

POND SAMPLING

RMRS/OPS-PRO 085

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Forms

Surface Water Field Collection Form SW 8A

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1 PURPOSE

The purpose of this procedure is to describe the techniques and methods used for the collection of pond samples at the Rocky Flats Environmental Technology Site (RFETS). This procedure also describes methods for measurement of field parameters in water from the ponds. Proper sampling is necessary to ensure that the collection of representative samples meets applicable regulations and appropriate sampling protocols. Included in this procedure are personnel responsibilities and qualifications, quality assurance/quality control (QA/QC), and documentation requirements that will be used for collection activities in order to attain acceptable standards of accuracy, comparability, precision, representativeness, and completeness.

2 SCOPE

This procedure is applicable to the collection of all water samples from the ponds at RFETS.

2.1 Notification And Logistics

The Site Supervisor will be responsible for determining the necessary notifications and authorizations required to (1) coordinate sampling activities with interested parties, and (2) address access and security concerns for specific sampling sites.

Sampling of terminal ponds (A-4, B-5, C-2) may be necessary prior to the periodic need to discharge water from each pond. RMRS will schedule all pre-discharge sampling events with the appropriate Colorado Department of Public Health and Environmental staff, and will notify the Department of Energy (DOE) three days prior to any pre-discharge sampling event. Access to the Site will be coordinated through the RMRS project manager.

Note: RFETS access and control procedures are subject to change. Contractors will be notified of any such changes by an RMRS contact. The Site Supervisor will be responsible for notifying sampling personnel of these changes.

2.2 Pond Sampling Teams

If pond sampling is to be performed from a boat, the pond sampling team will consist of three people. If pond sampling is to be performed from the shore, then only two people are required on the sampling team. In either event, one of the team members will be designated by the Site Supervisor or by the RMRS representative to be the team leader. When pond

sampling takes place from a boat, two team members will work out of the boat, while the third team member remains on shore

All team members will assist in preparing the sampling and data collection equipment as described in 5-21000-OPS-SW 01, *Surface Water Data Collection Activities*, decontaminate the equipment as detailed in SOP FO 3, *General Equipment Decontamination*, and transport the equipment to the field site. The two crew members in the boat will perform the majority of the data collection and sampling activities. The third person on the shore shall be responsible for the following

- Assist in locating proper sampling points
- Monitor all sampling activities
- Perform emergency response activities as detailed in the project-specific Health and Safety Plan (HSP)
- Measure field parameters

All sampling personnel collecting sample from a boat are required to wear and completely fasten appropriate life vests. The *Health and Safety Practices Manual* (HSP) should be consulted prior to data collection activities at any pond to determine the appropriate level of protection required in addition to life vests, for Site activities at the pond

3 REFERENCES

3.1 Source References

The following is a list of references reviewed prior to the writing of this procedure

A Compendium of Superfund Field Operations Methods EPA/540/P-87/001 December 1987

DOE 5400 1 General Environmental Protection Program, U. S. Department of Energy Environmental Safety and Health Directive November 9, 1988

Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA Interim Final EPA/540/G-89/004 October 1988

RCRA Facility Investigation Guidance Interim Final May 1989

The Environmental Survey Manual Appendixes E, F, G, H, I, J, and K DOE/EH-0053/Vol 4 of 4 August 1987

3.2 Internal References

Related SOPs cross-referenced by this SOP are as follows

- SOP FO 3, *General Equipment Decontamination*
- SOP FO 6, *Handling of Personal Protective Equipment*
- SOP FO 7, *Handling of Decontamination Water and Wash Water*
- SOP FO 9, *Handling of Residual Samples*
- SOP FO 13, *Containerizing, Preserving, Handling, and Shipping of Soil and Water Samples*
- SOP GW 6, *Groundwater Sampling*
- 5-21000-OPS-SW 01, *Surface Water Data Collection Activities*
- 5-21000-OPS-SW 02, *Field Measurement of Surface Water Field Parameters*
- 5-21000-OPS-SW 03, *Surface Water Sampling*
- 5-21000-OPS-SW 07, *Collection of Tap Water Samples*

4 PROCEDURE

4.1 Selection of Sampling Methods and Locations

Different field conditions will impact the type of sampling methodology that may be used. Ponds in which the entire surface area is frozen may be sampled only from shore. Further, high winds prevent the use of a boat on any pond. The Site safety officer will make determinations for cessation of sampling efforts in the event of high winds or other adverse weather conditions.

