMP1482 | | EPA | NE | MC | SMELTER HYDROMET TAILS | OK | - - - | - - - | - - - | Yes |
| SMP1482A | | EPA | NE | MC | SMELTER HYDROMET TAILS-SOLIDS | OK | - - - | - - - | - - - | Yes |
| SMP1482S | | EPA | NE | MC | SMELTER HYDROMET TAILS-SOLIDS | OK | - - - | - - - | - - - | Yes |
| SMP1482T | | EPA | NE | MC | SMELTER HYDROMET TAILS-SOLIDS | OK | - - - | - - - | - - - | Yes |
| BCP1483 | | EPA | NE | MC | COPPERTAON TAILINGS | OK | - - - | - - - | - - - | Yes |
| BCP1483A | | EPA | NE | MC | COPPERTAON TAILINGS-SOLIDS | OK | - - - | - - - | - - - | Yes |
| BCP1483S | | EPA | NE | MC | COPPERTAON TAILINGS-SOLIDS | OK | - - - | - - - | - - - | Yes |
| BCP1483T | | EPA | NE | MC | COPPERTAON TAILINGS-SOLIDS | OK | - - - | - - - | - - - | Yes |
| MCP1484 | | EPA | NE | MC | MAGNA TAILINGS | OK | - - - | - - - | - - - | Yes |
| MCP1484A | | EPA | NE | MC | MAGNA TAILINGS-SOLIDS | OK | - - - | - - - | - - - | Yes |
| MCP1484S | | EPA | NE | MC | MAGNA TAILINGS-SOLIDS | OK | - - - | - - - | - - - | Yes |
| MCP1484T | | EPA | NE | MC | MAGNA TAILINGS-SOLIDS | OK | - - - | - - - | - - - | Yes |
| TLP1485 | | EPA | NE | MC | EAST CYCLONE UNDERFLOW | OK | - - - | - - - | - - - | Yes |
| TLP1485A | | EPA | NE | MC | EAST CYCLONE UNDERFLOW -SOLIDS | OK | - - - | - - - | - - - | Yes |

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| TLP1485S | | EPA | NE | MC | EAST CYCLONE UNDERFLOW -SOLIDS | OK | --- | --- | --- | Yes |
| TLP1485T | | EPA | NE | MC | EAST CYCLONE UNDERFLOW -SOLIDS | OK | --- | --- | --- | Yes |
| TLP1486 | | EPA | NE | MC | EAST CYCLONE OVERFLOW | OK | --- | --- | --- | Yes |
| TLP1486A | | EPA | NE | MC | EAST CYCLONE OVERFLOW-SOLIDS | OK | --- | --- | --- | Yes |
| TLP1486S | | EPA | NE | MC | EAST CYCLONE OVERFLOW-SOLIDS | OK | --- | --- | --- | Yes |
| TLP1486T | | EPA | NE | MC | EAST CYCLONE OVERFLOW-SOLIDS | OK | --- | --- | --- | Yes |
| TLP1487 | | EPA | NE | MC | WEST CYCLONE UNDERFLOW | OK | --- | --- | --- | Yes |
| TLP1487A | | EPA | NE | MC | WEST CYCLONE UNDERFLOW -SOLIDS | OK | --- | --- | --- | Yes |
| TLP1487S | | EPA | NE | MC | WEST CYCLONE UNDERFLOW -SOLIDS | OK | --- | --- | --- | Yes |
| TLP1487T | | EPA | NE | MC | WEST CYCLONE UNDERFLOW -SOLIDS | OK | --- | --- | --- | Yes |
| TLP1488 | | EPA | NE | MC | WEST CYCLONE OVERFLOW | OK | --- | --- | --- | Yes |
| TLP1488A | | EPA | NE | MC | WEST CYCLONE OVERFLOW -SOLIDS | OK | --- | --- | --- | Yes |
| TLP1488S | | EPA | NE | MC | WEST CYCLONE OVERFLOW -SOLIDS | OK | --- | --- | --- | Yes |
| TLP1488T | | EPA | NE | MC | WEST CYCLONE OVERFLOW -SOLIDS | OK | --- | --- | --- | Yes |
| SMP1489 | | WTR | NE | SM | Acid plant cooling tower | OK | --- | --- | --- | Yes |
| NET1490 | | WTR | NE | TL | West of Arthur Stepback Repository | OK | Yes | --- | --- | --- |
| NET1491 | | WTR | NE | TL | West of Arthur Stepback Repository | OK | Yes | --- | --- | --- |
| NET1492 | | WTR | NE | TL | West of Arthur Stepback Repository | OK | Yes | --- | --- | --- |
| NEW1495A | | EPA | NE | WT | Between sludge pond A & 120ac. pond | OK | Yes | --- | --- | --- |
| NEW1495B | | EPA | NE | WT | Between sludge pond A & 120ac. pond | OK | Yes | --- | --- | --- |
| NEW1495C | | EPA | NE | WT | Between sludge pond A & 120ac. pond | OK | Yes | --- | --- | --- |
| NEW1496A | | EPA | NE | WT | Between sludge pond A & 120ac. pond | OK | Yes | --- | --- | --- |
| NEW1496B | | EPA | NE | WT | Between sludge pond A & 120ac. pond | OK | Yes | --- | --- | --- |
| NEW1496C | | EPA | NE | WT | Between sludge pond A & 120ac. pond | OK | Yes | --- | --- | --- |
| NES1497A | | EPA | NE | SM | Between slag lagoon & 120ac. pond | OK | Yes | --- | --- | --- |
| NES1497B | | EPA | NE | SM | Between slag lagoon & 120ac. pond | OK | Yes | --- | --- | --- |
| NES1498 | | EPA | NE | SM | Between slag lagoon & 120ac. pond | OK | Yes | --- | --- | --- |
| NES1499 | | EPA | NE | SM | Between slag lagoon & 120ac. pond | OK | Yes | --- | --- | --- |
| HMG1500 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | --- | --- | --- |
| HMG1501 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | --- | --- | --- |
| HMG1502 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | --- | --- | --- |
| HMG1503 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | --- | --- | --- |
| HMG1504 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | --- | --- | --- |
| HMG1505 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | --- | --- | --- |
| HMG1506 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | --- | --- | --- |
| HMG1507 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | --- | --- | --- |
| HMG1508 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | --- | --- | --- |
| HMG1509 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | --- | --- | --- |
| HMG1511 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | --- | --- | --- |
| HMG1512 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | --- | --- | --- |
| HMG1514 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | --- | --- | --- |
| HMG1527 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | --- | --- | --- |
| RVG1528 | | WTR | VW | RV | WELL INVENTORY | OK | Yes | --- | --- | --- |
| RVG1532 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | --- | --- | --- |
| HMG1535 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | --- | --- | --- |
| RVG1536 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | --- | --- | --- |
| RVG1537 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | --- | --- | --- |
| JRG1539 | | WTR | VW | JR | SJ WELL INVENTORY | OK | Yes | --- | --- | --- |
| HMG1540 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | --- | --- | --- |
| HMG1546 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | --- | --- | --- |
| HMG1547 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | --- | --- | --- |
| HMG1548 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | --- | --- | --- |
| RVG1550 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | --- | --- | --- |
| RVG1551 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | --- | --- | --- |

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| RVG1553 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| RVG1555 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BSG1560 | | WTR | VW | BS | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| RVG1569 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| EVG1570 | | WTR | VW | EV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| RVG1572 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| RVG1573 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| RVG1576 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| RVG1582 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG1587 | | WTR | VW | WJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| RVG1588 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| RVG1591 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| RVG1592 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| RVG1597 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| RVG1601 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| RVG1602 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| RVG1609 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| RVG1616 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| RVG1620 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| RVG1621 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| RVG1622 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG1623 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG1632 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| RVG1635 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1637 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1642 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG1643 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1644 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1645 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1648 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1649 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1654 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1655 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1662 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1663 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1666 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1668 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1669 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1670 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| RVG1677 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1679 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1684 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1687 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1688 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| EPG1689 | | WTR | VW | EP | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1691 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1694 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1698 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1699 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1700 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1708 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1717 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1718 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1719 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| RVG1726 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG1729 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG1730 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG1733 | | WTR | VW | WJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG1736 | | WTR | VW | WJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG1740 | | WTR | VW | WJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG1744 | | WTR | VW | WJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1748 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG1753 | | WTR | VW | WJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1765 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1768 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| JRG1773 | | WTR | VW | JR | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG1775 | | WTR | VW | WJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| JRG1777 | | WTR | VW | JR | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| JRG1781 | | WTR | VW | JR | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG1782 | | WTR | VW | WJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG1788 | | WTR | VW | WJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| JRG1790 | | WTR | VW | JR | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG1793 | | WTR | VW | WJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG1798 | | WTR | VW | WJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG1802 | | WTR | VW | WJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| B4G1803 | | WTR | VW | B4 | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SJG1808 | | WTR | VW | SJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG1811 | | WTR | VW | WJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| JRG1815 | | WTR | VW | JR | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG1828 | | WTR | VW | WJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG1833 | | WTR | VW | WJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG1840 | | WTR | VW | WJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| JRG1843 | | WTR | VW | JR | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG1851 | | WTR | VW | WJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG1853 | | WTR | VW | WJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG1856 | | WTR | | | Herriman irrigation well | OK | yes | - - - | - - - | - - - |
| WJG1866 | | WTR | VW | WJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG1952 | | WTR | VW | WJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG1957 | | WTR | VW | WJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG1961 | | WTR | VW | WJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| JRG1963 | | WTR | VW | JR | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG1968 | | WTR | VW | WJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG1969 | | WTR | VW | WJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| JRG1974 | | WTR | VW | JR | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG1976 | | WTR | VW | WJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG1977 | | WTR | VW | WJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG1979 | | WTR | VW | WJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| JRG1985 | | WTR | VW | JR | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| RVG1986 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG1989 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG1992 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| RVG1994 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| RVG1996 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| RVG1997 | | WTR | VW | RV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG1998 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG1999 | | WTR | VW | WJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2000 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG2000 | | WTR | VW | WJ | | OK | Yes | - - - | - - - | - - - |

