EnviroSearch INTERNATIONAL

COPY

March 12, 1997

Byron Shark
Rocky Mountain Region
U.S. Forest Service
P.O Box 25127
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Delivery: 740 Simms St.
Golden, Colorado 80401

Re: CONTRACT No. 53-84N8-6-005, HAZARDOUS WASTE REMEDIATION, ACTIVITY III - BLACK HILLS NATIONAL FOREST NEMO RANGER DISTRICT, NEMO WORK CENTER

Dear Mr. Shark:

It has come to our attention that an inaccuracy exists in a document recently provided to the Forest Service. The Standard Operating Procedures (SOPs) for Monitoring Well Installations, and Groundwater Sampling, contains an incorrect SOP. SOP-07 (Management of Investigation-Derived Waste), was inadvertently replaced with a similar SOP referencing a different Forest Service project. Please discard the incorrect page and insert the attached correct page.

We apologize for the inconvenience. If you have any questions or comments, please feel free to contact me at (801) 532-1717 or Richard Kelsey at (208) 345-8292.

Sincerely,

Mark Lilly
Staff Geologist

Enc. Standard Operating Procedures SOP-07

cc: Bill Schleining
Byron Shark
Don Murray
Richard Kelsey

1752E3-3/SOP Addendum ltr.doc/ML(dp)

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SOP-07 - Management of Investigation-Derived Wastes

A. Purpose

This purpose of this SOP is to define management procedure s for wastes generated during field investigation activities.

B. Scope

This SOP applies to all wastes generated during field investigations conducted in and around Nemo, South Dakota.

C. Discussion

Investigation-derived wastes (IDW) will be managed in accordance with the EPA Guide to Management of Investigation-Derived Wastes (OERR Directive 9345.3-02). The investigation activities include borehole drilling and sampling. The field generated wastes will fall into three categories: 1) purge water and decontamination rinsate, 2) soils and drill cuttings from drilling, augering and sampling activities and 3) non-indigenous wastes such as disposable personal protective equipment, disposable sampling tools, etc. The management of each of these wastes are discussed below.

D. Procedures

1. purge water and decontamination rinsate:

Purge water and decontamination rinsate generated from monitoring well installation, developing and sampling activities will be placed in 55 gallon drums pending characterization for disposal.

2. soils and drill cuttings from sampling and boring operations:

Soils and drill cuttings from each borehole will be sampled and placed on a bermed 6 mil plastic sheeting surface and covered, pending characterization for either on site management or off-site disposal.

3. non-indigenous field generated wastes:

Non-indigenous wastes such as disposable personal protective equipment, disposable sampling tools, etc. will be disposed of off-site.

STANDARD OPERATING PROCEDURES
for
Drilling, Monitoring Well Installations, and Groundwater Sampling

USFS Nemo, Well Drilling and Installations
Nemo Work Station, Black Hills N.F. South Dakota

February 27, 1997

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SOP-01 - Collection of Samples Using Field Log Book

A. Purpose

This SOP describes standard procedures for collecting environmental samples at the site.

B. Scope

This SOP is applicable for all types of samples.

C. Discussion

Upon the determining the need for collection of a sample, the sampler will document all pertinent information in the field log book.

D. Procedure

1. Note the analytical parameter, Date, Time, and Location;

2. Assigned a Sample ID# associated with the Borehole # and the depth interval from which the sample was collected;

3. Gather all additional data / Information pertinent to the sampling event as each task is completed;

E. Recording

Record all above data / information in the field logbook as each task is completed

SOP-02 - Subsurface Soil Sampling With a Split-Spoon Sampler

A. Purpose

This SOP describes the procedures for obtaining subsurface soil samples using a split-spoon sampler.

B. Scope

This SOP is applicable to the collection of soil samples using a stainless steel split-spoon sampler, and then containerizing the soil samples in sample bottles. This SOP also describes the requirements for drilling to the desired sampling depth, obtaining the sample, and sample collection. The equipment, materials, and the data recording requirements are also detailed.

C. Apparatus and Materials

1. Drilling equipment (Mobile B-24 drill rig with 4 3/8 inch outside diameter hollow stem auger);

2. Sampling drill rods;

3. Stainless steel Split-spoon sampler, (1 1/2 inch diameter, Two feet in length,);

4. Drive weight assembly (150 lb. hammer);

5. Accessory sampling equipment (i.e., Teflon or stainless steel scoops, bowls, sample bottles and disposable vinyl gloves); and

6. Documentation material (Chain-of-Custody Forms, Sample Labels and Seals, and the Field Log Book).

D. Procedures

The procedures for subsurface sampling will be the same as those detailed in the ASTM method D 1586-84. The procedures for collection of the sample in sample bottles for laboratory analysis are detailed in the field log book. The sampling depth interval will be carefully controlled to assure the samples are collected from the sampling interval specified. The depth to the sample point horizon shall be measured using the combined lengths of down hole tools and drill rods (the combination of this equipment is known as the drill string) relative to a fixed point above

the ground surface. The sample depth is determined by subtracting the length of the drill string above the ground from the total drill string length.