When sampling frozen ponds, boats will be used as sampling platforms to provide safety in the event the ice breaks. The boat will be secured with an anchor tied to the bow or stern and secured to the shore. Sampling will be performed from the opposite end of the boat. An auger will be used to drill a hole through the ice. The remaining steps in the sampling process are the same as described in Subsection 4.4.2.1, *Sampling from a Boat*.

Certain parameters will be measured at each sampling event to determine if stratification and/or a lack of mixing of water exists in the ponds. Stratification of water layers in ponds is usually caused by water temperature differences. Cooler, denser water lies beneath warmer water. Subsection 4.4.1, *Field Parameter Measurements*, describes measurement of dissolved oxygen (DO) and temperature profiles which will be used to identify stratified layers or a lack of mixing. The results of this profile will be used to determine sampling methodology.

Vertical composites and/or non-composited samples shall be collected from a boat at the deepest point in ponds. The deepest point of the pond is considered to be at the middle of the dam 10 to 15 feet from shore. Water samples and/or field parameters may be collected from multiple or randomly selected points in the ponds as required. Refer to 5-21000-OPS-SW 02, *Field Measurement of Surface Water Parameters* for a description of field parameter measurements.

Specific sampling events need to be considered if data collection objectives are not met by standard collection methods, or if interested parties request deviations from these sampling guidelines. One such deviation, the collection of split samples with the CDPHE, is described in Subsection 4 4 2 4, *Collecting Split Samples*. Such specific requests shall be considered on a case-by-case basis.

4 2 Sample Containers, Preservation, and Handling

In general, sample containers used for pond sampling may be prepared and handled as described in SOP FO 13, *Containerizing Preserving Handling and Shipping of Soil and Water Samples*. However, in the case of collecting composite samples directly into the containers, advance container preparation detailed in Subsection 4 2 1, *Preparation of Sample Bottles to be Used for Composite Samples*, will be required.

4 2 1 Preparation of Sample Bottles to be Used for Composite Samples

Though infrequently used, if required, composite sample container preparation is as follows:

- Prepare a complete set of reference bottles to be kept in the base lab as follows. For each sample bottle size to be used, prepare a reference bottle, by accurately dividing the bottle into volumetric thirds and halves using a graduated cylinder, potable water, and a permanent marker.
- Using the reference set of bottles as guides, divide the sample bottles into volumetric thirds (or halves) by marking each bottle at the volumetric third (or half) points with a permanent marker.

4 3 Equipment

All sampling equipment that is neither dedicated nor disposable will be constructed of inert organic materials or of stainless steel. The specific equipment items to be used for pond sampling are listed in Subsections 4 3 1, *Field Parameter Measuring Equipment*, and 4 3 2, *Hydrolab Multi-Parameter Measuring*.

Equipment used in boats to collect samples or measure field parameters will be organized to prevent the interaction of clean equipment with used equipment, sample water, or environmental samples. As much as is reasonably possible, equipment that does not float will be attached to a flotation device or the boat to prevent loss. Instruments that can be damaged by water will be stored in water-tight containers when not in use.

For most pond sampling events, the following equipment will be used in addition to some or all of the usual surface water sampling equipment listed in 5-21000-OPS-SW 01, *Surface Water Data Collection Site Activities*

- Discrete zone sampling device
- Peristaltic pump and tubing composed of inert material
- Depth measuring devices

4.3.1 Field Parameter Measuring Equipment

Equipment described in 5-21000-OPS-SW 02, *Field Measurement of Surface Water Parameters*, may be used in measuring field parameters in ponds. Exception to the methods listed in the above procedure are listed in this section.