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## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| BDG2001 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| JRG2002 | | WTR | VW | JR | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2005 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2006 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2009 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2016 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2017 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2018 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2019 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG2020 | | WTR | VW | WJ | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2025 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2026 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2027 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2028 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2029 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2032 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2034 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2035 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2036 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2038 | | WTR | VW | HM | | OK | Yes | - - - | - - - | - - - |
| HMG2038 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2039 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2040 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2041 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2042 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2043 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2044 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2046 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2047 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2051 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2052 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2053 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2055 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2056 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2057 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2058 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2061 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2062 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2063 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2064 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2065 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2066 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2067 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2068 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2070 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2071 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2072 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2073 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2074 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2076 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2077 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2078 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2079 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2080 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| HMG2081 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2082 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2083 | | WTR | VW | 20 | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2084 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2085 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2086 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2087 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2088 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2090 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2093 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2094 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2095 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2097 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2098 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2099 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2100 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2101 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2103 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2105 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2106 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2107 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2108 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2109 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2110 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2111 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2112 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2113 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2114 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2115 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2116 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2117 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2118 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2119 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2120 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2122 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2123 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2124 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2127 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2129 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2130 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2131 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2133 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2135 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2136 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2137 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2138 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SOG2139 | | WTR | VW | SO | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2140 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2141 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2142 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2143 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2144 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2145 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2147 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |

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TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| HMG2148 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2149 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2151 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2157 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2160 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2162 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2164 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| JRG2168 | | WTR | VW | JR | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2170 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| JRG2171 | | WTR | VW | JR | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2172 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2175 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2177 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| JRG2178 | | WTR | VW | JR | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2180 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| JRG2182 | | WTR | VW | JR | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2183 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| JRG2198 | | WTR | VW | JR | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| JRG2199 | | WTR | VW | JR | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| EVG2205 | | WTR | VW | EV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| EVG2211 | | WTR | VW | EV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| EVG2213 | | WTR | VW | EV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2214 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2215 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| EVG2216 | | WTR | VW | EV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| BDG2218 | | WTR | VW | BD | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| EVG2222 | | WTR | VW | EV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| EVG2225 | | WTR | VW | EV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| JRG2227 | | WTR | VW | JR | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2230 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| EVG2231 | | WTR | VW | EV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| JRG2232 | | WTR | VW | JR | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| EVG2233 | | WTR | VW | EV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| EVG2234 | | WTR | VW | EV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| EVG2239 | | WTR | VW | EV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| EVG2241 | | WTR | VW | EV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| EVG2242 | | WTR | VW | EV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| EVG2248 | | WTR | VW | EV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| JRG2253 | | WTR | VW | JR | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| EVG2257 | | WTR | VW | EV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| EVG2259 | | WTR | VW | EV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| EVG2276 | | WTR | VW | EV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| EVG2284 | | WTR | VW | EV | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2301 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2302 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2303 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2304 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2307 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2309 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2310 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2311 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2313 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SOG2314 | | WTR | VW | SO | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SOG2315 | | WTR | VW | SO | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |

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TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| SOG2317 | | WTR | VW | SO | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SOG2318 | | WTR | VW | SO | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SOG2319 | | WTR | VW | SO | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2320 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SOG2321 | | WTR | VW | SO | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| SOG2322 | | WTR | VW | SO | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2323 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2326 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2327 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2328 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2329 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2330 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2331 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2332 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2333 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2335 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2336 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2337 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2339 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2340 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2341 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2344 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2345 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2346 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2348 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2349 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2350 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2353 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2355 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2356 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2359 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2360 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2361 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2362 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2363 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2364 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2367 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2370 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2371 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2372 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| HMG2373 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| EVG2385 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| EVG2387 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| EVG2388 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| EVG2391 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| EVG2395 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG2401 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| EVG2403 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| WJG2412 | | WTR | VW | HM | SJ WELL INVENTORY | OK | Yes | - - - | - - - | - - - |
| TLT2452 | Relief wel | WTR | | | Dewatering well near east cyclone pad | OK | Yes | - - - | - - - | Yes |
| TVS2514 | | EPA | NE | TL | Mud Flat in Tooele County | OK | Yes | Yes | - - - | - - - |
| TVS2515 | | EPA | NE | TV | Fishing Creek in Tooele County at Termin | OK | Yes | Yes | - - - | - - - |
| TVS2516 | | EPA | NE | TV | Six Mile Creek in Tooele County at Termi | OK | Yes | Yes | - - - | - - - |
| BES2517 | | EPA | NE | BE | Bear River in Box Elder Co. near Terminu | OK | Yes | Yes | - - - | - - - |



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TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| BES2518 | | EPA | NE | BE | Weber River in Box Elder Co. @ Terminus | OK | Yes | Yes | - - - | - - - |
| DVS2519 | | EPA | NE | DV | Pond east of Farmington Bay, North bank | OK | Yes | Yes | - - - | - - - |
| DVS2520 | | EPA | NE | DV | Oil Drain near refinery in Davis Co. | OK | Yes | Yes | - - - | - - - |
| DVS2521 | | EPA | NE | DV | Jordan River @ Redwood Rd. | OK | Yes | Yes | - - - | - - - |
| LSC2522 | | EPA | NE | LS | Lee Creek @ 13th South. | OK | Yes | Yes | - - - | - - - |
| TVS2524 | | EPA | NE | TV | Timpie springs pond inlet | OK | Yes | Yes | - - - | - - - |
| TVS2525 | | EPA | NE | TV | Timpie springs pond on the west side | OK | Yes | Yes | - - - | - - - |
| TVS2526 | | EPA | NE | TV | Timpie Springs, small pool north of pond | OK | Yes | Yes | - - - | - - - |
| TVS2527 | | EPA | NE | TV | Drainage, north of Timpie Spring pond | OK | Yes | Yes | - - - | - - - |
| TVS2528 | | EPA | NE | TV | Timpie Springs, Northeast bank of pond | OK | Yes | Yes | - - - | - - - |
| TVS2529 | | EPA | NE | TV | Mill Pond in Tooele County South of I-80 | OK | Yes | Yes | - - - | - - - |
| USC2530 | | EPA | NE | US | Utah Salt Lake canal at 3500 south | OK | Yes | Yes | - - - | - - - |
| SLP2531 | | EPA | NE | SL | Main line to smelter from s17 ps, fm val | OK | Yes | - - - | - - - | Yes |
| SMP2532 | | EPA | NE | SM | Hazelton pump discharge at return canal | OK | Yes | - - - | - - - | Yes |
| MCP2533 | | EPA | NE | MC | #1 pumpstat. discharge at magna reservoi | OK | - - - | - - - | - - - | Yes |
| MCP2534 | | EPA | NE | MC | #4 pump station. discharge at magna reservoi | OK | - - - | - - - | - - - | Yes |
| BYP2535A | | EPA | NE | BY | tailings collection box NP6? | removed | - - - | - - - | - - - | Yes |
| MCP2536 | | EPA | NE | MC | Copp tails at drop box, above Arthur | OK | - - - | - - - | - - - | Yes |
| MCP2536A | | tails | NE | | Copperton tails at splitter box | OK | - - - | - - - | - - - | yes |
| BYP2537 | | EPA | NE | BY | 31.5" mine H2O discharge @ copp tail dis | OK | - - - | - - - | - - - | Yes |
| BYP2538 | | EPA | NE | BY | WDPS discharge @ copp. NP5 | OK | - - - | - - - | - - - | Yes |
| NOS2539 | | EPA | NE | NO | South A pond on mitigation site | OK | - - - | Yes | - - - | - - - |
| NOS2540 | | EPA | NE | NO | South B pond on mitigation site | OK | - - - | Yes | - - - | - - - |
| NOS2541 | | EPA | NE | NO | West A pond on mitigation site | OK | - - - | Yes | - - - | - - - |
| NOS2542 | | EPA | NE | NO | West B pond on mitigation site | OK | - - - | Yes | - - - | - - - |
| CFG2543 | | EPA | TV | CF | Carr Fork Production Shaft | OK | Yes | - - - | - - - | - - - |
| WTP2544 | WWTPefflue | EPA | NE | WT | Waste Water Treatment Plant effluent | OK | - - - | - - - | - - - | Yes |
| NER2545A | | EPA | NE | RF | South of Refinrey East of EP pond | OK | Yes | - - - | - - - | - - - |
| NER2545B | | EPA | NE | RF | South of Refinrey East of EP pond | OK | Yes | - - - | - - - | - - - |
| NER2546A | | EPA | NE | RF | Refinry, South of PM building | OK | Yes | - - - | - - - | - - - |
| NER2546B | | EPA | NE | RF | Refinry, South of PM building | OK | Yes | - - - | - - - | - - - |
| NER2546C | | EPA | NE | RF | Refinry, South of PM building | OK | Yes | - - - | - - - | - - - |
| NER2547 | | EPA | NE | RF | Refinery, West of PM building | OK | Yes | - - - | - - - | - - - |
| NER2548 | | EPA | NE | RF | Refinry, Garfield Townsite | OK | Yes | - - - | - - - | - - - |
| NER2549A | | EPA | NE | RF | North of refinery near highway 201 | OK | Yes | - - - | - - - | - - - |
| NER2549B | | EPA | NE | RF | North of refinery near highway 201 | OK | Yes | - - - | - - - | - - - |
| CFS2550 | Adamsontun | WTR | TV | CF | Adamson Tunnel Portal, Pine Canyon | OK | - - - | Yes | - - - | - - - |
| RVG2551 | Riverton C | WTR | RV | VW | Rivert city well at 13760 so. 3250 we. h | OK | Yes | - - - | Yes | - - - |
| WTS2552 | smel ret c | WTR | NE | WT | Smelter Return Canal @ Hwy 202 | OK | Yes | Yes | - - - | - - - |
| NER2553 | | WTR | NE | RF | Fromer Garfield townsite south end | OK | Yes | - - - | - - - | - - - |
| NER2554A | | WTR | NE | RF | Fromer Garfield townsite south end | OK | Yes | - - - | - - - | - - - |
| NER2554B | | WTR | NE | RF | Fromer Garfield townsite south end | OK | Yes | - - - | - - - | - - - |
| SMP2555 | Slag crush | | NE | SM | Drainage on north east corner of slag cr | OK | Yes | - - - | - - - | Yes |
| NES2556 | slag crush | WTR | NE | SM | WELL on north east corner of slag cr | OK | Yes | - - - | - - - | - - - |
| TLP2558 | W C-7 ditc | WTR | NE | TL | West C-7 ditch northeast of #4 pumpstati | OK | - - - | - - - | - - - | Yes |
| NOS2559 | We Cul C-7 | WTR | NE | NO | West Culvert (C-7 ditch) Northeast I-80 | OK | - - - | Yes | - - - | - - - |
| ADS2560 | Adamson No | WTR | NE | AD | Adamson Spring North Sump (Gland seal H2O) | OK | - - - | Yes | - - - | - - - |
| ADS2561 | Adamson So | WTR | NE | AD | Adamson Spring South Sump | OK | - - - | Yes | - - - | - - - |
| ECP2562 | Cutoff Wal | WTR | VW | EC | Bingham Cutoff Wall | OK | - - - | - - - | - - - | Yes |
| NOS2563 | Wetlands M | WTR | NE | NO | South West Pond-South Outlet | OK | - - - | Yes | - - - | - - - |
| NOS2564 | Wetlands M | WTR | NE | NO | South West Pond-West Outlet | OK | - - - | Yes | - - - | - - - |
| NOS2565 | Wetlands M | WTR | NE | NO | East Pond-Outlet | OK | - - - | Yes | - - - | - - - |
| NOS2566 | Wetlands M | WTR | NE | NO | North West Pond-West Outlet | OK | - - - | Yes | - - - | - - - |
| NOS2567 | Wetlands M | WTR | NE | NO | North West Pond-North Outlet | OK | - - - | Yes | - - - | - - - |



