

STANDARD OPERATING PROCEDURES

VOLUME I OF VI
FIELD OPERATIONS

ROCKY FLATS PLANT
ENVIRONMENTAL MONITORING AND ASSESSMENT DIVISION
P.O. Box 464
Golden, CO 80402

February 1991

REVIEWED FOR CLASSIFICATION/UCNI
By V. A. Muenchow *(initials)*
Date 6/11/91

STANDARD OPERATING PROCEDURES

VOLUME I OF VI
FIELD OPERATIONS

ROCKY FLATS PLANT
ENVIRONMENTAL MONITORING AND ASSESSMENT DIVISION
P.O. Box 464
Golden, CO 80402

February 1991

REVIEWED FOR CLASSIFICATION/LICN1
By V. A. Muenchow unw
Date 6/11/91

ROCKY FLATS PLANT

ENVIRONMENTAL ASSESSMENT AND MONITORING DIVISION

STANDARD OPERATING PROCEDURES

**VOLUME I OF VI
FIELD OPERATIONS**

VOLUME I: FIELD OPERATIONS

<u>SOP No.</u>		<u>TAB</u>
1.1	WIND BLOWN CONTAMINANT DISPERSION CONTROL	1
1.2	FIELD DOCUMENT CONTROL	2
1.3	GENERAL EQUIPMENT DECONTAMINATION	3
1.4	HEAVY EQUIPMENT DECONTAMINATION	4
1.5	HANDLING OF PURGE AND DEVELOPMENT WATER	5
1.6	HANDLING OF PERSONAL PROTECTIVE EQUIPMENT	6
1.7	HANDLING OF DECONTAMINATION WATER AND WASH WATER	7
1.8	HANDLING OF DRILLING FLUIDS AND CUTTINGS	8
1.9	HANDLING OF RESIDUAL SAMPLES	9
1.10	RECEIVING, LABELING, AND HANDLING OF WASTE CONTAINERS	10
1.11	FIELD COMMUNICATIONS	11
1.12	DECONTAMINATION FACILITY OPERATIONS	12
1.13	CONTAINERIZING, PRESERVING, HANDLING, AND SHIPPING OF SOIL AND WATER SAMPLES	13
1.14	FIELD DATA MANAGEMENT	14
1.15	USE OF PHOTOIONIZING AND FLAME IONIZING DETECTORS	15
1.16	FIELD RADIOLOGICAL MEASUREMENTS	16

ROCKY FLATS PLANT

ENVIRONMENTAL ASSESSMENT AND MONITORING DIVISION

STANDARD OPERATING PROCEDURES

VOLUME II: GROUNDWATER

<u>SOP No.</u>		<u>TAB</u>
2.1	WATER LEVEL MEASUREMENTS IN WELLS AND PIEZOMETERS	1
2.2	WELL DEVELOPMENT	2
2.3	PUMP-IN BOREHOLE PACKER TESTS	3
2.4	SLUG TESTS	4
2.5	MEASUREMENT FOR GROUNDWATER FIELD PARAMETERS	5
2.6	GROUNDWATER SAMPLING	6

VOLUME III: GEOTECHNICAL

<u>SOP No.</u>		<u>TAB</u>
3.1	LOGGING ALLUVIAL AND BEDROCK MATERIAL	1
3.2	DRILLING AND SAMPLING USING HOLLOW-STEM AUGER TECHNIQUES	2
3.3	ISOLATING BEDROCK FROM ALLUVIUM WITH GROUTED SURFACE CASING	3
3.4	ROTARY DRILLING AND ROCK CORING	4
3.5	PLUGGING AND ABANDONMENT OF BOREHOLES	5
3.6	MONITORING WELL AND PIEZOMETER INSTALLATION	6
3.7	LOGGING OF TEST PITS AND TRENCHES	7
3.8	SURFACE SOIL SAMPLING	8
3.9	SOIL GAS SAMPLING AND FIELD ANALYSIS	9
3.10	BOREHOLE CLEARING	10
3.11	PLUGGING AND ABANDONMENT OF WELLS	11

ROCKY FLATS PLANT

ENVIRONMENTAL ASSESSMENT AND MONITORING DIVISION

STANDARD OPERATING PROCEDURES

VOLUME IV: SURFACE WATER

<u>SOP No.</u>		<u>TAB</u>
4.1	SURFACE WATER DATA COLLECTION ACTIVITIES	1
4.2	FIELD MEASUREMENTS OF SURFACE WATER FIELD PARAMETERS ...	2
4.3	SURFACE WATER SAMPLING	3
4.4	DISCHARGE MEASUREMENTS	4
4.5	BASE LABORATORY WORK	5
4.6	SEDIMENT SAMPLING	6
4.7	COLLECTION OF TAP WATER SAMPLING	7
4.8	POND SAMPLING	8
4.9	INDUSTRIAL EFFLUENT AND POND DISCHARGE SAMPLING	9

VOLUME V: ECOLOGY

<u>SOP No.</u>		<u>TAB</u>
5.1	SAMPLING OF PERIPHYTON	1
5.2	SAMPLING OF BENTHIC MACROINVERTEBRATES	2
5.3	SAMPLING OF PLANKTON	3
5.4	SAMPLING OF FISHES	4
5.5	SAMPLING OF LARGE MAMMALS	5
5.6	SAMPLING OF SMALL MAMMALS	6
5.7	SAMPLING OF BIRDS	7
5.8	SAMPLING OF REPTILES AND AMPHIBIANS	8
5.9	SAMPLING OF TERRESTRIAL ARTHROPODS	9
5.10	SAMPLING OF TERRESTRIAL VEGETATION	10

ROCKY FLATS PLANT

ENVIRONMENTAL ASSESSMENT AND MONITORING DIVISION

STANDARD OPERATING PROCEDURES

VOLUME VI: AIR

<u>SOP No.</u>		<u>TAB</u>
6.1	EFFLUENT TRITIUM SAMPLE COLLECTION	1
6.2	TRITIUM SAMPLER CALIBRATION	2
6.3	EFFLUENT AIR RADIOPARTICULATE SAMPLE COLLECTION	3
6.4	EFFLUENT AIR RADIOPARTICULATE	4
6.5	RESPONSE TO EFFLUENT SAAM ALAR	5
6.6	EFFLUENT AIR PITOT TUBE INSPECTION AND REPLACEMENT	6
6.7	EFFLUENT AIR SAMPLE DATA REDUCTION	7
6.12	PREVENTIVE MAINTENANCE PROCEDURE FOR RFP TSP HIVOL SAMPLER	12

EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.1, Rev. 0
1 of 6
February 18, 1991
ER&WM

Safety Related
Category 1

TITLE:
WIND BLOWN CONTAMINANT
DISPERSION CONTROL

Approved by

J. W. Langman

1.0 TABLE OF CONTENTS

1.0	TABLE OF CONTENTS	2
2.0	PURPOSE	2
3.0	SCOPE	2
4.0	REFERENCES	2
4.1	SOURCE REFERENCES	2
4.2	INTERNAL REFERENCES	2
5.0	PREREQUISITES	2
6.0	LIMITATIONS AND PROCEDURES	4
7.0	PROCEDURE	4
8.0	AUTHENTICATION	4
9.0	RECORDS	4

2.0 PURPOSE

This standard operating procedure (SOP) contains instructions for wind blown contaminant dispersion control.

3.0 SCOPE

This procedure is intended to be used only by qualified personnel, and is applicable where moving earth, drilling, or dust particles are generated at the Rocky Flats Plant (RFP). It is designed to assist the Plan for Prevention of Contaminant Dispersion (PPCD). The PPCD will be reviewed before using this SOP. Any discrepancies between this procedure and the (PPCD) must be resolved by the EG&G project manager prior to implementation.

4.0 REFERENCES

4.1 SOURCE REFERENCES

- 4.1.1 29 CFR 1910.120
- 4.1.2 DOE Order 5400.1
- 4.1.3 DOE Order 5700.6B
- 4.1.4 ANSI/ASME NQA-1
- 4.1.5 EPA QAMS - 005/80

4.2 INTERNAL REFERENCES

- 4.2.1 Wind Speed Shut Down Criteria

**Safety Related
Category 1**

- 4.2.2 FCO #3, DWGs DK 986147-E1 and E2
- 4.2.3 ER Project Work Plan
- 4.2.4 Drilling Wind Speed Shut-Down Criteria
- 4.2.5 Inter-Agency Agreement

5.0 PREREQUISITES

- 5.1 All construction personnel shall have completed 40 hours Occupational Safety and Health Administration (OSHA/SARA) training, 24 hours On-The-Job training (OJT), 8 hours supervisor training (for supervisors only), and all required updates.
- 5.2 All personnel shall have a baseline physical complying with 29 CFR 1910.120 and shall comply with the site-specific Health and Safety Plan.
- 5.3 Wind anemometers shall be set up prior to start of work. (Refer to Internal Reference 3.2.2.).
- 5.4 The following equipment IS required where applicable:
 - 1. Hard hats
 - 2. Safety shoes or protectors
 - 3. Coveralls
 - 4. Gloves
 - 5. Monitoring equipment (H-nu and Ludlum test equipment)
 - 6. Electrical safety gear
 - 7. Safety belts for high work
 - 8. Eye/ear protection

**Safety Related
Category 1**

9. Organic vapor meter with assorted calibration tubes
10. 4-gas monitor (O₂/H₂O/CO/comb.)
11. Lo-Vol/Hi-Vol air samplers (personal and stationary)
12. Air sample scaler counter
13. Portable radiation monitoring equipment
14. Explosivity indicator/alarm
15. Digital dosimetry
16. Radiologic metering source calibration set
17. Respirator and cartridges
18. Soil moisture measuring device

5.5 The following documents are required where applicable:

1. Weekly work permit
2. Excavation permit(s)
3. Subcontractor's Health & Safety Plan
4. Approved construction schedule
5. OSHA and orientation training records
6. Records of physical examination and respirator examination
7. Health & Safety Plan (project and site specific)
8. Welding permits
9. Land use permits
10. Detailed Statement of Work and Project work plan

5.6 Hi-Vol and Lo-Vol air samplers shall be operational and calibrated prior to start of work.

5.7 Health & Safety Plans shall be approved by UNC OHS Manager prior to start of work.

5.8 All equipment being utilized for operations shall be inspected prior to start of work.

**Safety Related
Category 1**

5.9 All necessary documentation and permits shall be in place prior to start of work.

5.10 PPE and air monitoring shall be performed in accordance with the drilling site-specific Health and Safety Plan, as amended, and the ER SOP.

6.0 LIMITATIONS AND PROCEDURES

6.1 Wind anemometers shall be placed as close as possible to work site without interference.

7.0 PROCEDURE

7.1 Verify that all prerequisites are completed prior to beginning of the procedure.

7.2 Verify that Hi-Vol and Lo-Vol air samplers are operational and calibrated prior to start of work.

7.3 Verify that wind anemometers are operational prior to start of work. (Refer to Internal Reference 3.2.2).

7.4 Measure wind speed with a wind anemometer.

7.4.1 If wind speed measures above 15 mph for earth moving or other dust generation operations, have operations terminated until wind speed is below 15 mph.

7.4.2 If wind speed measures above 35 mph for drilling operations, have operations terminated until wind speed is below 35 mph.

7.5 Measure soil moisture content with a moisture meter.

**Safety Related
Category 1**

7.5.1 If soil moisture content measures below 15 percent, wet soil to prevent dust generation, and then complete Step 7.5, again. Soil wetting will only be performed in the immediate vicinity of excavation activities and only when analytical soil samples will not be affected.

7.6 Measure airborne dust concentrations when there is visible dust during operations.

7.7 Collect Hi-Vol samplers twice monthly.

7.8 Collect Lo-Vol air samplers weekly during excavation activities.

8.0 AUTHENTICATION

____/____/____ _____ _____
Date Operator (print name) Operator (sign name)

9.0 RECORDS

9.1 The procedure, after completion by the operator, shall be forwarded to the supervisor for further processing and proper retention.

EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.2, Rev 0
1 of 6
February 18, 1991
ER&WM

TITLE:
FIELD DOCUMENT CONTROL

Approved by:

J. W. Langmeier

1.0 TABLE OF CONTENTS

1.0	PURPOSE	2
2.0	SCOPE	2
3.0	REFERENCES	2
3.1	SOURCE REFERENCES	2
3.2	INTERNAL REFERENCES	2
4.0	PREREQUISITES	3
5.0	LIMITATIONS AND PROCEDURES	3
6.0	PROCEDURE	3
7.0	AUTHENTICATION	6

EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.2, Rev 0
2 of 6
February 18, 1991
ER&WM

1.0 PURPOSE

This procedure addresses the disposition of field datasheets and procedures which have been authenticated as part of the collection of Environmental Monitoring and Assessment field activities.

2.0 SCOPE

This procedure is intended for the use of trained personnel in controlled transmission of datasheets and authenticated procedures to the responsible Project Manager from the field.

3.0 REFERENCES

3.1 SOURCE REFERENCES

- 3.1.1 Environmental Restoration Interagency Agreement.
- 3.1.2 DOE Order 5400.1, General Environmental Protection Program.
- 3.1.3 DOE Order 5700.6B. Quality Assurance.
- 3.1.4 Environmental Restoration Department Quality Assurance Program Description.

3.2 INTERNAL REFERENCES

- 3.2.1 ER & WM Administrative Procedure 16.01, Control of Corrective Action Reports.

EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.2, Rev 0
3 of 6
February 18, 1991
ER&WM

4.0 PREREQUISITES

- 4.1 Datasheets must be properly completed per the applicable generation procedure.
- 4.2 Procedures with internal authentications must be properly authenticated per that procedure.
- 4.3 Each datasheet shall have a unique identification number.

5.0 LIMITATIONS AND PROCEDURES

None

6.0 PROCEDURE

- 6.1 Verify that the datasheets and authenticated procedures have been properly completed per the applicable procedures under, which they were generated.
- 6.2 Verify that each datasheet has a unique identification number generated in accordance with the datasheet original generation procedure.
- 6.3 If the verification in steps 6.1, 6.2, or 6.5.1 identify discrepancies with the applicable generation procedure, terminate this activity for the affected datasheet or authenticated procedure and prepare a Corrective Action Report.

NOTE

Datasheets and authenticated procedures identified in Corrective Action Reports will be dispositioned in accordance with the ER & WM Administrative Procedure 16.1 (Reference 3.2.1).

EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.2, Rev 0
4 of 6
February 18, 1991
ER&WM

Safety Related
Category 1

- 6.4 Maintain the datasheets and authenticated procedures in a location where they are protected from loss or damage.
- 6.5 At least once every seven days, prepare a package for transmission to the responsible project manager of the datasheets and authenticated procedures accumulated.
- 6.5.1 Collect the datasheets and authenticated procedures and review them for accuracy and completeness consistent with the requirements in the applicable generation procedure.
- 6.5.2 If datasheets or authenticated procedures are not consistent with the applicable generation procedures (see step 6.5.1), disposition the datasheet(s) or authenticated procedures(s) as described in step 6.3.
- 6.5.3 Obtain a Field Data Transmission Form.
- 6.5.4 Address the form to the responsible Project Manager and your complete address.
- 6.5.5 Record the Transmission Form Number.

NOTE

This number is "TFM", your initials, the date (mmddyy format), and the number of transmission forms you have generated that day, each separated by dashes. (Example: TFM-JWD-053191-1)

- 6.5.6 Record the following information on the Field Data Transmission Form (Form 1.2A) (Continuation sheets maybe used as needed):

EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.2, Rev 0
5 of 6
February 18, 1991
ER&WM

Safety Related
Category 1

1. Datasheet or procedure number,
2. Datasheet or procedure title, and
3. Datasheet or procedure date.

6.5.7 Record the page number and the total number of pages on the form and its continuation pages, if any.

6.5.8 Record the Transmission Form Number on the continuation pages, if any.

6.5.9 Attach the datasheets and authenticated procedures listed to the form.

6.5.10 Verify that all datasheets and authenticated procedures listed on the transmission form are attached.

6.5.11 If the datasheets and authenticated procedures were not attached per step 6.5.7 attach them or revise the form.

NOTE

If datasheets or authenticated procedures are lost a corrective Action Report shall be created per the ER & WM Administrative Procedure 16.01.

6.5.12 Authenticate the transmission form by:

1. Printing your name,
2. signing, and

EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.2, Rev 0
6 of 6
February 18, 1991
ER&WM

Safety Related
Category 1

3. recording date

at the bottom of the transmission form.

6.6 Transmit the transmission form and attachments to the Project Manager.

7.0 AUTHENTICATION

Authentication of completion of this procedure is documented by signing the Field Data Transmission Form (Form 1.2A) in step 6.5.9.

EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOPS
13, Rev. 0
1 of 19
February 18, 1991
ER&WM

Safety Related
Category 1

TITLE:
GENERAL EQUIPMENT
DECONTAMINATION

Approved By:

J. W. Longma

1.0 TABLE OF CONTENTS

1.0	TABLE OF CONTENTS	2
2.0	PURPOSE AND SCOPE	3
3.0	RESPONSIBILITIES AND QUALIFICATIONS	3
4.0	REFERENCES	4
4.1	SOURCE REFERENCES	4
4.2	INTERNAL REFERENCES	4
5.0	PROCEDURES AND EQUIPMENT	5
5.1	INTRODUCTION	5
5.2	CLEANING PROCEDURES FOR TEFLON® OR GLASS FIELD SAMPLING EQUIPMENT USED FOR THE COLLECTION OF SAMPLES FOR TRACE ORGANIC COMPOUNDS AND/OR METALS ANALYSES	7
5.3	CLEANING PROCEDURES FOR STAINLESS STEEL OR METAL SAMPLING EQUIPMENT	8
5.3.1	Cleaning Steel or Metal Sampling Equipment Without Steam in the Field ..	9
5.4	CLEANING PROCEDURES FOR AUTOMATIC WASTEWATER SAMPLING EQUIPMENT	10
5.4.1	General	10
5.4.2	Automatic Sampler Headers	10
5.4.3	Reusable Glass Composite Sample Containers	11
5.4.4	Reusable Plastic Composite Sample Containers	12

Safety Related
Category 1

5.4.5	Sequential Sample Bottles (Automatic Sampler Base for Sequential Mode)	12
5.4.6	Sequential Sample Bottles (Automatic Sampler Base for Sequential Mode) to be Used for Collecting Samples for Organic Compounds Analyses	12
5.4.7	Bottle Siphons Used to Transfer Sample From Composite Container	12
5.5	CLEANING PROCEDURES FOR SAMPLE TUBING	13
5.5.1	Silastic Rubber Pump Tubing Used in Automatic Samplers and Other Peristaltic Pumps	13
5.5.2	Teflon® Sample Tubing	13
5.5.3	Stainless Steel Tubing	13
5.5.4	Glass Tubing	14
5.6	MISCELLANEOUS EQUIPMENT CLEANING PROCEDURES	14
5.6.1	Well Sounders or Tapes Used to Measure Groundwater Levels	14
5.6.2	Submersible Pumps and Hoses Used to Purge Groundwater Wells	14
5.6.3	Field Analytical Equipment and Other Field Instrumentation	15
5.6.4	Ice Chests and Shipping Containers	16
5.6.5	Uncontaminated and Potentially Contaminated Drums	16
6.0	QUALITY ASSURANCE/QUALITY CONTROL	18
6.1	EQUIPMENT RINSE SAMPLES	18
7.0	DOCUMENTATION	19

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOPS
1.3, Rev. 0
3 of 19
February 18, 1991
ER&WM**

2.0 PURPOSE AND SCOPE

This standard operating procedure (SOP) describes procedures that will be used at Rocky Flats for general equipment decontamination. The collection of environmental samples requires that all equipment associated with collecting these samples be cleaned.

This requirement will ensure that contaminants will not be introduced into the sample from external sources. These procedures establish the cleaning and decontamination methods for achieving that goal.

3.0 RESPONSIBILITIES AND QUALIFICATIONS

The EG&G project manager has the overall responsibility for implementing this SOP. The subcontractor's project manager will be responsible for assigning project staff to implement this SOP and for ensuring that the procedures are followed by all subcontractor personnel.

All personnel performing these procedures are required to have the appropriate health and safety documentation and training as specified in the site-specific Health & Safety Plan. In addition, all personnel are required to have a complete understanding of the procedures described within this SOP and receive specific training regarding these procedures, if necessary.

All project staff are responsible for reporting deviations from this SOP to the individual's project manager. The subcontractor's project manager will report deviations and nonconformances to the EG&G project manager.

EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOPS
1.3, Rev. 0
4 of 19
February 18, 1991
ER&WM

4.0 REFERENCES

4.1 SOURCE REFERENCES

Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual. U.S. Environmental Protection Agency. Athens, GA. 1986.

Federal Register, Volume 44, 40 CFR Part 136. "Guidelines Establishing Test Procedures for the Analysis of Pollutants Under the Clean Water Act."

Test Methods for Evaluating Solid Waste. SW-846, 2nd Edition. U.S. Environmental Protection Agency. Washington, D.C. 1982.

Technical Enforcement Guidance Document (TEGD). EPA. 1986.

4.2 INTERNAL REFERENCES

Related SOPs cross-referenced in these procedures are as follows:

- SOP No. 1.4, Heavy Equipment Decontamination
- SOP No. 1.7, Handling of Decontamination Water and Washwater
- SOP No. 1.10, Receiving, Labeling, and Handling Waste Containers
- SOP No. 4.2, Field Measurement of Surface Water Field Parameters

5.0 PROCEDURES AND EQUIPMENT

5.1 INTRODUCTION

This procedure describes the method for physically removing contaminants. It applies to chemical and radioactive decontamination of equipment used in field investigations. All equipment must be cleaned before sample collection, decontaminated between samples, and decontaminated before being removed from the site.

Sufficient clean equipment should be transported to the field so that an entire study can be conducted without the need for field cleaning. However, this is not possible for some specialized items of field equipment (such as, well drilling rigs, soil coring rigs, and other large pieces of field equipment). In addition, during particularly large-scale studies, it may not be practical or possible to transport to the field all of the cleaned field equipment required, as steam cleaning is not always possible, it may be necessary to decon smaller metal and stainless steel equipment outside the exclusion zone (see 5.3.1) in order to have these items ready for repeated use (bailers, split spoons, etc.). This will decrease the need to travel to the MDF and decontaminate these items.

The following definitions apply to the cleaning procedures:

1. The laboratory detergent must be a standard brand of phosphate-free laboratory detergent, such as Liquinox or the equivalent.
2. Tap water is defined as RFP drinking water. It may be obtained from hydrants or the RFP fire department. The use of an untreated potable water supply is not an acceptable substitute for RFP drinking water.

3. Distilled water is defined as any commercially available distilled water. A record of the distilled water supplier and the lot numbers supplied will be maintained. A sample from the initial batch of each lot number will be analyzed for volatile organics, inorganics (major anions), metals, and total dissolved solids.

The following are general comments:

- During cleaning operations, the substitution of a higher grade water (such as substituting distilled or organic-free water for tap water) is permitted and need not be noted as a variation.
- The brushes used to clean equipment as outlined in the various sections of this procedure must not be of the wire-wrapped type.
- Solvents, nitric acid solution, laboratory detergent, and rinse waters used to clean equipment must not be reused, except as specifically permitted.
- Field equipment or reusable sample containers needing cleaning must not be stored with clean equipment, sample tubing, or sample containers. Field equipment, reusable sample containers, disposable sample containers, and sample tubing that are not used may not be replaced in storage without being recleaned if these materials are transported to a facility or study site where contamination or suspected contamination was present.
- Previously cleaned sample containers and field equipment that are cleaned using the procedures outlined in the attachments will be stored in an area and manner that protects them from exposure to contaminants. Sample containers and field

equipment will be stored separately from all other equipment and supplies, and from each other.

- Sample containers that contain a sample, regardless of the assumed or known level of hazard associated with that sample, must have all exterior surfaces decontaminated. For sample containers used in areas other than a controlled access area, a wipedown with disposable rags or toweling, or rinse with distilled water followed by drying with disposable rags or toweling, will suffice. Any visible dirt, water droplets, stains, or other extraneous materials must be removed. For containers used in controlled access areas, a more rigorous cleaning and/or radiation monitoring may be required.
- Solvents, including water and mineral acids, used for equipment cleaning purposes other than as described in this SOP must be justified and approved by the responsible EG&G project personnel and will be documented in logbooks. The laboratory to which the samples are sent must be informed as well.

5.2 CLEANING PROCEDURES FOR TEFLON®, OR GLASS FIELD SAMPLING EQUIPMENT USED FOR THE COLLECTION OF SAMPLES FOR TRACE ORGANIC COMPOUNDS AND/OR METALS ANALYSES

When this sampling equipment is used to collect samples that contain oil, grease, or other hard-to-remove materials, it may be necessary to steam clean the field equipment before proceeding with Step 1. If the field equipment cannot be cleaned utilizing these procedures, it should be discarded.