4.3.2 Hydrolab Multi-Parameter Measuring

Multi-parameter instruments may be used for measuring field parameters such as pH, temperature, specific conductance, dissolved oxygen, and salinity. The Operation and Maintenance Manual shall be followed when operating or calibrating the instrument.

4.4 Sampling

This section discusses measurement of field parameters and collection of surface water samples.

4.4.1 Field Parameter Measurements

Field parameters shall be measured and recorded as described in 5-21000-OPS-SW 02, *Field Measurement of Surface Water Parameters*. When available, a multi-parameter measuring instrument may be used for all measurements, except alkalinity and total residual chlorine (TRC). Refer to the multi-parameter measuring instrument manual for equipment specific procedures.

Prior to the sampling event a D O and temperature profile will be made at the sampling location. Measurements to construct the profiles will be taken starting 1½ feet from the

bottom and taken at one foot increments to one foot below the surface. The total depth shall be recorded at this time. This shall be done with a D O meter or a multi-parameter measuring device. Observation of the D O and water temperature may determine if a Redox boundary exists. RMRS personnel should be notified on a same day basis when one or both of the following conditions exist:

- There is a 1°C or greater temperature change over 3.3 feet (1 meter) depth
- The maximum and minimum D O measurements vary by more than 5 mg/L

If neither of these criteria are met, samples will be collected, at the depths described below, and composited (except in ponds of depth less than 4.5 feet). If one or both of the above criteria are met, the collected samples will not be composited. A unique sample number will be assigned to the set of analytes for each discrete sample interval.

- When pond depth is less than 4.5 feet, a discrete suite of samples will be taken at mid-depth
- Ponds with depths between 4.5 and 6.5 feet will be sampled at two intervals. The sampling depths will be separated by at least two feet. Collect one sample between mid-depth and one foot below water surface, and the second between mid-depth and 1.5 feet from the pond bottom. If no D O or temperature stratification is indicated, these samples are to be composited.
- Ponds with depth greater or equal to 6.5 feet will be sampled at the following depths:
 - One foot below the surface
 - Mid-depth of the pond
 - One and a half feet above the bottom of the pond
- Again, if no D O or temperature stratification is indicated, these samples are to be composited.

When samples are composited, refer to Subsection 4.4.2.1, Sampling From a Boat, for sampling procedures. When discrete depth samples are taken, refer to Subsection 4.4.2.3, Non-composite Samples.

If a multi-parameter measuring instrument is available, follow equipment specific instructions for determining total water depth. Special care should be taken to avoid excess disturbance of bottom sediments when determining water depth by either method.

4 4.2 Water Sampling Procedures

When samples can be collected from the approximate center of small ponds from shore without wading, they will be collected in accordance with Subsection 6.3 3, Sampling of Standing Water, of 5-21000-OPS-SW 03, *Surface Water Sampling*

4 4 2 1 Sampling From a Boat

The following procedures describe the general activities to be performed when water samples are collected from a boat. All sampling activities will be performed from the back of the boat. Life vests shall be worn and fastened while on the boat, per project-specific Health and Safety Plan. The field parameters, dissolved oxygen, water temperature, specific conductance, and pH, may be measured in the boat using a multi-parameter measuring device, if available or on shore. Alkalinity and total residual chlorine (TRC) will be measured on shore.