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TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| NOS2568 | Wetlands M | WTR | NE | NO | South Goggin-Outlet | OK | - - - | Yes | - - - | - - - |
| NEW2569A | | WTR | NE | WT | North of Kessler Springs | OK | Yes | - - - | - - - | - - - |
| NEW2569B | | WTR | NE | WT | North of Kessler Springs | OK | Yes | - - - | - - - | - - - |
| NEW2569C | | WTR | NE | WT | North of Kessler Springs | OK | Yes | - - - | - - - | - - - |
| NEW2570 | | WTR | NE | WT | North of Kessler Springs | OK | Yes | - - - | - - - | - - - |
| BMG2571 | North Ore | WTR | VW | BM | Mine-North Ore Shoot | OK | Yes | - - - | - - - | - - - |
| ECP2572 | | | EC | | RO concentrate | OK | - - - | - - - | - - - | Yes |
| BYP2573 | | | SE | BY | | OK | - - - | Yes | - - - | Yes |
| NES2574 | | WTR | NE | SM | REPLACEMENT FOR WELL NES620A | OK | Yes | - - - | - - - | - - - |
| TLT2575A | | WTR | NE | TL | South east corner of the Tailing Impound | OK | Yes | - - - | - - - | - - - |
| TLT2575B | | WTR | NE | TL | South east corner of the Tailing Impound | OK | Yes | - - - | - - - | - - - |
| PCG2576 | | WTR | PC | PC | West of Bonneville Gate | OK | Yes | - - - | - - - | - - - |
| WTS2577 | | WTR | NE | WT | Kessler Springs | OK | - - - | Yes | - - - | - - - |
| WTS2578 | | WTR | NE | WT | wetlands drain to outfall 008 | - - - | - - - | - - - | - - - | - - - |
| WTS2579 | | WTR | NE | WT | side channel discharge to outfall 008 | - - - | - - - | - - - | - - - | - - - |
| WTS2580 | No name spring | WTR | NE | | side channel discharge into smelter return canal near praxair | OK | | YES | | |
| CFG2581 | Bingham W | WTR | TV | CF | Bingham West Dip Tun | OK | Yes | - - - | - - - | - - - |
| TVS2582 | | WTR | CF | TV | Factory Creek Spng S | OK | - - - | - - - | - - - | Yes |
| TVS2583 | | WTR | CF | TV | Factory Creek Spng N | OK | - - - | - - - | - - - | Yes |
| BNP2584 | | WTR | NE | | Bonneville first chance pump ststion | gone | - - - | - - - | - - - | Yes |
| BNP2585 | | WTR | NE | | Bonneville last chance pond | gone | - - - | - - - | - - - | Yes |
| PCP2586 | | WTR | NE | | old power house cooling tower | gone | - - - | - - - | - - - | Yes |
| MCP2587 | | WTR | NE | | Magna flotation plant | gone | - - - | - - - | - - - | Yes |
| NES2589 | | WTR | NE | | | OK | Yes | - - - | - - - | - - - |
| NES2590 | | WTR | NE | | smelter parking lot arsnic well (grab sample) | OK | Yes | - - - | - - - | - - - |
| WTS2591 | | WTR | NE | | Spitz spring (base of dead mans cave) | OK | yes | - - - | - - - | - - - |
| WTS2592 | | WTR | NE | | Jones spring (east of SR 202) | OK | yes | - - - | - - - | - - - |
| TLP2593A | | EPA | NE | | New pond west point discharge | OK | - - - | - - - | - - - | Yes |
| TLP2593S | | EPA | NE | | New pond west point discharge | OK | - - - | - - - | - - - | Yes |
| TLP2593T | | EPA | NE | | New pond west point discharge | OK | - - - | - - - | - - - | Yes |
| NER2594 | | WTR | NE | RF | North of sewage plant 300 yards | OK | Yes | - - - | - - - | - - - |
| NER2595 | | WTR | NE | OK | North of sewage plant 300 yards | ok | yes | - - - | - - - | - - - |
| NET2596 | | WTR | NE | | Tailings pond dewatering well TLT449C replacement | OK | Yes | - - - | - - - | - - - |
| ECP2599 | | WTR | VW | | combined acid wells pipeline | OK | - - - | - - - | - - - | Yes |
| HMG2600 | | WTR | VW | | 12828 So. 4400 W. (A. Johnson) | OK | - - - | - - - | Yes | - - - |
| ECP2601 | | WTR | VW | EC | Queens Cut-off Wall | OK | - - - | - - - | - - - | Yes |
| ECP2603 | | WTR | VW | EC | Olsen Cut-off Wall | OK | - - - | - - - | - - - | Yes |
| ECP2605 | | WTR | VW | EC | Butterfield 1 Cut-off Wall | OK | - - - | - - - | - - - | Yes |
| ECP2606 | | WTR | VW | EC | Castro Flume | OK | - - - | - - - | - - - | Yes |
| ECP2612 | | WTR | VW | EC | South Saints Rest Cut-off Wall | OK | - - - | - - - | - - - | Yes |
| ECP2614 | | WTR | VW | EC | Saints Rest Cut-off Wall | OK | - - - | - - - | - - - | Yes |
| ECP2616 | | WTR | VW | EC | Yosemite Cut-off Wall | OK | - - - | - - - | - - - | Yes |
| ECP2618A | | WTR | VW | EC | Copper Flume east side collection | OK | - - - | - - - | - - - | Yes |
| ECP2618B | | WTR | VW | EC | Copper Flume east side collection | OK | - - - | - - - | - - - | Yes |
| ECP2624A | | WTR | VW | EC | North Copper Flume east side collection | OK | - - - | - - - | - - - | Yes |
| ECP2624B | | WTR | VW | EC | North Copper Flume east side collection | OK | - - - | - - - | - - - | Yes |
| ECP2627A | | WTR | VW | EC | Lost Creek Flume east side collection | OK | - - - | - - - | - - - | Yes |
| ECP2627B | | WTR | VW | EC | Lost Creek Flume east side collection | OK | - - - | - - - | - - - | Yes |
| ECP2629A | | WTR | VW | EC | Keystone Flume east side collection | OK | - - - | - - - | - - - | Yes |
| ECP2629B | | WTR | VW | EC | Keystone Flume east side collection | OK | - - - | - - - | - - - | Yes |
| ECP2631 | | WTR | VW | EC | Mascott Tunnel | OK | - - - | - - - | - - - | Yes |
| LWP2632 | | WTR | VW | LW | Bingham Tunnel | OK | - - - | - - - | - - - | Yes |
| ECP2648A | | WTR | VW | EC | North Keystone Flume east side collection | OK | - - - | - - - | - - - | Yes |
| ECP2648B | | WTR | VW | EC | North Keystone Flume east side collection | OK | - - - | - - - | - - - | Yes |

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| ECP2651 | | WTR | VW | EC | Crapo Flume | gone | - - - | - - - | - - - | Yes |
| ECP2651A | | WTR | | | Crapo east side collection | OK | - - - | - - - | - - - | Yes |
| ECP2651B | | WTR | | | Crapo east side collection | OK | - - - | - - - | - - - | Yes |
| ECP2654A | | WTR | VW | EC | South Conger 1&2 Flume east side collection | OK | - - - | - - - | - - - | Yes |
| ECP2654B | | WTR | VW | EC | South Conger 1&2 Flume east side collection | OK | - - - | - - - | - - - | Yes |
| ECP2662A | | WTR | VW | EC | Conger 1&2 Flume east side collection | OK | - - - | - - - | - - - | Yes |
| ECP2662B | | WTR | VW | EC | Conger 1&2 Flume east side collection | OK | - - - | - - - | - - - | Yes |
| ECP2663 | | WTR | | | Old Bingham Tunnel at portal surface | OK | - - - | - - - | - - - | Yes |
| ECP2664 | | WTR | VW | EC | Old Bingham Tunnel collection box | OK | - - - | - - - | - - - | Yes |
| ECP2668 | | WTR | VW | EC | Midas 2 Flume | OK | - - - | - - - | - - - | Yes |
| ECP2670 | | WTR | VW | EC | Midas 1 Flume | OK | - - - | - - - | - - - | Yes |
| ECP2674 | | WTR | VW | EC | Bluewater 3 Flume | OK | - - - | - - - | - - - | Yes |
| MDP2679 | | WTR | VW | MD | Bluewater 1 Flume @ dump toe | OK | - - - | - - - | - - - | Yes |
| ECP2682 | | WTR | VW | EC | Bluewater 1/2 Collection Box | OK | - - - | - - - | - - - | Yes |
| ECP2689 | | WTR | VW | EC | Dry Fork Tunnel | OK | - - - | - - - | - - - | Yes |
| COP2701 | | WTR | VW | | Midvalley well | OK | Yes | - - - | - - - | - - - |
| ECP2709 | | WTR | VW | EC | Bluewater 2 Flume | OK | - - - | - - - | - - - | Yes |
| ECP2710 | | WTR | VW | EC | 5490 Tunnel | OK | - - - | - - - | - - - | Yes |
| BMP2711 | | WTR | | | | OK | - - - | - - - | - - - | Yes |
| BMP2712 | | WTR | VW | EC | Utah Metals Tunnel Pit | OK | - - - | - - - | - - - | Yes |
| TVP2713 | | WTR | TV | BM | Utah Metals Tunnel Middle Cny. | OK | - - - | - - - | - - - | Yes |
| LWP2714 | | WTR | VW | LW | Lark Tunnel | OK | Yes | - - - | - - - | Yes |
| ECS2715 | | WTR | VW | EC | Butterfield 1 Seep | OK | - - - | Yes | - - - | - - - |
| ECS2716 | | WTR | VW | EC | Upper Keystone Seep | gone | - - - | Yes | - - - | - - - |
| LWS2717 | | WTR | VW | LW | Lower Keystone Seep | OK | - - - | Yes | - - - | - - - |
| ECS2718 | | WTR | VW | EC | Crapo Seep | gone | - - - | Yes | - - - | - - - |
| ECP2719 | | WTR | | | RO plant east rack Permeate | OK | - - - | - - - | Yes | - - - |
| BSG2723 | | WTR | VW | BS | Trans Jordan Landfill | OK | Yes | - - - | - - - | - - - |
| B2G2724 | | WTR | VW | B2 | Trans Jordan Landfill | OK | Yes | - - - | - - - | - - - |
| BCS2730 | | WTR | VW | BC | Barneys Tunnel | OK | - - - | Yes | - - - | - - - |
| BCS2731 | | WTR | VW | BC | Alluvial inflow to Barneys Pit | OK | - - - | Yes | - - - | - - - |
| BCS2732 | | WTR | VW | BC | seep composites entering Barneys Cr | OK | - - - | Yes | - - - | - - - |
| BCS2733 | | WTR | | | Barneys canyon pit lake | OK | - - - | Yes | - - - | - - - |
| BCS2734 | | WTR | | | East barneys pit lake | OK | - - - | Yes | - - - | - - - |
| BCP2738 | | WTR | | | 24" line from pit | OK | - - - | - - - | - - - | Yes |
| BCP2739 | | WTR | | | Copperton reservoir Sampled inside the concentrator | OK | - - - | - - - | - - - | Yes |
| ECP2740 | | WTR | | | Pit pumping | OK | - - - | - - - | - - - | Yes |
| BCP2741 | | WTR | | | Moly clairifyer | OK | - - - | - - - | - - - | Yes |
| BCP2743 | | WTR | | | Copperton clarifyer overflow | OK | - - - | - - - | - - - | Yes |
| ECP2745 | | WTR | | | RO Plant con rack #4 (east new one) | OK | - - - | - - - | - - - | Yes |
| BCP2750 | | WTR | | | Copperton clarifyer underflow | OK | - - - | - - - | - - - | Yes |
| BCP2751 | | WTR | | | Copperton Conc. No. side copper thickner | OK | - - - | - - - | - - - | Yes |
| BCP2752 | | WTR | | | Copperton Conc. Zone 1 retention pond | OK | - - - | - - - | - - - | Yes |
| BCP2753 | | WTR | | | Copperton Conc. Zone 2 retention reservoir | OK | - - - | - - - | - - - | Yes |
| BCP2754 | | | | | Copperton Conc. Zone 3 retentoin reservoir | OK | - - - | - - - | - - - | Yes |
| BCP2755 | | WTR | | | Copperton Conc. Zone 4 retention pond | OK | - - - | - - - | - - - | Yes |
| BCP2756 | | WTR | | | Copperton Conc. Thickner overflow pump ststion | OK | - - - | - - - | - - - | Yes |
| BCP2757 | | WTR | | | Copperton Conc. West flotation sump | OK | - - - | - - - | - - - | Yes |
| BCP2758 | | WTR | | | Copperton Conc. East flotation sump | OK | - - - | - - - | - - - | Yes |
| BCP2759 | | WTR | | | Copperton Conc. Grind basement main sump | OK | - - - | - - - | - - - | Yes |
| BCP2760 | | WTR | | | Copperton Conc. Moly sump 350 PP 57 | OK | - - - | - - - | - - - | Yes |
| BCP2761 | | WTR | | | Copperton Conc. Moly sump 2350 PP 165 | OK | - - - | - - - | - - - | Yes |
| BCP2762 | | WTR | | | Copperton Conc. Moly sump 350 PP 46 | OK | - - - | - - - | - - - | Yes |
| NES2763 | | WTR | | | Slag pond S.W. slag pile well | OK | Yes | - - - | - - - | - - - |

