

**LaGesse Mine Groundwater Quality
Monitoring Plan
LaGesse Mine Site
Chippewa County, Wisconsin**

**Prepared for
Preferred Sands of Minnesota, LLC**

August 8, 2011

DRAFT

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I hereby certify that this plan, document, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the state of Wisconsin.

Signature:

Steve Klein

Date: August xx, 2011 License No. E-31310



LaGesse Mine Groundwater Monitoring Plan
LaGesse Mine Site
Chippewa County, Wisconsin
August 8, 2011

Table of Contents

1.0 Introduction	1
1.1 Site Background.....	1
1.1.1 General Site Geology	1
1.1.2 Water Table.....	1
1.1.3 Planned Site Operations	1
1.2 Purpose.....	2
2.0 Groundwater Quality Monitoring Program	3
2.1 Water Table Monitoring Wells	3
2.2 Private Wells.....	3
2.3 Groundwater Sampling	3
2.3.1 Monitoring Wells	3
2.3.2 Private Wells.....	4
2.4 Quality Assurance/Quality Control.....	4
3.0 Reporting.....	5

List of Tables

Table 1	Analytical Parameters, Reporting Limits, and Methods
Table 2	Quality Control Sample Types and Recommended Frequency
Table 3	Recommended Hold Times and Preservation

List of Figures

Figure 1	Site Location Map
Figure 2	Water Table Monitoring Well Locations

List of Appendices

Appendix A	Standard Operating Procedures
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1.0 Introduction

This monitoring plan presents the recommended scope of work for conducting groundwater quality monitoring at the LaGesse Mine site (the Site). The Site is located in the Town of Cook's Valley, Chippewa County, Wisconsin in Township 30, Range 10W, Section 3. The site location is shown on Figure 1.

1.1 Site Background

Chippewa County issued Nonmetallic Mining (NMM) Permit 2011-01 for the Site on May 27, 2011.

1.1.1 General Site Geology

Surficial materials at the Site generally consist of a thin (approximately 10 feet or less) sequence of unconsolidated soil/sediment (topsoil, clay, sand, and gravel). The surficial materials are underlain by Cambrian-aged sandstone units. Based on available information, it is anticipated that the Eau Claire Formation and Mt. Simon Sandstone are the two lowermost geologic units in the Cambrian sandstone sequence.

1.1.2 Water Table

Available information indicates that the water table at the Site occurs in the Cambrian-aged sandstone units and that the depth below ground surface of the water table is variable across the Site ranging from approximately 80 to 190 feet. Water table elevation contours obtained from Chippewa County shown on Figure 2 indicate that the groundwater flow direction in the water table aquifer beneath the Site is generally to the north-northeast.

1.1.3 Planned Site Operations

At the Site, Preferred Sands of Minnesota, LLC plans to develop 200-acres for the purpose of open pit nonmetallic mineral mining from the Cambrian-aged sandstone that is adjacent to an operational 20-acre nonmetallic mineral mine that is subject to an existing Chippewa County Reclamation Plan. Operations at the Site will include the mining and washing of quartz sand and phased reclamation of the mined area. The mined and washed quartz sand will then be transported from the site by truck to a Preferred Sands processing facility where it will be dried, sorted, and transported to market by rail. No dewatering during mining at the Site is planned because the minimum elevation of the pit floor is planned to be approximately 20 feet above the water table.

1.2 Purpose

The purpose of this plan is to outline the tasks associated with monitoring groundwater at the Site and in nearby domestic wells.

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2.0 Groundwater Quality Monitoring Program

The groundwater quality monitoring network will consist of four wells in the water table aquifer at the site and, if the well owners so choose, private wells within ½-mile of the Site. Water table elevation data obtained from Chippewa County indicates that the groundwater flow direction in the water table aquifer at the Site is approximately to the north-northeast.

2.1 Water Table Monitoring Wells

There are four monitoring wells (MW1, MW2, MW3, and MW4) at the Site screened across the water table. The locations of these four wells are shown on Figure 2.

2.2 Private Wells

Owners of private wells within ½-mile downgradient (i.e., north and north-northeast) of the Site will be contacted to see if they would like to have their well sampled.