1. Wash equipment thoroughly with laboratory detergent and tap water using a brush to remove any particulate matter or surface film.

2. Rinse equipment thoroughly with tap water.
3. Rinse equipment thoroughly with distilled water.
4. Wrap equipment with a non-reactive plastic to prevent contamination during storage and/or transport to the field.
5. If the equipment is not decontaminated immediately after use, rinse the Teflon® or glass sampling equipment thoroughly with tap water in the field as soon as possible after use.

5.3 CLEANING PROCEDURES FOR STAINLESS STEEL OR METAL SAMPLING EQUIPMENT

When this sampling equipment is used to collect samples that contain oil, grease, or other hard-to-remove materials, it may be necessary, in extreme cases, to steam clean or sandblast equipment before proceeding with Step 1. Any sampling equipment that cannot be cleaned using these procedures should be discarded. If necessary, rinsate sampling frequency and procedures are specified in the Task QAPP.

1. Scrape and then steam clean gross contamination if needed.
2. Wash equipment thoroughly with laboratory detergent and tap water and use a brush to remove any particulate matter or surface film.
3. Rinse equipment thoroughly with tap water.
4. Rinse equipment thoroughly with distilled water.

5. Wrap equipment with a non-reactive plastic to prevent contamination during storage and/or transport to the field.
6. If equipment is not decontaminated immediately after use, rinse the stainless steel or metal sampling equipment thoroughly with tap water in the field as soon as possible after use. This process will make later decontamination easier and will help prevent the spread of contamination.

5.3.1 Cleaning Steel or Metal Sampling Equipment Without Steam in the Field

1. Scrape gross contamination from equipment while in the exclusion zone.
2. Remove equipment from exclusion zone and wash in laboratory detergent and tap water; a brush may be used for particulate residual.
3. Rinse in tap water.
4. Triple rinse in distilled water.
5. Equipment may now either be wrapped in plastic to prevent cross-contamination or be re-used immediately.

5.4 CLEANING PROCEDURES FOR AUTOMATIC WASTEWATER SAMPLING EQUIPMENT

5.4.1 General

Automatic samplers will be cleaned as follows:

1. The exterior and accessible interior portions (excluding the waterproof timing mechanism) of automatic samplers will be washed with laboratory detergent and rinsed with tap water.
2. The face of the timing case mechanism will be cleaned with a clean, damp cloth.
3. All silastic tubing (sample intake and pump tubing) will be discarded after use at site. SOP 1.10 Receiving, Labeling, and Handling Waste Containers will be followed.
4. New precleaned, silastic pump tubing (see Subsections 5.5.1 and 5.5.2) will be installed.
5. When utilizing the samplers for collecting samples for metals and/or organic compounds analyses, all sampling train components that come in direct contact with the liquid sample must be of glass, Teflon®, or disposable silastic material.

5.4.2 Automatic Sampler Headers

1. Disassemble header and, using a bottle brush, wash with tap water and phosphate-free laboratory detergent.

2. Rinse thoroughly with distilled water.
3. Reassemble header, let dry thoroughly, and wrap with plastic.

5.4.3 Reusable Glass Composite Sample Containers

Under normal circumstances reusable glass containers are supplied clean by the laboratory. When this is not the case cleaning of reusable glass composite containers will be accomplished using the procedure below.

(Note: Glass composite containers used to collect in-process wastewater samples at industrial facilities shall be discarded after sampling.) All materials will be disposed in accordance with SOP 1.10 Receiving, Labeling and Handling Waste Containers.

1. Scrub with liquinox or other phosphate-free laboratory detergent mixed with tap water.
2. Rinse with tap water.
3. Repeat step one.
4. Rinse in tap water again, and then in a triple-distilled water rinse.
5. Dry in inverted position on drain rack or suitable rack in clean room as is applicable.
6. If equipment is still discolored, spotted, or has a noticeable film or scale, discard in accordance with SOP 1.10, Receiving, Labeling, and Handling Waste Containers.

5.4.4 Reusable Plastic Composite Sample Containers

Under normal circumstances reusable glass containers are supplied clean by the laboratory. When this is not the case use cleaning procedures as they are outlined in Subsection 5.4.3.

5.4.5 Sequential Sample Bottles (Automatic Sampler Base for Sequential Mode)

1. Use cleaning procedures as they are outlined in Subsection 5.4.3.
2. Replace bottles in covered, automatic sampler base; cover with plastic for storage.

5.4.6 Sequential Sample Bottles (Automatic Sampler Base for Sequential Mode) to be Used for Collecting Samples for Organic Compounds Analyses

Routinely, precleaned sample bottles will be purchased and used with automatic sampling devices.

1. Use cleaning procedures as they are outlined in Subsection 5.4.3.
2. Replace in covered, automatic sampler base; cover with plastic for storage and mark the base as follows: "Cleaned for organic analyses."

5.4.7 Bottle Siphons Used to Transfer Sample From Composite Container

1. Use a new siphon for each sampling location.
2. Use new 3/8-inch Teflon® tubing for samples collected for organic compounds analyses. The siphon and tubing should be flushed with sample thoroughly before use.

5.5 CLEANING PROCEDURES FOR SAMPLE TUBING

5.5.1 Silastic Rubber Pump Tubing Used in Automatic Samplers and Other Peristaltic Pumps

1. New tubing will be used for each automatic sampler set-up.
2. Teflon® tubing should be cleaned as follows:
 - The exterior will be hand scrubbed with a solution of a phosphate free, laboratory grade detergent and tap water, followed by rinsing with ample amounts of tap water by spraying. The tubing will then be triple rinsed thoroughly with approved distilled water by submerging or spraying.
 - Pump or pour laboratory detergent and water solution through tubing.
 - Pump approved distilled water through the tubing equivalent to 10 volumes of the tubing capacity.

5.5.2 Teflon® Sample Tubing

1. New Teflon® tubing should be used for each sampling point.
2. Teflon® tubing should be cleaned as follows using the procedures of Subsection 5.5.1.

5.5.3 Stainless Steel Tubing

1. Wash with laboratory detergent and tap water using a long, narrow, bottle brush.
2. Proceed with Steps 3.6 as outlined in Subsection 5.3.

5.5.4 Glass Tubing

Use new glass tubing, precleaned as follows:

1. Rinse thoroughly with distilled water
2. Air dry
3. Wrap tubing with plastic to prevent contamination

5.6 MISCELLANEOUS EQUIPMENT CLEANING PROCEDURES

5.6.1 Well Sounders or Tapes Used to Measure Groundwater Levels

The procedure applies when this equipment is cleaned in the field.

1. Wash with laboratory non-phosphorus detergent and tap water.
2. Rinse with distilled water.
3. Equipment should be wrapped with non-reactive plastic to prevent contamination during storage or transit.

5.6.2 Submersible Pumps and Hoses Used to Purge Groundwater Wells

Where appropriate, pumps or bailers will be employed to purge and sample groundwater monitoring wells. This equipment will be cleaned as follows:

1. The external surfaces of the equipment will be vigorously hand scrubbed with a solution of a phosphate-free, laboratory grade detergent and tap water, followed

by rinsing with water by submerging or spraying. The equipment will then be triple rinsed thoroughly with approved distilled water.

2. Internal surfaces will be decontaminated by pumping a solution of non-phosphate detergent and water through the equipment.
3. Displace the soap solution immediately by pumping distilled water equivalent to 10 volumes of the pump storage capacity through the equipment.

5.6.3 Field Analytical Equipment and Other Field Instrumentation

The exterior of sealed, watertight equipment should be washed with a laboratory detergent and rinsed with tap water before storage. The interior of such equipment may be wiped with a damp cloth if necessary. Ensure that the equipment is dry prior to storage.

Other field instrumentation should be wiped with a clean, damp cloth; and pH meter probes, conductivity probes, dissolved oxygen (DO) meter probes, etc. should be rinsed with distilled water before storage.

If desiccant is present in flow meters or other equipment, it should be checked and replaced, if necessary, each time the equipment is cleaned.

For operations involving environmental or background samples, water quality sampling equipment (such as Kemmers, buckets, DO dunkers, dredges, etc.) may be cleaned with distilled water between sampling locations. A brush may be used to remove deposits of material or sediment, if necessary. If distilled water is used, water samplers should be flushed with ambient water at the next sampling location before the sample is collected. It should be emphasized that these procedures can only be used to clean equipment used for the collection of background samples.

Flow measuring equipment (such as, weirs, staff gauges, velocity meters, and other stream gauging equipment) will be cleaned with tap water after use between measuring locations.

5.6.4 Ice Chests and Shipping Containers

All ice chests and reusable containers will be steam cleaned thoroughly inside and out at MDF. If an ice chest is so contaminated it cannot be decontaminated, dispose of it in accordance with SOP 1.10, Receiving, Handling, and Labeling Waste Containers.

5.6.5 Uncontaminated and Potentially Contaminated Drums

Gray drums used for the temporary containment of uncontaminated or potentially contaminated solid or liquid waste will require decontamination prior to any additional use. It may also be necessary to decontaminate the exterior of gray drums due to radiological contamination. The following procedures will be used:

- General Procedure
 - All general gray drum decontamination will be performed at the Main Decontamination Facility (MDF)
- Ensure the drums are empty
- Scrape or shovel out any residual contaminants.
- Place drum in wash rack with open end down.

Safety Related
Category 1

- Stand upwind/crosswind of the surface being decontaminated. If necessary the equipment will be reoriented inside the decontamination station to allow an upwind or crosswind position.
- General Decontamination

Thoroughly steam clean all surfaces of drum including lid, locking ring, bottom, and interior surface. A brush may be used for stubborn particulate matter.

- Place top of the drum down in a clean area where it will not come in contact with contaminants to dry.
- When dry, turn the drum upright and put the top and locking ring in place.
- Return the decontaminated drum to EG&G.
- Surface Radiologically Contaminated Drums
 - Stand upwind/crosswind of the surface being decontaminated. If necessary the equipment will be reoriented inside the decontamination station to allow an upwind or crosswind position, or hand brushing will be used to complete decontamination.
 - Steam clean all exterior surfaces including drum bottom.
 - Remove the drum to a clean area where it will not come in contact with contaminants to dry.

- When the drum is dry, subcontractor personnel will monitor the drum for radiological contamination.
- If radiological contamination is still present, repeat decontamination as necessary.
- If verified free of radiological contamination by an EG&G RPT, return the drum to the storage area.

6.0 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 SOP.

This section outlines guidelines for specific quality control procedures to monitor the effectiveness of cleaning procedures given in the attachments.

6.1 EQUIPMENT RINSE SAMPLES

The effectiveness of the equipment cleaning procedures is monitored by submitting to the laboratory rinse water for low-level analysis of the parameters of interest. Select different pieces of equipment for this procedure, each time equipment is washed, so that a representative sampling approximately 10 percent of all equipment is obtained over the length of the project. Distilled water is poured over the representative equipment. This water is captured directly into Sample bottles. If a funnel is needed, glass or Teflon® will be used.

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOPS
1.3, Rev. 0
19 of 19
February 18, 1991
ER&WM**

7.0 DOCUMENTATION

A permanent record of the implementation of this standard operating procedure (SOP) will be kept by documenting field observations and data. Observations and data will be recorded with black waterproof ink in a bound weatherproof field notebook with consecutively numbered pages. Documentation of completed decontamination activities should similarly be noted.

EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.4, Rev. 0
1 of 18
February 18, 1991
ER&WM

Safety Related
Category 1

TITLE:
HEAVY EQUIPMENT
DECONTAMINATION

Approved By:

J. W. Langmaier

1.0 TABLE OF CONTENTS

1.0	TABLE OF CONTENTS	1
2.0	PURPOSE AND SCOPE	2
3.0	RESPONSIBILITIES AND QUALIFICATIONS	2
4.0	REFERENCES	3
4.1	SOURCE REFERENCES	3
4.2	INTERNAL REFERENCES	3
5.0	EQUIPMENT REQUIRED	4
5.1	CONTAMINATION REDUCTION IN THE FIELD	4
5.2	MAIN DECONTAMINATION FACILITY	5
6.0	PROCEDURES	7
6.1	INTRODUCTION	7
6.2	CONTAMINATION REDUCTION IN THE FIELD	8
6.2.1	Prework Activities	10
6.3	CONTAMINATION MONITORING	11
6.4	TRANSPORTATION OF CONTAMINATED HEAVY EQUIPMENT	12
6.5	CENTRAL DECONTAMINATION STATION	12
6.5.1	Predecontamination Procedures	13
6.5.2	Decontamination Procedures	14
6.5.3	Post Decontamination Procedures	17
7.0	DOCUMENTATION	18

EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.4, Rev. 0
2 of 18
February 18, 1991
ER&WM

2.0 PURPOSE AND SCOPE

This standard operating procedure (SOP) describes the procedures and equipment that will be used at the Rocky Flats Plant (RFP) to remove contaminants that may accumulate on heavy equipment. This SOP is applicable to all operations conducted as part of the Environmental Restoration Program.

This SOP describes the equipment and procedures required to complete decontamination of heavy equipment.

3.0 RESPONSIBILITIES AND QUALIFICATIONS

EG&G Radiation Protection Technicians (RPT) will perform radiation screening of all personnel and equipment leaving a work area. Screening will be performed in accordance with EG&G Radiological Operation Instruction 3.1 and screening procedures will follow Section 6.3, Contamination Monitoring of this SOP. For radiologically contaminated equipment, radiation screening will be performed following each field decontamination procedure until the equipment is free of radiological contamination or the decision is made to seal the contaminated area and transport the equipment to the central decontamination station. All radiologically contaminated heavy equipment transported to the central decontamination station will be screened by the RPTs following decontamination.

The subcontractor's project manager is responsible for ensuring that appropriate project staff and equipment are assigned to implement field decontamination, transport, and final decontamination of heavy equipment used by that subcontractor. The subcontractor's Site Safety Officer is responsible for performing Volatile Organic Compound (VOC) contamination screening of heavy equipment in accordance with the procedures given in Section 6.3, Contamination Monitoring, of

EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.4, Rev. 0
3 of 18
February 18, 1991
ER&WM

Safety Related
Category 1

this SOP. The subcontractor's Site Safety Officer is also responsible for performing radiological monitoring during contaminant reduction of heavy equipment in the field.

All personnel operating heavy equipment or company vehicles must have appropriate training and licenses.

4.0 REFERENCES

4.1 SOURCE REFERENCES

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

Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities. NIOSH/OSHA/USCG/EPA. October 1985.

Nuclear Weapon Accident Response Procedures (NARP) Manual. The Defense Nuclear Agency. January 1984. Change 1, July 1984.

Standard Operating Safety Guides. EPA. November 1984.

Technical Enforcement Guidance Document (TEGD). EPA. 1986.

4.2 INTERNAL REFERENCES

Related SOPs and EG&G Radiological Operating Instructions (ROI) cross-referenced in these procedures are as follows:

- SOP 1.3, General Equipment Decontamination

Safety Related
Category 1

- SOP 1.7, Handling of Decontamination Water and Washwater
- SOP 1.8, Handling of Drilling Fluids and Cuttings
- SOP 1.10, Receiving, Labeling and Handling Waste Containers
- SOP 3.1, Performance of Surface Contamination Surveys

5.0 EQUIPMENT REQUIRED

5.1 CONTAMINATION REDUCTION IN THE FIELD

At the work site, contamination reduction will be accomplished by using the following items:

- Spatula
- Stiff bristle brushes
- Long-handled shovel
- Plastic sheeting
- Absorbent wipes
- Containers for potentially contaminated media
- A trailer and tow vehicle to transport heavy equipment from work areas known or suspected of containing surficial contamination to a central decontaminating station. Procedures to limit the spread of contamination during transport are provided in Subsection 6.4.

Contamination monitoring will be accomplished using the following instruments:

- Radiation detection equipment
- Organic Vapor Detector (OVD) (Hnu or equivalent)

5.2 MAIN DECONTAMINATION FACILITY

The most effective results will be obtained at a fixed decontamination station with provisions for ensuring that wash and rinse solutions rapidly drain away from the equipment being decontaminated and are containerized. Numerous equipment items and supplies must be furnished from various sources for the Main Decontamination Facility (MDF) to function as intended. The equipment listed below has been divided into two sections "Equipment Provided At The MDF" and "Equipment Provided By MDF Users."

Equipment And Supplies Provided At The MDF

- Drains, pumps, and tanks for the collection and holding of decontamination and rinse solutions
- High pressure steam cleaner and high pressure wash and rinse systems
- Sufficient potable water to be used in the high pressure cleaning systems
- Portable power generator
- Splash curtains
- Wooden pallets
- A back-hoe or equivalent heavy equipment item outfitted with a "drum grappler"
- A two wheeled "dolley" designed to carry 55-gallon drums

**Safety Related
Category 1**

- Overpacks to be used in the event a waste container is dropped or otherwise damaged and starts to spill wastes
- Opaque, water proof sheeting
- Plastic or nylon banding and the equipment necessary to band the sheeting to waste containers
- Long and short-handled stiff bristle brushes
- Wire brushes
- Wash and rinse buckets for equipment interiors
- Premoistened towelettes
- Duct tape or equivalent
- Windsock or equivalent method for decontamination workers to determine the wind direction

Equipment And Supplies Provided By MDF Users

- Personal protective equipment (PPE) as required by the site-specific Health and Safety Plan.
- Waste containers for used PPE, non-reusable items required to complete decontamination, and soils dislodged during decontamination.

- An OVD to screen equipment and waste containers for an estimate of the effectiveness of decontamination efforts.
- Radiation detection equipment.
- Wash and rinse buckets necessary to establish a personal decontamination line identical to the one used at the work-site that resulted in contamination of the items being decontaminated.
- Any equipment of task-specific decontamination fluids required by a SOP of SOPA but that are not listed as being available at the MDF.
- Blank waste container labels to replace any completed labels that become dislodged or rendered unledgible during the decontamination process.
- In addition, MDF users are responsible for arranging to have an RPT present if required.

6.0 PROCEDURES

6.1 INTRODUCTION

Heavy equipment may become contaminated when used in an activity area characterized by EG&G as an Individual Hazardous Substance Site (IHSS). Heavy equipment used in an activity area characterized as uncontaminated but where environmental monitoring conducted as the work progresses indicates the presence of contamination may also become contaminated. Since such contamination is not always easily discernible, it is necessary to assume that all equipment working within an operable unit, where the presence of such substances are known or suspected, has been

**EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS**

**Safety Related
Category 1**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.4, Rev. 0
8 of 18
February 18, 1991
ER&WM**

contaminated. Effective decontamination procedures are implemented to minimize the potential for cross-contamination, offsite contaminant migration, and personnel exposure from improperly decontaminated equipment.

Heavy equipment used in an activity area characterized by EG&G as uncontaminated and where environmental monitoring conducted as the work progresses does not indicate the presence of contamination may be washed at a central decontamination station. Procedures established in Section 6.0 are not applicable, but Form 1.4A, Heavy Equipment Decontamination/Wash Checklist and Record, Sections I, II and III (Attachment 1), shall be completed.

Pework characterizations of activity areas will be based upon a review of analytical results from previous surface monitoring, nearby soil borings, and nearby monitoring well water.

6.2 CONTAMINATION REDUCTION IN THE FIELD

Although the most effective decontamination will generally be accomplished at a dedicated decontamination station, it is always desirable to accomplish a reduction in overall contamination in the field prior to moving equipment to a dedicated decontamination station. The goal of contamination reduction is to limit contaminant migration from the exclusion zone. Contamination reduction will occur near the work site within the exclusion zone.

Contamination reduction is accomplished by scraping, brushing, or otherwise removing as much obvious accumulation of the potentially contaminated media as possible. After the potentially contaminated media has been removed, monitoring will be accomplished by the subcontractor's Site Safety Officer. The subcontractor's Site Safety Officer will use procedures established in EG&G Radiological Operation Instructions (ROI) 3.1, Performance of Surface Contamination Surveys, to conduct radiation monitoring during contamination reduction activities in the field. Sections 10.3 and 10.4 of the referenced ROI relate specifically to conducting monitoring of potentially

EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS

Safety Related
Category 1

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.4, Rev. 0
9 of 18
February 18, 1991
ER&WM

contaminated heavy equipment during contamination reduction activities in the field. If monitoring indicated the presence of contamination, the contaminated areas will be wiped with heavy-duty premoistened towelettes (i.e., baby wipes) if doing so may reduce contamination. Following wipe down with the premoistened towelettes, the area will be remonitored. The preceding sequence of actions will be repeated until monitoring indicates that no further reduction in contamination is occurring. The contaminated area will then be sealed as described in Subsection 6.4. and the type, amount, and location of contamination recorded on Form 1.4A. The completed Form 1.4A will accompany the equipment and be provided to the individual responsible for completing decontamination at the main decontamination facility.

In the event disposal equipment is not available and equipment must be re-used immediately; as in the case of continuous samplers core butes, etc., a field decontamination may be set up outside the exclusion zone. A field decontamination will including the following procedures:

- Scrape gross contamination from equipment while in the exclusion zone.
- Remove the item to be decontaminated from the exclusion zone and wash in a laboratory grade detergent and tap water. A brush may be used for residual particulates.
- Rinse the item in tap water.
- Triple rinse the item in tap water.
- Equipment may now either be wrapped in plastic to prevent cross-contamination or be reused immediately.

Substances removed during the contamination reduction process shall be handled as described in SOP 1.7, Handling of Decontamination Water and Wash Water, SOP 1.8, Handling of Drilling Fluids and Cuttings, and SOP 1.10 Receiving, Labeling and Handling Waste Containers.

6.2.1 Prework Activities

Limiting the amount of surfaces exposed to potential contamination is an effective method of reducing contamination. The following steps will be taken each time heavy equipment is to be used in any manner that has potential for resulting in the equipment becoming contaminated.

Once an item of heavy equipment has been taken into a potentially contaminated area, it will not normally be removed from the work area until all work that requires the presence of the equipment has been completed. Therefore care should be taken to ensure that fuel, oil, hydraulic fluid, and lubricant reservoirs are filled prior to entering the work area. For example, if "X" amount of monitoring wells are to be constructed within a given work area, then the drill rig being used will not leave the area until all drilling has been completed. Of course, augers and other like items will have to be decontaminated between bore holes. In order to reduce the potential for contamination of internal operating parts, heavy equipment will be removed from potentially contaminated areas and decontaminated if it becomes necessary to perform any maintenance on the equipment that may result in contamination of internal operating parts.

If an enclosed cab is present, it will be lined with plastic sheeting. As a minimum, the seat(s) and floor will be covered, and the sheeting secured in such a manner that it will not become dislodged during routine use.

After arriving at a work site, any compartments, tool boxes, and enclosed caps shall be sealed by closing the doors and windows when such fixtures are present and sealing the seams around such fixtures with tape.

**EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS**

**Safety Related
Category 1**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.4, Rev. 0
11 of 18
February 18, 1991
ER&WM**

When at the work site, any fuel, oil, or hydraulic fluid fill ports and air cleaners will be sealed in a manner that blocks the entrance of dusts that may be radiologically contaminated unless to do so would disable a power system required to complete the field work.

6.3 CONTAMINATION MONITORING

Monitoring for potential VOC contamination and potential radiological contamination will be conducted on all heavy equipment used inside areas described in the first paragraph of Section 6.1.

EG&G RPTs will screen all equipment and personnel leaving the work area to ensure that no radioactively contaminated materials leave the project area. The RPT will use procedures established in EG&G Radiological Operation Instruction (ROI) 3.1, Performance of Surface Contamination Surveys.

The subcontractor's health and safety representative assigned to the field team will monitor all personnel and equipment to ensure that no materials grossly contaminated with VOCs leave the area.

Special attention shall be devoted to tires, tracks, and any other surfaces that have been in direct contact with the environmental media being investigated or that have been in direct contact with other items of equipment or personnel that have been in direct contact with the environmental media being investigated. Special attention shall also be devoted to any surfaces where accumulations of the environmental media being investigated exist.

6.4 TRANSPORTATION OF CONTAMINATED HEAVY EQUIPMENT

A trailer will be required to transport equipment to a central decontamination station if contamination monitoring indicates contamination on surfaces such as tires or tracks or any other item which may contact the ground or become dislodged when the equipment is moved. Any trailer used to transport heavy equipment to a central decontamination station will be decontaminated and the effectiveness of decontamination verified in the same manner as the equipment it was used to transport.

Following field contamination reduction, equipment surface areas remaining contaminated shall be covered with plastic sheeting prior to the equipment departing the exclusion zone. Edges of the sheeting will be held in place by duct tape or a similar type tape.

Contaminated heavy equipment will not be moved at speeds greater than 5 miles per hour. Heavy equipment will not be transported over paved roads during the hours of peak traffic flow, such as the beginning or end of the work day.