PN DRAFT

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| NES2764 | | WTR | | | Slag pond S.W. slag pile well | OK | Yes | - - - | - - - | - - - |
| NES2765 | | WTR | | | Slag pond S.W. slag pile well | OK | Yes | - - - | - - - | - - - |
| NES2766 | | WTR | | | Slag pond S.W. slag pile well | OK | Yes | - - - | - - - | - - - |
| NES2767 | | WTR | | | Slag pond S.W. slag pile well | OK | Yes | - - - | - - - | - - - |
| NES2768 | | WTR | | | Slag pond S.W. slag pile well | OK | Yes | - - - | - - - | - - - |
| SLS2769 | | WTR | | | Slag pond Hansen spring | OK | Yes | - - - | - - - | - - - |
| SLS2770 | | WTR | | | Slag pond combined spring waterflow | OK | Yes | - - - | - - - | - - - |
| ECP2771 | | WTR | | | R.O. plant west rack concentrate #3 | OK | Yes | - - - | - - - | - - - |
| ECP2772 | | WTR | | | R.O. plant west rack permeate #3 | OK | Yes | - - - | - - - | - - - |
| BSG2777A | | WTR | | | Bastian sink well | OK | Yes | - - - | - - - | - - - |
| BSG2777B | | WTR | | | Bastian sink well | OK | Yes | - - - | - - - | - - - |
| BSG2778A | | WTR | | | Bastian sink well | OK | Yes | - - - | - - - | - - - |
| BSG2778B | | WTR | | | Bastian sink well | OK | Yes | - - - | - - - | - - - |
| BSG2779A | | WTR | | | Bastian sink well | OK | Yes | - - - | - - - | - - - |
| BSG2779B | | WTR | | | Bastian sink well | OK | Yes | - - - | - - - | - - - |
| BSG2779C | | WTR | | | Bastian sink well | OK | Yes | - - - | - - - | - - - |
| EPG2780A | | WTR | | | Day break property | OK | Yes | - - - | - - - | - - - |
| EPG2780B | | WTR | | | Day break property | OK | Yes | - - - | - - - | - - - |
| EPG2781A | | WTR | | | Day break property | OK | Yes | - - - | - - - | - - - |
| EPG2781B | | WTR | | | Day break property | OK | Yes | - - - | - - - | - - - |
| BSG2782A | | WTR | | | Bastian sink well | OK | Yes | - - - | - - - | - - - |
| BSG2782B | | WTR | | | Bastian sink well | OK | Yes | - - - | - - - | - - - |
| BSG2782C | | WTR | | | Bastian sink well | OK | Yes | - - - | - - - | - - - |
| BSG2783A | | WTR | | | Bastian sink well | OK | Yes | - - - | - - - | - - - |
| BSG2783B | | WTR | | | Bastian sink well | OK | Yes | - - - | - - - | - - - |
| BSG2783C | | WTR | | | Bastian sink well | OK | Yes | - - - | - - - | - - - |
| BSG2784 | | WTR | | | Bastian sink well | OK | Yes | - - - | - - - | - - - |
| EPG2785A | | WTR | | | Day break property | OK | Yes | - - - | - - - | - - - |
| EPG2785B | | WTR | | | Day break property | OK | Yes | - - - | - - - | - - - |
| ECS2786 | | WTR | | | East side collection seep | OK | Yes | - - - | - - - | - - - |
| ECG2787 | | WTR | | | Bingham canyon well base of dump | OK | Yes | - - - | - - - | - - - |
| BCG2788A | | WTR | | | | OK | Yes | - - - | - - - | - - - |
| BCG2788B | | WTR | | | | OK | Yes | - - - | - - - | - - - |
| BCG2788C | | WTR | | | | OK | Yes | - - - | - - - | - - - |
| ECG2789A | | WTR | | | East side collection toe of dump (**abandon in 2020**) | OK | Yes | - - - | - - - | - - - |
| ECG2789B | | WTR | | | East side collection toe of dump **(abandon in 2020)** | OK | Yes | - - - | - - - | - - - |
| NES2790 | | WTR | | | Smelter flush mount (Arcadis well) | OK | Yes | - - - | - - - | - - - |
| NES2791 | | WTR | | | Smelter flush mount (Arcadis well) | OK | Yes | - - - | - - - | - - - |
| NES2792 | | WTR | | | Smelter flush mount (Arcadis well) | OK | Yes | - - - | - - - | - - - |
| NES2793A | | WTR | | | Smelter flush mount (Arcadis well) | OK | Yes | - - - | - - - | - - - |
| NES2793B | | WTR | | | Smelter flush mount (Arcadis well) | OK | Yes | - - - | - - - | - - - |
| NES2793C | | WTR | | | Smelter flush mount (Arcadis well) | OK | Yes | - - - | - - - | - - - |
| NES2794 | | WTR | | | Smelter flush mount (Arcadis well) | OK | Yes | - - - | - - - | - - - |
| NES2795 | | WTR | | | Smelter flush mount (Arcadis well) | OK | Yes | - - - | - - - | - - - |
| ECP2796 | | WTR | SE | | RO Plant Product Water | OK | Yes | - - - | - - - | - - - |
| NES2797A | | WTR | NE | | Smelter west of slag bluff, south of hwy 201 | OK | Yes | - - - | - - - | - - - |
| NES2797B | | WTR | NE | | Smelter west of slag bluff, south of hwy 201 | OK | Yes | - - - | - - - | - - - |
| NES2797C | | WTR | NE | | Smelter west of slag bluff, south of hwy 201 | OK | Yes | - - - | - - - | - - - |
| NES2797D | | WTR | NE | | Smelter west of slag butt | OK | Yes | - - - | - - - | - - - |
| NES2797E | | WTR | NE | | SmelterWest of slag butt | OK | Yes | - - - | - - - | - - - |
| NES2798A | | WTR | NE | | Smelter east of east smelter gate | OK | Yes | - - - | - - - | - - - |
| NES2798B | | WTR | NE | | Smelter east of east smelter gate | OK | Yes | - - - | - - - | - - - |
| NES2798C | | WTR | NE | | Smelter east of east smelter gate | OK | Yes | - - - | - - - | - - - |
| NES2798Z | | WTR | NE | | Smelter east of east smelter gate | OK | Yes | - - - | - - - | - - - |