E. Filling of Sample Bottles

After the split-spoon sampler is removed from the soil and opened, the sample bottle will be filled using decontaminated stainless steel implements and disposable vinyl gloves. The sample shall consist of a layer of soil from the entire length of the split-spoon sampler.

F. Data Recording

The drilling information required to be recorded in the field log is detailed in the ASTM method D 1586-84.

G. References

ASTM Method D 1586-843, "Standard Method for Penetration Test and Split-Barrel Sampling of Soils"

SOP-03 - Drilling and Augering

A. Purpose

This SOP describes the procedures for drilling boreholes.

B. Scope

The scope includes drilling, collection of split-spoon samples and stratigraphic characterization of tailings and alluvium.

C. Apparatus and Materials

1. A Mobile B-24 drill rig with related equipment;
2. Stainless steel sampling equipment;
3. A split-spoon sampler

D. Procedures

1. All material to be used in the boring and augering and all other equipment with potential to cross contaminate the samples shall be cleaned in accordance with SOP-05 prior to installation or use;
2. Once objects have been cleaned they shall be protected and kept clean. All contact with uncleaned surface materials shall be reason to repeat the cleaning;
3. Stainless steel sampling equipment (scoops, screens, bowls, trays, etc.) shall be cleaned as specified in SOP-04 - Sample Equipment Decontamination;
4. The holes shall be drilled/augered as straight and as nearly vertical as possible;
5. A descriptive lithology of strata shall be kept specifically noting clay and moisture content; and
6. Auger boreholes and collect split-spoon samples for analysis. Collect split-spoon samples in accordance with SOP-02 and record in the log book sample collection depth, and lithology specifically noting clay and moisture content for all samples.

SOP-04 - Sample Equipment Decontamination

A. Purpose

This section describes the decontamination procedures to be followed when cleaning sampling equipment. Rinsate samples (1 in 10) of a final deionized water rinse will be collected for analysis to provide quality assurance (QA) for the decontamination method.

B. Scope

This decontamination procedure is applicable to decontaminate dippers, pond samplers, scoops, split-spoon samplers, and any other devices used to obtain samples. Personnel assigned to perform the decontamination of sampling equipment will be briefed in the use, limitations, and safety considerations of the decontamination procedures.

C. Discussion

All reusable equipment will be decontaminated before and after use. Also, whenever possible, disposable equipment and containers will be used to minimize field decontamination requirements, thus saving time and money, reducing the potential for cross contamination, and minimizing the waste solvents that require disposal.

D. Materials

1. Wire and/or nylon scrub brushes;
2. Clean water source;
3. Deionized water;
4. Non-phosphate detergent such as Alconox;
5. Teflon wash bottles filled with Methanol or dilute HCL; and
6. Rinsate collection device (Kiddy pool for large equipment and small bowl for small equipment)

E. Procedures

The decontamination procedure for sampling equipment used for organic and inorganic sampling is as follows:

1. Remove bulky material from the equipment with clean water and scrub brushes.

2. Wash and scrub the equipment thoroughly with a non-phosphate detergent (such as Alconox) and clean water;

3. Rinse the equipment thoroughly with clean water;

4. Check sampling equipment for any particles adhering to the side; use a brush to dislodge and particles;

5. Triple rinse with deionized water; and

6. Using Teflon wash bottles, spray-rinse all surfaces with or dilute HCL. If the rinsate sample is required for QA, make and additional final rinse of the item, using deionized water, and collect if for analysis. If practical, allow cleaned equipment to air-dry indoors, or within an area protected from wind-blown dust.

F. Recording

A field sampling logbook will be used to document the date and time of decontamination, all sampling equipment used, and any deviations from the decontamination process listed above.

G. Disposal of Cleaning Solutions

Investigative derived waste will be maintained onsite. The final disposal of rinse water and material dislodged from sampling equipment will depend on the area sampled, known or suspected contaminant levels, and the proximity of the decontamination area to the sampling area.

SOP-05 - Drilling Equipment Decontamination

A. Purpose

This section describes the decontamination procedures to be followed when cleaning drilling rigs and tools to prevent cross-contamination. Decontamination of the drilling rigs and tools will be completed prior to start of drilling operations for each borehole to prevent contamination from one borehole to another.