2.3 Groundwater Sampling

2.3.1 Monitoring Wells

Groundwater samples will be collected from monitoring wells MW1, MW2, MW3, and MW4 quarterly for one year and then semiannually thereafter. Low flow sampling methods will be used to collect groundwater samples from the monitoring wells. Groundwater samples from the wells will be analyzed for the metals (dissolved), volatile organic compounds (VOCs), and semivolatile organic compounds (SVOCs) shown in Table 1. Metals samples will be filtered in the field in order to minimize analytical interferences from solids that may be entrained in the sample during sample collection but would not be expected to move with groundwater. Sampling procedures are described in Appendix A. Analytical results for the groundwater samples will be compared to Preventive Action Limits in Table 1 of WAC NR 140.10.

Groundwater sample analyses will be performed by TriMatrix Laboratories in Grand Rapids, Michigan. Samples will be shipped to the laboratory via overnight delivery service within 24 hours of sample collection. Samples will be stored on ice in a cooler prior to shipping.

2.3.2 Private Wells

Owners of private wells located within ½-mile downgradient (i.e., north to east-northeast) of the Site will be contacted to see if they would like to have their well sampled. If any of the well owners agree to allow sampling of their well, the well will be sampled, if possible, in conjunction with the first sampling event for the monitoring wells at the Site. Any private wells that cannot be sampled at the same time as the monitoring wells will be sampled as soon as possible after the monitoring well sampling event. Private wells will not be sampled again unless analytical results for samples collected from the site monitoring wells exceed one or more of the Preventive Action Limits. Samples will be collected from an outdoor tap (if available). The tap will be allowed to run for 10 to 15 minutes before the sample is collected. Groundwater samples from the wells will be analyzed for the metals, volatile organic compounds (VOCs), and semivolatile organic compounds (SVOCs) shown in Table 1. Metals samples will be filtered in the field in order to minimize analytical interferences from solids that may be entrained in the sample during sample collection but would not be expected to move with groundwater. Analytical results for the groundwater samples will be compared to Preventive Action Limits in Table 1 of WAC NR 140.10. A copy of the analytical results will be provided to the well owner.

Groundwater sample analyses will be performed by TriMatrix Laboratories in Grand Rapids, Michigan. Samples will be shipped to the laboratory via overnight delivery service within 24 hours of sample collection. Samples will be stored on ice in a cooler prior to shipping.

2.4 Quality Assurance/Quality Control

During each sampling event the quality control samples identified in Table 2 will be collected according to industry standard procedures at the frequencies shown in Table 2. The trip blank will be analyzed for only VOCs will the other quality control samples will be analyzed for metals, VOCs, and SVOCs.

The laboratory will be expected to analyze the samples within the holding times shown in Table 3.

Laboratory reports will be reviewed for quality assurance/quality control (QA/QC) purposes using industry standard protocols. Any QA/QC issues will be documented and the laboratory will be requested to take corrective actions, if necessary.

3.0 Reporting

Analytical results for groundwater samples collected from site monitoring wells during each calendar year will be included in the Reclamation Report & Activities Plan filed annually with the Chippewa County Department of Land Conservation & Forest Management.

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Table 1

Analytical Parameters, Reporting Limits, and Methods
TriMatrix Laboratories, Grand Rapids, MI

Analyte	Method	Reporting Limit ¹	Units
VOCs			
Acetone	8260B	5.0	ug/L
Benzene	8260B	1.0	ug/L
Bromodichloromethane	8260B	1.0	ug/L
Bromoform	8260B	1.0	ug/L
Bromomethane	8260B	1.0	ug/L
Carbon Disulfide	8260B	5.0	ug/L
Carbon Tetrachloride	8260B	1.0	ug/L
Chlorobenzene	8260B	1.0	ug/L
Chloroethane	8260B	1.0	ug/L
Chloroform	8260B	1.0	ug/L
Chloromethane	8260B	1.0	ug/L
Cyclohexane	8260B	5.0	ug/L
1,2-Dibromo-3-chloropropane	8260B	1.0	ug/L
Dibromochloromethane	8260B	1.0	ug/L
1,2-Dibromoethane	8260B	1.0	ug/L
1,2-Dichlorobenzene	8260B	1.0	ug/L
1,3-Dichlorobenzene	8260B	1.0	ug/L
1,4-Dichlorobenzene	8260B	1.0	ug/L
Dichlorodifluoromethane	8260B	1.0	ug/L
1,1-Dichloroethane	8260B	1.0	ug/L
1,2-Dichloroethane	8260B	1.0	ug/L
1,1-Dichloroethene	8260B	1.0	ug/L
cis-1,2-Dichloroethene	8260B	1.0	ug/L
trans-1,2-Dichloroethene	8260B	1.0	ug/L
1,2-Dichloropropane	8260B	1.0	ug/L
cis-1,3-Dichloropropene	8260B	1.0	ug/L
trans-1,3-Dichloropropene	8260B	1.0	ug/L
Ethylbenzene	8260B	1.0	ug/L
2-Hexanone	8260B	5.0	ug/L
Isopropylbenzene	8260B	1.0	ug/L
Methyl Acetate	8260B	5.0	ug/L
Methyl tert-Butyl Ether	8260B	1.0	ug/L
Methylcyclohexane	8260B	5.0	ug/L
Methylene Chloride	8260B	1.0	ug/L
2-Butanone (MEK)	8260B	5.0	ug/L
4-Methyl-2-pentanone (MIBK)	8260B	5.0	ug/L
Styrene	8260B	1.0	ug/L
1,1,2,2-Tetrachloroethane	8260B	1.0	ug/L
Tetrachloroethene	8260B	1.0	ug/L
Toluene	8260B	1.0	ug/L
1,2,4-Trichlorobenzene	8260B	1.0	ug/L
1,1,1-Trichloroethane	8260B	1.0	ug/L
1,1,2-Trichloroethane	8260B	1.0	ug/L
Trichloroethene	8260B	1.0	ug/L
Trichlorofluoromethane	8260B	1.0	ug/L
1,1,2-Trichloro-1,2,2-trifluoroethane	8260B	1.0	ug/L
Vinyl Chloride	8260B	1.0	ug/L
Xylene (Total)	8260B	3.0	ug/L