6.5 CENTRAL DECONTAMINATION STATION

The central decontamination station is located adjacent to and south of the 903 Pad. Information regarding the configuration, operation, and maintenance of the central decontamination station has been prepared and may be found in SOP 1.12, Decontamination Facility Operations. The following procedures are presented in the chronological order in which they should normally occur:

6.5.1 Predecontamination Procedures

- Review Form 1.4A, Heavy Equipment Decontamination Checklist and Record to determine the level of PPE required by the applicable site-specific health and safety plan and the correct decontamination procedure.
- Establish a personnel decontamination line as described in the applicable site-specific health and safety plan.
- Personal protective equipment (PPE) will be used as required in the applicable Health and Safety Plan.
- Upon arrival at the MDF, the equipment to be decontaminated and any accompanying waste containers will be set on the ground at locations that will permit one item or group of similar items at a time to be placed within the screened-in portion of the MDF.
- If radiological monitoring during the contamination reduction process documented the suspected presence of radioactive substances that could not be removed during the contamination reduction process, arrangements will be made for an EG&G RPT to verify the effectiveness of decontamination.
- Areas that have been sealed against exposure to the environment as required by this SOP, (due to the suspected presence of contamination that could not be removed during the contamination reduction process at the work area) will be clearly marked so that the area can be identified and monitored.
- Surfaces suspected of having tightly bound contamination that could not be removed during the contamination reduction process will be decontaminated first. Procedures specified in

this SOP will be followed. The MDF user will use an OVD or radiation monitor as appropriate to screen the surfaces suspected of having had tightly bound contamination. If the screening indicates the contamination has been removed, the equipment will be moved out of the MDF and returned to service only if the type of contamination that had previously been suspected was organic contamination. If the presence of radioactive contamination was suspected, the equipment will be moved out of the MDF, parked nearby, and held out of service until verification of decontamination as described in Subsection 6.4.1, Verification of Decontamination, has occurred.

- Verification of effectiveness of decontamination is not required for heavy equipment surfaces that were found to be contaminate free by monitoring at the work area conducted as part of the contamination reduction process.

6.5.2 Decontamination Procedures

- Enclosed cabs
 - Remove plastic lining/covers and dispose as contaminated waste.
 - Wipe down interior surfaces.
 - Use a brush to apply a detergent and water solution to the floor.
 - A low-pressure water hose should be used to flush the detergent and water solution from the cab.
 - Seal the cab by closing doors, windows, and vents.

- **Engine compartments**
 - Although engines should not normally become contaminated, the engine area will be visually inspected for signs (e.g., mud splashes) of potential contamination.
 - Any dry air filters servicing equipment used in a solid waste management unit will be removed and handled as radiologically contaminated waste.
 - If there are not any signs of contamination, the compartment should be left as is and sealed during decontamination of exterior surfaces.
 - If there appears to be contamination present, someone familiar with the engine will employ the procedures for decontaminating exterior surfaces while avoiding damage to moisture-sensitive engine components. Moisture-sensitive components may be covered with plastic during engine decontamination. The components will then be hand wiped with disposable moistened towels, following general engine decontamination.
 - Following engine decontamination, the engine compartment should be sealed during decontamination of exterior surfaces.
- **Exterior surfaces including trailers used to transport equipment to the decontamination station**
 - Inspect equipment and trailers for obvious accumulation of contaminated media that can be easily dislodged by physical means (see Subsection 6.2, Contamination Reduction in the Field).

**Safety Related
Category 1**

- Use a pressurized detergent and water solution, followed by a pressurized potable water rinse.
- Stand upwind/crosswind of the surface being decontaminated. If necessary the equipment will be reoriented inside the decontamination station to allow an upwind or crosswind position, or hand brushing will be used to complete decontamination.
- Start at the uppermost surface and work downward including the underside of the equipment.
- Pay particular attention to areas such as tires that came into contact with a potentially contaminated media and areas that show visual signs of contamination such as mud splashes on the inside of fenders or accumulations of water in a bed.
- Move the equipment and decontaminate the equipment surfaces that have been in contact with the decontamination station floor.
- Arrange for an EG&G RPT to conduct a smear test as described in ROI 3.1, Performance to Surface Contamination Surveys, to verify removal of radiological contamination if such contamination had been noted on the Form 1.4A when the equipment arrived. Repeat the decontamination procedures for exterior surfaces if radiological contamination is found and then repeat the monitoring. If contamination is still present after completing the second decontamination procedure, contact the appropriate EG&G Construction Manager.

- **Equipment**

- Items which come into direct contact with environmental samples collected for laboratory analysis will be decontaminated as described in SOP 1.3, General Equipment Decontamination. Examples of such items are sample containers.
- Equipment used inside contaminated activity areas but that do not directly contact samples will be decontaminated by a pressurized detergent and water solution followed by a pressurized potable water rinse. Examples of such items include augers, drilling rods, and any hand tools used during drilling. Decontamination will be verified as described in Subsection 6.4.3, Post Decontamination Procedures.

6.5.3 Post Decontamination Procedures

- Equipment surfaces that could not be decontaminated in the field during contamination reduction activities will undergo verification of decontamination at the MDF. Verification of organic decontamination will be accomplished with an OVD by the MDF user responsible for decontaminating the equipment. Verification of radiological decontamination will be accomplished by an EG&G RPT using the instruments and techniques specified in ROI 3.1, Performance of Surface Contamination Surveys.
- Decontaminate brushes and other reusable items of decontamination equipment as described in SOP 1.3, General Equipment Decontamination.
- Complete personal decontamination as described in the applicable site-specific health and safety plan.
- Document decontamination using Form 1.4A, Heavy Equipment Decontamination Record.

EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.4, Rev. 0
18 of 18
February 18, 1991
ER&WM

Safety Related
Category 1

- SOP 1.7, Handling of Decontamination Washwater, provides pertinent guidance which should be followed.

7.0 DOCUMENTATION

Form 1.4A, Heavy Equipment Decontamination Record, shall be used to document information required by this SOP. Completed forms will be maintained as part of the project files. Sections I and II of the form will be completed by the person delivering heavy equipment for decontamination. Sections III, IV, and V will be completed by the person conducting the decontamination operation.

III. Actions At Central Decontamination Station

- | | | |
|-----|-----|---|
| Yes | No | |
| ___ | ___ | The equipment was washed under the provisions of SOP No. 1.4, Heavy Equipment Decontamination, Subsection 6.1. |
| ___ | ___ | Personnel Decontamination Station established as described in the applicable site-specific health and safety plan. |
| ___ | ___ | Personal protective equipment (PPE) selected based upon results of radiological monitoring. |
| ___ | ___ | Specify PPE level utilized: ___ Level B ___ Level C ___ Level D |
| ___ | ___ | PPE inspected prior to donning. |
| ___ | ___ | Wind direction checked prior to using pressurized spray (circle the direction the wind was blowing from).
N NE E SE S SW W NW |
| ___ | ___ | Enclosed cab present and decontaminated. |
| ___ | ___ | Engine compartment inspected and decontaminated as required. |
| ___ | ___ | Were decontamination and rinse operations started at the uppermost surfaces? |
| ___ | ___ | Was particular attention devoted to areas such as tires that contacted a potentially contaminated medium and to areas identified as having a measurable level of alpha radiation? |
| ___ | ___ | Was the equipment moved to decontaminate surfaces that had been in contact with the decontamination station floor? |
| ___ | ___ | Was equipment used to decontaminate the heavy equipment decontaminated as described in SOP 1.3, General Equipment Decontamination? |
| ___ | ___ | Was personal decontamination completed as described in the applicable site-specific health and safety plan? |

IV. Equipment Monitoring to Verify Removal of Contamination

Name of EG&G RPT conducting smear test as described in ROI 3.1, Performance of Surface Contamination Surveys. _____
(Name) (Date) (Phone No.)

Results of smear test. _____

Name of person conducting VOC monitoring. _____
(Name) (Date) (Phone No.) (Subcontractor's Name)

Results of VOC monitoring. _____

V. Follow-up Decontamination

- Not Required
- Required for the following area/surfaces

Results of follow-up smear test _____

- Decontamination completed
- Decontamination incomplete and EG&G Construction Manager notified
(_____)
Name Date Phone No.

EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.5, Rev. 0
1 of 9
February 18, 1991
ER&WM

Safety Related
Category 1

TITLE:
HANDLING OF PURGE AND
DEVELOPMENT WATER

Approved By:

J. W. Langford

1.0 TABLE OF CONTENTS

1.0	TABLE OF CONTENTS	1
2.0	PURPOSE AND SCOPE	2
3.0	RESPONSIBILITIES AND QUALIFICATIONS	2
4.0	REFERENCES	3
4.1	SOURCE REFERENCES	3
4.2	INTERNAL REFERENCES	3
5.0	EQUIPMENT	4
5.1	EQUIPMENT NEEDED TO HANDLE PURGE AND DEVELOPMENT WATER	4
6.0	HANDLING OF PURGE AND DEVELOPMENT WATER	5
6.1	UNCONTAMINATED ACTIVITY AREAS	6
6.2	CONTAMINATED ACTIVITY AREAS	7
7.0	DECONTAMINATION	8
8.0	DOCUMENTATION	8
8.1	DRUM FIELD LOG FORM	8

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.5, Rev. 0
2 of 9
February 18, 1991
ER&WM**

2.0 PURPOSE AND SCOPE

This standard operating procedure (SOP) describes the procedures that will be used for containing, transporting, and emptying wastewater generated during well development at the Rocky Flats Plant (RFP).

3.0 RESPONSIBILITIES AND QUALIFICATIONS

Personnel using light or heavy equipment, scientific monitoring devices, or operating company vehicles must have appropriate training or licenses.

The subcontractor's site manager is responsible for coordinating the removal and transfer of all wastes from the project work area.

The subcontractor is also responsible for the transportation of liquid waste suspected of containing radioactive and/or hazardous substances to holding tanks located at the central EG&G decontamination facility.

It is the subcontractor's site manager's responsibility to report as soon as possible to the EG&G project manager or a designated EG&G representative any damage incurred to a drum. Types of damage include holes, damage to the lid seal, or any other problem that may compromise drum integrity. Damaged drums must have their contents transferred to an undamaged drum or be overpacked.

The subcontractor's site manager will assign personnel to conduct monthly inspection of all the drums issued to the subcontractor until relinquished to EG&G. These inspections will ensure that drum integrity is maintained.

EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.5, Rev. 0
3 of 9
February 18, 1991
ER&WM

Safety Related
Category 1

EG&G's Radiation Protection Technicians (RPTs) are responsible for conducting radiation screenings of equipment, samples, and personnel before they leave the work area.

EG&G's Waste Operations personnel are responsible for the collection, transport, storage, treatment, and disposal of solid and liquid wastes from the drum transfer area at the main decontamination facility.

4.0 REFERENCES

4.1 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.

RCRA Facility Investigation Guidance. Interim Final. May 1989.

Rockwell International. Policies: Rocky Flats Plant. Use and Color Coding of Drums. RFPM MAT 20-005. November 3, 1989.

4.2 INTERNAL REFERENCES

Related SOPs cross-referenced in this SOP are:

- SOP 1.3, General Equipment Decontamination
- SOP 1.7, Handling of Decontamination Water and Wash Water
- SOP 1.8, Handling of Drilling Fluids and Cuttings
- SOP 1.10, Receiving, Labeling, and Handling Waste Containers

- SOP 1.12, Decontamination Facility Operations
- SOP 1.15, Use of PIDs and FIDs
- SOP 1.16, Field Radiological Measurements

5.0 EQUIPMENT

5.1 EQUIPMENT NEEDED TO HANDLE PURGE AND DEVELOPMENT WATER

The following is a list of equipment needed for the proper handling of purge and development water:

- 55-gallon, open top (removable top), gray drums or liquid containers appropriately sized for the task
- Hand, electric, or gas powered pumps
- An organic vapor detector (OVD)
- A field radiation monitor
- Shovel (scoop type)
- Clear plastic sheeting for placing around the well head to prevent cross contamination of the surface
- Splash protective and personal protective equipment as required by the site-specific Health and Safety Plan

- Department of Transportation "Other Regulated Materials Class E" (ORM-E) stickers

6.0 HANDLING OF PURGE AND DEVELOPMENT WATER

Water used during the development of an environmental monitoring well is considered purge and development water. Monitoring well development is the process by which the drilling fluids and mobile particulates are removed from within and adjacent to newly installed wells. This process can also be used to remove sediment or other built-up materials from older wells.

Each project work area will be characterized by EG&G prior to any field activity. Work area characterizations will be based on the historical background of the work area and include the chemical results of previous soil and groundwater analyses and the results of field radiological surveys conducted by EG&G RPTs. Work areas associated with the Environmental Restoration (ER) program field operations fall into two characterizations: potentially contaminated and not potentially contaminated. Work areas currently characterized as potentially contaminated include the following:

- Individual Hazardous Substance Sites (IHSSs)
- Identified Groundwater Plume Areas
- Americium Zone at OU No. 2
- Surface water and sediment sampling stations that have not been verified as background locations

See SOP 1.10, Receiving, Labeling, and Handling Waste Containers for specific work areas currently characterized as potentially contaminated.

Wastes generated during ER field operations will be handled depending on the work area characterization and the results of field monitoring performed during intrusive activities. Liquid wastes suspected of containing radioactive and/or nonradioactive RCRA-regulated hazardous (hazardous) substances will be transported to holding tanks located at the main decontamination facility (see SOP 1.12, Decontamination Facility Operations). The use of field monitors, including an OVD and radiation monitor, for the detection of volatile organics and radionuclides is discussed in SOPs Nos. 1.8, Handling of Drilling Fluids and Cuttings; 1.15, Use of Photoionizing Detectors and Flame Ionizing Detectors; and 1.16, Field Radiological Instruments.

The types of contamination which may be encountered within potentially contaminated work areas include the following:

- Low-level radioactively contaminated substances
- Nonradioactive RCRA-regulated hazardous (hazardous) substances
- Mixed (low-level radioactive and hazardous substances)

6.1 NOT POTENTIALLY CONTAMINATED WORK AREAS

In work areas characterized as not potentially contaminated and where no verified measurements above background were detected on the OVD or radiation monitor, the purge and development water will be disposed of on the ground, approximately 50 feet from the well, and at least 200 feet from any stream drainage.

In work areas characterized not potentially contaminated where verified measurements from field monitoring indicate the presence of previously unsuspected contaminant classes, the purge and development water will be temporarily stored in 55-gallon, open top, gray drums or appropriately sized containers. Liquid containers will be marked with an ORM-E sticker and the words "NONPOTABLE" as described in SOP 1.10, Receiving, Labeling, and Handling Waste Containers.

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.5, Rev. 0
7 of 9
February 18, 1991
ER&WM**

**Safety Related
Category 1**

The liquid containers suspected of containing radioactive and/or hazardous substances will be transported to EG&G's main decontamination facility by the subcontractor. The decontamination facility will have an area specifically designed for liquid wastes. The liquid waste area includes a process for separating solids from the liquids. The subcontractor will empty the entire container's contents into this liquid waste area. (See SOP 1.12, Decontamination Facility Operations, for details pertaining to the liquid waste area.)

The liquid containers will be decontaminated between each use. If gray drums are used, pertinent information regarding the use of gray drums will be documented on the Drum Field Log Form (Form 1.10A, see Section 8.0 - Documentation).

6.2 POTENTIALLY CONTAMINATED WORK AREAS

In work areas characterized as potentially contaminated, the purge and development water will be contained in the 55-gallon, open top, gray drums or appropriately sized containers only if field monitoring measurements above background are detected. If no readings above background are encountered on field monitors, the purge and development water will be disposed of on the ground, approximately 50 feet from the well, and at least 200 feet from any stream drainage.

If verified positive readings above background are detected on field monitors, the subcontractor will transport the liquid wastes to EG&G's main decontamination facility and empty the wastes in the designated liquid waste area. Field personnel should decant the liquid waste from one drum (or container) to another (or from a trough to a drum or transfer container) prior to transporting if the amount of sludge or sediment within the liquid waste is substantial. The residual sediment will be drummed according to field monitoring results.

Containers used for transporting liquid wastes suspected of containing radioactive and/or hazardous substances will be marked with an ORM-E sticker and the word "NONPOTABLE" as described in SOP 1.10, Receiving, Labeling, and Handling Waste Containers.

The drums containing residual sediment will be brought to the drum transfer area at the main decontamination facility and transferred to the custody of EG&G Waste Operations personnel.

Liquid waste containers will be decontaminated between each use.

7.0 DECONTAMINATION

Equipment used for the development of a monitoring well will be decontaminated according to SOP No. 1.3, General Equipment Decontamination if positive readings above background were detected during field monitoring.

In work areas where no verified detections were encountered during field monitoring, the equipment used will be power sprayed and rinsed.

Decontamination and wash water will be disposed according to SOP 1.7, Handling of Decontamination Water and Wash Water.

8.0 DOCUMENTATION

8.1 DRUM FIELD LOG FORM

A Drum Field Log Form (Form 1.10A) will be kept on each gray drum used to transport liquid wastes suspected of containing radioactive and/or hazardous substances. The Drum Field Log

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.5, Rev. 0
9 of 9
February 18, 1991
ER&WM**

**Safety Related
Category 1**

Form will be used as a "cradle to grave" record. The following information will be documented on the form:

- Drum ID Number
- Date of issuance
- Location in field
- Contents
- Fill date
- Date of decontamination and location
- Date returned to EG&G

Entries made on the Drum Field Log Form may be supported with entries in a field logbook.

NAME OF THE SUBCONTRACTOR
DRUM ID NUMBER WITH SUBCONTRACTOR'S ID.....

LOCATION AND DATE OF ISSUANCE

LOC

DATE

NAME AND LOCATION OF FIELD ACTIVITY

NAME

LOC

ASSOCIATED WELL, BORING, OR SAMPLING

LOCATION

NAME

CONTENTS OF DRUM

SUBSURFACE INTERVALS (IF SOILS)

BAG #S (IF PPE)

ASSOCIATED SAMPLE ID #S

DATE DRUM WAS FILLED

IF SOLID WASTE

LOCATION OF TEMPORARY STORAGE AREA

DATE DRUM RETURNED TO EG&G

SIGNITURE OF EG&G REPRESENTATIVE

IF LIQUID WASTE

DATE AND LOCATION WHERE CONTENTS WERE

EMPTIED AND DECONNED

DATE

LOC

(EXAMPLE: 2/18/91 DECON PAD #____)

EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.6, Rev. 0
1 of 13
February 18, 1991
ER&WM

Safety Related
Category 1

TITLE:
HANDLING OF PERSONAL PROTECTIVE
EQUIPMENT

Approved By:

J. W. Langford

1.0	TABLE OF CONTENTS	
1.0	TABLE OF CONTENTS	1
2.0	PURPOSE AND SCOPE	2
3.0	RESPONSIBILITIES AND QUALIFICATIONS	2
4.0	REFERENCES	3
4.1	SOURCE REFERENCES	3
4.2	INTERNAL REFERENCES	3
5.0	EQUIPMENT	4
6.0	PROCEDURES FOR HANDLING OF PERSONAL PROTECTIVE EQUIPMENT	5
6.1	PERSONAL PROTECTIVE EQUIPMENT	6
6.2	HANDLING OF PPE IN WORK AREAS CHARACTERIZED AS POTENTIALLY CONTAMINATED	7
6.2.1	Temporary Sampling Sites	7
6.2.2	Fixed Sample Sites for Site-Wide Programs	10
6.3	HANDLING OF PPE IN WORK AREAS CHARACTERIZED AS NOT POTENTIALLY CONTAMINATED	11
6.4	DECISION DIAGRAM	11
7.0	DOCUMENTATION	12

LIST OF FIGURES

FIGURE 1.6-1	DECISION DIAGRAM FOR DISPOSAL OF PERSONAL PROTECTIVE EQUIPMENT	9
--------------	---	---

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.6, Rev. 0
2 of 13
February 18, 1991
ER&WM**

**Safety Related
Category 1**

2.0 PURPOSE AND SCOPE

The waste generated from environmental restoration (ER) field activities will be handled in accordance with the Rocky Flats Plant (RFP) waste management program. This standard operating procedure (SOP) describes procedures that will be used by subcontractors at RFP to receive, label, and handle containers containing waste personal protective equipment (PPE) until they are returned to EG&G.

These procedures are intended to be sufficiently detailed so that conformance with them will result in reliable handling and management of PPE used in ER field activities.

3.0 RESPONSIBILITIES AND QUALIFICATIONS

Personnel using light or heavy equipment, scientific monitoring devices, or operating company vehicles must have appropriate training or licenses.

The subcontractor's site manager is responsible for coordinating the removal and transfer of all wastes from the project work area.

The subcontractor is responsible for the drumming and transfer of solid waste suspected of containing radioactive and/or hazardous substances to the drum transfer area at the main decontamination facility for transfer to EG&G Waste Operations personnel.

The subcontractor is also responsible for the transportation of liquid waste suspected of containing radioactive and/or hazardous substances to holding tanks located at the main EG&G decontamination facility.

It is the subcontractor's site manager's responsibility to report as soon as possible to the EG&G project manager or a designated EG&G representative any damage incurred to a drum. Types of damage

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.6, Rev. 0
3 of 13
February 18, 1991
ER&WM**

**Safety Related
Category 1**

include holes, damage to the lid seal, or any other problem that may compromise drum integrity. Damaged drums must have their contents transferred to an undamaged drum or be overpacked.

The subcontractor's site manager will assign personnel to conduct monthly inspections of all the drums issued to the subcontractor until relinquished to EG&G. These inspections will ensure that drum integrity is maintained.

EG&G's Radiation Protection Technicians (RPTs) are responsible for conducting radiation screenings of equipment, samples, and personnel before they leave potentially contaminated work areas.

EG&G's Waste Operations personnel are responsible for the collection, transport, storage, treatment, and disposal of solid and liquid wastes from the drum transfer area at the main decontamination facility.

4.0 REFERENCES

4.1 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.

Rockwell International. Policies: Rocky Flats Plant, Use and Color Coding of Drums. RFPM MAT 20-005. November 3, 1989.

4.2 INTERNAL REFERENCES

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

- SOP 1.10, Receiving, Labeling, and Handling Waste Containers
- SOP 1.2, Field Documentation
- SOP 1.8, Handling of Drilling Fluids and Cuttings
- SOP 1.12, Decontamination Facility Operations
- SOP 1.15, Use of Photoionizing Detectors and Flame Ionizing Detectors
- SOP 1.16, Field Radiological Measurements

5.0 EQUIPMENT

The following items will be required during most operations that generate potentially contaminated PPE.

- Appropriate 55-gallon drums as described in SOP 1.10, Receiving, Labeling, and Handling Waste Containers
- Paint stick for marking drums
- Tools for opening and sealing open-top 55-gallon drums with a clamp-type sealing band
- Pallets or other method of ensuring that drums do not rest on the ground surface
- Opaque, weather-proof sheeting
- Plastic/nylon banding to secure plastic sheeting on the drums

6.0 PROCEDURES FOR HANDLING OF PERSONAL PROTECTIVE EQUIPMENT

Each project work area will be characterized by EG&G prior to any field activity. Work area characterizations will be based on the historical background of the work area and include the chemical results of previous soil and groundwater analyses and the results of field radiological surveys conducted by EG&G Radiation Protection Technicians (RPTs). Work areas associated with the ER program field operations fall into two characterizations: potentially contaminated and not potentially contaminated. Work areas currently characterized as potentially contaminated include the following:

- Individual Hazardous Substance Sites (IHSSs)
- Identified Groundwater Plume Areas
- Americium Zone at OU No. 2
- Surface water and sediment sampling stations which have not been verified as background locations

Other potentially contaminated work areas where groundwater plumes have been identified will be specified in the applicable work plans, as appropriate. SOP 1.10, Receiving, Labeling, and Handling Waste Containers, lists the IHSS work areas at RFP and illustrates the identified groundwater plume areas and the americium area at OU No. 2. It also lists the surface water and sediment stations that have been verified as background stations as of December 1990. Other surface and sediment sampling stations will be added to this list as they become verified as background stations. Unless specified in the individual project work plans, all other work areas will be considered potentially contaminated.

PPE generated during ER field operations will be handled depending on the work area characterization and the results of field monitoring performed during intrusive activities. The color of the drum used and disposal procedure will depend on the results of field monitoring and the work area characterization. The use of field monitors for the detection of volatile organics and low-level

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.6, Rev. 0
6 of 13
February 18, 1991
ER&WM**

**Safety Related
Category 1**

radioactively contaminated substances is discussed in SOP 1.15, Use of Photoionization Detectors and Flame Ionization Detectors; and SOP 1.16, Field Radiological Instruments.

The subcontractor's site manager is responsible for implementing waste management procedures established by this SOP and procedures referenced in this SOP.