IN DRAFT

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| NES2799A | | WTR | NE | | smelter acid tank farm | OK | Yes | - - - | - - - | - - - |
| NES2799B | | WTR | NE | | smelter acid tank farm | OK | Yes | - - - | - - - | - - - |
| NES2800A | | WTR | NE | | smelter acid tank farm | OK | Yes | - - - | - - - | - - - |
| NES2800B | | WTR | NE | | smelter acid tank farm | OK | Yes | - - - | - - - | - - - |
| NES2801 | | WTR | NE | | smelter acid tank farm | OK | Yes | - - - | - - - | - - - |
| NES2802 | | WTR | NE | | smelter acid tank farm | OK | Yes | - - - | - - - | - - - |
| NES2803A | | WTR | NE | | smelter acid tank farm | OK | Yes | - - - | - - - | - - - |
| NES2803B | | WTR | NE | | smelter acid tank farm | OK | Yes | - - - | - - - | - - - |
| NES2804A | | WTR | NE | | smelter acid tank farm | OK | Yes | - - - | - - - | - - - |
| NES2804B | | WTR | NE | | smelter acid tank farm | OK | Yes | - - - | - - - | - - - |
| NES2804C | | WTR | NE | | smelter acid tank farm | OK | Yes | - - - | - - - | - - - |
| NES2805 | | WTR | NE | | smelter acid tank farm | OK | Yes | - - - | - - - | - - - |
| NEW2807A | | WTR | NE | | Garfield wetlands | OK | Yes | - - - | - - - | - - - |
| NEW2807B | | WTR | NE | | Garfield wetlands | OK | Yes | - - - | - - - | - - - |
| NEW2807C | | WTR | NE | | Garfield wetlands | OK | Yes | - - - | - - - | - - - |
| NEW2807D | | WTR | NE | | Garfield wetlands | OK | Yes | - - - | - - - | - - - |
| NEW2807E | | WTR | NE | | Garfield wetlands | OK | Yes | - - - | - - - | - - - |
| NEW2807F | | WTR | NE | | Garfield wetlands | OK | Yes | - - - | - - - | - - - |
| NEW2807G | | WTR | NE | | Garfield wetlands | OK | Yes | - - - | - - - | - - - |
| NER2808 | | WTR | NE | | Charlie / Refinery gate | OK | Yes | - - - | - - - | - - - |
| NEW2809A | | WTR | NE | | Garfield wetlands | OK | Yes | - - - | - - - | - - - |
| NEW2809B | | WTR | NE | | Garfield wetlands | OK | Yes | - - - | - - - | - - - |
| NEW2810A | | WTR | NE | | Garfield wetlands | OK | Yes | - - - | - - - | - - - |
| NEW2810B | | WTR | NE | | Garfield wetlands | OK | Yes | - - - | - - - | - - - |
| NEW2810C | | WTR | NE | | Garfield wetlands | OK | Yes | - - - | - - - | - - - |
| NER2811A | | WTR | NE | | Refinery PM Cap | OK | Yes | - - - | - - - | - - - |
| NER2811B | | WTR | NE | | Refinery PM Cap | OK | Yes | - - - | - - - | - - - |
| NER2812A | NA | WTR | NE | | Refinery North of MAP | OK | Yes | - - - | - - - | - - - |
| NER2812B | NA | WTR | NE | | Refinery North of MAP | OK | Yes | - - - | - - - | - - - |
| NER2813A | NA | WTR | NE | | KUC south west of refinery | OK | Yes | - - - | - - - | - - - |
| NER2813B | NA | WTR | NE | | KUC south west of refinery | OK | Yes | - - - | - - - | - - - |
| NER2813C | NA | WTR | NE | | KUC south west of refinery | OK | Yes | - - - | - - - | - - - |
| NER2814A | NA | WTR | NE | | KUC at Kesler springs | OK | Yes | - - - | - - - | - - - |
| NER2814B | NA | WTR | NE | | KUC at Kesler springs | OK | Yes | - - - | - - - | - - - |
| NER2814C | NA | WTR | NE | | KUC at Kesler springs | OK | Yes | - - - | - - - | - - - |
| NEW2815A | NA | WTR | NE | | wetlands garfield area | OK | Yes | - - - | - - - | - - - |
| NEW2815B | NA | WTR | NE | | wetlands garfield area | OK | Yes | - - - | - - - | - - - |
| NEW2815C | NA | WTR | NE | | wetlands garfield area | OK | Yes | - - - | - - - | - - - |
| NER2816A | NA | WTR | NE | | KUC Hillside west of refinery | OK | Yes | - - - | - - - | - - - |
| NER2816B | NA | WTR | NE | | KUC Hillside west of refinery | OK | Yes | - - - | - - - | - - - |
| NER2816C | NA | WTR | NE | | KUC Hillside west of refinery | OK | Yes | - - - | - - - | - - - |
| MPC2817 | #1 magna Res | WTR | NE | | Leak detection sump located at the new magna res. | OK | - - - | - - - | - - - | Yes |
| MPC2818 | #2 magna res | WTR | NE | | Leak detection sump located at the origional magna res. | OK | - - - | - - - | - - - | Yes |
| WJG2819A | NA | WTR | SE | | Ground water well replacement for WJG1170A | OK | Yes | - - - | - - - | - - - |
| WJG2819B | NA | WTR | SE | | Ground water well replacement for WJG1170B | OK | Yes | - - - | - - - | - - - |
| WJG2819C | NA | WTR | SE | | Ground water well replacement for WJG1170C | OK | Yes | - - - | - - - | - - - |
| EPS2820 | NA | WTR | daybreak | | Acid rock drainage surface sites at daybreak | OK | - - - | Yes | - - - | - - - |
| EPS2821 | NA | WTR | daybreak | | Acid rock drainage surface sites at daybreak | OK | - - - | Yes | - - - | - - - |
| EPS2822 | NA | WTR | daybreak | | Acid rock drainage surface sites at daybreak | OK | - - - | Yes | - - - | - - - |
| EPS2823 | NA | WTR | daybreak | | Acid rock drainage surface sites at daybreak | OK | - - - | Yes | - - - | - - - |
| EPS2824 | NA | WTR | daybreak | | Acid rock drainage surface sites at daybreak | OK | - - - | Yes | - - - | - - - |
| EPS2825 | NA | WTR | daybreak | | Acid rock drainage surface sites at daybreak | OK | - - - | Yes | - - - | - - - |
| EPS2826 | NA | WTR | daybreak | | Acid rock drainage surface sites at daybreak | OK | - - - | Yes | - - - | - - - |
| EPS2827 | NA | WTR | daybreak | | Acid rock drainage surface sites at daybreak | OK | - - - | Yes | - - - | - - - |

TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| BSG2828 | NA | WTR | Mine | | 2012 new sulfate well. Water is shipped to the RO plant | OK | Yes | - - - | Yes | - - - |
| BMP2829 | NA | WTR | Mine | | North well drainage gallery composite @ portal bingham pit | OK | - - - | Yes | - - - | - - - |
| NEL2831 | | WTR | Sec 21 | | New Section 21 Well | OK | Yes | - - - | Yes | - - - |
| BMS2832 | NA | WTR | Mine | | Cottonwood drainage composite sample @ flume | OK | - - - | Yes | - - - | - - - |
| ECG2833A | NA | WTR | Mine | | Adjacent to Saints rest drainage | OK | Yes | - - - | - - - | - - - |
| ECG2833B | NA | WTR | Mine | | Adjacent to Saints rest drainage | OK | Yes | - - - | - - - | - - - |
| ECG2833C | NA | WTR | Mine | | Adjacent to Saints rest drainage | OK | Yes | - - - | - - - | - - - |
| ECG2833D | NA | WTR | Mine | | Adjacent to Saints rest drainage | OK | Yes | - - - | - - - | - - - |
| BCS2834 | NA | WTR | Barneys | | BC1 Drain down. Sample collected in sump | OK | - - - | - - - | - - - | Yes |
| BCS2835 | NA | WTR | Barneys | | BC2 drain down Sample collected in sump | OK | - - - | - - - | - - - | Yes |
| BCS2836 | NA | WTR | Barneys | | BC 3 Drain down. Sample collected in sump | OK | - - - | - - - | - - - | Yes |
| BCS2837 | NA | WTR | Barneys | | BC 4 drain down Sample collected in sump | OK | - - - | - - - | - - - | Yes |
| BCS2838 | NA | WTR | Barneys | | BC 5 Drain down. Sample collected in sump | OK | - - - | - - - | - - - | Yes |
| BMP2839 | | WTR | Mine | | Pit dewatering well 5490 east wall (2014) | ok | - - - | - - - | - - - | - - - |
| BMP2840 | | WTR | Mine | | Pit dewatering well 5490 east wall (2014) | ok | - - - | - - - | - - - | - - - |
| BMP2841 | | WTR | Mine | | East wall depressurization adjacent to crusher (2014) | OK | - - - | - - - | - - - | - - - |
| SMP2842 | Sec. 17 | WTR | smelter | | Section 17 blended from smelter reseviour (smelter wash down water) S.W.corner of hydromet | OK | - - - | Yes | - - - | - - - |
| SMP2843 | KLB-2 | WTR | tailings | | Monitor wells drilled to monitor horizonal drain water | OK | Yes | - - - | - - - | - - - |
| SMP2844 | SE2-3 | WTR | Tailings | | Monitor wells drilled to monitor horizonal drain water | OK | Yes | - - - | - - - | - - - |
| BCS2845A | | WTR | Barneys | | Upper North Fork Barneys creek seep | OK | | - - - | - - - | - - - |
| BCS2845B | | WTR | Barneys | | Upper Mid North Fork Barneys creek seep | OK | | - - - | - - - | - - - |
| BCS2845C | | WTR | Barneys | | Lower mid North Fork Barneys creek seep | OK | | - - - | - - - | - - - |
| BCS2845D | | WTR | Barneys | | Lower North Fork Barneys creek seep | OK | | - - - | - - - | - - - |
| BCG2846 | | WTR | Barneys | | Barneys canyon ground water monitor well | OK | Yes | - - - | - - - | - - - |
| NEP2847 | | WTR | NE | | North end se plant (Influent) sample port on north side of skid | OK | - - - | - - - | - - - | Yes |
| NEP2848 | | WTR | NE | | North end se plant (Effluent) off train #1 at south most sample spigot **bioreactor 1120** | OK | - - - | - - - | - - - | Yes |
| NEP2849 | | WTR | NE | | North end se plant (Effluent) off train #2 middle sample port **Bioreactor 1220** | OK | - - - | - - - | - - - | Yes |
| NEP2850 | | WTR | NE | | North end se plant Effluent off train #3 north sample port **bioreactor 1320** | OK | - - - | - - - | - - - | Yes |
| NEP2851A | | WTR | NE | | Effluentfrom all three trains sample port directly below sample site NEP2847 | OK | - - - | - - - | - - - | Yes |
| NEP2851B | | WTR | NE | | Effluentfrom all three trains sample port directly below sample site NEP2847 | OK | - - - | - - - | - - - | Yes |
| NES2852 | | | | | Praxair Capture Trench sampled | OK | - - - | - - - | - - - | Yes |
| ECG2853A | | WTR | South end | | Bingham canyon ground water well | OK | Yes | - - - | - - - | - - - |
| ECG2853B | | WTR | South end | | Bingham canyon ground water well | OK | Yes | - - - | - - - | - - - |
| ECG2854 | | WTR | South End | | Bingham canyon dumps well | OK | Yes | - - - | - - - | - - - |
| BCS2855 | Bass pond | WTR | Barneys | | 01-03 pond collection formaly (Bas pond) | OK | - - - | Yes | - - - | - - - |
| ECP2856A | copper 4 | WTR | South end | | East side collection weir box (copper 4) sample water from the sump this is a combo of ECP2856 A&B | OK | - - - | Yes | - - - | - - - |
| ECP2856B | copper 4 | WTR | South end | | East side collection weir box (copper 4) sump sample labled ECP2856A | OK | - - - | Yes | - - - | - - - |
| ECP2857A | copper 2 | WTR | South end | | East side collection weir box (copper 2) | OK | - - - | Yes | - - - | - - - |
| ECP2857B | copper 2 | WTR | South end | | East side collection weir box (copper 2) | OK | - - - | Yes | - - - | - - - |
| ECP2858A | South crapo | WTR | south end | | East side collection weir box (south crapo) | OK | - - - | Yes | - - - | - - - |
| ECP2858B | South crapo | WTR | south end | | East side collection weir box (south crapo) | OK | - - - | Yes | - - - | - - - |
| ECG2859 | Keystone | WTR | south end | | Keystone drainage ground water well | OK | Yes | - - - | - - - | - - - |
| ECG2859 | Keystone | WTR | south end | | Keystone drainage ground water well | OK | Yes | - - - | - - - | - - - |
| BCG2860A | Barneys | WTR | south end | | Barneys ground water east of well #32 | OK | Yes | - - - | - - - | - - - |
| BCG2860B | Barneys | WTR | south end | | Barneys ground water east of well #32 | OK | Yes | - - - | - - - | - - - |
| HCG2861A | Harkers | WTR | south end | | Harkers creek below PS 3B | OK | Yes | - - - | - - - | - - - |