Table 1

Analytical Parameters, Reporting Limits, and Methods
TriMatrix Laboratories, Grand Rapids, MI

Analyte	Method	Reporting Limit ¹	Units
<i>SVOCs</i>			
Acenaphthene	8270C	0.50	ug/L
Acenaphthylene	8270C	0.50	ug/L
Acetophenone	8270C	0.50	ug/L
Anthracene	8270C	0.50	ug/L
Atrazine	8270C	0.50	ug/L
Benzaldehyde	8270C	0.50	ug/L
Benzo(a)anthracene	8270C	0.50	ug/L
Benzo(a)pyrene	8270C	0.50	ug/L
Benzo(b)fluoranthene	8270C	0.50	ug/L
Benzo(k)fluoranthene	8270C	0.50	ug/L
Benzo(g,h,i)perylene	8270C	0.50	ug/L
1,1'-Biphenyl	8270C	0.50	ug/L
4-Bromophenyl Phenyl Ether	8270C	0.50	ug/L
Butyl Benzyl Phthalate	8270C	1.0	ug/L
Caprolactam	8270C	1.0	ug/L
Carbazole	8270C	0.50	ug/L
4-Chloro-3-methylphenol	8270C	0.50	ug/L
4-Chloroaniline	8270C	1.0	ug/L
Bis(2-chloroethoxy)methane	8270C	0.50	ug/L
Bis(2-chloroethyl) Ether	8270C	0.50	ug/L
Bis(2-chloroisopropyl) Ether	8270C	0.50	ug/L
2-Chloronaphthalene	8270C	0.50	ug/L
2-Chlorophenol	8270C	0.50	ug/L
4-Chlorophenyl Phenyl Ether	8270C	0.50	ug/L
Chrysene	8270C	0.50	ug/L
Dibenz(a,h)anthracene	8270C	0.50	ug/L
Dibenzofuran	8270C	0.50	ug/L
Di-n-butyl Phthalate	8270C	1.0	ug/L
3,3'-Dichlorobenzidine	8270C	1.0	ug/L
2,4-Dichlorophenol	8270C	0.50	ug/L
Diethyl Phthalate	8270C	0.50	ug/L
2,4-Dimethylphenol	8270C	1.0	ug/L
Dimethyl Phthalate	8270C	0.50	ug/L
4,6-Dinitro-2-methylphenol	8270C	0.50	ug/L
2,4-Dinitrophenol	8270C	5.0	ug/L
2,4-Dinitrotoluene	8270C	0.50	ug/L
2,6-Dinitrotoluene	8270C	0.50	ug/L
Di-n-octyl Phthalate	8270C	0.50	ug/L
Bis(2-ethylhexyl) Phthalate	8270C	0.50	ug/L
Fluoranthene	8270C	0.50	ug/L
Fluorene	8270C	0.50	ug/L
Hexachlorobenzene	8270C	0.50	ug/L
Hexachlorobutadiene	8270C	0.50	ug/L
Hexachlorocyclopentadiene	8270C	0.50	ug/L
Hexachloroethane	8270C	0.50	ug/L
Indeno(1,2,3-cd)pyrene	8270C	0.50	ug/L
Isophorone	8270C	0.50	ug/L
2-Methylnaphthalene	8270C	0.50	ug/L
2-Methylphenol	8270C	0.50	ug/L