These duties include:

- Consulting with the EG&G ER project manager to resolve any questions concerning the characterization of a work area
- Arranging for the pick up of gray, white, and white/black drums
- Ensuring that potentially contaminated PPE is not commingled in a drum with solid wastes
- Ensuring all documentation and drum markings are completed properly and that a "cradle-to-grave" system of drum tracking is maintained (see SOP 1.10, Receiving, Labeling, and Handling Waste Containers)
- Conducting monthly inspections of all drums issued to the subcontractor
- Arranging for the transfer of drums to EG&G

6.1 PERSONAL PROTECTIVE EQUIPMENT

PPE is generally defined as clothing or equipment required to be worn by the site-specific Health and Safety Plan (HSP) in order to limit worker's exposure to physical, chemical or radiological health

hazards. Any questions regarding whether a given item is considered to be PPE for the purposes of waste disposal should be directed to the site safety officer.

Potentially contaminated PPE is any PPE used in a work area characterized as potentially contaminated or PPE used in a work area characterized as not contaminated but where a verified positive reading was encountered on either the OVD or field radiation monitor during intrusive activities.

In general, the site-specific HSP will describe the PPE to be worn, as well as methods of decontaminating disposable and reusable PPE, such as respirators. In general, garbage cans with plastic liners are prescribed for use in the personal decontamination line to contain discarded PPE. This SOP provides procedures for handling and disposing of disposable PPE.

6.2 HANDLING OF PPE IN WORK AREAS CHARACTERIZED AS POTENTIALLY CONTAMINATED

6.2.1 Temporary Sampling Sites

PPE used at temporary sampling sites in work areas characterized as potentially contaminated will be considered potentially contaminated. Workers will establish a personal decontamination line in accordance with the site-specific HSP and will place their PPE in containers while going through the decontamination line.

The following procedures will be used to handle potentially contaminated PPE from containers used in a personal decontamination line.

- If respiratory protection was required during the field activity, the last person through the decontamination line will continue to wear the respiratory protection until removal is indicated in these procedures.

- The last person will process through the decontamination line just as the preceding workers.
- After all PPE items have been removed and placed in the waste container, the container can be processed.
- The last worker will don a fresh pair of gloves before handling the plastic bags containing PPE at the last decontamination station. He will then remove the plastic bags containing the discarded PPE from the container, compress the bags in a downwind direction, seal the compressed bags with duct tape, and return the bags to the container from which they were taken.
- While still wearing the respirator and the fresh pair of gloves, the worker will remove the sealed plastic bags containing PPE from the containers along the decontamination line.
- Where possible, the individual bags of PPE will be combined in a single plastic bag, sealed with duct tape, and marked with a waterproof marker. If it is not possible to combine individual bags into a single bag, each individual bag will be sealed and marked.
- Marking for plastic bags will include the characters "PPE"; the I.D. number of the waste drum in which it will be stored; the associated well, boring, or sampling number and location; and the date.
- The waste bags will be placed in a designated 55-gallon, color-coded drum in accordance with the decision diagram, Figure 1.6-1 and SOP 1.10, Receiving, Labeling, and Handling Waste Containers.

- In no instance will an unmarked bag be placed in a drum.
- The respirator may be removed after all PPE waste bags have been placed in appropriate drums. The respirator cartridges and gloves will also be removed and placed inside an appropriate drum.
- Partially filled drums will be marked and taken to the temporary staging area at the drum transfer area.
- Filled drums will be taken to the drum transfer area.
- For temporary sampling sites within an IHSS, the drum staging area will be centrally located within the unit.

6.2.2 Fixed Sample Sites for Site-Wide Programs

Procedures described in Subsection 5.2.1 for PPE removal, bagging, and marking will be followed to handle potentially contaminated PPE used in work areas characterized as potentially contaminated.

Procedures for staging the bags of potentially contaminated PPE are as follows:

- Seal and mark bags of PPE and transport bags to the EG&G main decontamination facility.
- Drums will be filled to a minimum capacity of 90 percent prior to transfer.

- The bags of PPE will be placed in the appropriately color-coded 55-gallon drum according to decision diagram, Figure 1.6-1, and marked as described in SOP 1.10, Receiving, Labeling, and Handling Waste Containers.

6.3 HANDLING OF PPE IN WORK AREAS CHARACTERIZED AS NOT POTENTIALLY CONTAMINATED

PPE will be considered uncontaminated if it was used in a work area characterized as not potentially contaminated and field monitoring did not indicate the presence of potential contamination.

Disposable PPE will normally be handled as ordinary waste. Disposable PPE and uncontaminated miscellaneous solid wastes will be placed in garbage cans lined with plastic bags at the work area. Marking is not required for bags of uncontaminated disposable PPE or bags of uncontaminated miscellaneous solid wastes. When full, these plastic bags will be transferred to EG&G's custody at designated locations within the subcontractor's work areas.

The procedures for handling potentially contaminated PPE will be followed if either verified positive field organic vapor monitoring or field radiation detection monitoring indicate potential contamination (see Subsection 5.2) and decision diagram Figure 1.6-1.

6.4 DECISION DIAGRAM

A detailed Decision Diagram, which includes the proper color coding of drums to be used, is included in this SOP. The chart is based upon EG&G containment classifications of low-level radioactively contaminated substances, non-radioactive RCRA-hazardous substances, and a mixture of low-level radioactive and hazardous substances (mixed) that may be in work area. The contaminant classifications are based upon historical data of the work area. Verified positive field monitoring will be used to

EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.6, Rev. 0
12 of 13
February 18, 1991
ER&WM

Safety Related
Category 1

augment the contaminant classification data and ensure that substances are contained in the appropriate color-coded drum as described in SOP 1.10, Receiving, Labeling, and Handling Waste Containers.

7.0 DOCUMENTATION

A permanent record of the implementation of this SOP will be kept by documenting field observations and data. Observations and data will be recorded on drum field log forms. It is important to annotate on the drum field log form all of the sample locations and sample numbers of the activities for which these PPE were worn. This information should be included in the space for intervals on the drum field log form. Subcontracting personnel may also choose to document the observations and data in a personal field notebook in addition to the field log forms. If a field book is used, entries should be made with a black waterproof ink pen. The field notebook should be waterproofed and have consecutively numbered pages.

It is recommended that the subcontractor bring duplicate copies of the completed Drum Field Log Form when transferring custody of waste drums to EG&G personnel. Both copies should be signed by the receiving EG&G representative. EG&G Waste Operations will retain one signed copy and the subcontractor will retain the second signed copy in the project files.

Additional guidance on completing documentation for the drums is found in SOP 1.10, Receiving, Labeling, and Handling Waste Containers.

Drum field log forms will be prepared for each drum containing PPE. Partial drums will be transferred to the drum staging area until they can be filled and transferred at the drum transfer area to EG&G.

Drum field log forms will be kept in the subcontractor's project files until the project is completed. All project files will be turned over to EG&G at this time (see SOP 1.2, Field Documentation).

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.6, Rev. 0
13 of 13
February 18, 1991
ER&WM**

**Safety Related
Category 1**

Contaminant Characterization Forms will be used for the characterization of PPE that has been temporarily stored in gray drums until analytical results are received. Upon receipt of the sample results for all the samples taken while the PPE was worn and therefore associated with the contents of a drum, the subcontractor will submit the drum identification portion of the form along with the analytical results to the EG&G project manager for characterization.

EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.7, Rev. 0
1 of 9
February 18, 1991
ER&WM

Safety Related
Category 1

TITLE:
HANDLING OF DECONTAMINATION
WATER AND WASH WATER

Approved By:

J. W. Langman, Jr.

1.0 TABLE OF CONTENTS

1.0	TABLE OF CONTENTS	1
2.0	PURPOSE AND SCOPE	2
3.0	RESPONSIBILITIES AND QUALIFICATIONS	2
4.0	REFERENCES	3
4.1	SOURCE REFERENCES	3
4.2	INTERNAL REFERENCES	3
5.0	EQUIPMENT	4
6.0	WORK AREA CHARACTERIZATIONS	4
6.1	HANDLING OF DECONTAMINATION WATER AND WASH WATER	5
6.1.1	Handling of Decontamination Water	6
6.1.2	Handling of Wash Water	7
7.0	DECONTAMINATION	8
8.0	DOCUMENTATION	8
8.1	DRUM FIELD LOG FORM	8

**EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.7, Rev. 0
2 of 9
February 18, 1991
ER&WM**

**Safety Related
Category 1**

2.0 PURPOSE AND SCOPE

This standard operating procedure (SOP) describes procedures that will be used by subcontractors at Rocky Flats to handle decontamination water and wash water used during Environmental Restoration (ER) field activities.

3.0 RESPONSIBILITIES AND QUALIFICATIONS

Personnel using light or heavy equipment, scientific monitoring devices, or operating company vehicles must have appropriate training or licenses.

The subcontractor's site manager is responsible for coordinating the removal and transfer of all wastes from the project work area.

The subcontractor is also responsible for the transportation of liquid waste suspected of containing radioactive and/or hazardous substances to holding tanks located at the central EG&G decontamination facility.

It is the subcontractor's site manager's responsibility to report as soon as possible to the EG&G project manager or a designated EG&G representative any damage incurred to a drum. Types of damage include holes, damage to the lid seal, or any other problem that may compromise drum integrity. Damaged drums must have their contents transferred to an undamaged drum or be overpacked.

The subcontractor's site manager will assign personnel to conduct monthly inspections of all the drums issued to the subcontractor until relinquished to EG&G. These inspections will ensure that drum integrity is maintained.

EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.7, Rev. 0
3 of 9
February 18, 1991
ER&WM

Safety Related
Category 1

EG&G's Radiation Protection Technicians (RPTs) are responsible for conducting radiation screenings of equipment, samples, and personnel before they leave the work area.

EG&G's Waste Operations personnel are responsible for the collection, transport, storage, treatment, and disposal of solid and liquid wastes from the drum transfer area at the main decontamination facility.

4.0 REFERENCES

4.1 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.

RCRA Facility Investigation Guidance. Interim Final. May 1989.

Rockwell International. Use and Color Coding of Drums. Policies: Rocky Flats Plant. RFBM MAT 20-005. November 3, 1989.

4.2 INTERNAL REFERENCES

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

- SOP 1.3, General Equipment Decontamination
- SOP 1.4, Heavy Equipment Decontamination
- SOP 1.8, Handling of Drilling Fluids and Cuttings
- SOP 1.10, Receiving, Labeling, and Handling Waste Containers

- SOP 1.12, Decontamination Facility Operations
- SOP 1.18, Use of Photoionizing Detectors and Flame Ionizing Detectors
- SOP 1.16, Field Radiological Measurements

5.0 EQUIPMENT

The minimum equipment needed to handle decontamination water or wash water are the following:

- Truck or trailer with enclosed sides for transporting liquid waste containers
- Personal splash protection equipment
- Pump (hand or peristaltic)
- Gray drums or other liquid waste containers
- Drum handling equipment (if drums are used)

6.0 WORK AREA CHARACTERIZATIONS

Each project work area will be characterized by EG&G prior to any field activity. Work area characterizations will be based on the historical background of the work area and include the chemical results of previous soil and groundwater analyses and the results of field radiological surveys conducted by EG&G RPTs. Work areas associated with the ER program field operations fall into two characterizations: potentially contaminated and not potentially contaminated. Work areas currently characterized as potentially contaminated include the following:

- Individual Hazardous Substance Sites (IHSSs)
- Identified Groundwater Plume Areas
- Americium Zone at OU No. 2
- Surface water and sediment sampling stations which have not been verified as background locations

**EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.7, Rev. 0
5 of 9
February 18, 1991
ER&WM**

**Safety Related
Category 1**

See SOP 1.10, Receiving, Labeling, and Handling of Waste Containers for specific work areas currently characterized as potentially contaminated.

Wastes generated during ER field operations will be handled depending on the work area characterization and the results of field monitoring performed during intrusive activities. Liquid wastes suspected of containing radioactive and/or nonradioactive RCRA-regulated hazardous substances will be transported to holding tanks located at the main decontamination facility. The use of field monitors for the detection of volatile organics and radionuclides is discussed in SOPs 1.8, Handling of Drilling Fluids and Cuttings; 1.15, Use of Photoionizing Detectors and Flame Ionizing Detectors; and 1.16, Field Radiological Measurements.

The types of contamination which may be encountered within potentially contaminated work areas include the following:

- Low-level radioactively contaminated substances
- Nonradioactive RCRA regulated hazardous (hazardous) substances
- Mixed (low-level radioactive and hazardous substances)

6.1 HANDLING OF DECONTAMINATION WATER AND WASH WATER

Decontamination water is soapy or clear water used for cleaning and rinsing equipment, personnel, samples, or vehicles used in work areas characterized as potentially contaminated or in not potentially contaminated work areas, where verified positive detections above background were encountered during field monitoring. Wash water is soapy or clear water used to clean equipment, personnel, samples, or vehicles used at work areas characterized as not potentially contaminated where no verified positive readings were above background were detected during field monitoring.

If a work area is characterized as not potentially contaminated but verified results from field monitoring indicate the presence of previously unsuspected contaminated substances, then the water used for cleaning equipment, personnel, samples, and vehicles is considered decontamination water.

6.1.1 HANDLING OF DECONTAMINATION WATER

Decontamination water will be contained by the subcontractor in gray 55-gallon drums or liquid containers if the equipment being cleaned was used in a work area characterized as potentially contaminated or if the work area is characterized as not potentially contaminated, but verified positive readings above background were detected during field monitoring. The drums will be taken by the subcontractor to the main EG&G decontamination facility. The decontamination facility will have an area specifically designed for liquid waste disposal (see SOP 1.12, Decontamination Facility Operations for details pertaining to the liquid waste area). The subcontractor will empty the entire drum's contents into this area.

Other considerations to ensure the proper handling of decontamination water are:

- Due to high phosphate levels, Alconox will not be used. Liquinox or a phosphate-free equivalent will be used.
- Decontamination water used by subcontracting personnel must be replaced at least once daily regardless of the contamination level. Replacement may be required more than once a day, depending on field conditions (i.e., heavy mud or organic or radioactive contaminants).
- Use gray, 55-gallon, open top (removable top) drums or liquid waste containers appropriately sized for the task to transport decontamination water.

**EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS SOP**

**Safety Related
Category 1**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.7, Rev. 0
7 of 9
February 18, 1991
ER&WM**

- Liquid container lids will be secured and containers will be transported in trucks with enclosed sides.
- ~~Mark the liquid containers used for transporting liquid wastes suspected of containing hazardous and/or radioactive substances with the words "NONPOTABLE" as described in SOP 1.10, Receiving, Labeling, and Handling Waste Containers.~~
- Label liquid containers with a Department of Transportation "Other Regulated Material Class E" (ORM-E) label.
- Document the use of gray drums for transporting liquid wastes on the Drum Field Log Form (Form 1.10A, see Section 8.0 - Documentation.)
- Decontaminate containers used to transport liquid wastes after emptying them. (See SOP 1.3, General Equipment Decontamination.)
- No containers with holes, leaks, or bad seals will be used for transporting decontamination water.
- Proper "splash" protection must be used while handling fluids (see SOP 1.4, Heavy Equipment Decontamination.)

6.1.2 HANDLING OF WASH WATER

For surface water field activities in areas characterized as background stations (uncontaminated) (see SOP 1.10, Receiving, Handling, and Labeling Waste Containers), wash water and rinse water will

be disposed of on the ground at least 50 feet from the sampling location such that the waste water cannot discharge into any stream, pond or other surface water impoundment.

Wash water used to clean equipment, personnel, or vehicles during soil sampling, groundwater sampling, or drilling in work areas characterized as not potentially contaminated where no verified positive reading were detected on field monitors will be disposed of approximately 50 feet from the well or boring. The disposal location must be at least 200 feet from any stream drainage.

7.0 DECONTAMINATION

Decontamination of equipment used to handle and transport decontamination water will be done in accordance with SOP 1.4, Heavy Equipment Decontamination and SOP 1.3, General Equipment Decontamination, and will be done between work areas so as not to promote cross-contamination of work areas. Equipment and containers used for handling wash water will be power sprayed and rinsed.

8.0 DOCUMENTATION

8.1 DRUM FIELD LOG FORM

If gray drums are used for transporting liquid wastes suspected of containing hazardous and/or radioactive substances, a Drum Field Log Form (Form 1.10A) will be filled out in order to maintain a "cradle to grave" record. Information on the Field Drum Log Form includes:

- Drum ID number
- Date of issue
- Location in field
- Contents

**EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.7, Rev. 0
9 of 9
February 18, 1991
ER&WM**

**Safety Related
Category 1**

- Fill date
- Date of decontamination and area location
- Date returned to EG&G

Any damage incurred to a drum either during shipping or handling will be reported to an EG&G representative as soon as possible for immediate correction.

Entries made on the Drum Field Log Form may be supported with entries in a field logbook.

NAME OF THE SUBCONTRACTOR

DRUM ID NUMBER WITH SUBCONTRACTOR'S ID.....

LOCATION AND DATE OF ISSUANCE

LOC

DATE

NAME AND LOCATION OF FIELD ACTIVITY

NAME

LOC

ASSOCIATED WELL, BORING, OR SAMPLING

LOCATION

NAME

CONTENTS OF DRUM

SUBSURFACE INTERVALS (IF SOILS)

BAG #S (IF PPE)

ASSOCIATED SAMPLE ID #S

DATE DRUM WAS FILLED

IF SOLID WASTE

LOCATION OF TEMPORARY STORAGE AREA

DATE DRUM RETURNED TO EG&G

SIGNATURE OF EG&G REPRESENTATIVE

IF LIQUID WASTE

DATE AND LOCATION WHERE CONTENTS WERE

EMPTIED AND DECONNED

DATE

LOC

(EXAMPLE: 2/18/91 DECON PAD #___)

EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.8, Rev. 0
1 of 17
February 18, 1991
ER&WM

Safety Related
Category 1

TITLE:
HANDLING OF DRILLING FLUIDS
AND CUTTINGS

Approved By:

J. W. Langstaff

1.0 TABLE OF CONTENTS

1.0	TABLE OF CONTENTS	1
2.0	PURPOSE AND SCOPE	3
3.0	RESPONSIBILITIES AND QUALIFICATIONS	3
4.0	REFERENCES	4
4.1	SOURCE REFERENCES	4
4.2	INTERNAL REFERENCES	5
5.0	EQUIPMENT	5
6.0	CONTAMINANT CHARACTERIZATION	7
6.1	PREDRILLING PROCEDURES	8
6.2	DRILLING PROCEDURES	10
6.3	FIELD MONITORING	10
6.3.1	Verified Positive Readings	11
6.4	WORK AREAS CHARACTERIZED AS NOT POTENTIALLY CONTAMINATED	12
6.4.1	Handling Drill Cuttings	12
6.4.2	Handling Drilling Fluids	13
6.5	WORK AREA CHARACTERIZED AS POTENTIALLY CONTAMINATED ...	14
6.5.1	Handling Drill Cuttings	14

EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.8, Rev. 0
2 of 17
February 18, 1991
ER&WM

6.5.1.1 Alluvial Cuttings 14
6.5.1.2 Bedrock Cuttings 15
6.5.2 Handling Drilling Fluids 15
7.0 DOCUMENTATION 17

LIST OF FIGURES

FIGURE 1.8-1 DECISION DIAGRAM FOR HANDLING ALLUVIAL DRILL CUTTINGS 16

EG&G ROCKY FLATS PLANT	Manual:	5-21200-FOP
EMAD FIELD PROCEDURES SOP	Procedure No.:	1.8, Rev. 0
	Page:	3 of 17
Safety Related	Effective Date:	February 18, 1991
Category 1	Organization:	ER&WM

2.0 PURPOSE AND SCOPE

This Standard Operating Procedure (SOP) will be used at the Rocky Flats Plant (RFP) to control, contain, and place in the appropriate on-site holding area, drilling fluids and cuttings.

This SOP describes the handling of drill cuttings generated in both potentially contaminated and not potentially contaminated work areas and the use of organic vapor detectors (OVDs) and radiological screening for field monitoring.

3.0 RESPONSIBILITIES AND QUALIFICATIONS

Personnel using light or heavy equipment, scientific monitoring devices, or operating company vehicles must have appropriate training or licenses.

The subcontractor's site manager is responsible for coordinating the removal and transfer of all wastes from the project work area.

The subcontractor is responsible for the drumming and transfer of solid waste suspected of containing radioactive and/or hazardous substances to the drum transfer area at the main decontamination facility for transfer to EG&G Waste Operations personnel.

The subcontractor is also responsible for the transportation of liquid waste suspected of containing radioactive and/or hazardous substances to holding tanks located at the main EG&G decontamination facility.

It is the subcontractor's site manager's responsibility to report as soon as possible to the EG&G project manager or a designated EG&G representative any damage incurred to a drum. Types of damage include holes, damage to the lid seal, or any other problem that may compromise drum

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.8, Rev. 0
4 of 17
February 18, 1991
ER&WM**

**Safety Related
Category 1**

integrity. Damaged drums must have their contents transferred to an undamaged drum or be overpacked.

The subcontractor's site manager will assign personnel to conduct monthly inspections of all the drums issued to the subcontractor until relinquished to EG&G. These inspections will ensure that drum integrity is maintained.

EG&G's Radiation Protection Technicians (RPTs) are responsible for conducting radiation screenings of equipment, samples, and personnel before they leave potentially contaminated work areas.

EG&G's Waste Operations personnel are responsible for the collection, transport, storage, treatment, and disposal of solid and liquid wastes from the drum transfer area at the main decontamination facility.

4.0 REFERENCES

4.1 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.

Hall, Ridgway M. Jr., Tom Watson, Jeffrey J. Davidson, David R. Case, Nancy S. Bryson. RCRA Hazardous Wastes Handbook. 6th Edition. Government Institutes, Inc. Rockville, MD. March 1986.

National Institute for Occupational Safety and Health (NIOSH), Occupational Safety and Health Administration (OSHA), U.S. Coast Guard (USCG), and U.S. Environmental Protection Agency

EG&G ROCKY FLATS PLANT	Manual:	5-21200-FOP
EMAD FIELD PROCEDURES SOP	Procedure No.:	1.8, Rev. 0
	Page:	5 of 17
Safety Related	Effective Date:	February 18, 1991
Category 1	Organization:	ER&WM

(EPA). Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities.
October 1985.

Rockwell International. Policies: Rocky Flats Plant, Use and Color Coding of Drums. RFPM MAT
20-005. November 3, 1989.

4.2 INTERNAL REFERENCES

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

- SOP 1.3, General Equipment Decontamination
- SOP 1.4, Heavy Equipment Decontamination
- SOP 1.5, Handling of Purge and Development Water
- SOP 1.6, Handling of Personal Protective Equipment
- SOP 1.7, Handling of Decontamination Water and Wash Water
- SOP 1.9, Handling of Residual Core and Laboratory Samples
- SOP 1.10, Receiving, Labeling, and Handling Waste Containers
- SOP 1.12, Decontamination Facility Operations
- SOP 1.15, Use of Photoionizing Detectors and Flame Ionizing Detectors
- SOP 1.16, Field Radiological Measurements
- SOP 3.2, Drilling and Sampling Using Hollow-Stem Auger Techniques

5.0 EQUIPMENT

The following items will be required during most field operations that generate drilling fluids and cuttings suspected of containing radioactive and/or hazardous substances.

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.8, Rev. 0
6 of 17
February 18, 1991
ER&WM**

**Safety Related
Category 1**

- **Color-coded, 55-gallon drums as described in SOP 1.10, Receiving, Labeling, and Handling Waste Containers**
- **Shovels and scoops with nonporous surfaces to facilitate decontamination**
- **Paint stick for marking drums**
- **If drilling muds are used, a seamless container (such as a molded plastic type) will be used for decanting fluids from residual sediments**
- **Personal Protective Equipment (PPE) as specified in the Site-Specific Health and Safety Plan**
- **A heavy equipment forklift or truck equipped with a drum grappler and capable of lifting a 55-gallon drum containing solid or liquid wastes**
- **A tow vehicle and trailer for transporting drums and heavy equipment required to handle filled drums to a decontamination facility**
- **Organic vapor detector (OVD)**
- **Field radiation monitor**
- **Overpack drums**
- **Drum bung wrench**

EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.8, Rev. 0
7 of 17
February 18, 1991
ER&WM

Safety Related
Category 1

- Tools for opening and sealing open-top 55-gallon drums with a clamp-type sealing band
- Pallets
- Opaque weather-proof sheeting
- Hand pressurized sprayer

6.0 CONTAMINANT CHARACTERIZATION

Each project work area will be characterized by EG&G prior to any field activity. Work area characterizations will be based on the historical background of the work area and include the chemical results of previous soil and groundwater analyses and the results of field radiological surveys conducted by EG&G RPTs. Work areas associated with the ER program field operations fall into two characterizations: potentially contaminated and not potentially contaminated. Work areas currently characterized as potentially contaminated include the following:

- Individual Hazardous Substance Sites (IHSSs)
- Identified Groundwater Plume Areas
- Americium Zone at OU No. 2
- Surface water and sediment sampling stations which have not been verified as background locations

See SOP 1.10, Receiving, Labeling and Handling Waste Containers, for details on potentially contaminated work areas.