B. Scope

This decontamination procedure is applicable to the drilling rig and drilling tools. Personnel assigned to perform the decontamination of sampling equipment will be briefed in the use, limitations, and safety considerations of the decontamination procedures.

C. Discussion

All drilling tools will be decontaminated daily and/or before use on a new borehole.

D. Materials

1. Wire and/or nylon scrub brushes;
2. Clean water source;
3. Non-phosphate detergent such as Alconox;
4. Deionized water;
5. Trash pump and hoses for transferring fluids;
6. Teflon wash bottles filled with dilute HCL; and
7. Rinsate collection device (Kiddy pool for large equipment and small bowl for small equipment).

E. Procedures

The decontamination procedure for the drilling rig and drilling tools is as follows:

1. Build a bermed pad lined with plastic sheets as a decontamination station for the drilling rig.

2. Remove bulky material adhering to the rig and the drilling tools using Nylon scrub brushes or wire brushes. If necessary, use water and non-phosphate detergent such as Alconox to assist in dislodging and removing contaminated material;

3. Drive the drilling rig to the decontamination pad. Use high-pressured water to wash and rinse the drilling rig thoroughly. The decontamination fluids on the bermed pad will be collected and containerized;

4. Rinse the drilling tools thoroughly with clean water;

5. Use dilute HCL to rinse the equipment if it is suspected that contamination is present; and

6. Rinse the decontaminated item with deionized water. Collect one out of 10 rinsate samples for analysis for QA. If practical, allow cleaned equipment to air-dry indoors, or within an area protected from wind-blown dust.

F. Recording

A field sampling logbook will be used to document the date and time of decontamination, all sampling equipment used, and any deviations from the decontamination process listed above.

G. Disposal of Cleaning Solutions

The final disposal of rinse water and material dislodged from sampling equipment will depend on the area sampled, known or suspected contaminant levels, and the proximity of the decontamination area to the sampling area.

SOP-06 - Chain-of-Custody Procedure

A. Purpose

This SOP provides the requirements for the completion of the Chain-of-Custody forms which are required for all environmental field samples collected by EnviroSearch.

B. Discussion

Chain-of-Custody documentation will be maintained from the time of sample collection through delivery to the laboratory. A Chain-of-Custody form will be completed for all environmental field samples. The form will accompany the sample to the point of receipt at the analytical laboratory.

C. Responsibilities

The sample collector shall initiate the Chain-of-Custody form at the sample collection point. Subsequently, the person relinquishing custody of the sample and the person accepting custody will document the exchange of the sample each time the responsibility of the sample is transferred for packaging or shipment. The receiving laboratory will document the final acceptance of custody of the sample and will return the Chain-of-Custody form to the Field Contact.

D. Chain-of-Custody Procedures

Items 1-10 are to be completed by the sample collector:

1. Enter the date and applicable page numbers;

2. Provide the laboratory name and point of contact;

3. Make a separate entry for each sample taken, including unique sample number, date, time, and location sampled.;

4. On the vertical axis, list the testing parameters to be performed on all samples that are included on this page. Mark the intersection of the sample number with each parameter to be measured on that sample;

5. Indicate the number of containers included for each sample;

6. Include any special observations or comments for each sample, such as media type;

7. Sign the sampler signature blank, and print your name in the adjacent blank;

8. Enter any general comments, such as time or temperature limitations in the Remarks section; and

9. Indicate the method of shipment of the sample.

Documentation of transfer of custody of sample

10. Each time the custody of the sample is transferred, the person relinquishing custody will sign, and provide the date and time of the transfer; and

11. The person accepting custody of the sample will sign to verify receipt.

Laboratory documentation

12. The laboratory sample custodian accepting responsibility for the sample will sign, date, and indicate the time of receipt of the sample; and

13. The laboratory will provide a unique number for each sample.

SOP-07 - Management of Investigation-Derived Wastes

A. Purpose

This purpose of this SOP is to define the management of wastes generated during field investigation activities at the Monarch Stamp Mill Site.

B. Scope

This SOP applies to all wastes generated during field investigations conducted in and around the Monarch Stamp Mill Site.

C. Discussion

Investigation-derived wastes (IDW) will be managed in accordance with the EPA Guide to Management of Investigation-Derived Wastes (Publication No. 9345.3-03FS).. These activities include borehole drilling and sampling. The field generated wastes will fall into three categories: 1) rinsate from equipment decontamination, 2) soil and drill cuttings from drilling, augering and sampling activities and 3) non-indigenous wastes such as disposable personal protective equipment, disposable sampling tools, etc. The management of each of these wastes are discussed below.

