DRUM PENETRATOR

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DRUM PENETRATOR

1.0 SCOPE AND APPLICATION

The objective of this Standard Operating Procedure (SOP) is to establish standard practices for the operation of the drum penetrator.

A Quality Assurance Project Plan (QAPP) in Uniform Federal Policy (UFP) format describing the project objectives must be prepared prior to deploying for a sampling event. The sampler needs to ensure that the methods used are adequate to satisfy the data quality objectives (DQOs) listed in the QAPP for a particular site.

The procedures in this SOP may be varied or changed as required, dependent on site conditions, equipment limitations or other procedural limitations. In all instances, the procedures employed must be documented on a Field Change Form and attached to the QAPP. These changes must be documented in the final deliverable.

2.0 METHOD SUMMARY

The drum penetrator is a lightweight tool used to gain access to the content of drums from a remote point (up to approximately 120 feet [ft] away). The tool operates by puncturing the container with a non sparking pin driven by hydraulic pressure. This tool functions on both open head and closed head drums, over-pack containers, and pails. The pin can be positioned at any point on the drum head within six inches of the lip.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING AND STORAGE

This section is not applicable to this SOP.

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

The use of the drum penetrator is typically employed based on a problem/situation addressed in the project's UFP QAPP and/or the Health and Safety Plan (HASP). Any additional unforeseen problems occurring in the field need to be approached with health and safety as its best interest.

5.0 EQUIPMENT/APPARATUS

The drum penetrator (Appendix A, Figure 1) consists of three sub-systems:

- Hydraulic system
- Penetrator and support
- Fasteners

5.1 Hydraulic System

The hydraulic system has three sections:

- Cylinder
- Pump
- Hose

The hydraulic system is comprised of a five-ton capacity ram cylinder with spring return (Enterpac RC 55), a manually operated 10,000-pound per square inch (psi) hydraulic pump (Enterpac P142), and a high pressure hydraulic hose charged with fluid and equipped with quick connect fittings. This

hose is in three sections (20, 50 and 50 foot lengths), enabling the operator to stand at distances of 20 to 120 ft from the drum.

5.2 Penetrator/Support System

The penetrator and support system contains three parts:

- Penetrator
- Hydraulic cylinder
- Support

The penetrator is a replaceable spike fabricated of beryllium bronze metal. The spike is threaded to the hydraulic cylinders piston and can be easily replaced. The support positions and stabilizes the hydraulic cylinder and pin onto the drum surface and is connected by the fastening devices.

5.3 Fasteners

The fasteners include three items:

- Drum gripper
- Tightening device
- Chain and s-hooks

The fasteners consist of a drum gripper that attaches to the lip of the drum, a tightening device that secures the support frame tightly to the surface to be punctured and a chain that connects the tightening devices to the penetrator support frame. The eye hook of the gripper is attached to the tightener which in turn is attached to the chain. These three components make up one fastener set. There are two different types of tighteners available with a set: turnbuckle or load binder.

6.0 REAGENTS

Reagents will be utilized for decontamination of drum penetrating equipment. Decontamination solutions are specified in U.S. EPA Environmental Response Team (ERT) SOP, *Sampling Equipment Decontamination.*

7.0 PROCEDURE

The operation of the drum penetrator consists of three phases:

- Pre-operational checkout
- Attach and puncture
- Decontamination

7.1 Pre-Operational Checkout

1. First, perform a visual inspection to determine that the equipment is not damaged, then assemble the components (Appendix A, Figure 1).

2. The initial survey of the site and drum staging should be completed prior to use of the drum penetrator, and the "stand back" distance already determined. Couple the necessary lengths of hydraulic hose to reach this required "stand back" distance: Check for a secure link by grasping the hose on either side of each quick connect coupling and pulling with a jerking action.

3. Check that all connections are secure and that there is no leaking of hydraulic fluid.

4. Determine that the hydraulic cylinder's piston is fully retracted.

5. Attach one end of the hydraulic line to the cylinder mounted in the support and the other end to the hydraulic pump.

6. Check the connections in the same manner as described above for the hose couplings.

7. Move the hydraulic pump switch into the *"forward"* position and begin pumping slowly.

8. Observe all connections for hydraulic leaks.

9. Release the hydraulic pressure by moving the pump switch to "*neutral"* and observe the spring return action of the cylinder. If the equipment is functioning properly, the piston should be fully retracted within ten seconds.

