



**Rocky Mountain  
Remediation Services, L L C**  
*protecting the environment*

## PROCEDURE

### GEOPHYSICAL BOREHOLE LOGGING

Procedure No RMRS/OPS-PRO 103

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APPROVED

Manager, Water Operations, Waste Operations Division

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### USE CATEGORY 2

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**1 0 PURPOSE**

This document describes procedures that will be used at the Rocky Flats Environmental Technology Site (RFETS) for conducting down-hole geophysical logging. Geophysical logging may be accomplished by employing a variety of down-hole instruments. Geophysical logging methods may include, but are not limited to, temperature log, caliper log, density log, focused log, induction log, micro log, neutron log, sidewall neutron log, spontaneous potential log, acoustic log, variable density and full-waveform sonic log, dip log, gamma ray log, or collar log.

Accurate and dependable quantitative analysis of the data requires that the logging operation be of the best possible quality. The following sections describe all procedures that will be used to collect and document down-hole geophysical data.

**2 0 SCOPE**

This document, which supercedes procedure No GT 15, constitutes a Standard Operating Procedure (SOP) that applies to all Rocky Mountain Remediation Services (RMRS) personnel and subcontractors conducting down-hole geophysical logging and related work at the RFETS. The procedures described herein will be followed whenever geophysical logging or associated activities are being performed.

All field analyses will meet the data quality objectives specified in the RMRS project work plan and/or other controlling documents.

**3 0 REQUIREMENTS**

A RMRS or subcontractor representative with experience or training in down-hole geophysical logging will conduct oversight and supervision of geophysical logging operations. Down hole logging is to be performed by a reputable firm with proven geophysical logging expertise.

The following sections identify the personnel qualifications and equipment for conducting down-hole geophysical logging and related work.

**3 1 Personnel Qualifications**

Personnel performing these procedures are required to have completed the initial 40-hour OSHA classroom training that meets Department of Labor Regulation 29 CFR 1910.120(e)(3)(i), and must maintain a current training status by completing the appropriate 8-hour OSHA refresher courses.

Prior to conducting down-hole geophysical logging and related work, personnel are required to have a complete understanding of the procedures described within this and certain related SOPs, have experience with down-hole logging procedures, and/or receive specific training regarding these procedures as necessary.

**3 2 Equipment**

Equipment required to conduct geophysical logging operations will be provided by the qualified geophysical logging service company that has been engaged to perform the logging. RMRS or subcontractor supervisory personnel will supply materials and supplies necessary to document the performance of these procedures.

- Field logbook
- Waterproof (black) pens

- Copies of Form GT 15A

#### 4 0 INSTRUCTIONS

##### 4 1 General Preparation

The need for and use of geophysical logging will be discussed in the project-specific work plan and/or other controlling documents. Given the project-specific objectives and the subsurface information required, an appropriate suite of down-hole geophysical logs will be selected. The RMRS or subcontractor representative will then contact the manager and/or supervisory operator of the logging service company. The RMRS or subcontractor representative will review the logging program and objectives with the logging company representative. The geology of the logging site(s) will also be reviewed to optimize the results of the geophysical logging. The RMRS or subcontractor representative will provide the logging company representative with all information necessary to enable the company to deliver the required or potentially required equipment to the drill site when the logging work begins. The logging company may be requested to maintain access to any additional logging equipment that may be requested by the RMRS or subcontractor representative and, if so will provide the additional logging services within eight hours of the request.

The logging company representative will notify the appropriate RMRS or subcontractor representative as to when the logging equipment will arrive at RFETS. The RMRS or subcontractor representative will notify Security, the RMRS Health and Safety Supervisor, and Radiological Engineering-approved contractor Health and Safety Specialists, all of whom will examine the vehicle, equipment, and down-hole instruments and tooling before these materials are allowed to enter RFETS. The equipment will be verified contamination free prior to coming onto site. The logging service company will be required to present documentation of down-hole source certification. If a radioactive source will be used, the logging truck will display the appropriate placards, and the source container will be appropriately labeled and secured.