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TABLE DC-1

## APPROVED SAMPLE LOCATIONS

| Site ID | Alias | Program | Region ID | Area ID | Location/Description | Status | Ground | Surface | Drinking | Process |
|---|---|---|---|---|---|---|---|---|---|---|
| HCG2861B | Harkers | WTR | south end | | Harkers creek below PS 3B | OK | Yes | - - - | - - - | - - - |
| WJG2862A | West Jordan | WTR | south end | | Near 7800 so. Backus hwy | OK | Yes | - - - | - - - | - - - |
| WJG2862B | West Jordan | WTR | south end | | Near 7800 so. Backus hwy | OK | Yes | - - - | - - - | - - - |
| WJG2863 | West Jordan | WTR | south end | | Production well near 2862 / 8600 west | OK | Yes | - - - | - - - | - - - |
| BMS2864 | Mine / Pit | WTR | | | Replacement for BMS1356 (Located in the PIT | OK | Yes | - - - | - - - | - - - |
| COG2865 | Mine / Pit | WTR | South end | | Replacement for picnic flats well (COG 1172) | OK | Yes | - - - | - - - | - - - |
| ECG2866A | bingham cyn | WTR | south end | | Replacement for ECG2789 A Base vof bingham canyon | OK | Yes | - - - | - - - | - - - |
| ECG2866B | bingham cyn | WTR | south end | | Replacement for ECG2789 B Base of bingham canyon | OK | Yes | - - - | - - - | - - - |
| COG2867A | | WTR | south end | | East of Retention Pond 4 Copperton Concentrator | OK | Yes | - - - | - - - | - - - |
| COG2867B | | WTR | south end | | East of Retention Pond 4 Copperton Concentrator | OK | Yes | - - - | - - - | - - - |
| HCG2868 | WR5468 | WTR | | | Private well, Strang Excavating, about 5500 South HWY 111 | OK | Yes | - - - | - - - | - - - |
| BMP2869 | Mine/Pit | WTR | South end | | High quality sump at 6190 pump station | OK | - - - | - - - | - - - | Yes |
| NEL2870A | | WTR | NE | LS | East Tailings Impoundment expansion | OK | Yes | - - - | - - - | - - - |
| NEL2870B | | WTR | NE | LS | East Tailings Impoundment expansion | OK | Yes | - - - | - - - | - - - |
| NEL2870C | | WTR | NE | LS | East Tailings Impoundment expansion | OK | Yes | - - - | - - - | - - - |
| BCG2871 | | WTR | South end | | East of Copperton Concentrator | OK | Yes | - - - | - - - | - - - |
| TLL4100 | LY94100 | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4100 | LY94100 | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4101 | LY94101 | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4101 | LY94101 | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4102 | LY94102 | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4102 | LY94102 | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4103 | LY94103 | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4103 | LY94103 | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4124 | LY94124 | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4124 | LY94124 | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4125 | LY94125 | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4125 | LY94125 | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4126 | LY94126 | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4126 | LY94126 | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4127 | LY94127 | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4127 | LY94127 | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4128 | LY94128 | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4128 | LY94128 | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4129 | LY94129 | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4129 | LY94129 | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4133 | | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4133 | | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4134 | | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4134 | | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4135 | | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4135 | | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4136 | | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4136 | | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4137 | | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4137 | | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4138 | | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| TLL4138 | | WTR | NE | TL | Lysimeter | OK | - - - | - - - | - - - | - - - |
| USGS8A | B1236BAA3 | | NE | NO | | OK | - - - | - - - | - - - | - - - |
| USGS8B | B1236BAA2 | | NE | NO | | OK | - - - | - - - | - - - | - - - |
| USGS8C | B1236BAA1 | | NE | NO | | OK | - - - | - - - | - - - | - - - |

KENNECOTT
ENVIRONMENTAL LABORATORY
9600 West 2100 South Magna, Utah 84044

# ANALYTICAL REQUEST SHEET
## Sample Chain of Custody

_____-_____-_____
Sheet Request No.
Lab Use Only

| *Lab Use Only ID#* | LOCATION Control # | FIELD DATA | | | | | | | | | | | Analyses Requested |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Time | Date | pH | Cond | Temp | Depth | # of Cont | | | | | |
| | **EXAMPLE** | | 01/01/01 | 0.00 | 0 | 0.0 | 0.00 | | | | | | **GCMP** |

Sample Submitted by:__________ Telephone No. __________ Fax No. __________

Report Results to: __________ Telephone No. __________ Fax No. __________

Samples submitted on Ice: Yes / No

Surrendered By:__________ Date:______ Time:______ Received By:__________ Date: ______ Time: ______

Surrendered By:__________ Date:______ Time:______ Received By:__________ Date: ______ Time: ______

**Comments / Special Instructions:** ____________________

# TABLE DC-3

## SAMPLE CONTAINERS, PRESERVATION TECHNIQUES, AND HOLDING TIMES

| ANALYTE | CONTAINER[1] | PRESERVATION | MAXIMUM HOLDING TIME |
|---|---|---|---|
| Alkalinity | P,G | *Store on ice | 14 Days |
| BOD | P | *Store on ice | 48 Hours |
| Chloride | P,G | None | 28 Days |
| Coliform | P | *Store on ice | 6 Hrs-UPDES<br>12 Hrs-Drinking |
| Cyanide | P,G | *Store on ice, NaOH to pH>12, store in dark | 14 Days |
| Fluoride | P | None | 28 Days |
| Hydrogen Ion (pH) | P,G | None | Analyze Immediately |
| Mercury | P,G | $HNO_3$ to pH<2 | 28 Days |
| Metals, except Mercury | P,G | $HNO_3$ to pH<2 | 6 Months |
| Nitrate | P,G | *Store on ice, $H_2SO_4$ | 48 Hours<br>28 Days/once acidified |
| Nitrite | P,G | *Store on ice, $H_2SO_4$ | 48 Hours |
| Oil & Grease | G | *Store on ice, $H_2SO_4$ to PH<2 | 28 Days |
| Organics<br>PCB<br><br>Pesticides<br><br>PHC<br>SEM<br>VOL | <br>VOA<br><br>VOA<br><br>G<br>VOA<br>VOA | <br>*Store on ice, pH 5-9<br><br>*Store on ice, pH 5-9<br><br>*Store on ice<br>*Store on ice<br>*Store on ice | <br>7 Days<br><br>7 Days<br><br>7 Days<br>7 Days<br>7 Days |
| Phenolics | G | *Store on ice, $H_2SO_4$ to pH<2 | 28 Days |
| Phosphate | G | *Store on ice | 48 Hours |
| Radionuclides | P,G | pH<2, $HNO_3$ | 6 Months |
| Silica | P | *Store on ice | 28 Days |
| Sulfate | P,G | *Store on ice, if pH is < 4.5, use HCL | 28 Days |
| TDS | P,G | *Store on ice | 7 Days |

*Or refrigerate.

[1]Polyethylene (P), or Glass (G)

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# Figures

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# KENNECOTT UTAH COPPER

## WELL INSPECTION REPORT

**GENERAL**

Well I.D. # : ____________ Date of Inspection: ____________
Name of Inspector: ____________

**SITE CONDITIONS**

Attach photogragh of site showing general site conditions.
Attach photogragh showing inside of protective casing and well casing.
Attach any additional maps and/or aerial photographs.

Was site cleaned up and refuse removed after well constructions? Yes ____ No ____
Is site cleanup required? Yes ____ No ____

**PROTECTIVE CASING**

Description of Protective Casing

Is casing present? Yes ____ No ____
Nominal Casing Diameter: ____ inches
Casing Material: PVC ____ Steel ____ Other: ____
If "Other" describe: ____________
Paint Condition: None ____ Good ____ Poor ____
Is painting recommended? Yes ____ No ____
Is Well I.D. # painted on casing? Yes ____ No ____
Is Well I.D. # stamped on casing? Yes ____ No ____
Other markings: ____________
Is there a weep hole in the protective casin? Yes ____ No ____

Well Pad Condition

Does a concrete pad surround the protective casing? Yes ____ No ____
Was the concrete formed when it was poured? Yes ____ No ____
Is the pad thickness greater than 6 inches? Yes ____ No ____
Is replacement of the pad recommended? Yes ____ No ____
Is the Well I.D. # inscribed in the pad? Yes ____ No ____

Lock

Is the protective casing locked? Yes ____ No ____
Can the protective casing be locked? Yes ____ No ____
If not, identify cause of problem: Missing Lock ____ Locking Hasp ____ No Lid on Casing ____

**WELL CONSTRUCTION**

Well Casing

Inside Diameter: ____ inches
Casing Material: PVC ____ Steel ____ Other: ____
If "Other" describe: ____________
Is a casing adapter used to terminate the casing? Yes ____ No ____
Type of casing adapter: Male ____ Female ____
Is the casing top smooth and even? Yes ____ No ____
Is there a cap or plug for the well casing? Yes ____ No ____
Is there a hole in the top of the well cap? Yes ____ No ____
Is the marker point for measuring the depth to water present? Yes ____ No ____
How is it identified? ____________
Is annular cement/grout present? Yes ____ No ____
Is the grout in good condition? Yes ____ No ____
Is grout filled to near the top of the well casing? Yes ____ No ____
Is grout filled to within 1/2 inch of the protective casing weep hole? Yes ____ No ____

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DIVISION OF WATER RIGHTS
REQUEST FOR MONITOR WELL CONSTRUCTION

APPLICANTS NAME ______ Kennecott Utah Copper ______

APPLICANTS ADDRESS ______ P. O. Box 525, Bingham Canyon, Utah 84006-0525 ______

INDIVIDUAL CONTACT ______________________ ______
Name Phone

CURRENT PROPERTY OWNER ______________________

PROPOSED NUMBER OF WELLS ______ DIAMETERS ______ APPROX. DEPTHS ______

TYPE OF COMPLETIONS ______________________
(Casing, intake, ______________________
gravel pack, grout, ______________________
etc.)

