1.0 Purpose and Scope

This document describes the Sandia National Laboratories (SNL) Waste Isolation Pilot Plant (WIPP) procedure for collecting water samples with the Snap Sampler® Passive Groundwater Sampling Device. The Snap Sampler® provides Sandia the ability to collect water samples within a water column without utilizing a pump to bring water to surface. The Snap Sampler's design provides the ability to collect the sample at any desired depth within a water column and then seals the sample in-situ before it is raised to the surface. These water samples will then be analyzed to determine the water chemistry. The objectives of this procedure are to describe the operation and maintenance of the Snap Sampler® as part of the water sampling performed in support of the Sandia’s geohydrology research. The actual analysis of the collected water samples is not covered in this procedure.

This Activity/Project Specific Procedure (SP) is intended to direct SNL technical personnel in the procedures needed to obtain water quality data that meet SNL Quality Assurance (QA) standards. This SP is supplemented by the operation manuals associated with the Snap Sampler® system. All activities will be documented in the appropriate Scientific Notebook (SN) according to NP 20-2, “Scientific Notebooks.” This SP will support activities described in Waste Isolation Pilot Plant (WIPP) Test Plans TP 06-01, “Monitoring Water Levels in WIPP Wells” and TP 03-01, “Test Plan for Testing of Wells at the WIPP Site.” This SP may also be used in support of Work-for-Others or New Mexico Small Business Assistance activities that may be described in associated work plans or test plans.

Acronyms and definitions for terms used in this procedure may be found in the Glossary located at the Sandia National Laboratories (SNL) WIPP Online Documents web site.

2.0 Implementation Actions

Several different methods can be employed when sampling groundwater, however, few sampling methods offer the ability to sample from any depth within a water column. The Snap Sampler® design allows the sample bottles to remain in a fixed open state within the water column, and the collection of the sample after ample time for the ambient water to flow-through under natural groundwater gradients. The Snap Sampler® may eliminate the need to purge a well prior to sample collection. This document is not meant to substitute for the manufacturer instruction manuals for this instrument. The user is responsible for reading and understanding the appropriate manuals.
2.1 Safety and Training

The activities described in this SP shall conform to SNL Environmental Health and Safety Programs (ES&H). All activities described in this SP are subject to ES&H requirements governed by the WIPP Industrial Safety Program and the WIPP Industrial Hygiene Program.

As defined in the SNL ES&H manual, personnel will not be exposed to hazardous voltages. The voltage levels expected in the performance of this procedure should be 12 VDC or less.

Disposal of any preservative used in the sample bottles or left over water collected by the sampler will adhere to SNL/Carlsbad lab practices.

2.2 Responsibilities

The Principal Investigator (PI), or designee, whose activities warrant the use of this procedure, is responsible for implementing the requirements of this procedure. The PI or designee is responsible for performing the measurements following the requirements of this procedure, documenting those measurements, and assuring that the latest revision of this document is followed.

2.3 Equipment

2.3.1 Water-Level Sounder

Water levels in wells will be measured according to SP 12-5, “Depth-to-Water (DTW) Measurement Using a Solinst Brand Electric Sounder.” The DTW is to be measured from the north side of casing/tubing. If any steps cannot be accomplished as specified in SP 12-5, they must be noted in the SN.

2.3.2 Snap Sampler® System

Prior to use of any device, inspect the device for damage, wear or excess dirt. If the device is damaged or in disrepair, replace or repair the parts prior to initiating sample collection. Prior to the use of all devices and following manufacturer's recommendations, clean the device and ensure sanitation of sample bottles. Use of lab gloves is necessary in preserving the sample bottle sanitation as well as protection from any acid preservatives or brine/contaminants from the well.

Items within the Snap Sampler® kit include all the essentials required to collect groundwater samples from water wells. Items listed below and depicted in Figures 1 and 2 are included in the Snap Sampler® kit, and are the items that make up the Snap Sampler® system.