Table 1

Analytical Parameters, Reporting Limits, and Methods
TriMatrix Laboratories, Grand Rapids, MI

Analyte	Method	Reporting Limit ¹	Units
4-Methylphenol	8270C	0.50	ug/L
Naphthalene	8270C	0.50	ug/L
2-Nitroaniline	8270C	1.0	ug/L
3-Nitroaniline	8270C	1.0	ug/L
4-Nitroaniline	8270C	1.0	ug/L
Nitrobenzene	8270C	0.50	ug/L
4-Nitrophenol	8270C	5.0	ug/L
2-Nitrophenol	8270C	0.50	ug/L
N-Nitroso-diphenylamine	8270C	0.50	ug/L
N-Nitroso-di-n-propylamine	8270C	0.50	ug/L
Pentachlorophenol	8270C	0.50	ug/L
Phenanthrene	8270C	0.50	ug/L
Phenol	8270C	0.50	ug/L
Pyrene	8270C	0.50	ug/L
2,4,6-Trichlorophenol	8270C	0.50	ug/L
2,4,5-Trichlorophenol	8270C	0.50	ug/L
<i>RCRA Metals</i>			
Silver	6020A	0.20	ug/L
Arsenic	6020A	1.0	ug/L
Barium	6020A	1.0	ug/L
Cadmium	6020A	0.20	ug/L
Chromium	6020A	1.0	ug/L
Mercury	7470A	0.20	ug/L
Lead	6020A	1.0	ug/L
Selenium	6020A	1.0	ug/L

¹ The Reporting Limits (RL) in the above tables are calculated by the laboratory based on the most recent annual Method Detection Limit (MDL) study. These values may change slightly on an annual basis, or whenever significant changes are made to instrumentation or to the Standard Operating Procedures (SOPs) for the associated analytical method.

Table 2

Quality Control Sample Types and Recommended Frequency

Quality Control Type	Frequency
Field Blank	1 in 20 or 1 per event, whichever is greater
Trip Blank	submit with each cooler shipped
Masked Duplicate	1 in 20 or 1 per event, whichever is greater
Matrix Spike/Matrix Spike Duplicate (MS/MSD)	extra sample volume every 20 samples; at least one per sampling event

Table 3

Recommended Hold Times and Preservation

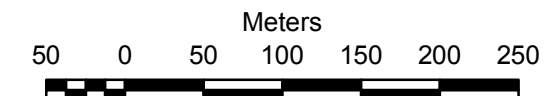
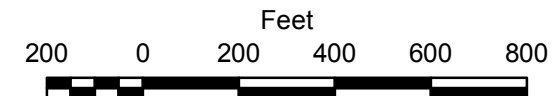
Parameter Group	Preservation	Recommended Hold Time	Notes
Volatile Organic Compounds (VOCs)	HCl, on ice	14 days	Labs typically send 3, 40 mL vials for <u>each</u> location
Semivolatile Organic Compounds (SVOCs)	On ice	7 days (ship ASAP)	--
RCRA Metals	HNO ₃ , on ice	180 days	--

Barr Footer: ArcGIS 10.0, 2011-08-08 09:25:31 484000 File: I:\Projects\491091006\Maps\Reports\GW_Quality_Monitoring_Plan\Figure 2 Water Table Monitoring Well Locations.mxd User: JCG



- ⊕ Proposed_shallow_monitoring_wells
- ⊕ High Capacity Well
- Ground Water Elevation Contour (ft)*
- ▨ Proposed Berm
- ▭ Proposed Mining Area Boundary
- - - Approximate Property Boundary

*Source: Generalized Water-Table Elevation of Chippewa County, Wisconsin, I.D. Lippett, 1988.



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Figure 2

WATER TABLE MONITORING
WELL LOCATIONS
LaGessee Mine Site
Preferred Sands
Bloomer, Wisconsin

Appendix A

Standard Operating Procedures

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Standard Operating Procedure for Low-Flow Monitoring Well Purging

Purpose

In specific cases, low-flow purging and sampling techniques are employed obtain environmental groundwater samples. Low-flow purging is discussed in detail in Low Flow Ground Water Sampling Procedures (EPA, 1996), which are included with the SOP for Low Flow Monitoring Well Sampling.