The RMRS or subcontractor representative's field supervisor will notify the logging company far enough in advance to enable the logging company to set up at the drill site to begin logging immediately after drilling has been completed. Every effort should be made to prevent any delay in logging operations. When the logging service company arrives at the drill site, the RMRS or subcontractor representative will review the logging program, objectives, and site geology with the logging operator and provide information necessary for completing the Borehole Geophysical Logging Form (Form PRO 103A). The logging service representative(s) will then initiate the equipment calibration(s) and geophysical logging activities.

##### 4 2 Equipment Calibration

The geophysical logging company will

- Calibrate, and document the calibration of all logging equipment before and after the logging run,
- Provide documentation of all shop calibrations, surface calibrations, and calibrations performed before and after the logging run to the RMRS or subcontractor representative,
- Possess documentation of down-hole instrument source certification of any radioactive tools

##### 4 3 Logging

The RMRS or subcontractor representative will ultimately be responsible for data quality. Therefore, the RMRS or subcontractor representative, as well as any other appropriate RMRS personnel, shall have access to the logging unit at all times in order to monitor logging activities.

Every effort shall be made to initiate logging immediately following the completion of drilling activities, and to complete logging in one day. Therefore, the RMRS or subcontractor representative will be required to schedule the drilling and subsequent logging activities efficiently and with a minimum of transition time between completion of the hole and initiation of logging. In addition, boreholes should be left open as briefly as possible.

Logging units will be computerized and logs shall be recorded digitally on tape or disk. The tapes or disks shall become the property of RMRS and their final disposition shall be determined by the RMRS project manager at the end of the project. Field prints of each log shall be made during or immediately following each logging run. No portion of the log run, including calibration steps, shall be destroyed. Field prints shall be collected by the RMRS or subcontractor representative at the end of each day.

Every effort shall be made to recover any stuck tool. If a stuck tool contains a radioactive source and cannot be recovered, State of Colorado guidelines shall be followed in order to recover as much of the tool as possible. If recovery of the tool is not feasible, or if parts of the tool remain in the hole after recovery procedures have been exhausted, the tool or tool parts shall be cemented in place.

After completion of logging activities in a given borehole, all logging equipment shall be decontaminated in accordance with SOP OPS-PRO 127, General Equipment Decontamination, and SOP OPS-070, Decontamination of Heavy Equipment at Decontamination Facilities. Radiological Engineering-approved contractor Health and Safety Specialists will provide radiation monitoring. Geophysical logging equipment and personnel will be monitored before they leave the work area. Radiation monitoring will be performed in accordance with SOP FO 16, Field Radiological Measurements. Organic vapor monitoring, if applicable, will be performed in accordance with SOP FO 15, Photoionization Detectors (PIDs) and Flame Ionization Detectors (FIDs). All radiation and organic vapor monitoring will also be performed in accordance with the Health and Safety Program Plan and the project-specific Health and Safety Plan.

## **5 0 RECORDS**

Logging information and specifications will be documented on the Geophysical Borehole Logging Form (Form PRO 103A). Forms will be completed in the field without transcribing from a field logbook or other document. The RMRS or subcontractor representative will check these forms for completeness before releasing the operator. A field logbook will be maintained by the RMRS or subcontractor representative, and will serve as additional supporting documentation for all logging activities.

High quality, reproducible logs will be submitted by the logging service company to the RMRS or subcontractor's office within 10 working days following completion of the logging run.

## **6 0 REFERENCES**

### **6 1 Internal References**

Related SOPs cross-referenced by this SOP are as follows:

- SOP OPS-PRO 127, General Equipment Decontamination
- SOP OPS-PRO 070, Decontamination of Heavy Equipment at Decontamination Facilities
- SOP FO 16, Field Radiological Measurements
- SOP FO 15, Photoionization Detectors (PIDs) and Flame Ionization Detectors (FIDs)
- SOP 2S47-ER-ADM-05 14, Use of Field Logbooks and Forms