- Collect Oil and Grease samples by partially immersing the sample bottle at the pond surface, taking care not to interfere with the movement of the product into the container
- If no multi-parameter sampling device is available, use a discrete zone sampler to collect water for field parameters. One type of discrete zone sampler is an extension rod with a clamp that can hold a glass sampling bottle securely. Built into the frame of the rod is another rod with a ball on the top end and a suction cup on the bottom end. To collect a sample, lower the bottle to the proper depth and rotate the ball counterclockwise to remove the bottle lid by suction. Air bubbles will rise to the surface. When bubbles have stopped, rotate the ball clockwise to close the lid. The sample bottle can then be raised and removed from the rod. Transfer the sample to an unbreakable sample container while minimizing agitation of the sample. Deliver the sample container to the technician on shore for performance of field parameter measurements
- If multi-parameter equipment is used, the grab sample for alkalinity and TRC measurements will be collected with a discrete sampler
- Samples for analysis of all parameters except volatile organic compounds (VOCs), field parameters, and rad screens will be collected by the use of a peristaltic pump. Samples will be prepared as follows
 - A Geopump or equivalent peristaltic pump, with an adequate length of Teflon® or polyethylene intake tubing will be used to collect the sample. The intake for the tubing must be attached to a water depth measuring device so that technicians are certain to collect all samples from the same depth.

- This sampling device will be lowered to the proper sampling depth, as described in Subsection 4 4 1, Field Parameter Measurements. Samples requiring filtration will be collected first by pumping through a disposable inline 0.45-micron filter. Sample containers (except for volatiles and rad screens) will be filled (partially for composites), capped, and stored in iced coolers. The containers will have been previously marked to permit ease in properly filling to the appropriate volumes.
- The discrete zone sampler will be used to collect VOC samples by following the above procedures. The collected sample is carefully poured into a VOC bottle, leaving no headspace. If a VOC bottle is observed to contain bubbles after it is filled, the bottle must be disposed of and replaced with a new bottle for use in sampling. VOCs will be collected at the uppermost sampling level if samples are being composited.
- The water remaining in the discrete sampler after the VOC sample has been decanted into the VOC bottle may be used for a radioactivity screen sample and field parameters.
- Sample bottles partially filled will be composited with an equal portion of water collected from subsequent sample interval(s) with the peristaltic pump.
- Field parameters shall be measured at each sampling interval in the manner described above for the initial interval.
- Special care will be taken to avoid any disturbance of bottom sediments.

4 4 2 2 Small Pond Sampling From Shore

- Sampling of small (non-terminal) ponds will routinely be accomplished by collection of samples from the shore.
- Field parameters shall be collected by the dip and transfer method, as described in 5-21000-OPS-SW 03, *Surface Water Sampling*.
- VOCs shall be collected by the sample container immersion method following 5-21000-OPS-SW 03, *Surface Water Sampling*.
- Oil and Grease shall be collected as described in Subsection 4 4 2 1, Sampling From a Boat.
- Other samples shall be collected with the use of a Geopump or equivalent peristaltic pump. An adequate length of Teflon[®] or polyethylene tubing will be used to collect the sample. The tubing intake shall be tied to the end of a twelve foot stainless steel rod.
 - A float shall be attached to the end of the rod and the tubing positioned in such a manner that the sample is collected one foot below the surface of the water. The full length of the rod shall be extended into the water and the

samples collected from the midpoint of the dam side of the pond. During snowy or other hazardous conditions, the samples can be collected from an easily accessible location away from the dam.

4 4 2 3 Non-Composite Samples

The procedures for sampling without compositing are the same as in Subsection 4 4 2.1, Sampling From a Boat, with the following exceptions:

- Samples will not be composited
- Sample bottles will be completely filled at each of the three sampled zones (see Subsection 4 4 1, Field Parameter Measurements)
- Each sample will require a separate sample identification number
- This method will require more sample bottles than called for in the general procedures. Arrangements should be made prior to the sampling events to provide for use of this method

4 4 2 4 Collecting Split Samples

CDPHE or the Cities of Broomfield or Westminster may request that sampling be performed from the shore so that CDPHE personnel may actively participate in sample collection with the surface water sampling teams. Therefore, when collecting split samples in conjunction with CDPHE, the following guidelines may be employed:

- Sampling will be performed from the shore, if requested, or if weather conditions dictate
- The location to be sampled will be designated by CDPHE
- CDPHE and/or the Cities of Broomfield or Westminster and the contractor may perform split sampling as described in the following steps:
 - 1 Sample bottles will be filled by CDPHE or the field technician by taking turns partially filling the bottles if requested, in the following manner:
 - CDPHE will half-fill a bottle, then the field technician will half-fill a similar bottle
 - CDPHE will finish filling their bottle, then the technician will complete filling their bottle
 - 2 VOC bottles will be filled in one step, not by half-filling bottles, as described above
 - 3 CDPHE may direct the order in which samples are collected.
 - 4 The field technicians will measure and record field parameters

- 5 When bottle sizes differ between CDPHE and sampling personnel, the bottles are filled proportionately. Fill both bottles 1/3 of the way for each depth, for samples composited from three depths.

4 4 2 5 Collecting Pre-Discharge Samples at Ponds A-4, B-5, and C-2

Pre-discharge samples will be collected at Ponds A-4, B-5, and C-2 at the direction of RMRS. The samples will be collected in accordance with Subsection 4 4 2 1, Sampling from a Boat and Subsection 4 4 2 4, Collecting Split Samples, as applicable.

4 4 2 6 Samples for Bacteriological Examination

Samples for bacteriological examination must be collected in bottles properly sterilized and protected against contamination. The preferred method is to scoop up the water with an open bottle just below the surface of the water. This method is usually used when sampling from a boat. While the bottle is open, both the bottle and the stopper must be protected against contamination. A small amount of water should be poured from the bottle after filling to leave an air space for subsequent shaking in the laboratory. The bottle should be closed at once. Additional information concerning Bacteriological Sampling can be found in 5-21000-OPS-SW 07, *Collection of Tap Water Samples*.

4 4 2 7 Samples for Dense Non-Aqueous Phase Liquids (DNAPLs) and Light Non-Aqueous Phase Liquids (LNAPLs)

When an occurrence of DNAPLs and/or LNAPLs is suspected, by visual observation, detectable odor, or is a known spill, it shall be sampled. The appropriate method for detecting these layers is discussed in SOP GW 1, *Water Level Measurements in Wells and Piezometers*. LNAPLs shall be collected with a bottom valve bailer or peristaltic pump. DNAPLs shall be collected with a bottom double check valve bailer or peristaltic pump.

Water containing LNAPLs will be checked for the presence of DNAPLs by lowering the pump intake or bailer to the bottom of the pond and collecting the first water from the bottom of the pond in a 1-liter glass container. The container will be initially checked with an organic vapor analyzer (OVA) for the presence of organic vapors. The liquid in the glass container shall be allowed to stand for 15 minutes and visually observed for the presence of separate phases. If no DNAPLs have separated out of the solution after 15 minutes, the water will be presumed free of DNAPLs.

In all cases, care shall be taken to carefully lower the bailer into the water so that agitation of the immiscible layer is minimal. Any bailer used to collect immiscible layers will be dedicated to the pond which is sampled. Peristaltic pumps will be equipped entirely with silicone tubing when sampling immiscible layers. Dedicated equipment used for collecting immiscible layers shall be decontaminated prior and after use as described in SOP GW 6, *Groundwater Sampling*. Immiscible layer sampling shall be performed as follows:

- Dedicated bailers will be removed from the sampling site and decontaminated as specified in SOP GW 6, *Groundwater Sampling*. Dedicated pump tubing if used shall also be decontaminated prior to use.
- For light non-aqueous phase liquids (LNAPLs), the bailer will be carefully lowered to the midpoint of the immiscible layer and allowed to fill while it is being held at this level. The bailer must be lowered into the immiscible layer slowly so that minimal agitation of the immiscible layer occurs. Peristaltic pump intakes will also be lowered to the midpoint of the immiscible layer when used.
- If a DNAPL layer is being sampled, either the double check valve bailer or peristaltic pump shall be used. The bailer will be lowered into the water until the bottom is encountered. Peristaltic pump intakes will also be lowered to the bottom. Care must be taken not to submerge the pump intake into, or disturb the bottom sediments.
- At no time should the bailer or line be allowed to touch the ground or come in contact with other physical objects that might introduce contaminants into the sample.
- Immediately after sampling is completed, all equipment shall be decontaminated. Silicone tubing used with peristaltic pumps will be discarded.