Responsibilities

The environmental technicians are responsible for the proper execution of this SOP. Application of these procedures should follow low-flow monitoring well purging techniques described in the SOP.

Procedure

For low-flow purging, either an electric whale pump, bladder pump, double-valve pump, or peristaltic pump will be used. If a peristaltic pump is used, the drive tubing will change between wells. Pumping rates during low-flow purging will be kept below 0.5 liters per minute. All pump powering equipment (generators) will be kept down wind of the well being sampled. An electronic water level indicator will be used to ensure that no or a minimal amount of drawdown is occurring within the well. During the first purge/sampling event, a purge rate will be established for each monitoring well. This purge rate will be a rate at which minimal drawdown occurs. An attempt will be made to keep drawdown to 0.1 feet or less.

The intake port for the purging pump being used will be placed at a depth such that the intake is at or slightly above the middle of the screened interval.

Monitoring well purging will be considered complete when field analytical parameters, pH, Eh, conductivity, dissolved oxygen, and turbidity have reached stabilization. Temperature will also be measured. Field analytical parameters, aside from turbidity, will be measured utilizing in-line flow-through cell equipment. Stabilization readings will begin immediately. Readings will be taken at 3-minute intervals thereafter. All equipment will be calibrated prior to purging of wells. Field sampling logs will be kept and will include well construction information, water level data, field analytical results, and pumping rate records. Calibration records will be kept on appropriate forms.

Standard Operating Procedure for Low-Flow Monitoring Well Sampling

Purpose

In specific cases, low-flow sampling techniques will be employed to sample monitoring wells. Low-flow sampling is discussed in detail in Low Flow Ground Water Sampling Procedures (EPA, 1996), which are attached to this SOP. For newly installed and developed monitoring well, a minimum of one week will pass between the well development and first monitoring well sampling event.

Responsibilities

The field technicians are responsible for the proper execution of this SOP. Application of these procedures should follow low-flow monitoring well purging techniques described in the SOP.

Procedure

The same pump as is used for purging will be used for low flow sampling. Pumping rates during low-flow sampling will be the same as is used during low-flow purging. These should be established during the first purge or sampling event for the well. This purge rate will be the rate at which minimum drawdown occurs and may be variable for each monitoring well. Generally, low-flow rates will be below 0.5 liters per minute.

For filtered samples, in-line filtration methods will be used to collect the sample.

Sample containers will be filled following standard groundwater sample collection techniques.

Standard Operating Procedures for the Collection of Quality Control Samples

Purpose

To describe the procedures used in the collection of quality control samples; equipment blanks, field blanks, masked duplicate samples (i.e. field duplicate samples), matrix spikes and matrix spike duplicate and trip blank samples.

Applicability

This procedure applies to sample definition, collection and handling techniques used by the technician(s) and the laboratory in regards to quality control samples.

Equipment

Laboratory certified containers appropriate for the required analysis
Nitrile or vinyl gloves
Bailer
Chain of custody
Sample Labels
Sample containers/media
Analyte-free water

Definitions

Equipment Blank. The equipment blank sample is made up from analyte-free water that is rinsed on or through sample collection equipment. The rinse water is collected in the appropriate sample container(s) and submitted for analysis. The equipment blank samples are used to determine the following; the effectiveness of field cleaning procedures and to determine any source of contamination in a trip blank sample. The purpose of the equipment blank sample is to determine if the sampling devices and apparatus for sample collection have been adequately cleaned before they are shipped to the field site.

Field Blank. Field blank samples (or Rinsate Blanks) are prepared on-site. The field technician pours analyte-free water through decontaminated sample collection equipment (bailer or pump, hand-trowel, etc.) and collects the “rinsate” in the appropriate sample container(s). The field blank samples will be handled in the same manner as the sample group for which they are intended (i.e. blanks will be stored and transported with the sample group). The purpose of the field blank sample is to determine whether the field or sample transporting procedures and environments have contaminated the sample.

Field (or Masked) Duplicates. Field duplicate samples are: two identical aliquots of a sample, collected in separate sample bottles at the same time, and placed under identical circumstance using a dual inlet sampler or by splitting a larger aliquot. They are treated exactly the same throughout field and laboratory procedures. Analyses of field duplicate samples give a measure of the precision associated with sample collection, preservation, and storage, as well as with laboratory procedures.