PROJECT ENGINEER/MANAGER ______________________
Name

______________________ ______
Address Phone

GENERAL LOCATION DESCRIPTION ______________________ COUNTY ______

WELLS IN CONJUNCTION WITH (LEAKING) UNDERGROUND STORAGE TANKS ______ ______
YES NO

NAME OF LICENSED DRILLER ______________________ LICENSE # ______

PROPOSED CONSTRUCTION DATE ______________________ ANTICIPATED COMPLETION DATE ______

LOCATION OF WELLS:

1. N/S ____ FT. & E/W ____ FT. FRM ____ COR. or ___ 1/4 ___ 1/4 of SEC. ___ T ___ N/S R ___ E/W SLBM/USM
2. N/S ____ FT. & E/W ____ FT. FRM ____ COR. or ___ 1/4 ___ 1/4 of SEC. ___ T ___ N/S R ___ E/W SLBM/USM
3. N/S ____ FT. & E/W ____ FT. FRM ____ COR. or ___ 1/4 ___ 1/4 of SEC. ___ T ___ N/S R ___ E/W SLBM/USM
4. N/S ____ FT. & E/W ____ FT. FRM ____ COR. or ___ 1/4 ___ 1/4 of SEC. ___ T ___ N/S R ___ E/W SLBM/USM
5. N/S ____ FT. & E/W ____ FT. FRM ____ COR. or ___ 1/4 ___ 1/4 of SEC. ___ T ___ N/S R ___ E/W SLBM/USM
6. N/S ____ FT. & E/W ____ FT. FRM ____ COR. or ___ 1/4 ___ 1/4 of SEC. ___ T ___ N/S R ___ E/W SLBM/USM
7. N/S ____ FT. & E/W ____ FT. FRM ____ COR. or ___ 1/4 ___ 1/4 of SEC. ___ T ___ N/S R ___ E/W SLBM/USM
8. N/S ____ FT. & E/W ____ FT. FRM ____ COR. or ___ 1/4 ___ 1/4 of SEC. ___ T ___ N/S R ___ E/W SLBM/USM
9. N/S ____ FT. & E/W ____ FT. FRM ____ COR. or ___ 1/4 ___ 1/4 of SEC. ___ T ___ N/S R ___ E/W SLBM/USM
10. N/S ____ FT. & E/W ____ FT. FRM ____ COR. or ___ 1/4 ___ 1/4 of SEC. ___ T ___ N/S R ___ E/W SLBM/USM

Comments or explanation ______________________
______________________

For office use only

DATE OF REQUEST ______________ APP/REJ DATE BY ______________
AREA OFFICE ______________ AUTHORIZATION # ______________

KENNECOTT UTAH COPPER

# Borehole Log

Project ____________________ Location ____________________

Well I.D. # ____________________ Weather ____________________

Total Depth __________ Diameter/Interval ____________________

Surface Elevation __________ Initial Depth to Water __________ 24-hrs __________

Screen: Dia. __________ Length __________ Slot Size __________

Casing: Dia. __________ Length __________ Type __________

Sand ____________________ Seal ____________________

Grout ____________________ Key Number ____________________

Drilling Company ____________________ Drilling Method ____________________

Driller ____________________ Log By __________ Date Drilled __________

Sketch Map

Notes

| Depth (feet) | Graphic Log | Well Const. | Sample Number | Description/Soil Classification (Color, Texture, Structures) |
|---|---|---|---|---|
| | | | | |

# KENNECOTT UTAH COPPER SOIL MOISTURE LYSIMETERS

| Site | Depth (ft) | Date/Time Vacuum Applied | Date/Time Sample Taken | Remaining Vacuum (centibars) | Volume Collected (ml) | pH | Temp | EC (ms) | Eh (mV) | Fe+2 (mg/L) | Sulfide (mg/L) | NO2 (mg/L) | NO3 (mg/L) | D.O. (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LINDDUP | | | | | | | | | | | | | | |
| TLL4100 | 4 | | | | | | | | | | | | | |
| TLL4101 | 8 | | | | | | | | | | | | | |
| TLL4102 | 12 | | | | | | | | | | | | | |
| TLL4103 | 20 | | | | | | | | | | | | | |
| TLL4124 | 2 | | | | | | | | | | | | | |
| TLL4125 | 5 | | | | | | | | | | | | | |
| TLL4126 | 2 | | | | | | | | | | | | | |
| TLL4127 | 5 | | | | | | | | | | | | | |
| TLL4128 | 2 | | | | | | | | | | | | | |
| TLL4129 | 5 | | | | | | | | | | | | | |
| TLL4133 | 3 | | | | | | | | | | | | | |
| TLL4134 | 5 | | | | | | | | | | | | | |
| TLL4135 | 8 | | | | | | | | | | | | | |
| TLL4136 | 2 | | | | | | | | | | | | | |
| TLL4137 | 2 | | | | | | | | | | | | | |
| TLL4138 | 2 | | | | | | | | | | | | | |

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**KENNECOTT UTAH COPPER**
**UPDES FIELD DATA SHEET**

OUTFALL No.______________

DATE: ___________ARRIVAL TIME:____________

METER ID FIELD CALIBRATION

pH____________________ pH Buffers (1)____ (2)____ Final Readings (1)____ (2)____

SC____________________ Standard________________ Final Reading______________

FIELD MEASUREMENTS/OBSERVATIONS

pH________ Conductivity________ Temp________

Visible Sheen (oil/grease)?__________ Floating Solids or Visible Foam?________

ANALYSES

Nutrient_____
Total _____
Diss _____
Hg _____
Phenol _____
CN _____

Bio Sample_______
O+G _______
Coliform _______

COMMENTS:______________________________________________________________

_____________________________________________________________________

_____________________________________________________________________

If this is a split sample with the State, please put (G) on the sample ID.

Sampler(s) Signature(s)________________________________

________________________________

Departure Time________________________________

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**FIGURE DW-1**

# KENNECOTT UTAH COPPER

## DRINKING WATER
## FIELD DATA SHEET

**Sample ID #:**________________________________

**Meter ID Numbers and Calibration**

**See:**

**Date:**________________ **Arrival Time** _______ **Field Log Book:** ______________

____________________

**Sampler(s) Initials:**____________________________ **Page** ________________

**Field Measurements**

**Ph**__________________

**Cond**________________

**Temp.**________________

**Sample Containers**

**Nutrients (1/2 gal.)**__________________
**Total Metals (8 oz.)**__________________
**Diss. Metals (8 oz.)**__________________
**Mercury (Hg)-(8 oz. glass)**_____________
**Nitrates ($N0_x$)-(8 oz. glass)**_____________
**Coliform yes**_______ **no**____________

**Remarks:**____________________________________________________
__________________________________________________________
__________________________________________________________

**Sampler(s) Signature** ________________________

________________________

**Time Sampling Completed**________________________

PN DRAFT

UTAH DEPARTMENT OF HEALTH

# Water Bacteriological Analysis Test Request Form
# Utah Public Health

4431 S 2700 W Taylorsville, UT 84129-8600

801 965 2400 Fax 801 969 3238

http://health.utah.gov/lab/chemistry

**Please fill out this form using block letters and with a black or blue pen.**
**Do not attach this form to the sample.**

LAB USE SECTION

LAB NUMBER

Received Date and Time Stamp

Analyzed Date and Time Stamp

Customer Number

Public Water System: U T A H

**Facility ID**

**Sampling Point ID**

System/Agency Name

Collection Point Description / Project Name (if applicable)

Collection Point Description (Continued)

Sample Receipt Conditions

☐ Health Department Investigative

Temperature .

Ice
- ○ Yes
- ○ No

**Contact Numbers**

USL: Public Health - Environmental Microbiology (801) 965-2400
State Division of Drinking Water (801) 536-4200

Contact Your Local Health Department for Pool, Spa, and Hot Tub Information

**Please fill in the circles or check boxes next to the appropriate option.**
**DO NOT make any other marks. If you need assistance with this form call 801 965 2405.**

**Reporting Options**
- ○ State Drinking Water Compliance Samples
- ○ Private Investigative
- ○ Repeat
  - ○ Downstream Within 5 Of Original Sample
  - ○ Near First Service Connection
  - ○ Original Site
  - ○ Upstream Within 5 Of Original Sample

Original Sample Number

Original Sample Collection Date: M M D D 2 0 Y Y

Complete this section for repeat samples.

**Unsatisfactory Sample**
- ☐ Exceeded Holding Time
- ☐ Out of Date Container
- ☐ Not State Lab Container
- ☐ Container is Broken/Leaking
- ☐ Incomplete Documentation
- ☐ Other

**Please Submit a New Sample**

- ○ TCR Repeat ONLY
- ○ TCR Repeat AND GW Source
- ○ Other

Chlorine Residual ppm

**Type of Water**
- ○ Drinking Water
- ○ Pool/Spa
- ○ Raw Water
- ○ Deionized or RO
- ○ Other

Matrix Testing
- ☐ Well 51
- ☐ Well 51 and HPC
- ☐ Well 97
- ☐ HPC
- ☐ Well 51

Additional Testing

LAB USE SECTION

LAB USE SECTION

**GWR Trigger Source Sample(s)**

Facility ID (Source #): W S

Representative Site: SSG001

Sample # __ of __ source(s)

- ☐ Sampled all sources in use at time of positive
- ☐ Other source(s) not in use

Name of Wholesaler

Date Wholesaler notified: M M D D Y Y Y Y

Collector's First Name

Collector's Last Name

Collection Date: M M D D 2 0 Y Y

Collection Time
- ○ AM
- ○ PM

Collector's Comments

**REPORTING/CONTACT**

First Name | Last Name

Address | City

State | Zip | Email

Phone | Fax

☐ New Information Update Account

**BILLING** ☐ **SAME AS REPORTING**

First Name | Last Name

Address | City

State | Zip | Email

Phone | Fax

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FIGURE SW-2 EXAMPLE SURFACE WATER QUALITY FIELD DATA SHEET

KENNECOTT UTAH COPPER

Sheet ____ of ____

SURFACE WATER QUALITY
FIELD DATA SHEET

SITE SKETCH:

SAMPLE LOCATION ID #: __________________

DATE: _______________ TIME: _________am/pm

SAMPLING PERSONNEL: ____________________

____________________ ____________________

SITE DESCRIPTION:

PHOTOGRAPH: Roll #: ________ Photo #: ________ Direction Faced: ________
Roll #: ________ Photo #: ________ Direction Faced: ________

SAMPLE DESCRIPTIONS:

TIME: DEPTH:

METER NUMBERS: pH CONDUCTIVITY Eh D.O.
CALIBRATION
CONCENTRATON: pH CONDUCTIVITY Eh D.O.
SAMPLING METHOD:
NUMBER OF COMPOSITE SAMPLES: FIELD
PARAMETERS:
METER ID #: TITRATION:
Carbonate ($CO_3$): _____ml _____titrate _____M _____mg/l _____time
Bicarbonate ($HCO_3$): _____ml _____titrate _____M _____mg/l _____time
Time: _________ a.m./p.m.
Ferrous Iron:
Sulfide: Paper mg/l Colormetric mg/l time

| TIME | TEMP.(C) | pH | COND. | D.O./METHOD | TURB.(NTU) |
|---|---|---|---|---|---|



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# Plates

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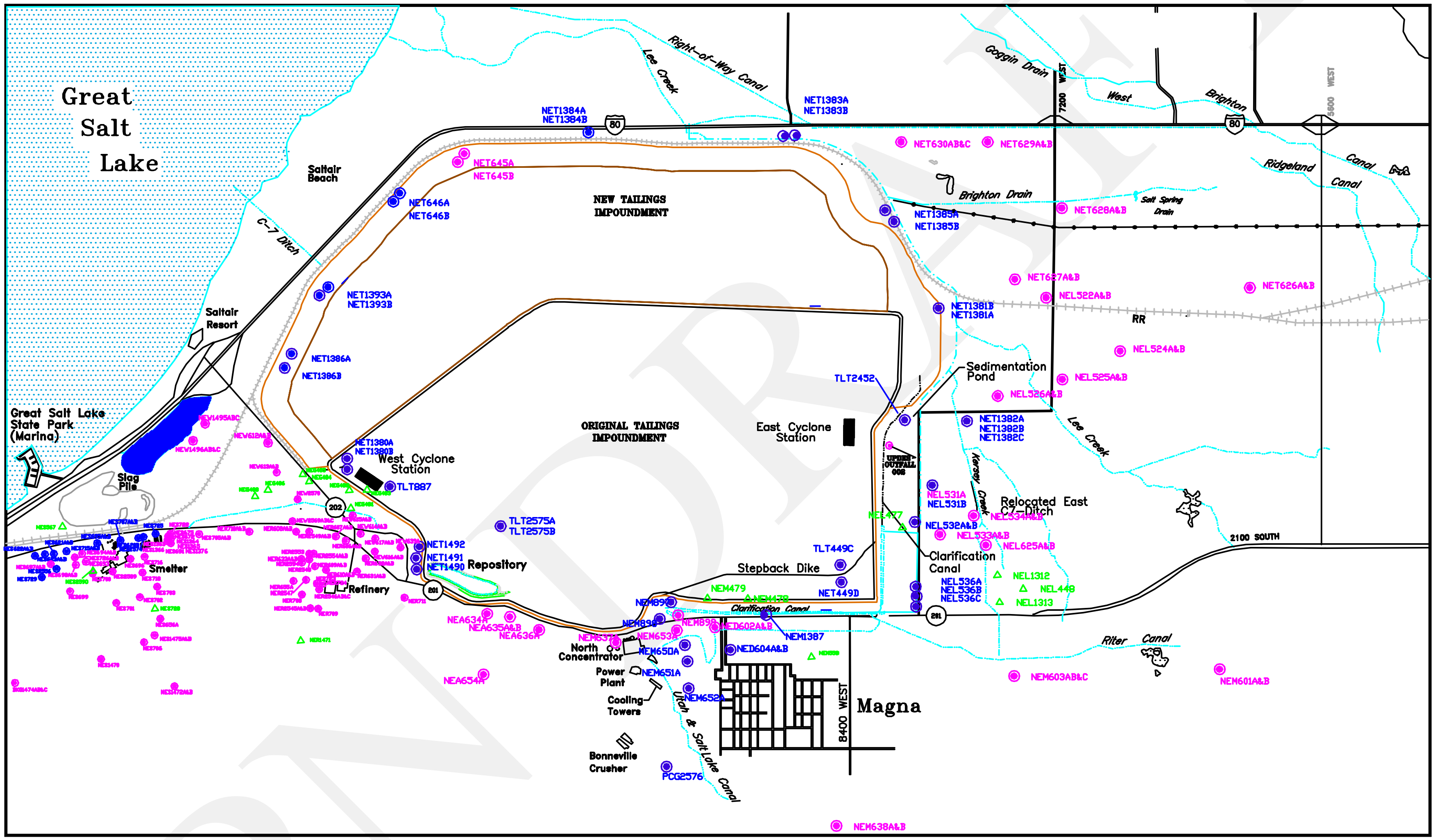
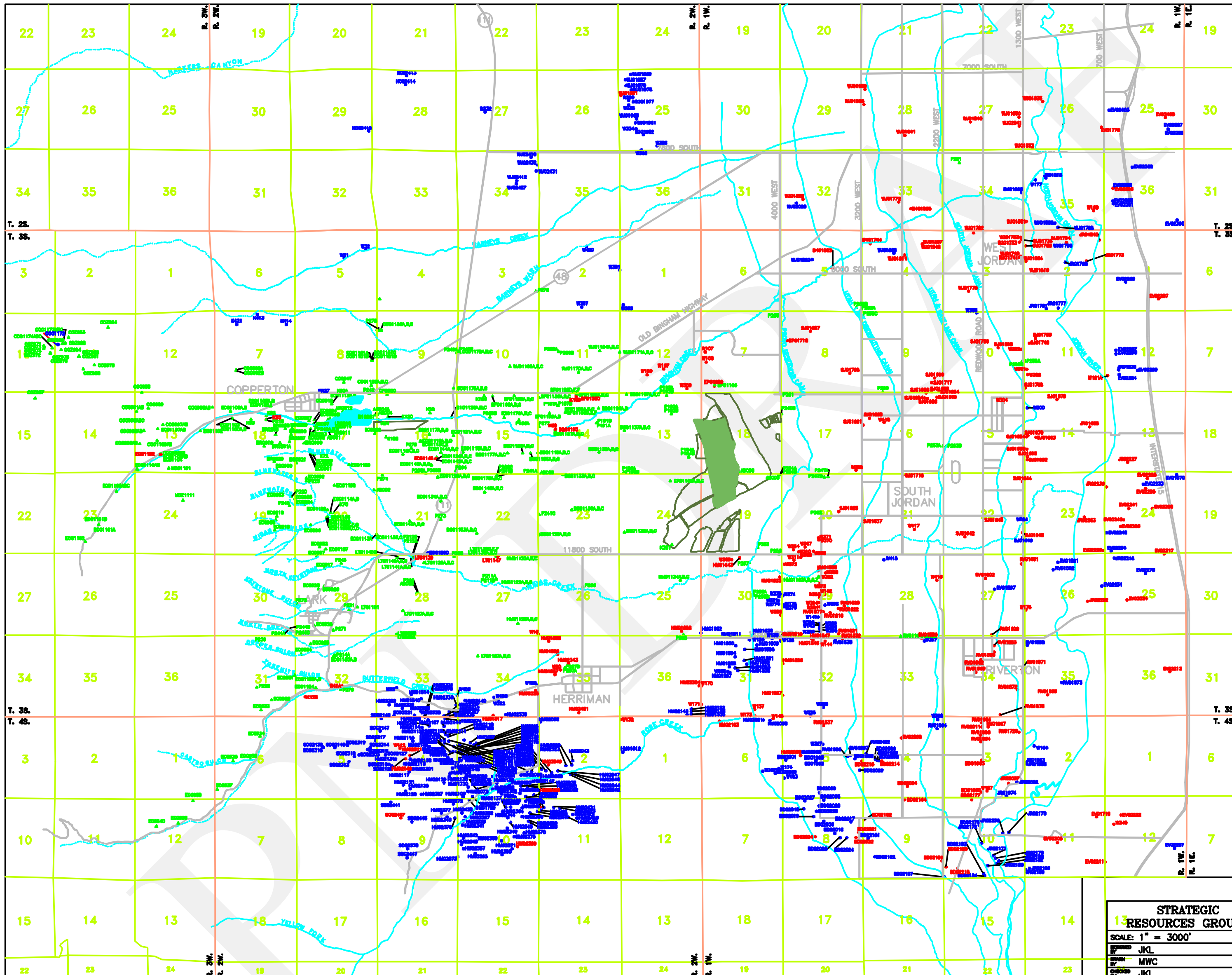



| | |
|---|---|
| Railroad | Permit Well |
| Rerouted C-7 Ditch | Monitoring Well |
| Footprint of Tailings Impoundment Complex | Production Well |

| | | | |
|---|---|---|---|
| ENVIRONMENTAL AFFAIRS | | KENNECOTT UTAH COPPER | |
| SCALE: | DATE | NORTH FACILITIES WELL LOCATIONS | |
| JCC | 03/00 | PLATE1 | |
| BS | 03/00 | | |
| JS | 01/02 | | |
| Job No. | Dwg. No. NONE | REV 1 | |

F:\ENVR\RWQ\DRAWINGS\ENVIT015 03/14/00 BSCOTT




## LEGEND

WELL DEFINITION

- EVG2395 DRINKING WATER WELL LOCATION WITH SITE ID
- WJG2041 NON-DRINKING WATER WELL LOCATION WITH SITE ID
- K401 KUC MONITORING WELL LOCATION WITH SITE ID

MAP FEATURES

- PERENNIAL STREAMS AND CANALS
- EPHEMERAL STREAMS AND GULCHES
- PREVIOUS LOCATION OF TAILINGS, EVAPORATION PONDS AND WASTE ROCK
- LOCATION OF COMPLETED CAPPED AND RECLAIMED SITES

GRAPHIC SCALE

( IN FEET )
1 inch = 3000 ft.

Location of KUC monitoring wells from Kennecott Utah Copper surveys.

Location of other wells derived from Kennecott Utah Copper PPG GPS surveys during the 1994–1995 well inventory project.

Location of completed capped and reclaimed sites from Kennecott Utah Copper Surveys, Nov 1994.

Location of old evaporation ponds derived from aerial photographs (Aero Graphics, Inc.) March 1994

Location of Oquirrh Mountain streams and gulches, reservoirs, and Arco tailings area derived from aerial photographs (Aero Graphics, Inc.) October 1993.

Location of valley streams and canals and survey lines from USGS 7.5' Quadrangles (Jordan Narrows, Lark, Midvale, Tickville Spring).

| STRATEGIC RESOURCES GROUP | |
|---|---|
| SCALE: 1" = 3000' | DATE |
| DESIGNED BY JKL | 8/27/01 |
| DRAWN BY MWC | 8/27/01 |
| CHECKED BY JKL | 8/28/01 |
| PROJECT ENGINEER JCC | |
| PROJECT MANAGER | |

KENNECOTT
UTAH COPPER

SOUTH FACILITIES
WELL LOCATION MAP
PLATE 2

Job No. ---  Dwg. No. 451-T-2057  REV

N:\DOCUMENTS\451\451????? 08/27/01 kmcook