- Pneumatic Actuator – This is the device that the air pulse is sent through that activates an internal plunger that trips the Snap Sampler® pins, and releases the sample bottle lids, collecting the sample.
- Snap Samplers® – These are the individual plastic modules that are coupled together (up to 6 in a single deployment) that hold the sample bottles and are fitted with the release pins that will hold the lids in an open position until the actuator trips them. There are two versions. One is designed to hold both the 125 mL and 350 mL sample bottles. A smaller unit is sold to accommodate a 40 mL vial.
- Sample Bottles – There are three different sizes of sample bottles. As mentioned above the 125 mL and 350 mL bottles are accommodated by the same size Snap Sampler®. A 40 mL vial is available, but uses a smaller Snap Sampler®. If desired, all the bottles are designed to be capped and transferred to the lab for analysis without any transferring of liquids to additional sample bottles.
- Ball-End Connector Cable Fittings – Connected to release pins on Snap Sampler® modules that link the system together for simultaneous sample bottle lid release when activated.
- Air Compressor – Operates on 12v power (through vehicle or a portable 12v battery) used to send air through an air-line and into the pneumatic actuator for tripping the release pins.
- Air Pressure Gauge – Gauge shows pressure build and release.
- Battery Pack – Used to power Air Compressor in remote conditions where 12v vehicle plug in is not available.
- Hand tool kit – For assembling Snap Samplers® and preparing the bottles.
- Air Line (1/4” Nylon Tubing) – One short segment (Figure 1 and 2) is used to connect to the air gauge to the trigger line. The main trigger line varies in length depending on the application.
- Weight (3lb or 6lb) – Certain applications may require the use of a weight especially for deeper deployments.

Figure 1. The image above depicts the items typically used in the deployment of the snap sampler®, minus the sample bottles. The number of sampler modules may vary, and the weight is not necessary in all applications.

Figure 2. The photo on the left depicts the nylon tubing segment connecting the pressure gauge to the end of the main line via a compression fitting. The picture on the right depicts the main air-line feeding into the pneumatic actuator. The main line is on a reel that allows length adjustment based on application needs.
2.3.3 Sample Bottle Insertion and Assembling the Snap Samplers®

Figures 3 – 8. The photos above depict the method of inserting the sample bottles into the snap sampler® module and connecting the modules to the pneumatic actuator.
2.3.4 Setting Release Pins and Opening Caps

Figures 9 – 14. The photos above depict securing the ball fitting in the release pin and the opening of the sample bottle lids and setting the release pins.

Push release pin up through the hole in the snap cap to secure in the open position.

Use tip of driver tool to seat the ball fitting.

Pivot the cap back using the Snap Driver Tool. The notch acts as the pivot bringing the cap back in place.
2.4 Snap Sampler® Deployment

2.4.1 Once the Snap Sampler® has been assembled, sample bottle caps opened and the air-line has been attached, the next step is lowering the Snap Sampler® into the well bore to collect the sample from the water column at the desired depth within the well. A well diagram or well log should be used to determine the desired set depth for the Snap Sampler®.

Note: As an extra precaution to avoid losing the sampler in the well, a hole was drilled at the top of the pneumatic actuator that allows a quick-link to be inserted through. This quick link is then connected to a Kellem’s grip that wraps around the air-line and acts as a catch guard if the fitting inside the pneumatic actuator comes loose.

2.4.2 If the deployment depth is over 100’ below water, it is recommended that a weight be attached to the Snap Sampler® (see figure 1). This will counteract the slight buoyancy produced by the air-line once it enters the water.

2.4.3 Lower the Snap Sampler® into the well bore - lowering of the apparatus into the well may require two people. In normal situations only 4 or less Snap Sampler® modules will be strung together, however, for more sample volume, up to 6 modules can be linked together (refer to figures 3-8). The Snap Samplers® are made of flexible, yet durable plastic, however, to keep from serious bends or breaks, care should be taken when lowering the device into the well.
2.4.4 Deployment Duration - The PI or designee should determine how long to leave the samplers in the well. The objective is to grab a sample that is representative of in situ groundwater conditions.

2.4.5 Once the Snap Sampler® is lowered to the desired depth the bottles are ready to be closed which requires sending an air pulse through the line that will trip the plunger inside the pneumatic actuator causing the plunger to rise, drawing the cable connector fittings up and releasing the bottle lids.