Matrix Spikes (MS) and Matrix Spike Duplicate (MSD). Matrix spike and matrix spike duplicates are two identical aliquots of an environmental sample to which known quantities of analytes are added (spiked) in the laboratory. The MS and MSD are prepared and analyzed exactly like their project (native) sample aliquot. Generally, it is required that three separate sample aliquots are collected in the field for each analysis. One aliquot is analyzed to determine the background concentrations in the project sample, a second sample aliquot serves as the MS sample and the third sample aliquot serves as the MSD. The purpose of the MS and MSD is to quantify the bias and precision caused by the sample matrix. The background concentrations of the analytes in the sample matrix must be determined in a separate aliquot and the measured values in the MS and MSD corrected for background concentrations.

Trip Blank. A trip blank sample is made up of contaminant-free water and is prepared prior to sampling event by the laboratory providing the sampling containers. The purpose of the trip blank sample is to determine if contamination has occurred from any of the following sources; improper sampling container cleaning, contaminated source water, sample contamination during storage and transportation due to exposure to contaminants or any other environmental conditions during sampling. Trip blank samples apply to VOC samples only.

References

Procedures for Ground Water Monitoring, Minnesota Pollution Control Agency Guidelines, December 1986

EPA: Title 40 of the Code of Federal Regulations

Responsibilities

The sampling technician(s) are responsible for the accurate collection of quality control samples. The laboratory is responsible for the accurate set-up and analysis of quality control samples.

Procedure

The ratio of quality control samples are generally 1 field blank/field duplicate per twenty samples, however, specific project requirements may be determined by the QAPP/SAP for the project.

A. Masked duplicate sample:

1. Collect samples by rotating sampling containers from original sample to the field (masked) duplicate sample (using the same exact methods for both).
2. Preserve, store, and transport the field duplicate sample in the same manner as the original sample.
3. Submit the field duplicate sample to the laboratory for the same analyses as the original sample.

B. Trip blank Samples:

1. Trip blank samples are sealed prior to sampling (prepared by the laboratory performing the VOC analysis).

2. Transport trip blank samples to the site in the sample storage cooler containing the VOC vials used for collecting project samples for the sampling event.
3. Trip blank sample containers are not to be opened in the field.
4. Transport trip blank samples back to the laboratory in the sample storage cooler. There must be one set of trip blank samples per sample cooler containing VOC samples from the Site.
5. The trip blanks should be listed on the chain-of-custody along with the other samples and the analysis required. (Trip blanks are only provided for VOCs analyses).

Note: Labeling of all sample blank containers follow the SOP for the collection of groundwater, soil, or sediment samples.

C. Field, Rinsate, or Equipment blanks:

1. Obtain the appropriate sampling containers and desired amount (analyte-free) water from the laboratory. (Generally, blanks are taken for each parameter of interest.)
2. Pour analyte-free water through decontaminated sample collection equipment (bailer or pump, hand-trowel, etc.) and collecting the “rinsate” in the appropriate sample containers.
3. Seal the field blank sample containers and store with other samples collected (should be handled in the same manner).

Filtered equipment blank:

1. Pour or pump (analyte-free) water into and/or through the groundwater sampling filter.
2. Begin filtering (as described in the standard operating procedure for Filtering Groundwater Samples).

Note: The filtered equipment blank is usually conducted for dissolved metals or dissolved organic carbon samples only.

Sample Storage

The samples will be bubble wrapped or bagged immediately after collection, stored in a sample cooler, packed on double bagged wet ice and accompanied with the proper chain of custody documentation. Custody seals may be present, but at minimum, the coolers must be taped shut with three straps of strapping tape. If sample coolers are left in a vehicle or field office for temporary storage, the area will be locked and secured. The coolers must be delivered to the laboratory via hand or over night delivery courier in accordance with all Federal, State and Local shipping regulations.

Disposal

All waste generated by this process will be disposed of in accordance with Federal, State and Local regulations. Where reasonably feasible, technological changes have been implemented to minimize the potential for environmental pollution.

Documentation

The technician(s) will document the type and number of quality control samples collected during each field event. All sample information will be documented in the field notebook, field log data sheet and chain-of-custody record.

Attachments

Attachment 1 – Field Log Data Sheet

Attachment 2 – Chain of Custody Form

Attachment 3 – Sample Label – Example

Attachment 4 – Custody Seal – Example

Attachment 3
Example - Sample label



Client _____
Project Number _____
Date: _____ Time _____
Preservative: _____
Sampled By: _____
Sample Location: _____

Attachment 4
Custody Seal

Custody Seal			
Date _____	Project _____		
Signature _____	Container# _____	of _____	