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.8, Rev. 0
8 of 17
February 18, 1991
ER&WM**

**Safety Related
Category 1**

Wastes generated during ER field operations will be handled depending on the work area characterization and the results of field monitoring performed during intrusive activities. Wastes suspected of containing low-level radioactively contaminated substances and/or nonradioactive RCRA-regulated hazardous substances will be placed in color-coded drums. The color of the drum used will depend on the type of suspected contamination and whether the waste is solid or liquid. The use of field monitors for the detection of volatile organics and radionuclides is discussed in SOP 1.15, Use of Photoionizing Detectors and Flame Ionizing Detectors; and SOP 1.16, Field Radiological Measurements.

The types of contamination that may be encountered within potentially contaminated work areas include the following:

- Low-level radioactively contaminated substances
- Nonradioactive RCRA-regulated hazardous (hazardous) substances
- Mixed (low-level radioactive and hazardous substances)

6.1 PREDRILLING PROCEDURES

Predrilling procedures will be conducted prior to drilling a well or boring regardless of the work area characterization. Predrilling procedures include the following:

- Subcontracting personnel will conduct a radiological screening (see SOP 1.16, Field Radiological Measurements) of the ground surface prior to any drilling activity.
- The surface soil around the staked boring or well location will be wetted with distilled water from a hand-pressurized spray bottle. The wetting will be sufficient to preclude dust generation during the soil removal process.

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.8, Rev. 0
9 of 17
February 18, 1991
ER&WM**

**Safety Related
Category 1**

- A drive sample will be collected using a split-spoon sampler with a stainless steel liner in order to obtain a surface soil sample from the surface to approximately 20 centimeters (cm) in depth. (Refer to SOP 3.2, Drilling and Sampling Using Hollow-Stem Auger Techniques.)
- The outside of the liner will be wiped clean of excess material and marked with the sample identification; and the liner, with sample, will be placed in double plastic bags. The surface sample will be transferred to the sample manager to ensure proper handling and shipping.
- The subcontractor personnel will then use a shovel to remove a depth of approximately 20 cm of soil from an arc of sufficient size to allow for approximately 2 inches of clearance on each side of the auger. The wet soil will be spread over the ground near the drilling site for work areas characterized as not potentially contaminated. For work areas characterized as potentially contaminated, the wetted soil will be put on plastic sheeting on the ground. The soil will be covered and secured so that it will not blow away. Drilling activities may now begin. The shovel should be decontaminated between work areas.
- In work areas characterized as potentially contaminated, or if verified positive readings above background are detected on field monitors, drill cuttings will be contained in colored-coded drums. Cuttings will be placed in the first drum until the drum is approximately 95 percent full. The excavated soil will then be used to fill the drum.

This surface sampling and shovel excavation procedure will facilitate the collection of a representative surface sample and the safe removal of the soil with the highest potential to contain radioactively contaminated substances.

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.8, Rev. 0
10 of 17
February 18, 1991
ER&WM**

6.2 DRILLING PROCEDURES

The auger will be positioned approximately in the center of the 20-cm-deep excavation to begin drilling. As cuttings are generated, they will be wetted with distilled water from a hand-pressurized sprayer and placed on the ground (in work areas characterized as not potentially contaminated) or in 55-gallon gray drums (in work areas characterized as potentially contaminated).

An OVD and a field radiation monitor will be used routinely to confirm the absence of hazardous or radioactive substances. If verified positive readings are encountered during field monitoring, soil cuttings from that point forward will be placed in color-coded drums based on the field monitoring results. (See SOP 1.10, Receiving, Labeling, and Handling of Waste Containers.)

In work areas requiring a work permit, an EG&G RPT will be contacted to radiologically monitor drill cuttings and excavated soil on the ground around the borehole at the end of each day's drilling activities. Any cuttings exhibiting radioactive readings above background (see SOP 1.16, Field Radiological Measurements) will be wetted, removed with a shovel, and placed in a white 55-gallon drum until analytically characterized (see SOP 1.10, Receiving, Labeling, and Handling Waste Containers).

6.3 FIELD MONITORING

OVD and field radiological screenings will be conducted by the subcontractor within each work area for all intrusive activities. Results of the screenings will be used to properly handle wastes generated at the work area.

The OVD and field radiological monitors will be used as described in SOP 1.15, Use of Photoionizing Detectors and Flame Ionizing Detectors, and 1.16, Field Radiological Measurements. For the purposes of this SOP, the following procedures apply:

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.8, Rev. 0
11 of 17
February 18, 1991
ER&WM**

**Safety Related
Category 1**

- Prior to the start of work, measure the organic vapor and radioactive background level on the upwind side of the activity area. Record the results on Form 1.8A, Verification of Organic Vapor Monitoring, Form 1.16A, Results of Radiological Monitoring in the Field, and in the logbook.
- Monitor the borehole where the intrusive work is occurring. The results of monitoring shall be recorded as described in the site-specific Health and Safety Plan (HSP). When hollow-stem augers are being used, monitor inside the auger each time the drive head is removed. When solid-stem augers are being used, monitor the cuttings at ground level each time the auger is stopped.
- Single OVD or field radiological measurements greater than the background measurement may indicate the presence of hazardous or radioactive substances and must be verified as described in Subsection 6.3.1.
- When an OVD or field radiological measurement above background is detected, all intrusive work will stop until the verification procedures are complete.

6.3.1 Verified Positive Readings

The following verification procedures will be used after detecting an OVD or radiological measurement greater than the initial background measurement. The verification process will be recorded on Form 1.8A, Verification of Organic Vapor Monitoring Results, and Form 1.16A, Results of Radiological Monitoring in the Field.

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.8, Rev. 0
12 of 17
February 18, 1991
ER&WM**

**Safety Related
Category 1**

- For an OVD reading above background, turn off any diesel- or gasoline-driven engines operating within the vicinity of the work area since most OVDs will detect incomplete combustion by-products.
- Remove the instrument (OVD or field radiological) from the work area and make an upwind measurement of ambient organic vapor levels or radioactivity, as appropriate.
- That measurement will be followed by a remeasurement at the same location where the positive measurement was recorded.
- If the remeasurement is not above background, repeat the preceding actions for a third measurement and record the results.
- If any two of the three measurements (including the original measurement) indicate organic vapor levels or radioactivity greater than the background level, the original measurement has been verified. From that point forward, solid and liquid wastes will be placed in 55-gallon color-coded drums (if solids) or liquid containers (if fluids) (see Subsection 6.5.1 for handling procedures for wastes suspected of containing hazardous and/or radioactive substances). Drilling fluids will be transported to the liquid waste area at EG&G's main decontamination facility (see SOP 1.10, Receiving, Labeling, and Handling Waste Containers).

6.4 WORK AREAS CHARACTERIZED AS NOT POTENTIALLY CONTAMINATED

6.4.1 Handling Drill Cuttings

The following procedures will be used in work areas characterized as not potentially contaminated:

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.8, Rev. 0
13 of 17
February 18, 1991
ER&WM**

**Safety Related
Category 1**

- Drill cuttings that have no verified reading on the OVD or field radiation monitors will be disposed of on the ground within a 50-foot radius of the borehole.
- Drill cuttings that have a verified positive reading on the OVD but no verified positive reading on the field radiation monitor will be drummed as suspected of containing hazardous substances and placed in 55-gallon white/black colored drums.
- Drill cuttings that have a verified positive reading on the field radiation monitor only will be drummed as suspected of containing radioactive substances and placed in 55-gallon white drums.
- Drill cuttings that have verified positive readings on both the OVD and field radiation monitor will be drummed as suspected of containing mixed substances and placed in white drums.

See SOP 1.10, Receiving, Labeling, and Handling of Waste Containers for the proper handling of waste drums.

6.4.2 Handling Drilling Fluids

If a work area is characterized as not potentially contaminated and if no verified positive readings are detected on either the OVD or the field radiation monitor, the drilling fluids will be disposed of on the ground, approximately 50 feet from the borehole, and not within 200 feet of any stream drainage. The drilling fluids should not be disposed in a manner that would result in erosion of the soil.

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.8, Rev. 0
14 of 17
February 18, 1991
ER&WM**

**Safety Related
Category 1**

If a verified positive reading is detected on either the OVD or the field radiation monitor, the drilling fluids will be contained in 55-gallon grey drums or appropriately sized containers. Field personnel should decant the liquid waste from one drum (or container) to another (or from a trough to a drum or container) prior to transporting if the amount of sediment within the liquid waste is substantial. The residual sediments will be drummed according to the field monitoring results. The liquid waste containers will be transported to the liquid waste area at the main decontamination facility. (See SOP 1.12, Decontamination Facility Operations for details pertaining to the liquid waste area.) Liquid waste containers will be marked and transported as described in SOP 1.10, Receiving, Labeling, and Handling Waste Containers. The liquid containers will be emptied by the subcontractor into the decanting tanks at the liquid waste area.

6.5 WORK AREA CHARACTERIZED AS POTENTIALLY CONTAMINATED

6.5.1 Handling Drill Cuttings

6.5.1.1 Alluvial Cuttings

In work areas characterized as potentially contaminated, alluvial drill cuttings will be drummed in 55-gallon grey drums if no verified positive readings are detected on the OVD or field radiation monitors. These grey drums will be marked and transported to the drum transfer area at the main decontamination facility for transfer to the custody of EG&G Waste Operations personnel as described in SOP 1.10, Receiving, Labeling, and Handling Waste Containers.

If verified positive readings are detected on either the OVD or the radiation monitor, the alluvial cuttings will be drummed, from the point of detection until casing is set, in the appropriately colored drum based on the detection.

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.8, Rev. 0
15 of 17
February 18, 1991
ER&WM**

**Safety Related
Category 1**

A detailed flow chart (Figure 1.8-1) has been constructed to assist field personnel in the decision process to properly handle alluvial drill cuttings. The Decision Diagram starts with the work area characterization and includes the use of field monitoring instruments and the proper color coding of drums to be used.

6.5.1.2 Bedrock Cuttings

If a well casing is set in order to isolate the alluvial materials from the underlying bedrock materials, the bedrock cutting will be deposited on the ground, within a 50-foot radius of the borehole, unless a verified positive reading is detected on the OVD or field radiation monitors. If a verified positive reading is detected, the bedrock cuttings will be contained in the appropriate colored drum based on the monitoring results.

6.5.2 Handling Drilling Fluids

If drilling fluids are to be used, the entire pumping system will be checked for leaks before the pumping system is taken to the work area. Checking will consist of assembling the system and pumping potable quality water through it. If a leakage in the hose connections or elsewhere is detected, it will be repaired before being used.

If a drilling fluid system being used on a work site develops a significant leak that will result in the potential contamination of the surficial soils, the system will be shut down and repaired within the work area, if feasible. If repairs are not feasible within the work area, the drill rig will be removed from the work area and decontaminated before it is repaired (see SOP 1.4, Heavy Equipment Decontamination).

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.8, Rev. 0
17 of 17
February 18, 1991
ER&WM**

**Safety Related
Category 1**

If no verified positive readings are detected on either the OVD or the field radiation monitor, the drilling fluids will be disposed of on the ground, approximately 50 feet from the borehole, and not within 200 feet of any stream drainage. The drilling fluids should not be disposed in such a manner that would result in erosion of the soil.

If verified positive readings are detected on either the OVD or the field radiation monitor, the same procedures for monitoring detections described for not potentially contaminated work areas will be followed (see Subsection 6.4.2).

7.0 DOCUMENTATION

A permanent record of the implementation of this SOP will be kept by documenting field observations and data. Form 1.8A, Verification of Organic Vapor Monitoring Results and Form 1.8B, Record of Drilling Fluids and Cuttings are provided to assist in the documentation of the field monitoring. Results of the field radiological monitoring will be documented in accordance with SOP 1.16, Field Radiological Measurements.

Additionally, drums issued to a subcontractor by EG&G will have an associated Drum Field Log Form (1.10A) and a Contaminant Characterization Form (1.10C) as discussed in SOP 1.10, Receiving, Labeling, and Handling Waste Containers.

VERIFICATION OF ORGANIC VAPOR MONITORING RESULTS

1. Date _____ Activity Area _____

2. Check Historical Contaminant Classifications

_____ Radiological _____ RCRA Wastes _____ Mixed Wastes

3. Prework/Background Organic Vapor Monitoring Results

_____ (numeric value) _____ (units, i.e. ppm) _____ Instrument Used

4. Verification Measurements

Initial measurement above background _____

Background check _____

First verification measurement _____

Background check _____

Second verification measurement _____

5. If either of the verification measurements are above the preceding background measurement the initial measurement has been verified.

Individual completing this form _____
Print Name Signature Date Subcontractor

EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP

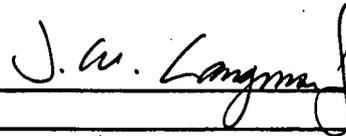
Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.9, Rev. 0
1 of 8
February 18, 1991
ER&WM

Safety Related
Category 1

TITLE:
HANDLING OF RESIDUAL SAMPLES

Approved By:



1.0 TABLE OF CONTENTS

1.0	TABLE OF CONTENTS	1
2.0	PURPOSE AND SCOPE	2
3.0	RESPONSIBILITIES AND QUALIFICATIONS	2
3.1	SUBCONTRACTORS	2
3.2	LABORATORY	2
3.3	EG&G	3
4.0	REFERENCES	3
4.1	SOURCE REFERENCES	3
4.2	INTERNAL REFERENCES	3
5.0	PROCEDURE FOR THE HANDLING OF RESIDUAL SAMPLES	4
5.1	RECEIVING RESIDUAL LABORATORY SAMPLES	4
5.2	CHARACTERIZING RESIDUAL LABORATORY SAMPLES	4
5.3	RECEIVING SAMPLE SHIPMENTS	6
5.4	DOCUMENT PACKAGE	7
6.0	DOCUMENTATION	8

2.0 PURPOSE AND SCOPE

This standard operating procedure (SOP) describes the waste management procedures to be implemented at the Rocky Flats Plant (RFP) for the handling of residual laboratory soil samples, and the documentation necessary to be in compliance with the RFP Waste Management Program. This SOP is intended to be sufficiently detailed so that conformance will result in reliable handling of residual laboratory soil samples.

3.0 RESPONSIBILITIES AND QUALIFICATIONS

3.1 SUBCONTRACTORS

The subcontractor's project manager will be responsible for assigning project staff to implement this SOP and for ensuring that the procedures are followed by all subcontractor personnel.

The assigned onsite sampling manager will have a minimum of a two year college science degree and report to an assigned chemist. The sampling manager will be responsible for all coordination and required documentation as specified in this SOP between the subcontractor, EG&G, and the laboratory.

Personnel using light or heavy equipment, scientific monitoring devices, or operating company vehicles must have appropriate training or licenses.

3.2 LABORATORY

The laboratory will be responsible for contacting the subcontractor that originally submitted the samples prior to shipping any residual lab soil samples. The laboratory will also be required to

provide all documentation, as specified in this SOP, to the subcontractor and ship all laboratory residual soil samples in accordance with all applicable DOT regulations.

3.3 EG&G

The EG&G project manager has the overall responsibility for implementing this SOP. EG&G will be responsible for approving all Residual Lab Soil Characterization (RLSC) forms and final disposition of all residual laboratory soils.

4.0 REFERENCES

4.1 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.

RCRA Facility Investigation Guidance. Interim Final. May 1989.

4.2 INTERNAL REFERENCES

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

- SOP 1.10, Receiving, Labeling, and Handling Waste Containers
- SOP 1.12, Decontamination Facility Operations

5.0 PROCEDURE FOR THE HANDLING OF RESIDUAL SAMPLES

Residual laboratory soil samples consist of excess soils collected at RFP, that were not used by the chemical laboratory for analyses and are being returned to RFP.

The following procedures are guidelines to be followed by the subcontractor for the proper chemical characterization, transport, storage, and containment of residual laboratory soils being returned to RFP by EG&G's contracted chemical laboratories.

5.1 RECEIVING RESIDUAL LABORATORY SAMPLES

Chemical laboratories requesting to return residual soil samples will first contact the subcontractor that originally submitted the soil samples to the laboratory. The subcontractor will require all documentation specified in this SOP. The laboratory will provide the subcontractor with the following notification of shipment:

- Sample identification list of residual soils to be returned to RFP
- Method of shipment (i.e., courier)
- Expected date and time of delivery
- Number of shipping containers
- Total number of individual sample containers

5.2 CHARACTERIZING RESIDUAL LABORATORY SAMPLES

Once the subcontractor receives all required information from the laboratory, the subcontractor will access the Rocky Flats Data Management System (RFDMS) for the validated chemical results of the associated soil sample. The subcontractor will categorize each soil as radioactive, hazardous (nonradioactive RCRA-regulated hazardous substances), or non-hazardous based upon the chemical

results. The chemical categorization will be performed by the subcontractor's assigned sample manager and chemist. All chemical categorizations performed by subcontracting personnel will be based on validated chemical results of the associated soil sample obtained during field sampling activities.

Following the subcontractor's chemical categorization of each residual soil sample to be returned to EG&G, the subcontractor will complete a Residual Lab Soil Characterization (RLSC) Form (Form 1.9A). This form will identify the name of the subcontractor, the chemical laboratory requesting the return shipment, the date of request, and the RLSC identification (I.D.) number (sample I.D.). Included on this form will be the subcontractor's chemical categorization of each soil sample which will be identified as follows:

- Uncontaminated
- Low-level radioactivity contaminated (RAD)
- Nonradioactive RCRA-regulated hazardous (hazardous)
- Mixed (RAD and hazardous)

The subcontractor will also cross-reference the original Chain-of-Custody (COC) number to the residual soil sample and record that COC number on the spaces provided on the RLSC Form.

The RLSC form(s) and associated chemical results will be submitted to EG&G for final characterization and approval of acceptance of the residual laboratory soil samples. Following EG&G's waste characterization and approval, the RLSC Form and associated chemical analyses will be returned to the subcontractor. The subcontractor will authorize the chemical laboratory to proceed with the return shipment of the designated residual laboratory soils to RFP.

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.9, Rev. 0
6 of 8
February 18, 1991
ER&WM**

**Safety Related
Category 1**

5.3 RECEIVING SAMPLE SHIPMENTS

The laboratory will address the residual laboratory soils to the subcontractor at RFP. The samples will be shipped in accordance with all applicable Department of Transportation (DOT) shipping regulations. The laboratory will also provide duplicate copies of the associated COC form(s) pertaining the residual laboratory soils. The duplicate copies of the COC forms are to be securely placed on the outside of the shipping container(s) and well protected from the weather.

When the designated residual soil samples are received by EG&G's Shipping and Receiving Department, the subcontractor will be notified of the shipment. The subcontractor will transport the unopened sample container(s) (coolers or packages) to the main decontamination facility. At the main decontamination facility, the subcontractor will open the sample cooler(s) in accordance with the Environmental Restoration's Project Health and Safety Plan. The subcontractor will inspect the contents in each sample container, assess damage, and ensure that all individual sample containers are listed on the accompanied COC form.

Samples identified on the COC by the subcontractor that cannot be accounted for will be lined-out, dated, and initialed on both COC copies. This discrepancy will be documented on the COC forms and the laboratory will be notified.

If containers are inventoried by the subcontractor during inspection and are not listed on the COC forms, the subcontractor will separate the non-listed sample container(s) and contact the laboratory and EG&G for further guidance.

If a sample container is found to be broken, the sample manager will check the EG&G characterization of the contents of the container. If the contents are characterized as uncontaminated, the sample will be left in the shipment container. If the soils within the broken

sample container are characterized as RAD, hazardous, or mixed, the sample manager will contact the EG&G project manager for further guidance.

If the sample containers are undamaged, the subcontractor will segregate each sample container based on the EG&G characterization of the sample. Sample containers having the same characterization will be repackaged together. Each new package will be labeled according to the characterization of samples. Packages containing samples characterized as RAD will be labeled with a "White I" radioactive label. Packages containing samples characterized as hazardous or mixed will be labeled with a Department of Transportation (DOT) "Other Regulated Materials Class E" (ORM-E) sticker. Additionally, packages containing mixed residual samples will be marked with the word "RAD." (See SOP 1.10, Receiving, Labeling, and Handling Waste Containers for details pertaining to the proper handling of waste containers.)

The subcontractor will then place the repackaged samples at the drum transfer area at the main decontamination facility (see SOP 1.12, Decontamination Facility Operations). The subcontractor will have EG&G's Waste Operations personnel sign both copies of the COC forms. Custody of the residual soil samples is now considered officially transferred to EG&G.

The subcontractor will relinquish one copy of the COC form(s) to EG&G's Waste Operations personnel. The subcontractor will retain the duplicate COC form(s) to complete the subcontractor's document package that will ensure that residual soils were appropriately handled and returned to RFP.

5.4 DOCUMENT PACKAGE

The subcontractors's document package for residual laboratory samples returned to EG&G's custody will contain the following information for each shipment:

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.9, Rev. 0
8 of 8
February 18, 1991
ER&WM**

**Safety Related
Category 1**

- An EG&G signed copy of the COC form(s)
- A copy of the completed RLSC form(s) and associated chemical analyses
- Laboratory notification of shipment

These document packages are to be filed in the subcontractor's project QA files and kept until requested by EG&G for permanent storage.

6.0 DOCUMENTATION

Information requested by this SOP will be documented on the RLSC (Form 1.9A) form(s) and the COC(s).

RESIDUAL LAB SOIL CHARACTERIZATION FORM (RLSC)

ATTACH CHEMICAL RESULTS OF ASSOCIATED SAMPLES

THIS PORTION WILL BE COMPLETED BY THE SUBCONTRACTOR AND APPROVED BY EG&G

Name of Subcontractor

Name of Chemical Laboratory

Date of Request

Are Associated Chemical Results Attached? (Y/N)

Subcontractor's Signature

Date

Comments:

EG&G Project Manager

Residual Lab Soil Characterization

Table with 3 columns: Sample I.D., Original COC #, and Characterization. Multiple rows for data entry.

Comments:

EG&G Approval Signature

Date

EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.10, Rev. 0
1 of 26
February 18, 1991
ER&WM

Safety Related
Category 1

TITLE:
RECEIVING, LABELING, AND
HANDLING WASTE CONTAINERS

Approved By:

J. W. Langman

1.0 TABLE OF CONTENTS

1.0	TABLE OF CONTENTS	1
2.0	PURPOSE AND SCOPE	3
3.0	RESPONSIBILITIES AND QUALIFICATIONS	3
4.0	REFERENCES	4
4.1	SOURCE REFERENCES	4
4.2	INTERNAL REFERENCES	5
5.0	EQUIPMENT	6
6.0	DRUM RECEIVING, MARKING, AND HANDLING PROCEDURES	7
6.1	DRUM COLOR CODES	11
6.2	RECEIVING	13
6.3	LABELING AND HANDLING	13
6.3.1	Liquid Waste Suspected of Containing Radioactive and/or Hazardous Substances (Gray Drums)	14
6.3.2	Temporary Containment of Solid Waste Pending Characterization (Gray Drums)	16
6.3.3	Solid Waste Suspected of Containing Radioactive and/or Hazardous Substances (White and White/Black Drums)	20
6.3.3.1	Verified Positive Reading During Field Monitoring	20
7.0	DOCUMENTATION	23
7.1	FIELD LOG FORMS	24

**EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.10, Rev. 0
2 of 26
February 18, 1991
ER&WM**

**Safety Related
Category 1**

7.2	DRUM INSPECTION FORM	25
7.3	CONTAMINANT CHARACTERIZATION FORM	25
7.4	COMPUTER LOG FORMS	26

LIST OF TABLES

Table 1.10-1	Background Surface Water and Sediment Stations for Rocky Flats Plant	9
--------------	--	---

LIST OF FIGURES

Figure 1.10-1	Potentially Contaminated Work Areas, Operable Unit No. 2	8
Figure 1.10-2	Color Coded Drums for Suspected Contaminated Solid Wastes	22

LIST OF APPENDIXES

Appendix 1.10A	Table A-1 Individual Hazardous Substance Sites	A-1
----------------	--	-----

2.0 PURPOSE AND SCOPE

The waste generated from environmental restoration (ER) field activities will be handled in accordance with the Rocky Flats Plant (RFP) waste management program. This standard operating procedure (SOP) describes procedures that will be used by subcontractors at RFP to receive, label, and handle waste drums until they are returned to RFP's representative, EG&G.

These procedures are intended to be sufficiently detailed so that conformance with them will result in reliable drum handling and management.