2.4.6 Trigger Actuation - The electric pump is attached to the upper end of the air line, and turned on to increase pressure until pressure increase stops, or 60 psi, whichever occurs first. For shallow deployments (<20ft submerged), pressure may stop increase as low as 10-20 psi and you may hear bubbling as air escapes (this occurs only after samplers have closed). For deep deployments (>100 ft submerged), pressure will continue to increase after samplers have tripped. You may see a brief pressure drop when samplers trip.

Note: When retrieving Snap Samplers®, leave pressure system engaged to clear water from the tubing for next deployment.

2.4.7 The applicable scientific notebook should be annotated with the following:

2.4.7.1 The time at which the Snap Sampler was installed at the desired sampling depth.

Note: Be sure to account for the length of the sampler and the height of any casing when determining the sample collection depth.

2.4.7.2 The depth where the sampler was stopped and the duration of the dwell time.

2.4.7.3 The time at which the sampler was actuated to collect the water sample.

2.5 Sample Handling

2.5.1 Once the air-line is reeled in, the sample bottles can be removed from the Snap Sampler® and capped immediately or transferred to other lab approved sample containers.

2.5.2 Preparing the Sample Containers

2.5.2.1 Handle all samples with care and use lab gloves to protect the skin from acid preservatives and ensure the sanitation of the bottle. Snap Sampler lids are sealed water tight by a spring inside the bottle, push the lid tab to open the sample bottle and pour the contents into the other sample containers.

2.5.2.2 Use a permanent marker to fill in all the information fields of the sample label (see Figure 16).

2.5.2.3 Once all the sample containers have been filled, dry the outside of the bottle and affix labels.
2.5.2.4 Cover the labels with a clear packing tape to safeguard from moisture.

2.5.2.5 Tighten the lids of the sample containers hand-tight and wrap electric tape around the lid as an added seal and to keep the lid from loosening.

2.5.2.6 Place the sample containers into a gallon zip-lock storage bag, seal tight and label the bag with the sample name.

2.5.2.7 Place samples in a cooler with ice. If not being shipped immediately, move the samples to a refrigerator when samples arrive back at the laboratory. The appropriate chains of custody should be placed in the refrigerator (in a zip-lock bag) next to the samples.

2.5.3 Shipping Sample Kits

2.5.3.1 Fill gallon zip-lock bags with ice and place in the cooler, packing snugly around the samples. If necessary, use additional packing materials to pack in around the ice to keep samples from shifting during transport.

2.5.3.2 Prior to shipment, signed originals of the appropriate chains of custody should be placed in a separate zip-lock bag, sealed and inserted in the cooler with the samples.

2.5.3.3 When shipping samples to another analytical laboratory, keep in mind the maximum hold times for samples. Make necessary shipping arrangements so as not to exceed time thresholds for certain time-sensitive water quality parameters (e.g. 24 hours for nitrates).

2.5.4 Samples will be collected and controlled in accordance with NP 13-1, Control of Samples and Standards. The chain of custody for the samples when they are transferred to the analytical laboratory will be established using procedure SP 13-1, Chain of Custody.

2.6 Pulling a Pressure Gauge – Pressure Gauge Removal

In the event that a Pressure Gauge must be removed from the well and a Monitoring Test stopped, this process is outlined in detail in: 1) SP 9-7: WIPP Well Water-Level Monitoring, and 2) SP 12-5: Depth-to-Water Measurement Using a Solinst Brand Electric Sounder, and will be comprehensively followed.
2.7 Post-Sampling Activities

2.7.1 Disassemble the Snap Sampler®, rinse materials with DI water and dry, ensuring that equipment has been decontaminated and returned to proper storage location.

2.7.2 Process the appropriate Chains of Custody (COC) paperwork for tracking and QA purposes.

2.7.3 Compile and record all the field data for the scientific notebook(s).

2.8 References

- Standard Operating Procedure for the Snap Sampler® Passive Groundwater Sampling Method (October 2014)
- Snap Sampler JSA
- Nuclear Waste Management Procedure, NP13-1, Control of Samples and Standards

3.0 Records

The following records generated through implementation of this procedure shall be prepared and submitted to the WIPP Records Center in accordance with NP 17-1, “Records”.

QA Record

- Scientific Notebooks
- Chain of Custody

4.0 Appendices

None
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