D. Procedures

1. Rinsate from decontamination processes

Rinsate from the decontamination of sampling, drilling, and other equipment used was disposed of on the surface of the tailings at the decontamination area.

2. Tailings and soil from sampling and boring operations

Drill cuttings from each borehole was left at the borehole location on the surface of the tailings.

3) non-indigenous field generated wastes

Non-indigenous wastes such as disposable personal protective equipment, disposable sampling tools, etc. were disposed of off-site.

SOP-08 - Water Level Measurements

A. Purpose

All monitoring wells are required to be measured to determine the static groundwater level, total depth and total volume of groundwater in the well prior to well purging and sampling.

B. Apparatus and Materials

1. Electronic water level indicator (accurate to 0.01 foot)
2. A straight edge such as a 6" rule (optional)
3. Decontamination supplies (deionized or distilled water, hexane, 10% HCl solution, non-phosphate detergent)
4. Disposable gloves
5. Socket wrench and well protector key
6. Dolphin lock key

C. Procedure and Documentation

1. Decontaminate the water level indicator.
2. Open the metal well protector cover using the socket wrench or well protector key. Unlock the locking well cap using a dolphin key.
3. Turn on water level indicator and lower the indicator probe into the monitoring well. The probe will sound when in contact with water. Determine the depth to water relative to the reference point (black mark and/or filed notch) on north side of the top of the PVC well casing.
4. Document the depth to water and indicate the date and time of measurement in the field log book.

SOP-09 - Monitoring Well Purging

A. Purpose

Prior to sampling, the monitoring well should be purged for at least three well casing volumes to ensure that the sample collected from the well is representative of actual aquifer conditions. All down hole sampling equipment should be dedicated, disposable or decontaminated prior to use.

B. Apparatus and Materials

1. 55-gallon open top (17-H) drums
2. A decontaminated submersible pump
3. A disposable or decontaminated Teflon or stainless steel bailer
4. A generator to run the submersible pump
5. 50 feet of decontaminated suction hose
6. A vehicle to transport equipment
7. Disposable gloves
8. Disposable cord for lowering and raising the bailer (100 lb. test monofilament preferred)
9. pH, conductivity, temperature meter(s)
10. A small glass jar to hold purge water during the measuring of the pH, conductivity, and temperature parameters

C. Procedures and Documentation

1. Groundwater, temperature, pH and conductivity (specific conductance) measurements should be made prior to and during well purging as a measure of purging effectiveness. These parameters will be measured from the discharge line of the submersible pump or from samples collected with a bailer.

2. Document the pre-purge and subsequent temperature, pH and conductivity measurements in the field log book along with the date and time that these measurements were taken.

3. Lower the decontaminated submersible pump and hose into the monitoring well.

4. Turn on the generator and allow the pump to run until three well volumes have been removed.

5. Retrieve the submersible pump from the well, and document the actual volume of water purged from the well in the field log book.

6. Purged well water will be pumped or discharged directly into open top (17-H) 55-gallon drums. The drums shall remain sealed except when water is being added and labeled with the date and time of accumulation and a description of the drum contents (e.g. Purged Well Water). Document drum labeling information and drum storage locations in the field log book.

7. Following purging, the water level in each well will be allowed to recover to at least 90% of the pre-purge level. Well recovery will be confirmed with the same electronic device used for static water level measurements. Document the pre-purge and recovered water level in the field log book.

D Discussion

1. Alternatively, well purging can also be accomplished using a Teflon bailer and a disposal cord. Prior to sampling, three casing volumes of water are removed manually by lowering and rising the bailer filled with water. Document the actual volume of water purged from the well in the field log book.

SOP-10 - Groundwater Sample Collection

A. Purpose

This SOP describes standard procedure for collecting groundwater samples from monitoring wells at the site.

B. Apparatus and Materials

1. A disposable or decontaminated stainless steel or Teflon bailer or low flow sampling pump
2. Bailer sampling spigot for volatile organic compounds (VOCs) samples
3. Disposable cord for lowering and raising the bailer (100 lb. test monofilament preferred)
4. Peristaltic pump, silicon tubing and 0.45 micron filters for filtering samples on-site for total metal analyses
5. pH, Conductivity, Temperature Meter(s)
6. Decontaminated Stainless steel bowl or wide mouth glass jar (1 quart or larger)
7. Appropriate sample containers supplied by the laboratory for the required analyses
8. disposable gloves
9. Sample labels, sample container seals
10. Cooler with ice or coolant packs
11. Chain-of-Custody and analytical request forms
    analyses

C. Procedure and Documentation

1. Groundwater temperature, pH and conductivity measurements should be made before and after sample collection as a check on well purging effectiveness and groundwater stability during sampling.