3.0 RESPONSIBILITIES AND QUALIFICATIONS

Personnel using light or heavy equipment, scientific monitoring devices, or operating company vehicles must have appropriate training or licenses.

The subcontractor's site manager is responsible for coordinating the removal and transfer of all wastes from the project work area.

The subcontractor is responsible for the drumming and transfer of solid waste suspected of containing radioactive and/or hazardous substances to EG&G's drum transfer area for transfer to EG&G Waste Operations personnel.

The subcontractor is also responsible for the transportation of liquid waste suspected of containing radioactive and/or hazardous substances to holding tanks located at the main EG&G decontamination facility.

**EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS SOP**

**Safety Related
Category 1**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.10, Rev. 0
4 of 26
February 18, 1991
ER&WM**

It is the subcontractor's site manager's responsibility to report as soon as possible to the EG&G project manager or a designated EG&G representative any damage incurred to a drum. Types of damage include holes, damage to the lid seal, or any other problem that may compromise drum integrity. Damaged drums must have their contents transferred to an undamaged drum or be overpacked.

The subcontractor's site manager will assign personnel to conduct monthly inspections of all the drums issued to the subcontractor until relinquished to EG&G. These inspections will ensure that drum integrity is maintained.

EG&G's Radiation Protection Technicians (RPTs) are responsible for conducting radiation screenings of equipment, samples, and personnel before they leave potentially contaminated work areas.

EG&G's Waste Operations personnel are responsible for the collection, transport, storage, treatment, and disposal of solid and liquid wastes from the drum transfer area at the main decontamination facility.

4.0 REFERENCES

4.1 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.

**EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.10, Rev. 0
5 of 26
February 18, 1991
ER&WM**

**Safety Related
Category 1**

Hall, Ridgway M. Jr., Tom Watson, Jeffrey J. Davidson, David R. Case, Nancy S. Bryson.
RCRA Hazardous Wastes Handbook. 6th Edition. Government Institutes, Inc. Rockville,
MD. March 1986.

National Institute for Occupational Safety and Health (NIOSH), Occupational Safety and
Health Administration (OSHA), U.S. Coast Guard (USCG), and U.S. Environmental
Protection Agency (EPA). Occupational Safety and Health Guidance Manual for
Hazardous Waste Site Activities. October 1985.

Rockwell International. Policies: Rocky Flats Plant, Use and Color Coding of Drums.
RFFPM MAT 20-005. November 3, 1989.

4.2 INTERNAL REFERENCES

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

- SOP 1.3, General Equipment Decontamination
- SOP 1.5, Handling of Purge and Development Water
- SOP 1.6, Handling of Personal Protective Equipment
- SOP 1.7, Handling of Decontamination Water and Wash Water
- SOP 1.8, Handling of Drilling Fluids and Cuttings
- SOP 1.9, Handling of Residual Samples
- SOP 1.12, Decontamination Facility Operations
- SOP 1.15, Use of PIDs and FIDs
- SOP 1.16, Field Radiological Measurements

5.0 EQUIPMENT

Several types of equipment can be used to move drums too heavy to lift safely. A list of appropriate equipment includes:

- A drum grappler attached to a hydraulic excavator
- A small front-end loader, which can be either loaded manually or equipped with a bucket sling
- A rough terrain forklift
- A roller conveyor equipped with solid rollers
- Drum carts designed specifically for drum handling
- Miscellaneous sizes of wrenches, sockets, and socket ratchets for opening and sealing drums
- Wood pallets
- Plastic or nylon banding

The drum grappler is the preferred equipment for handling heavy drums (NIOSH, et al., 1985).

EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.10, Rev. 0
7 of 26
February 18, 1991
ER&WM

Safety Related
Category 1

6.0 DRUM RECEIVING, MARKING, AND HANDLING PROCEDURES

Each project work area will be characterized by EG&G prior to any field activity. Work area characterizations will be based on the historical background of the work area and include the chemical results of previous soil and groundwater analyses and the results of field radiological surveys conducted by EG&G RPTs. Work areas associated with the ER program field operations fall into two characterizations: potentially contaminated and not potentially contaminated. Work areas currently characterized as potentially contaminated include the following:

- Individual Hazardous Substance Sites (IHSSs)
- Identified Groundwater Plume Areas
- Americium Zone at OU No. 2
- Surface water and sediment sampling stations that have not been verified as background locations

Potentially contaminated work areas where groundwater plumes have been identified will be specified in the applicable work plans, as appropriate. Table A-1 of Appendix 1.10A lists the IHSS work areas at RFP. Figure 1.10-1 illustrates the identified groundwater plume areas and the americium area at OU No. 2. Table 1.10-1 lists the surface water and sediment stations (locations) that have been verified as background stations (uncontaminated) as of December, 1990. Other surface and sediment sampling stations will be added to this list as they become verified as background stations. Unless specified in the individual project work plans, all other work areas will be considered potentially contaminated.

EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.10, Rev. 0
9 of 26
February 18, 1991
ER&WM

Safety Related
Category 1

TABLE 1.10-1
BACKGROUND SURFACE WATER AND SEDIMENT STATIONS
FOR
ROCKY FLATS PLANT

<u>Surface Water Station Number</u>	<u>Sediment Station Number</u>	<u>Location</u>
SW004	SED 22	Rock Creek Drainage
SW005	SED 20	Rock Creek Drainage
SW006	SED 23	Rock Creek Drainage
SW108	SED 21	Rock Creek Valley Wall
SW007	SED 04	Tributary of Walnut Creek
SW041	SED 17	Tributary of Woman Creek
SW080	SED 18	Tributary of Woman Creek (spring)
SW104	SED 19	Tributary of Woman Creek (spring)
SW107	SED 16	Woman Creek Drainage
SW042	SED 15	Offsite Gravel Pits

Draft Background Geochemical Characterization Report
Rocky Flats Plant, Golden, Colorado
rockwell\bkgdchem\sed-3a.jbb

Wastes generated during ER field operations will be handled depending on the work area characterization and the results of field monitoring performed during intrusive activities. Wastes suspected of containing radioactive and/or nonradioactive RCRA-regulated hazardous substances will be placed in color coded drums (see Subsection 6.2). The color of the drum used will depend on the type of suspected contaminants and whether the waste is solid or liquid.

The types of contamination that may be encountered within potentially contaminated work areas include the following:

- Low-level radioactively contaminated substances
- Nonradioactive RCRA-regulated hazardous (hazardous) substances
- Mixed (low-level radioactive and hazardous substances)

The use of field monitors for the detection of volatile organics and radionuclides is discussed in SOPs Nos. 1.8, Handling of Drilling Fluids and Cuttings; 1.15, Use of Photoionizing Detectors and Flame Ionizing Detectors; and 1.16, Field Radiological Measurements.

Waste generated within work areas characterized as not potentially contaminated and where no verified positive readings were detected on field monitors will be considered uncontaminated and handled as described in following SOPs:

- SOP 1.5, Handling of Purge and Development Water
- SOP 1.6, Handling of Personal Protective Equipment
- SOP 1.7, Handling of Decontamination Water and Wash Water
- SOP 1.8, Handling of Drilling Fluids and Cuttings
- SOP 1.9, Handling of Residual Samples

6.1 DRUM COLOR CODES

Various types of wastes are generated during ER field operations. Solid wastes for the purpose of ER waste management at the RFP include drill cuttings, sludge, surface soils, and disposable personal protective equipment (PPE). Liquid wastes generated during field activities include drilling fluids, decontamination and wash water, and residual groundwater and surface water samples.

EG&G has segregated drums into a color coding scheme for identification to ensure the proper management of waste (RFP MAT 20-005). The color code identifies the suspected contaminant characterization of the materials within the drums. The color scheme has been modified to specifically address ER operations. The color codes pertaining to waste generated during ER field operations are as follows:

- **Gray Drums**
 1. **Gray, 55-gallon, open top (removable top) drums will be used for the temporary containment of solid wastes generated within potentially contaminated work areas where no verified positive detections were encountered during field monitoring. These wastes are awaiting the results of chemical analyses for contaminant characterization (see Subsection 6.3.2).**
 2. **Gray, 55-gallon, open top drums may also be used for the transportation (when properly secured) of liquid wastes suspected of containing radioactive or hazardous substances. These drums will be transported to the liquid waste area at the main EG&G decontamination facility and emptied (see Subsection 6.3.1).**

• **White Drums**

White, 55-gallon, open top drums will be used for the storage and transfer of solid wastes suspected of containing radioactive or mixed substances. White drums suspected of containing mixed wastes will be marked with an "Other Regulated Materials Class E" (ORM-E) sticker (see Subsection 6.3.3) to distinguish mixed waste from radioactive waste. White drums suspected of containing only radioactive substances will be labeled with a "White I" radioactive waste label.

• **White/Black Drums**

Two-tone (white on the ends and black in the center), 55-gallon, open top drums will be used for the storage and transfer of nonradioactive RCRA-regulated hazardous solid wastes and will be marked with an ORM-E sticker (see Subsection 6.3.3).

Other closable transfer containers, appropriately sized for the volume of water generated by the tasked activity, may also be used for the transportation of potentially contaminated liquid wastes to the holding tanks at the central decontamination facility. They will also be appropriately marked with an ORM-E sticker and the word "NONPOTABLE."

Uncontaminated disposable PPE and uncontaminated miscellaneous solid wastes will be placed in garbage cans lined with plastic bags at the work area. When full, these plastic bags will be transferred to EG&G's custody at a designated transfer area.

If no verified positive readings above background are detected during field monitoring, fluids used for drilling and coring bedrock will be deposited on the ground within 15 feet

**EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.10, Rev. 0
13 of 26
February 18, 1991
ER&WM**

**Safety Related
Category 1**

of the borehole regardless of the work area characterization (see SOP 1.8, Handling of Drilling Fluids and Cuttings).

If no verified positive readings were detected during field monitoring, the water used for cleaning and rinsing equipment will also be deposited on the ground as describe in SOP 1.7, Handling of Decontamination Water and Wash Water.

6.2 RECEIVING

Waste drums can be obtained by contacting the EG&G project manager. The amount and type of drums required to perform the work should be specified by the subcontractor. The EG&G project manager will direct the subcontractor to the appropriate drum distribution area. An advance notice of two days is preferred.

6.3 MARKING AND HANDLING

White drums are premarked with an identification (ID) number by RFP representatives. The subcontractor will give a sequential number for each gray and white/black drum received. A two-letter subcontractor ID will follow directly behind the drum ID number. The letter ID will be chosen by the subcontractor. For example, "1326WC" would identify Drum Number 1326 handled by Woodward-Clyde. Additionally, an identifying marking will be associated with each drum. A Drum Field Log Form (Form 1.10A, see Section 7.0-Documentation) will be used by the subcontractor to track each drum used for containing solid wastes until returned to EG&G.

6.3.1 Liquid Waste Suspected of Containing Radioactive and/or Hazardous Substances (Gray Drums)

Liquid wastes generated within the following work areas will be characterized as potentially contaminated:

- Surface water and sediment sampling stations which have not been verified as background locations
- Work areas characterized as not potentially contaminated but where verified positive reading were detected during field monitoring
- Work areas where new wells or new surface water stations are being installed and there is no pre-characterization of the work area

These liquid wastes will be placed in gray drums or appropriately sized liquid transfer containers and transported by the subcontractor's personnel. Field personnel should decant the liquid waste from one drum (or container) to another (or from a trough to a drum or transfer container) if the amount of sludge and sediment within the liquid waste is substantial. The residual sediment will be drummed according to the work area characterization and the results of field monitoring as described in Subsections 6.3.2 and 6.3.3. The liquid waste will then be brought to the central EG&G decontamination facility. The decontamination facility will have an area specifically designed to receive liquid wastes. The liquid waste area will include a decanting process to remove residual sludges and sediments remaining within the liquid. The subcontractor will empty the entire drum's contents into this area. The liquid waste will be pumped from the decanting area to holding tanks. When a liquid holding tank is full, an EG&G

EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.10, Rev. 0
15 of 26
February 18, 1991
ER&WM

Safety Related
Category 1

designated subcontractor will take a representative sample from the tank for volatile organic analysis (see SOP 1.12, Decontamination Facility Operations).

The following marking and handling procedures apply to any transport containers used for transporting liquid wastes suspected of containing radioactive and/or hazardous substances:

- In addition to the ID number, the drums or transport tanks will be marked with the word "NONPOTABLE."
- A paint stick (or indelible marker) should be used to apply identifying marks on liquid transfer containers to ensure that the markings will not be washed away during decontamination or precipitation. Paint should not be applied in the vicinity of sampling or field monitoring events to prevent cross-contamination of samples.
- Identifying marks should be legible, approximately 5 inches high, and written on two (opposite) sides of the container.
- An EG&G RPT will do a radiation screening test on the exterior of the container before the container leaves the work area. If necessary, the exterior of the container will be decontaminated.
- Liquid waste container lids will be secured before the containers are transported. Containers will be transported in trucks with enclosed sides and will not be stacked.

- After the container's contents have been emptied, the subcontractor's personnel will decontaminate the container prior to any additional use (see SOP 1.3, General Equipment Decontamination).
- Empty gray drums may be stored by the subcontractor at a designated location in the work area. Drums will be banded to prevent them from blowing away.
- The subcontractor will designate personnel to inspect the integrity of the drums on a monthly basis. Drums will be inspected for damage. Types of damage include holes, damage to the lid seal, or any other problem that may compromise drum integrity. The subcontractor will report as soon as possible to the EG&G project manager or a designated EG&G representative any damage incurred to a drum. Damaged drums must have their contents transferred to an undamaged drum or be overpacked. The results of this inspection will be documented on a Drum Inspection Form (Form 1.10B, see Section 7.0-Documentation), dated, and signed by the person performing the inspection.
- Any containers used off site, such as decontamination and wash water containers, must meet DOT specifications for containers, markings, and labeling (see Subsection 6.3.2).

6.3.2 Temporary Containment of Solid Waste Pending Characterization (Gray Drums)

Gray drums will be used for the temporary containment of solid wastes that are pending characterization. These solid wastes were generated within work areas characterized as potentially contaminated but where no verified positive readings were detected on field monitors used during intrusive activities (see SOP 1.8, Handling of Drilling Fluids and

**EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.10, Rev. 0
17 of 26
February 18, 1991
ER&WM**

**Safety Related
Category 1**

Cuttings). Representative environmental samples from an associated well, boring, or sampling location will be sent to an off site laboratory for a full suite of analytical results to characterize these wastes.

Gray drums filled with solid wastes suspected of containing radioactive and/or hazardous substances will be brought to a designated transfer area at the main decontamination facility and transferred to the custody of EG&G's Waste Operations personnel.

The subcontractor will perform the following steps to ensure the proper handling of the gray drums until transferred to EG&G custody:

- In addition to the drum number, the drums will be marked with the word "SUSPECT"; the associated well, boring, or sampling number and location; the word "SOIL", or "PPE" (for disposable personnel protective equipment), as appropriate; the subsurface interval (if soil waste); and the date the drum was filled. (Soils will not be commingled with miscellaneous wastes or PPE within a drum.)
- A paint stick (or indelible marker) should be used to apply identifying marks on drums to ensure that the marks will not be washed away during decontamination or precipitation. A paint stick should not be applied in the vicinity of sampling or field monitoring events to prevent cross-contamination of samples.
- Identifying marks should be legible, with characters approximately 5 inches high, and written on two (opposite) sides of the drum.

**EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS SOP**

**Safety Related
Category 1**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.10, Rev. 0
18 of 26
February 18, 1991
ER&WM**

- An ORM-E sticker or "White I" label should be used, as appropriate (see Subsection 6.3.3.1).
- The appropriate information will be documented on the Drum Field Log Form (Form 1.10A).
- An EG&G RPT will do a radiation screening test on the exterior of the drum before the drum leaves the work area. If necessary, the exterior of the drum will be decontaminated.
- Drums will be transported in trucks with enclosed sides and will not be stacked.
- These gray drums will be transferred to EG&G's custody at a designated pickup area. The drums should be placed on wood pallets at the pickup area to assist the transfer.
- Drums will be decontaminated prior to any reuse, and the old markings should be spray-painted over and/or a new marking applied.
- Drum number should never be painted over or changed.

The volume of PPE generated will be less than the soil waste. Consequently, PPE will be placed in plastic garbage bags, sealed, and labeled with a waterproof marker. Each subcontractor will have a designated gray drum at the transfer area for the placement of plastic bags. The contents of the bags and the date will be documented on the drum's Field Log Form, which should be attached to the inside of the drum's lid. When the

drum is full, it will be stored on the wood pallets with the other gray drums for transfer to EG&G's Waste Operations personnel.

The plastic bag's label should include the gray drum number in which it will be placed; the associated well, boring, or sampling number and location; and the initials "PPE;" and the date.

When the validated chemical analyses from the environmental sample are received by EG&G, the subcontractor will be sent a summary of the results from the EG&G project manager. The subcontractor will maintain a project file of these results with the Drum Field Log Form of the drum containing the associated solid wastes. When all the sample methods for all the samples associated with a drum have been received, the subcontractor will fill out the upper portion of the Contaminant Characterization Form (Form 1.10C, see Section 7.0-Documentation). The form, along with the analytical summaries, will be submitted to the EG&G project manager. The designated EG&G representative will characterize the drum's contents and contact the appropriate Waste Operations personnel. Waste Operations personnel will transfer the associated drum's contents to the appropriate colored drum.

If the contents of the drum have been characterized as radioactive, mixed, or hazardous wastes, EG&G personnel will transfer the drum's contents to, or overpacked the drum with, a white drum with appropriate markings, or a white/black drum, respectively. The drum will then be transported to the appropriate EG&G storage facility. The drum's transfer will take place within 3 working days after the Contaminant Characterization Form has been returned to the Waste Management personnel. The gray drum will be brought to the main decontamination facility and decontaminated by the designated operating subcontractor prior to any additional use. The decontamination event will be recorded on the Drum Log Form.

If the drum's contents are characterized as "uncontaminated," the associated drum will be brought to the RFP landfill by EG&G personnel, or the contents may be disposed in proximity to the original borehole. The EG&G project manager will direct the disposition of "uncontaminated" soils.

6.3.3 Solid Waste Suspected of Containing Radioactive and/or Hazardous Substances (White and White/Black Drums)

Under no circumstances will a white or a white/black drum be left in the field overnight regardless if it is filled, partially filled, or empty. Since the RFP closes at 4:00 p.m., arrangements must be made by the subcontractor to ensure that white or white/black drums are brought to the drum transfer area prior to plant closing. Failure to remove white or white/black drums from the work areas by the end of the day will lead to noncompliance with this SOP.

6.3.3.1 Verified Positive Reading During Field Monitoring

White and white/black drums will be used to contain solid wastes at any work area where a verified positive reading above background has been detected on an organic vapor detector (OVD) and/or a field radiological monitor. White drums will be used for the transfer and storage of solid wastes suspected of containing radioactive or mixed substances. White/black drums will be used for the transfer and storage of solid wastes suspected of containing nonradioactive RCRA-regulated hazardous substances.

Field monitoring including OVDs and radiation detectors will be used during intrusive activities regardless of the work area classification. If a verified positive reading is encountered during the activity, the solid wastes will be drummed according to the results of the field monitoring for the remainder of the activity. For example, if the

work area has been characterized as not potentially contaminated, yet a positive reading was verified on a OVD, the solid waste generated during the remainder of this activity will be placed in white/black drums. SOP 1.8, Handling of Drilling Fluids and Cuttings describes the use of field monitors for intrusive activities as well as verifying positive reading.

Figure 1.10-2 illustrates the appropriate colored drums that will be used for containing solid wastes suspected of being contaminated based on the work area characterization and the results of field monitoring.

The subcontractor will perform the following steps to ensure the proper handling of waste drums suspected of containing radioactive and/or hazardous substances:

- White drums suspected of containing radioactive but not hazardous substances will be labeled with a "White I" radioactive label.
- All other drums, including white drums suspected of containing mixed waste, will have an ORM-E sticker.
- In addition to the drum number, the drums will be marked with the word "SOIL," or "PPE," as appropriate; the associated well, boring, or sampling number and location; the subsurface interval (if soil waste); and the date the drum was filled. Also the date the drum was filled will be marked in the appropriate space on the ORM-E sticker, if applicable.
- A paint stick (or indelible marker) should be used to apply identifying marks on drums to ensure that the labels will not be washed away during decontamination or precipitation. A paint stick should not be applied in the

EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.10, Rev. 0
23 of 26
February 18, 1991
ER&WM

Safety Related
Category 1

vicinity of sampling or field monitoring events to prevent cross-contamination of samples.

- Identifying marks should be legible, with characters approximately 5 inches high, and written on two (opposite) sides of the drum.
- The appropriate information will be documented on the Drum Field Log Form (Form 1.10A).
- An EG&G RPT will do a radiation screening test on the exterior of the drum before the drum leaves the work area. If necessary, the exterior of the drum will be decontaminated.
- Drum lids will be secured and drums will be transported in trucks with enclosed sides. Drums will not be stacked.
- White and white/black drums will be transported by the subcontractor to the transfer area and transferred to the custody of EG&G Waste Operations personnel.
- A copy of the completed Drum Field Log Form (Form 1.10A) will be given to the receiving EG&G Waste Operations personnel (see Section 7.0 - Documentation).

7.0 DOCUMENTATION

A permanent record of the implementation of this SOP will be kept by documenting field observations and data. Observations and data will be recorded on drum field log forms.

Subcontracting personnel may also choose to document the observations and data in a personal field notebook in addition to the field log forms. If a field book is used, entries should be made with a black waterproof ink pen. The field notebook should be waterproofed and have consecutively numbered pages.

It is recommended that the subcontractor bring duplicate copies of the completed Drum Field Log Form when transferring custody of waste drums to EG&G personnel. Both copies should be signed by the receiving EG&G representative. EG&G Waste Operations will retain one signed copy and the subcontractor will retain the second signed copy in the project files.

Drum forms will be kept in the subcontractor's project files until the project is completed. All project files will be turned over to EG&G at this time (see SOP 1.2, Field Documentation).

7.1 DRUM FIELD LOG FORMS

A Drum Field Log Form will be kept on each drum by the subcontractor from the time of issuance until returned to an EG&G representative. At a minimum, the forms will include the following:

- The name of the subcontractor issued the drum
- The color of the drum
- The identification number with the subcontractor's ID
- The date the drum was issued

- The location of the field activity area
- The contents of the drum (include the subsurface interval if contents are soils from a well or boring)
- The date the drum was filled
- The date the drum was decontaminated or returned to EG&G (include the EG&G facility where the drum was returned to)

Form 1.10A is an example of the Drum Field Log Form to be used. Drum log forms must be checked and updated immediately upon handling. In addition to the drum marking, the Drum Field Log Form will identify the drum and provide a history of the drum. All the field log forms combined will be used to track the movement of wastes generated during ER field operations.

7.2 DRUM INSPECTION FORM

The subcontractor is responsible for conducting monthly inspections of all the gray drums they have been issued until the drum is returned to EG&G. Monthly inspections will ensure that the integrity of the drums is maintained. The Drum Inspection Form (Form 1.10B) will be used to document these inspections.

7.3 CONTAMINANT CHARACTERIZATION FORM

The Contaminant Characterization Form (Form 1.10C) will be used for the characterization of materials that have been temporarily stored in gray drums until analytical results are received. Upon receipt of all the sample methods for each sample

**EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.10, Rev. 0
26 of 26
February 18, 1991
ER&WM**

**Safety Related
Category 1**

associated with the drum, the subcontractor will submit the drum identification portion of the form along with the analytical results to the EG&G project manager. The drum contents will be characterized by an EG&G representative based on the chemical analyses and returned to EG&G's Waste Operations personnel for transferal to the appropriate colored drum and storage.

7.4 COMPUTER LOG FORMS

All information found on drum field log forms may be entered into a computer database by designated subcontractor personnel. This will allow the immediate tracking of any waste drum used by a subcontractor during ER field activities and will provide a backup to the field log forms.