4.5 Decontamination

Decontamination shall be performed before and after all sampling and data collection activities as described in SOPs FO.3, *General Equipment Decontamination*, SOP FO 6, *Handling of Personal Protective Equipment*, SOP FO 7, *Handling of Decontamination Water and Wash Water*, and SOP FO 9, *Handling of Residual Core and Laboratory Samples*.

5 QUALITY ASSURANCE/QUALITY CONTROL

Quality Assurance (QA) and Quality Control (QC) activities will be accomplished according to applicable project plans as well as quality requirements presented in this procedure.

The Quality Assurance Project Plan (QAPjP) outlines program-wide quality assurance objectives and identifies organization and responsibilities for attaining those objectives. The QAPjP also defines general QA methods to be implemented on projects. However, each project's Quality Assurance Addendum (QAA) defines project-specific organization and responsibilities, and specific methods and frequencies that will apply to a given project, such as QA audits and QA samples.

QA samples fall into five categories:

- Duplicate
- Matrix spike
- Matrix spike duplicate
- Equipment rinsate
- Laboratory replicate

SOP FO 13, *Containerizing, Preserving, Handling, and Shipping of Soil and Water Samples* describes the general handling of samples. Applicable project plans specify QA sample functions.

5.1 Duplicates

Sample collection procedures for QA samples will be the same as those described in Subsection 4.4.2, Water Sampling Procedures. Duplicates are obtained immediately after the suite of analytes that they are intended to duplicate have been collected.

5.2 Equipment Rinsates

A rinsate sample from sampling equipment is intended to check for potential contamination of the sample by the sampling equipment. The rinsate will be taken after decontamination and prior to the sampling event. The rinsate samples will be analyzed for the same parameters as the surface water samples.

The rinsate will be taken using the same equipment to be used in the sampling event. Except for VOCs, the peristaltic pump and tubing shall be used to pump out of a container of distilled water into an identical set of sample containers as to be used for the actual sampling event. A new disposable filter will be used as part of the tubing assembly when collecting rinsates for dissolved constituents. For VOCs, fill the discrete sample bottle, from the discrete sampler equipment, with distilled water and pour into the VOC bottles using the same procedure for collecting VOCs as given in 5-21000-OPS-SW 03, *Surface Water Sampling*.

6 DOCUMENTATION

The Surface Field Collection Form (SW 8A) will be used for documentation of pond sampling activities

7 RECORDS

The following documents generated during the performance of this procedure must be controlled as follows

<u>Document</u>	<u>Record Type</u>	<u>Disposition</u>
Field Collection Form SW 8A	QA	<ul style="list-style-type: none"> • Original to customer • Copy to be retained by subcontractor • RMRS Document Control
Contaminants of Concern	QA	<ul style="list-style-type: none"> • Original w/sample(s) • Copy to customer • RMRS Document Control

Form SW 8A
Surface Water Field Collection

Sample Contractor _____

Sampler 1 _____

Collection Date/Time _____

Sampler 2 _____

Sampler 3 _____

Sample Event # _____

Sample Type _____

Project _____

Disposition _____

Location _____

Sample QC _____

Result Expected Yes No

Sample QC Partner _____

Event Comment _____

Table with 5 columns: Field Measurement, Result, Unit, Derivation Code, Derivation Comment. Rows include DO, pH, SC, TEMP (AIR), TEMP (H2O), GAGEHT, TOTALIZER.

Table with 6 columns: Line Item, Bottle Disposition, Collection Date/Time, Bottle Type Volume, Field Preservative, Filtered, Matrix.

Sampler/Date _____

Reviewer/Date _____

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