2. A disposable, dedicated or decontaminated bailer suspended from a clean, disposable cord is used to collect groundwater samples from monitoring wells.

3. Three bailers full of groundwater will be extracted and discarded into the purged water container.

4. Groundwater temperature, pH and conductivity will be re-measured from the third bailer full of water.

5. Samples to be submitted for laboratory analysis will be collected from subsequent bailers.

6. At a minimum, one sample duplicate should be collected as a laboratory QC check for each sampling event and each set of 20 samples. Sample duplicates should be collected from a split of a single bailer full of water and submitted as a blind duplicate with a unique sample identification number.

7. For groundwater samples prepared for VOC analyses, a sampling spigot should be inserted into the bottom of the bailer for drawing water to minimize aeration during sample extraction.

8. The groundwater sample is to be transferred into 40-mL VOA vials with zero headspace.

9. For samples collected for metal analyses, the groundwater in the bailer is decanted into a decontaminated stainless steel bowl or wide mouth glass jar. 10. The water will then be pumped through a disposable 0.45 micron filter using a peristaltic pump and clean silicon tubing.

11. The filtered groundwater sample is then collected in a plastic container fixed with nitric acid to minimize microbial activity.

12. Sample containers will be transferred into a cooler with ice or frozen refrigerant packs for delivery to the laboratory within the allowable holding times for the requested analyses.

13. Sample custody will be documented from time of collection through delivery to the laboratory using standard chain-of-custody records. The time and date of sample collection, sample identification numbers and requested analyses are to be documented in the field log book as an independent sample control record.

SOP-11 - Monitoring Well Installation

A. Purpose

This SOP describes standard procedure for monitoring well installation at the site.

B. Materials/Supplies

Well Screen
End Cap
Blank Riser
Sand
Bentonite seal material
Cement Grout
Sakrete or similar cement
Well cap
Well cover
Barrels for cuttings

C. Installation Procedure

1. Well drilling using a subcontractor until the total depth is reached.

2. Run the wellstring (with an endcap on the bottom) into the hole. To prevent contamination, clean vinyl gloves should be worn while handling the screen and riser.

3. After the well reaches the total depth, the well should be capped to prevent foreign materials from entering the well during completion.

4. The sandpack should be poured slowly to prevent bridging. The depth to the top of the sand should be measured as often as necessary to maintain control of the depth. A weighted measuring device will also help settle the sand as well as knock down bridges. The sand is usually taken up to two feet above the top of the screen in shallow holes and more in deeper holes. It is very important to bring the level of the sand high enough to prevent the sealing material from entering the well screen.

5. Once the sand has been poured and has settled, a bentonite seal is placed into the annulus. In shallow holes the bentonite is poured, dry into the annulus. In deeper holes below the water table a bentonite slurry must be pumped in using a treamie line.

6. Once the bentonite seal is in place, the rest of the annulus is filled with a grout. Grout is commonly composed of portland cement with three to five percent by weight bentonite. When the bentonite seal is above the water table, the first bit of grout can be mixed slightly wet to activate the bentonite. In shallow wells the grout is commonly poured from the surface. In deeper wells, below the water table, the grout should be pumped from the bottom up using a treamie line. The top of the well usually consists of a cover which is cemented in place. The cover acts as a seal, preventing contamination.

D. Documentation

Document drilling details in the EnviroSearch Field Drilling Log. Record the well installation details in the field log book.

SOP-12 - Monitoring Well Development

A. Purpose

This SOP describes the standard procedures for well development after completion of well installation.

B. Procedures for Well Development by Air Lifting

1. Insert a one-inch PVC pipe to the bottom of the monitoring well. Connect the pipe to a air compressor with a hose.

2. Connect the well head to a drum or a batch tank using a PVC pipe that can fit on the well casing.

3. Turn on the air compressor, adjust the air injection flow rate until sediments in the bottom of the well are flushed out of the well and discarded into the waste container.

4. Keep purging for a certain period of time until the groundwater sample is free of obvious sediments.

C. Discussion

Monitoring wells can also be developed by pumping the sediments out using a down-well pump. To achieve better results of well development, the well can be surged after air lifting or pumping. Surging can be accomplished by displacing water with a surge block or by injecting water to the well. The surge block is the preferred method since it does not add water which can potentially affect water quality. When surging a well with water it is important to use formation water to prevent aquifer chemistry changes.

D. Documentation

Document well development details in the field log book.