CONTAMINANT CHARACTERIZATION FORM
FOR GRAY DRUMS PENDING CHARACTERIZATION

ATTACH CHEMICAL RESULTS OF ASSOCIATED SAMPLES

THIS PORTION WILL BE COMPLETED BY SUBCONTRACTOR

Name of the Subcontractor Issued the Drum
The serialized Drum ID number with the Subcontractor's ID
The Date the Drum Was Taken to a Field Activity
The Location of the Field Activity Area
The Contents of the Drum (Subsurface Intervals, if Soils) (Bag #s, if PPE)

The Date the Drum was Filled
The Associated Well, Boring, or Sample location
Matrix of Sample Analyzed
Sample ID #s

Intervals Sample was Taken From
Date Submitted to EG&G for Characterization
Subcontractor's Representative Signature

THIS PORTION WILL BE COMPLETED BY EG&G

The Contaminant Characterization of the Drum's Contents
Signature of EG&G Representative Determining the Contaminant Characterization and Date Signed
Date
EG&G Holding Facility Where Drum Will be Stored

Date and Time Form Returned to Waste Operations Date Time

APPENDIX A

TABLE A-1
ROCKY FLATS PLANT
INDIVIDUAL HAZARDOUS SUBSTANCE SITES

<u>REF. NO.</u>	<u>SITE NAME</u>
101	207 SOLAR EVAPORATION PONDS
102	OIL SLUDGE PIT
103	CHEMICAL BURIAL
104	LIQUID DUMPING
105	OUT-OF-SERVICE FUEL TANKS 105.1 - WESTERNMOST TANK 105.2 - EASTERNMOST TANK
106	OUTFALL
107	HILLSIDE OIL LEAK
108	TRENCH T-1
109	TRENCH T-2
110	TRENCH T-3 TRENCHES T-4 TO T-11 111.1: TRENCH T-4 111.2: TRENCH T-5 111.3: TRENCH T-6 111.4: TRENCH T-7 111.5: TRENCH T-8 111.6: TRENCH T-9 111.7: TRENCH T-10 111.8: TRENCH T-11
112	903 DRUM STORAGE AREA
113	MOUND AREA
114	PRESENT LANDFILL
115	ORIGINAL LANDFILL
116	MULTIPLE SOLVENT SPILLS 116.1: WEST LOADING DOCK AREA 116.2: SOUTH LOADING DOCK AREA

Note: This information is based on the administrative record including the information submitted in the hazardous and low-level mixed waste Part B application dated November 1, 1985, as modified by the subsequent revision dated November 28, 1986, as modified by the subsequent revision dated December 15, 1987, and the transuranic mixed waste Part B application submitted July 1, 1988, Thereafter referred to as the applications. This information is also based on independent review of historical aerial photographs of the facility and independent review of facility submittals.

Table A-1 (cont.)

INDIVIDUAL HAZARDOUS SUBSTANCE SITES

<u>REF. NO.</u>	<u>SITE NAME</u>
117	CHEMICAL STORAGE 117.1: NORTH SITE 117.2: MIDDLE SITE 117.3: SOUTH SITE
118	MULTIPLE SOLVENT SPILLS 118.1: WEST OF BUILDING 731 118.2: SOUTH END OF BUILDING 776
119	MULTIPLE SOLVENT SPILLS 119.1: WEST AREA 119.2: EAST AREA
120	FIBERGLASSING AREAS 120.1: NORTH OF BUILDING 664 120.2: WEST OF BUILDING 664
121	ORIGINAL PROCESS WASTE LINES
122	UNDERGROUND CONCRETE TANK
123	VALVE VAULT 7 123.1: VALVE VAULT 7 4,000 GALLON TANK #67)
125	HOLDING TANK
126	OUT-OF-SERVICE PROCESS WASTE TANKS 126.1: WESTERNMOST TANK 126.2: EASTERNMOST TANK
127	LOW-LEVEL RADIOACTIVE WASTE LEAK
128	OIL BURN PIT NO. 1
129	OIL LEAK
130	RADIOACTIVE SITE - 800 AREA SITE #1
131	RADIOACTIVE SITE - 700 AREA SITE \$1
132	RADIOACTIVE SITE - 700 AREA SITE #4
133	ASH PITS 133.1:ASH PIT 1-1 133.2:ASH PIT 1-2 133.3:ASH PIT 1-3 133.4:ASH PIT 1-4 133.5:INCINERATOR 133.6:CONCRETE WASH PAD
134	LITHIUM METAL DESTRUCTION SITE
135	COOLING TOWER BLOWDOWN

Table A-1 (cont.)
INDIVIDUAL HAZARDOUS SUBSTANCE SITES

<u>REF. NO.</u>	<u>SITE NAME</u>
136	COOLING TOWER PONDS 136.1 : NORTHEAST CORNER OF BUILDING 460 136.2 : WEST OF BUILDING 460 136.3 : S. OF BLDG. 460, W. OF BLDG. 444
137	COOLING TOWER BLOWDOWN - BLDG. 774
138	COOLING TOWER BLOWDOWN - BLDG. 779
139	CAUSTIC/ACID SPILLS 139.1: HYDROXIDE TANK AREA 139.2: HYDROFLUORIC ACID TANKS
140	REACTIVE METAL DESTRUCTION SITE
141	SLUDGE DISPERSAL
142	RETENTION PONDS (A,B,C-SERIES) 142.1: A-1 POND METAL DESTRUCTION SITE
141	SLUDGE DISPERSAL
142	RETENTION PONDS (A,B,C-SERIES) 142.1: A-1 POND 142.2: A-2 POND 142.3: A-3 POND 142.4: A-4 POND 142.5: B-1 POND 142.6: B-2 POND 142.7: B-3 POND 142.8: B-4 POND 142.9: B-5 POND 142.10: C-1 POND 142.11: C-2 POND 142.12 NEWLY IDENTIFIED A-5 POND
143	OLD OUTFALL
144	SEWER LINE BREAK
145	SANITARY WASTE LINE LEAK
146	CONCRETE PROCESS WASTE TANKS 146.1: 7,500 GALLON TANK (#31) 146.2: 7,500 GALLON TANK (432) 146.3: 7,500 GALLON TANK (*34W) 146.4: 7,500 GALLON TANK (#34E) 146.5: 3,750 GALLON TANK (*30) 146.6: 3,750 GALLON TANK (#33)
147	PROCESS WASTE LEAKS 147.1: MAAS AREA 147.2: OWEN AREA
148	WASTE SPILLS
149	EFFLUENT PIPE

Table A-1 (cont.)
INDIVIDUAL HAZARDOUS SUBSTANCE SITES

<u>REF. NO.</u>	<u>SITE NAME</u>
150	RADIOACTIVE LIQUID LEAKS (8) 150.1: NORTH OF BUILDING 771 150.2: WEST OF BUILDING 771 150.3: BETWEEN BUILDINGS 771 and 774 150.4: EAST OF BUILDING 750 150.5: WEST OF BUILDING 707 150.6: SOUTH OF BUILDING 779 150.7: SOUTH OF BUILDING 776 150.8: NORTHEAST OF BUILDING 770
151	FUEL OIL LEAK
152	FUEL OIL TANK
153	OIL BURN PIT NO. 2
154	PALLET BURN SITE
155	903 LIP AREA
156	RADIOACTIVE SOIL BURIAL 156.1: BUILDING 334 PARKING LOT 156.2: SOIL DUMP AREA
157	RADIOACTIVE SITE 157.1: NORTH AREA 157.2: SOUTH AREA
158	RADIOACTIVE SITE - BLDG. 551
159	RADIOACTIVE SITE - BLDG. 559
160	RADIOACTIVE SITE - BLDG. 444 PK LOT
161	RADIOACTIVE SITE - BLDG. 664
162	RADIOACTIVE SITE - 700 AREA SITE #2
163	RADIOACTIVE SITE - 700 AREA SITE #3 163.1: WASH AREA 163.2: BURIED SLAB
164	RADIOACTIVE SITE - 800 AREA SITE #2 164.1: CONCRETE SLAB 164.2: BUILDING 886 SPILLS 164.3: BUILDING 889 STORAGE PAD
165	TRIANGLE AREA
166	TRENCHES 166.1: TRENCH A 166.2: TRENCH B 166.3: TRENCH C
167	SPRAY FIELDS - THREE SITES 167.1: NORTH AREA 167.2: POND AREA 167.3: SOUTH AREA
168	WEST SPRAY FIELD

TABLE A-1 (cont.)
INDIVIDUAL HAZARDOUS SUBSTANCE SITES

<u>REF NO.</u>	<u>SITE NAME</u>
169	WASTE DRUM PEROXIDE BURIAL
170	P.U.& D. STORAGE YARD - WASTE SPILLS
171	SOLVENT BURNING GROUND
172	CENTRAL AVENUE WASTE SPILL
173	RADIOACTIVE SITE - 900 AREA
174	P.U.&D. CONTAINER STORAGE FACILITIES (2)
175	S&W BLDG. 980 CONTAINER STORAGE FACILITY
176	S&W CONTRACTOR STORAGE YARD
177	BUILDING 885 DRUM STORAGE AREA
178	BUILDING 881 DRUM STORAGE AREA
179	BUILDING 865 DRUM STORAGE AREA
180	BUILDING 883 DRUM STORAGE AREA
181	BUILDING 334 CARGO CONTAINER AREA
182	BUILDING 444/453 DRUM STORAGE AREA
183	GAS DETOXIFICATION AREA
184	BUILDING 991 STEAM CLEANING AREA
185	SOLVENT SPILL
186	VALVE VAULT 12
187	ACID LEAKS (2)
188	ACID LEAK
189	MULTIPLE ACID SPILLS
190	CAUSTIC LEAK
191	HYDROGEN PEROXIDE SPILL
192	ANTIFREEZE DISCHARGE
193	STEAM CONDENSATE LEAK
194	STEAM CONDENSATE LEAK
195	NICKEL CARBONYL DISPOSAL
196	WATER TREATMENT PLANT BACKWASH POND
197	SCRAP METAL SITES
198	VOCs IN GROUND WATER
199	CONTAMINATION OF THE LAND SURFACE
200	GREAT WESTERN RESERVOIR
201	STANDLEY RESERVOIR
202	MOWER RESERVOIR
203	INACTIVE HAZARDOUS WASTE STORAGE AREA
204	ORIGINAL URANIUM CHIP ROASTER
205	BLDG. 460 SUMP 43 ACID SIDE
206	INACTIVE D-836 HAZARDOUS WASTE TANK
207	INACTIVE 444 ACID DUMPSTER
208	INACTIVE 444/447 WASTE STORAGE AREA
209	SURFACE DISTURBANCE SOUTHEAST OF BLDG. 881
210	UNIT 16, BUILDING 980 CARGO CONTAINER

TABLE A-1 (cont.)
INDIVIDUAL HAZARDOUS SUBSTANCE SITES

<u>REF NO.</u>	<u>SITE NAME</u>
211	UNIT 26, BUILDING 881 DRUM STORAGE
212	UNIT 63, BUILDING 371 DRUM STORAGE
213	UNIT 15, 904 PAD PONDCRETE STORAGE
214	UNIT 25, 750 PAD PONDCRETE AND SALTCRETE STORAGE
215	UNITS 55.13, 55.14, 55.15, 55.16 - TANKS T-40, T-66, T-67, T-68
216	EAST SPRAY FIELDS 216.1: NORTH AREA 216.2: CENTER AREA 216.3: SOUTH AREA
217	UNIT 32, BUILDING 881, CN- BENCH SCALE TREATMENT

EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.11, Rev. 0
1 of 8
February 18, 1991
ER&WM

Safety Related
Category 1

TITLE:
FIELD COMMUNICATIONS

Approved By:

J.W. Longman

1.0 TABLE OF CONTENTS

1.0	TABLE OF CONTENTS	1
2.0	PURPOSE AND SCOPE	2
3.0	RESPONSIBILITIES AND QUALIFICATIONS	2
4.0	REFERENCES	2
4.1	SOURCE REFERENCES	2
5.0	COMMUNICATION PROCEDURES	3
5.1	COMMUNICATIONS INTERNAL TO SUBCONTRACTOR'S OPERATION	3
5.1.1	Radios and Telephones	3
5.1.2	Alarms	4
5.1.3	Buddy System	5
5.1.4	Hand Signals	5
5.2	EXTERNAL COMMUNICATION	6
6.0	DOCUMENTATION	8

2.0 PURPOSE AND SCOPE

This standard operating procedure (SOP) provides procedures that will be used at The Rocky Flats Plant (RFP) to establish subcontractor internal and external communication links, and basic emergency communication needs.

3.0 RESPONSIBILITIES AND QUALIFICATIONS

A short training session on use of telephones and radios will be conducted by the subcontractor's Site Manager. Concomitantly, a discussion of communication etiquette and emergency signals will be included in the training. The Site Manager should document the names of all personnel attending these training sessions in the daily log book. The Site Manager will post the names and phone numbers of key personnel to be contacted in case of emergency.

In case of an emergency, the Emergency Coordinator (EC) for the RFP is the Shift Supervisor on duty. The EC will respond to all emergencies and coordinate emergency response activities. The EC will activate the Emergency Operation Center (EOC), notify departments that have an advisory role in the situation, and contact off-site agencies (police, medical, etc.) if required.

4.0 REFERENCES

4.1 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.

EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.11, Rev. 0
3 of 8
February 18, 1991
ER&WM

Safety Related
Category 1

EG&G. Rocky Flats Plant Environmental Restoration Health and Safety Program Plan.
October 1990.

EG&G. Rocky Flats Plant Environmental Restoration Health and Safety Program Plan.
October 1990.

5.0 COMMUNICATION PROCEDURES

5.1 COMMUNICATIONS INTERNAL TO SUBCONTRACTOR'S OPERATION

5.1.1 Radios and Telephones

A communication center will be established at the subcontractor's field trailer office. This office will be equipped with a telephone communications system for routine operations. Field radios and chargers are assigned and issued to subcontractors by EG&G's Environmental Monitoring Assessment Division (EMAD), RFP. Radios are assigned as follows:

- 1 radio per field team
- 1 radio for the field trailer
- 1 radio for the site supervisor
- 1 radio for the site Health and Safety Officer
- 1 to 2 radio(s) as spares

All subcontractor radios shall be operated on channel 3.

All subcontractors assigned under EMAD share the same radio network and channel.

Field teams will utilize the two-way radio system for contact with both the field office trailer and other field teams. The radio system will be part of the RFP network so that field crews have a direct link to emergency response groups if an emergency occurs. In the event of an emergency, procedures outlined in the Site Health and Safety Plan shall be followed. If a temporary shortage of radios occurs, subcontractors can arrange to use each other's field trailer radio for communications with their respective field crews. Since multiple subcontractors share the same radio network and channel, it is important for field crews to exercise prudent use of field radios. Any field crew declaring an emergency shall have priority on radio usage. All other personnel not involved in the emergency or emergency response shall refrain from radio usage until the emergency is resolved. Additionally, proper demeanor will be maintained on the radio network at all times. This means that no profanity or coarse language will be used in transmitting messages.

Radio transmissions will not use codes to deliver messages. Radios requiring repair will be exchanged with EG&G EMAD.

5.1.2 Alarms

All personnel working on the RFP will be trained to immediately recognize RFP and Emergency Response site alarm signals.

Standard alarm signals must be documented in each Site Plan. Subcontractors can call 966-7541 to listen to a recording of RFP alarm signals and the significance of each.

In addition to the standard RFP and Emergency Response site alarm signals, field crews involved in drilling or other loud-noise activities will utilize a compressed air horn to communicate the alarm messages identified below:

Safety Related
Category 1

- One long blast -- evacuate area in a cross-wind direction
- Two short blasts -- localized problem (not dangerous to workers)
- Two long blasts -- all clear

Field crews will use hand signals to indicate an understanding of the alarm message as appropriate.

5.1.3 Buddy System

Most field activities will be conducted in pairs or groups of personnel. This system, known as the buddy system, ensures that all personnel receive assistance if required. Additionally, the buddy system minimizes the health and safety risks associated with any hazardous area.

The buddy system alone may not be sufficient to ensure that help will be provided in an emergency. Therefore, workers in the activity area should be in line-of-sight contact or communications contact with backup personnel in the work area.

5.1.4 Hand Signals

The following standard hand signals shall be used in the event of failure of radio communications or if wearing personal protective equipment impedes hearing:

- Hand gripping throat -- out of air, cannot breathe
- Grip partner's wrist or both hands around partner's waist -- leave area immediately
- Hands on top of head -- need assistance
- Thumbs up -- ok; I am all right; I understand
- Thumbs down -- no; negative

5.2

EXTERNAL COMMUNICATION

The specifics for each field activity will be delineated in the Health and Safety Plan accompanying that activity. In general, the following is applicable to all situations.

The closest accessible telephone during all working hours will be identified by the Site Safety Officer (SSO) prior to commencing field activities if communication with the field trailer office communications center is not possible. All guard posts have telephones. Emergency telephone numbers will be posted near the field office telephone as follows:

Rocky Flats Plant Medical Facility (Building 122, Central Avenue)

Ambulance Service 966-2911
General Information 966-2594

Rocky Flats Fire
Emergency 966-2911
Routine 966-4336

Rocky Flats Police/Security
Emergency 966-2911
Routine 966-2444

Spill Response
Emergency 966-2911
Non-Emergency 966-2914

When reporting an emergency provide as much detail as possible, such as:

- Your name
- Your location
- Exact location of the emergency
- Nature of emergency
- Condition of patient if applicable
- Special hazards in the area
- Any other information requested

In addition, the names and phone numbers of key personnel at Emergency Response remedial project sites with the authority and training to respond to accidents and emergencies must be provided in the subcontractor's Site Plan and posted on site so that they are readily accessible to site workers. Key ER site personnel to be contacted in the event of an emergency are as follows:

1. EG&G Shift Supervisor
2. EG&G Environment Restoration Project Manager
3. EG&G Site Health & Safety Coordinator
4. Subcontractor Field Manager
5. Subcontractor Health & Safety Officer

The EG&G Shift Supervisor, with assistance from the EG&G Site Safety Officer, has responsibility and authority for coordinating all emergency response activities until proper authorities arrive and assume control.

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Safety Related
Category 1**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.11, Rev. 0
8 of 8
February 18, 1991
ER&WM**

6.0

DOCUMENTATION

A permanent record of the implementation of this SOP will be kept by documenting pertinent field observations and data. Observations of violations that could affect worker health and safety will be recorded by field personnel with black waterproof ink in a bound weatherproof field notebook with consecutively numbered pages. Any observations that need to be permanently documented will be entered into the site manager's daily activity notebook. Entries must be signed and dated by personnel making the entries.

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.12, Rev. 0
1 of 20
February 18, 1991
ER&WM**

**Safety Related
Category 1**

**TITLE:
DECONTAMINATION FACILITY
OPERATIONS**

Approved By:

J. W. Langford

1.0 TABLE OF CONTENTS

1.0	TABLE OF CONTENTS	1
2.0	PURPOSE AND SCOPE	3
3.0	RESPONSIBILITIES AND QUALIFICATIONS	3
4.0	REFERENCES	5
4.1	SOURCE REFERENCES	5
4.2	INTERNAL REFERENCES	5
5.0	EQUIPMENT REQUIRED	6
5.1	EQUIPMENT AND SUPPLIES TO BE PROVIDED AT THE MDF	6
5.2	EQUIPMENT AND SUPPLIES TO BE PROVIDED BY MDF USERS	8
5.3	MDF CONFIGURATION	9
5.3.1	Equipment Decontamination Pad	9
5.3.2	Liquid Waste Management Area	9
5.3.3	The Drum Transfer Area	9
6.0	PROCEDURES	11
6.1	INTRODUCTION	11
6.2	DSC	11
6.2.1	Coordinating With MDF Users	12
6.2.2	Routine Maintenance, Operations, and Minor Repairs	12
6.3	MDF USERS	14
6.3.1	Coordinating With the DSC	14

6.3.2	Operations At the MDF	14
6.4	PERSONAL DECONTAMINATION	15
6.5	WASTE HANDLING AND SAMPLING	16
6.5.1	Unrepairable Equipment And PPE Used By DSC Employees	16
6.5.2	PPE Worn by MDF Users	17
6.5.3	Water Wastes	17
6.5.4	Sediments in the Decontamination Pad Floor Drain Sump and Sedimentation Tank Bottoms	18
6.6	DRUM TRANSFER AND DRUM STAGING	18
6.6.1	Drum Transfer Procedure	18
6.6.2	Drum Staging Procedures	19
7.0	DOCUMENTATION	19

LIST OF FIGURES

FIGURE 1.12-1	FACILITY DIAGRAM	10
---------------	------------------------	----

2.0 PURPOSE AND SCOPE

This standard operating procedure (SOP) describes procedures that will be used at the Rocky Flats Plant (RFP) Main Decontamination Facility (MDF). MDF as used in the context of waste management at RFP refers to a fixed facility that will generally include a paved and bermed area equipped with sumps, pumps, and pressurized sprays intended for use in decontaminating large items that could not conveniently be decontaminated in a relatively uncontrolled environment. Currently, one MDF is under construction. However, the Environmental Monitoring and Assessment Division (EMAD) plans include the construction of additional MDF facilities. The terminology MDF should not be interpreted to refer to any specific RFP decontamination facility.

This SOP is applicable to all decontamination operations conducted as part of the Environmental Restoration (ER) Program and is specifically applicable to heavy equipment and waste containers (drums) used in a work area characterized by EG&G as potentially contaminated (see SOP 1.10, Receiving, Labeling, and Handling Waste Containers). This SOP is also specifically applicable to heavy equipment and waste containers used in a work area characterized as not potentially contaminated but where field monitoring conducted during intrusive activities indicates the possible presence of contamination. This SOP does not apply to heavy equipment and waste containers used in a work area characterized by EG&G as not potentially contaminated if field monitoring conducted during intrusive activities does not indicate the presence of contamination. However, a subcontractor may chose to follow the procedures established by this SOP as general practice.

3.0 RESPONSIBILITIES AND QUALIFICATIONS

The EG&G project manager has the overall responsibility for implementing this SOP and will construct MDFs as needed; provide certain equipment, as listed in Subsection 5.1, Equipment To Be Provided at the MDF; and designate a subcontractor to be responsible for the day-to-day

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.12, Rev. 0
4 of 20
February 18, 1991
ER&WM**

**Safety Related
Category 1**

operation of the MDF. For the purposes of this SOP, the designated subcontractor is referred to as the DSC.

The subcontractor designated to maintain the MDF is responsible for providing general use equipment; coordinating with MDF users to ensure efficient utilization of the MDF; performing routine maintenance, operations, and minor repairs to equipment and facilities; managing waste liquids and residual sediments that are brought to the MDF; and maintaining documentation.

Individual subcontracting companies using the MDF are responsible for coordinating with the DSC, providing the items specified in Subsection 5.2 and as described in Subsection 6.3, conducting the decontamination of their own equipment, and verifying the decontamination effectiveness. Additional equipment-specific decontamination guidance is available within SOP 1.4, Heavy Equipment Decontamination; SOP 1.5, Handling of Purge and Development Water; SOP 1.7, Handling of Decontamination and Waste Water; SOP 1.8, Handling of Drilling Fluids and Cuttings; SOP 1.10, Receiving, Labeling, and Handling Waste Containers.

All subcontractor's project managers will be responsible for assigning project staff to implement this SOP and for ensuring the heavy equipment and waste containers used by the subcontractor are decontaminated according to the procedures outlined in this SOP.

All personnel performing these procedures are required to have the appropriate health and safety training as specified in 29 CFR 1910.120. In addition, all personnel are required to have a complete understanding of the procedures described within this SOP and receive specific training regarding these procedures, if necessary. Personnel using light or heavy equipment, scientific monitoring devices, or operating vehicles must have appropriate training or licenses.

EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.12, Rev. 0
5 of 20
February 18, 1991
ER&WM

Safety Related
Category 1

4.0 REFERENCES

4.1 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.

Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities. NIOSH/OSHA/USCG/EPA. October 1985.

Nuclear Weapon Accident Response Procedures (NARP) Manual. The Defense Nuclear Agency. January 1984. Change 1, July 1984.

Standard Operating Safety Guides. EPA. November 1984.

4.2 INTERNAL REFERENCES

Related SOPs and EG&G Radiological Operating Instructions (ROI) cross-referenced in these procedures are as follows:

- SOP 1.3, General Equipment Decontamination
- SOP 1.4, Heavy Equipment Decontamination
- SOP 1.6, Handling of Personal Protective Equipment
- SOP 1.7, Handling of Decontamination Water and Washwater
- SOP 1.8, Handling of Drilling Fluids and Cuttings
- SOP 1.10, Receiving, Labeling, and Handling Waste Containers
- SOP 1.13, Containerizing, Preserving, Handling, and Shipping of Soil and Water Samples

- SOP 1.16, Field Radiological Measurements
- SOP 4.6, Sediment Sampling
- ROI 3.1, Performance of Surface Contamination Surveys

5.0 EQUIPMENT REQUIRED

Various equipment items, supplies, and structures must be provided for the MDF to function as intended. In an attempt to simplify this subject, the equipment listing has been divided into these subsections: Subsection 5.1, Equipment and Supplies to be Provided at the MDF; Subsection 5.2, Equipment and Supplies to be Provided by MDF Users; and Subsection 5.3, MDF Configuration.

5.1 EQUIPMENT AND SUPPLIES TO BE PROVIDED AT THE MDF

The following is a list of equipment that will be provided at the MDF for general use. The party responsible (EG&G or the DSC) for providing each item is indicated in parentheses.