10. Attach the spike by screwing it into the piston of the cylinder.

11. If all the above steps are positive, the pre-operational check is complete and the penetrator and support are ready to be mounted on the drum, otherwise repairs must be made.

12. The amount of field repairs that can be done to this tool are very limited. It is suggested that as much spare equipment as possible, including an entire second drum penetrator, be brought into the field.

7.2 Attach and Puncture

7.2.1 Attach

1. Disconnect the hydraulic hose from the cylinder; it is not recommended that the support be carried or positioned on the drum with the hose connected. Run the hydraulic hose from the pump to the drum to be opened.

2. Before positioning the penetrator, remove any loose debris from the spot on which the base will rest.

3. Place the unit on the surface to be punctured.

4. If the surface is not flat (i.e., the drum top is swollen) it will be necessary to have second team member hold the unit in place while the fasteners are connected.

5. Position the drum grippers on the lid 120º from each other.

6. Attach the end of the chain to the drum gripper.

7. Hook the top hook of the load binder, or turnbuckle, to the tab on the top plate of the support.

8. Attach the free end of the chain to the bottom hook of the load binder. Choose a link in the chain such that there is tension in the chain.

9. The support base must be firmly pressing against the surface to be punctured or the unit will begin to rise as the hydraulic pressure forces the spike through the container.

10. When the correct link is determined, pull the load binders into the closed position or tighten the turnbuckles to secure the support to the drum.

11. Attach the hydraulic hose to the cylinder and check the connection. At this point the operator is ready to operate the hydraulic pump and penetrate the drum.

7.2.2 Puncture

1. Stand at the prescribed distance from the drum and begin pumping the pump as described in the pre-operational check out (Step #7).

2. Continue to pump until the spike has fully entered the drum.

3. Next retract the piston as indicated in the pre-operational checkout (Step #9).

4. The drum should now be open. Sampling of the contents are to be conducted in accordance with ERT SOP #2009, *Drum Sampling*.

5. Remove the penetrator by reversing the attachment process.

6. The penetrator can now be attached to another drum or decontaminated; the spike and any of the support frame must be decontaminated.

7.3 Decontamination

To prevent cross-contamination of samples, drum penetrating equipment must be decontaminated. Refer to ERT SOP, *Sampling Equipment Decontamination*, QAPP, and the health and safety plan for specific decontamination procedures. Different parts of the drum penetrator require different decontamination procedures:

- The spike must be decontaminated after opening each drum.
- The penetrating unit (hydraulic cylinder, support frame, and fasteners) may only need cleaning on a daily basis or per use, depending on a visual inspection.
- The hydraulic hoses can be put into a protective sheeting (i.e., Tyvek, plastic) and cleaned on an as-needed basis or per use. This also holds true for the pump.

8.0 CALCULATIONS

This section is not applicable to this SOP.

9.0 QUALITY ASSURANCE/QUALITY CONTROL

There are no specific quality assurance activities which apply to the implementation of these procedures. However, all equipment must be operated in accordance with operating instructions as supplied by the manufacturer, unless otherwise specified in the work plan. Equipment checkout must occur prior to operating the equipment, and the equipment must be decontaminated as described in Section 7.3. Records must be maintained, documenting the training of the operators that use instrumentation and equipment for the collection of environmental information.

10.0 DATA VALIDATION

Data verification (completeness checks) must be conducted to ensure that all data inputs are present for ensuring the availability of sufficient information. These data are essential to providing an accurate and complete final deliverable. The ERT contractor's Task Leader (TL) is responsible for completing the UFP-QAPP verification checklist for each project.

11.0 HEALTH AND SAFETY

Based on Occupational Safety and Health Administration (OSHA) requirements, a site-specific HASP must be prepared for response operations under the Hazardous Waste Operations and Emergency Response (HAZWOPER) standard, 29 CFR 1910.120. Field personnel working for EPA's ERT should consult the Emergency Responder Health and Safety Manual currently located at https://response.epa.gov/_HealthSafetyManual/manual-index.htm for the development of the HASP, required personal protective equipment (PPE) and respiratory protection.

12.0 APPENDICES

A - Figure

APPENDIX A
Figure
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FIGURE 1. Drum Penetrator