- Drains and tanks for the collection and holding of decontamination and rinse solutions (EG&G)
- One or more movable tanks for containing RFP tap water for use during decontamination (DSC)
- Pumps for moving liquids from one container to another container (DSC)
- High pressure steam cleaner and high pressure wash and rinse systems (DSC)
- Portable power generator (DSC)

- Splash curtains (EG&G)
- Wooden pallets (EG&G)
- A rough terrain forklift or equivalent heavy equipment item outfitted with a "drum grappler" (DSC)
- A drum rack designed to hold empty 55-gallon drums in a manner that promotes an outward flow of decontamination fluids from the drum interior as it is being decontaminated (EG&G)
- Flammable storage facility/cabinet (EG&G)
- A "dumpster" for containerizing uncontaminated waste (EG&G)
- A two wheeled "dolly" designed to carry 55-gallon drums (DSC)
- Plastic sheeting (DSC)
- Long and short-handled stiff bristle brushes (DSC)
- Wire brushes (DSC)
- Wash and rinse buckets for equipment interiors (DSC)
- Premoistened towelettes (DSC)
- Duct tape or equivalent (DSC)

- **Windsock or equivalent method for decontamination workers to determine the wind direction (DSC)**
- **A bottom filling bailer or equivalent to collect water samples (DSC)**
- **Grey, removable-top 55-gallon drums (EG&G)**

5.2 EQUIPMENT AND SUPPLIES TO BE PROVIDED BY MDF USERS

Each subcontractor that uses the MDF will provide the following equipment and supplies as needed to complete their decontamination activities:

- **Personal protective equipment (PPE) as required by the site specific Health and Safety Plan**
- **Waste containers (obtained from EG&G) for used PPE, non-reusable items required to complete decontamination, and soils dislodged during decontamination**
- **An organic vapor detector (OVD) and a radiation monitor to screen equipment and waste containers for an estimate of the effectiveness of decontamination efforts**
- **Wash and rinse buckets necessary to establish a personal decontamination line**
- **Any equipment or task specific decontamination fluids required by a SOP or SOPA but that are not listed as being available at the MDF**
- **Blank waste container labels to replace any completed labels that become dislodged or rendered illegible during the decontamination process**

5.3 MDF CONFIGURATION

A typical MDF is depicted in Figure 1.12-1, MDF Configuration. A MDF consists of three functional areas, the equipment decontamination pad, the liquid waste management area, and the drum transfer area.

5.3.1 Equipment Decontamination Pad

The equipment decontamination pad includes a drainage system, a sump for collection of fluid runoff, and a pumping system for moving fluids from the sump to the liquid waste management area. Wet sediments will be removed from the sump manually.

5.3.2 Liquid Waste Management Area

The liquid waste management area consists of large holding tanks enclosed by berms, and sedimentation tanks located between the bermed area and the decontamination pad. All liquid wastes are emptied into the sedimentation tanks, and when the residual sediments have settled, the relatively sediment free liquids are pumped from the sedimentation tanks to the large holding tanks.

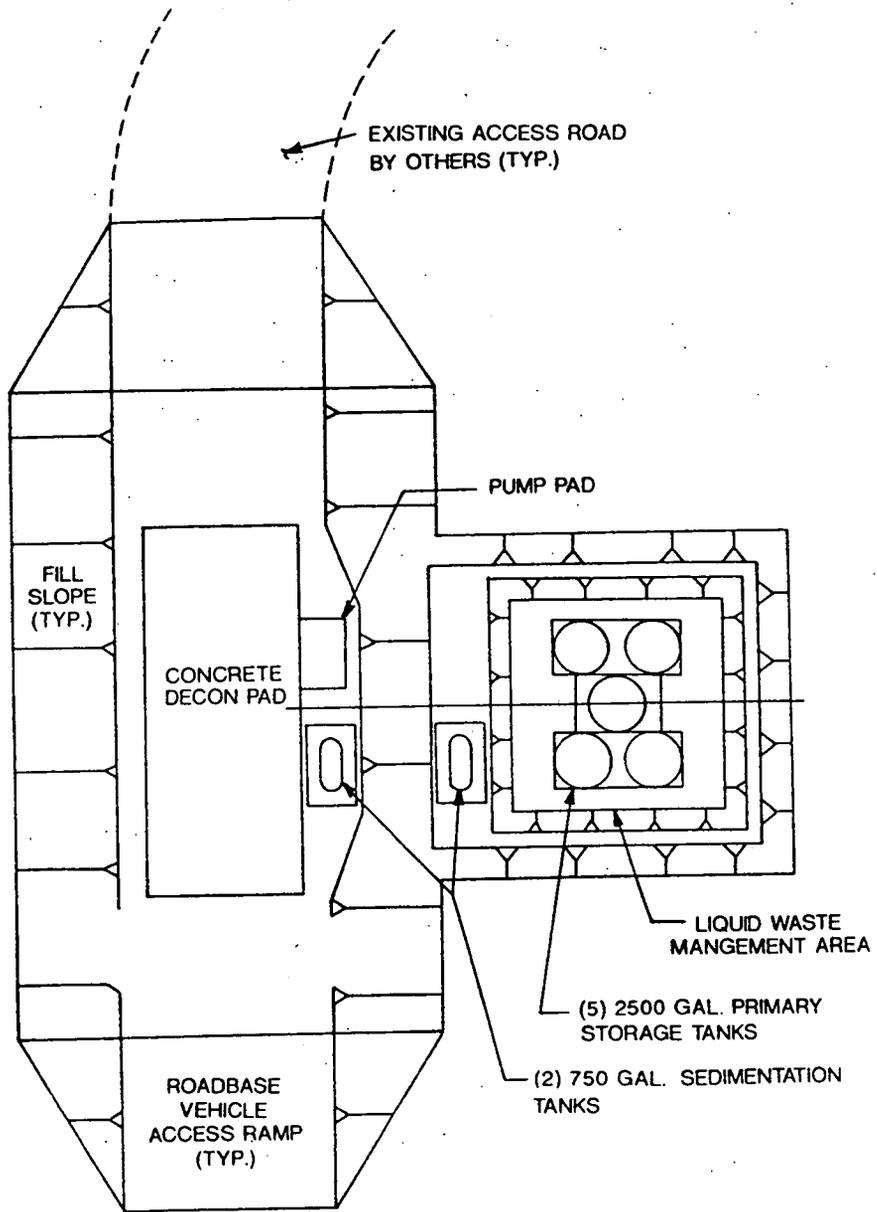
5.3.3 The Drum Transfer Area

The drum transfer area is the point at which subcontractors transfer colored drums containing wastes suspected of containing radioactive and/or hazardous substances to EG&G representatives. Transfers of filled drums will normally occur at the conclusion of each day of field operations. Partially filled waste drums will be stored at a temporary staging area at the drum transfer area until they are retrieved for complete filling. When full, drums will be placed at the designated drum transfer point.



DRUM TRANSFER AREA

EXISTING ACCESS ROAD BY OTHERS (TYP.)



TYPICAL MDF CONFIGURATION

5-21200-FOP
 1.12, Rev. 0
 10 of 20
 February 18, 1991
 ER&WM

U.S. DEPARTMENT OF ENERGY
 Rocky Flats Plant, Golden, Colorado

OPERABLE UNIT 2
 PHASE II RFI/RI WORK PLAN (BEDROCK)

RFP-903 PAD
 DRILLING

FIG. 1.12-1 1/24/91

6.0 PROCEDURES

6.1 INTRODUCTION

Effective decontamination procedures are required to minimize the potential for cross-contamination, offsite contaminant migration, and personnel exposure from improperly decontaminated equipment. Heavy equipment and waste containers may become contaminated in either of the two following scenarios: (1) when used in a work area characterized as potentially contaminated such as an Individual Hazardous Substance Site (IHSS) or (2) when used in a work area characterized as not potentially contaminated but where field monitoring conducted during field activities indicates the possible presence of contamination. Because contamination is not always easily discernible, it will be assumed that equipment used in one of the two preceding scenarios has been contaminated and will therefore require decontamination.

Procedures established in this SOP are not applicable for heavy equipment used in a work area characterized as not potentially contaminated where no verified positive detections were encountered during field monitoring. Heavy equipment used in these work areas may be washed at the MDF. Form 1.4A, Heavy Equipment Decontamination/Wash Checklist and Record, Sections I, II, and III will be completed for heavy equipment decontaminated or washed (see SOP 1.4, Heavy Equipment Decontamination).

6.2 DESIGNATED SUB-CONTRACTOR (DSC)

The subcontractor designated to maintain the MDF is responsible for providing general use equipment as specified in Subsection 5.1; coordinating with MDF users to ensure efficient utilization of the MDF; performing routine maintenance, operations, and minor repairs to equipment and facilities as described below; managing waste liquids and residual sediments (as described in

Subsection 6.5) that are placed at the MDF; and maintaining documentation as described in Section 7.0.

6.2.1 Coordinating With MDF Users

The DSC will coordinate with MDF Users by accomplishing the following:

- Maintaining and issuing keys to subcontractors required to use the MDF
- Maintaining a roster of subcontractors that have been issued keys and a point of contact to receive information regarding the operation of the MDF
- Devising and posting a system of priorities for use of the MDF
- Informing other subcontractors of any changes to this SOP
- Scheduling foreseeable periods of "downtime" and notifying other subcontractors of both scheduled and unscheduled periods of "downtime"
- Scheduling use of the rough terrain forklift

6.2.2 Routine Maintenance, Operations, and Minor Repairs

At the beginning of each day of ER field operations, the DSC will perform the following:

- Visually inspect the MDF to verify that the required equipment and supplies are on-hand

**Safety Related
Category 1**

- Reinstall splash screens if they have been removed and repair any tears by applying duct tape or equivalent over the tear on both sides of the curtain
- Perform routine maintenance on equipment by following instructions in the equipment owners manuals
- Fill decontamination fluid and rinse fluid reservoirs
- Pump any liquids in the sedimentation tanks into a holding tank. If, after the liquid has been pumped, a sufficient amount of sediment has accumulated, the sediment will be drummed, sampled, and handled as described in Subsection 6.5.4.
- When necessary, use the steam generator to deice the MDF

At the end of each days operation, the DSC will perform the following:

- Decontaminate all MDF structural surfaces, powered equipment, and nonpowered equipment.
- Use an OVD to monitor the MDF surfaces, then collect and have radiological smear tests counted, as described in SOP 1.16, Field Radiological Measurements. If either the OVD or the smear tests indicate the presence of contamination, the involved surfaces will be decontaminated again and remonitored.
- Drain and winterize all equipment that could be damaged internally by the freezing of fluids.

- Ethylene glycol will not be used as an antifreeze in any of the pressurized spray systems.
- Pump any liquids from the floor sump into a decanting tank.

6.3 MDF USERS

Subcontractors using the MDF are responsible for providing the items specified in Subsection 5.2; conducting decontamination of equipment and verification of decontamination effectiveness as described previously in Subsection 6.1; coordinating with the DSC; and conducting operations at the MDF as described below.

6.3.1 Coordinating With the DSC

Before a subcontractor may initially use the MDF, that subcontractor must register with the DSC by signing for a key to the MDF, designating an employee to be responsible for the key and to serve as a point of contact to interface with the DSC. MDF users are to maintain strict control over the key to the MDF and notify the DSC if any above normal usage of the MDF is anticipated.

6.3.2 Operations At the MDF

- Splash screens must be closed if pressurized sprays are to be used.
- Subcontractors should request that DSC personnel pump the MDF floor drain sump if planned decontamination activities are likely to cause the sump to overflow
- The "buddy system" will be employed while decontamination activities are being conducted with the splash screens closed.

- Decontamination procedures for heavy equipment and/or waste containers will preempt equipment washing operations described in Subsection 6.1.
- Items from different work areas will not be decontaminated simultaneously within the screened-in area of the MDF.
- Each MDF user will steam clean all surfaces within the screened portion of the MDF after each use. Screens used to enclose the decontamination pad and equipment used during equipment decontamination will be steam cleaned.

6.4 PERSONAL DECONTAMINATION

- MDF users will bring a sufficient quantity of containers to the MDF to establish a personal decontamination line as required by the site-specific health and safety plan. DSC personnel will decontaminate the personal decontamination containers that hold decontamination and rinse fluids.
- DSC personnel will conduct personal decontamination as described in the applicable Health and Safety Plan.
- Personal decontamination lines will not be established downwind of any pressurized sprays being used at the MDF.

6.5 WASTE HANDLING AND SAMPLING

Wastes generated at the MDF will normally fit within one of the following categories.

- Unrepairable equipment
- PPE worn by MDF users decontaminating equipment or waste containers
- PPE worn by DSC employees working at the MDF
- Water brought to the MDF by subcontractors and water used to decontaminate equipment and waste containers
- Sediments in the decontamination pad floor drain sump and sediments in the sedimentation tank's bottom

The handling and sampling of each waste category is described in the following sections. Any subcontractor that anticipates wastes other than those listed above will coordinate the proposed handling procedures with the appropriate EG&G representative before implementing the proposed procedures.

6.5.1 Unrepairable Equipment And PPE Worn By DSC Employees

Unrepairable equipment and PPE used by DSC employees working at the MDF will be thoroughly decontaminated and placed in a dumpster for uncontaminated wastes.

6.5.2 PPE Worn by MDF Users

PPE worn during decontamination of equipment or waste containers used in the field will be disposed of in the same manner as PPE used during the field operation that warranted the decontamination activity.

6.5.3 Water Wastes

Liquid wastes will be emptied into the sedimentation tanks before being pumped into holding tanks. When a holding tank becomes full, the DSC will open the tank, monitor the tank interior with an OVD, and will use a bottom filling bailer or equivalent to collect a sample. Water samples will be analyzed by an EG&G approved laboratory for the target compound list (TCL) volatiles. The sampler will be decontaminated as described in SOP 1.3, General Equipment Decontamination, before and after each sample collection event. The sample will be collected from the middle portion of the tank. As the bailer is removed from the holding tank, its contents will be emptied into a sample container and the container sealed. The sample container exterior will then be decontaminated and the sample transferred to the DSC's sample manager for marking and handling as described in SOP 1.13, Containerizing, Preserving, Handling, and Shipping of Soil and Water Samples. All samples will be marked to reflect the holding tank they were drawn from. After sampling, the tank will be sealed to prevent the addition of more water after sampling has occurred.

Results of sample analysis will be used by an EG&G representative to determine the disposition of the tanks contents. If the total concentration of TCL volatile organics is less than 1 part per million (ppm), the DSC will notify EG&G Waste Operations personnel who will use an appropriately sized water container to transport the holding tank contents to the EG&G evaporation tank. If the total TCL volatile organics concentration is greater than 1 ppm, the DSC will pump approximately one-half of the holding tank's contents into a separate holding tank and then add water from either an

unsampled holding tank or from the settling basins. Resampling will be accomplished and the analytical results used to determine how each holding tank's contents will be handled. These procedures will be conducted every time a holding tank becomes full.

6.5.4 Sediments in the Decontamination Pad Floor Drain Sump and Sediments in the Sedimentation Tank Bottoms

Sediment wastes generated at the MDF will be composited in grey drums. Grey drums used by the DSC will be obtained, marked, and handled as described in SOP 1.10, Receiving, Labeling, and Handling Waste Containers. At the end of each day of operation, any sediments that remain in the MDF floor drain sump will be placed into the same sedimentation tank as the water that was pumped from the sump. If at the beginning of each day of operation, the depth of sediments remaining in the settling basins appears to be sufficient to fill a 55-gallon drum, representative sediment samples will be collected using the General Sampling Procedure for collecting sediment material (see SOP 4.6, Sediment Sampling). Collected samples will be transferred to the DSC's sample manager and will be analyzed for (TAL) metals and other metals; pH; nitrate; percent solids; TCL volatiles, semi-volatiles, pesticides/PCBs; and radionuclides. After samples have been collected, the sediment will be removed from the settling basin and placed into a grey drum.

6.6 DRUM TRANSFER AND DRUM STAGING

The drum transfer area and the drum staging area at the MDF will be identified by signs and each area will be delineated by rope.

6.6.1 Drum Transfer Procedures

Filled drums will be sealed and marked as described in SOP 1.10, Receiving, Labeling, and Handling Waste Containers, before being transported to the MDF. At the MDF, each subcontractor will

decontaminate the filled drums (see SOP 1.4, Heavy Equipment Decontamination) and place each drum at the drum transfer area for transfer custody to EG&G Waste Operations.

Subcontractors will maintain a Drum Field Log Form (See SOP 1.10) on each drum issued to them by EG&G. The Drum Field Log Form is partially completed in the field and documents the type of waste contained in the drum. When EG&G Waste Operations personnel take custody of the drums, subcontractor personnel will complete the Drum Field Log Form by recording the name of the EG&G representative receiving the drum.

6.6.2 Drum Staging Procedures

Partially-filled drums will be sealed and marked as described in SOP 1.10, Receiving, Labeling, and Handling Waste Containers, before being transported to the MDF. At the MDF, each subcontractor will decontaminate the partially-filled drums (see SOP 1.4, Heavy Equipment Decontamination) and place each partially-filled drum at the drum staging area.

It is the responsibility of each subcontractor to maintain Drum Field Log Forms that correspond to the drums placed at the drum staging area and to retrieve and complete the filling of those drums at the first opportunity. The "first opportunity" is defined as the next field activity likely to generate wastes that are suitable for placement in the staged drums.

7.0 DOCUMENTATION

The DSC responsible for operation of the MDF will maintain a bound activities log book. The activities log is intended to reflect the daily activities accomplished in order to operate the MDF. Additionally, Form 1.12A, Main Decontamination Facility Daily Record of Activities, will be completed on a daily basis.

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.12, Rev. 0
20 of 20
February 18, 1991
ER&WM**

**Safety Related
Category 1**

A Drum Field Log Form (Form 1.10A) will be kept on each drum issued to the DSC until the drum is returned to an EG&G representative.

The DSC will conduct an inspection of the drums within the temporary staging area or any grey drum used for general use. The inspection should be conducted at least monthly. The Drum Inspection Form (Form 1.10B) will be used to document these inspections.

A Contaminant Characterization Form (1.10C) will be used for the characterization of the wastes generated at the MDF that have been placed in grey drums and are suspected to contain radioactive and/or hazardous substances.

The preceding forms are described in detail in SOP 1.10, Receiving, Labeling, and Handling Waste Containers.

MAIN DECONTAMINATION FACILITY
DAILY RECORD OF ACTIVITIES

Facility and Equipment Inspection

Facilities and Equipment Operational: _____ Yes ____ No (if no explain & describe corrective action)

Management of Main Decontamination Facility (MDF)

Listing of Subcontractors Issued MDF Keys:

<u>Name</u>	<u>Phone</u>
_____	_____
_____	_____
_____	_____

Record of Information Disseminated to MDF Users

MDF Waste Management Activities

Liquid Waste Holding Tanks Sampled:

Tank(s) Number(s) _____

MDF Pad Sampling Liquid Pumped And Dredger Removed _____ Yes _____ No (if No explain) _____

Results of MDF Facility and Equipment Monitoring.

OVD _____ FIDLER _____

(Name) (Subcontractor) (Phone)

EG&G ROCKY FLATS PLANT
EMAD GEOTECHNICAL SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.13, Rev. 0
1 of 18
February 18, 1991
ER&WM

Safety Related
Category 1

TITLE:
CONTAINERIZING,PRESERVING,
HANDLING AND SHIPPING OF
SOIL AND WATER SAMPLES

Approved By:

J. W. Langman

1.0	TABLE OF CONTENTS	
1.0	TABLE OF CONTENTS	1
2.0	PURPOSE AND SCOPE	3
3.0	RESPONSIBILITIES AND QUALIFICATIONS	3
4.0	REFERENCES	3
4.1	SOURCE REFERENCES	3
4.2	INTERNAL REFERENCES	4
5.0	EQUIPMENT	5
5.1	EQUIPMENT LIST	5
5.2	DEPARTMENT/OFFICE CONTACT LIST	6
6.0	PROCEDURES	6
6.1	SAMPLE CONTAINERS AND PRESERVATIVES	6
6.2	CONTAINER LABELING, DECONTAMINATION, AND FIELD PACKAGING	7
6.3	CHAIN OF CUSTODY RECORD	8
6.3.1	Tampering of Sample Containers	9
6.3.2	Chain of Custody Form	10
6.4	FIELD DATA DOCUMENTATION	12
6.5	PACKAGING AND SHIPPING	13
7.0	QUALITY ASSURANCE/QUALITY CONTROL SAMPLES	17
8.0	DOCUMENTATION	17

LIST OF FIGURES

FIGURE 1.13-1 SAMPLE COMPLETED COC FORM 11

LIST OF APPENDIXES

APPENDIX A NON-RADIOLOGICAL AND RADIOLOGIC TABLES A-1

LIST OF TABLES IN APPENDIX A

**TABLE A-1 SAMPLE CONTAINERS, SAMPLE PRESERVATION, AND SAMPLE HOLDING
FOR TARGET COMPOUND AND TARGET ANALYTS LIST**

**TABLE A-2 SAMPLE CONTAINERS, SAMPLE PRESERVATION, AND SAMPLE HOLDING
TIMES FOR TARGET COMPOUNDS AND TARGET ANALYTE TESTS**

**TABLE A-3 SAMPLE CONTAINERS, SAMPLE PRESERVATION, AND SAMPLE HOLDING
TIMES FOR RADIOLOGICAL SAMPLES - WATER MATRIX**

**TABLE A-4 SAMPLE CONTAINERS, SAMPLE PRESERVATIONS, AND SAMPLE HOLDING
TIMES FOR RADIOLOGICAL SAMPLES - SOIL MATRIX**

**EG&G ROCKY FLATS PLANT
EMAD GEOTECHNICAL SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.13, Rev. 0
3 of 18
February 18, 1991
ER&WM**

2.0 PURPOSE AND SCOPE

This standard operating procedure (SOP) describes procedures that will be used at Rocky Flats to define the SOPs addressing sample containers, preservatives, handling, packaging and shipping of soil/sediment and water samples collected at the Rocky Flats Plant (RFP).

3.0 RESPONSIBILITIES AND QUALIFICATIONS

All personnel performing these procedures are required to have the appropriate health and safety training as specified in the site-specific Health & Safety Plan. In addition, all personnel are required to have a complete understanding of the procedures described within this SOP and receive specific training regarding these procedures.

Only qualified personnel will be allowed to perform these procedures. Required qualifications are based on minimum of a two year science related degree and/or education, previous experience, on-the-job training, and supervision by an onsite chemist. The subcontractor's project manager will document personnel qualifications related to this procedure in the subcontractor's project QA files.

4.0 REFERENCES

4.1 SOURCE REFERENCES

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

DOE 1987: The Environmental Survey Manual. DOE/EH-0053, Volumes 1-4. August 1987.

Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA. Interim Final. October 1988.

**EG&G ROCKY FLATS PLANT
EMAD GEOTECHNICAL SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.13, Rev. 0
4 of 18
February 18, 1991
ER&WM**

**Safety Related
Category 1**

RCRA Facility Investigation Guidance. Interim Final. May 1989.

Rocky Flats Plant Environmental Restoration Program. Quality Control Plan. January 1989.

Technical Enforcement Guidance Documentation (TEGD) USEPA. 1986

Test Methods for Evaluating Solid Waste, Volume II: Field Manual Physical/Chemical Methods.
USEPA. SW-846. 3rd Edition. November 1986.

User's Guide to the Contract Laboratory Program. USEPA. December 1988.

4.2 INTERNAL REFERENCES

Related SOPs cross-referenced by this SOP are:

- SOP 1.3, General Equipment Decontamination
- SOP 1.14, Data Base Management
- SOP 2.6, Groundwater Sampling
- SOP 3.8, Surface Soil Sampling
- SOP 4.6, Sediment Sampling
- SOP 4.3, Surface Water Sampling
- SOP 4.7, Collection of Tap Water Sampling
- SOP 4.8, Pond Sampling
- SOP 4.9, Industrial Effluent and Pond Discharge Sampling

5.0 EQUIPMENT

5.1 EQUIPMENT LIST

The following list of equipment is not intended to be task specific. The equipment and materials shown are the minimum that may be needed to ensure that proper procedures are followed for sample handling, packaging, and shipping.

- Sample containers/bottles
- Coolers
- Thermometer
- Blue ice
- Sample labels
- COC forms
- Decontamination equipment¹
- Preservatives
- Baggies for containers
- Bubble wrap
- Vermiculite or equivalent
- Strapping and clear tape
- Custody seals
- Garbage bags
- Metal paint cans²

Appropriate uses for the equipment listed are detailed in the following sections of this SOP.

¹ Decontamination equipment and procedures are thoroughly discussed in the General Equipment Decontamination, SOP No. 1.3

² Large enough to accommodate sample containers.

5.2 DEPARTMENT/OFFICE CONTACT LIST

EG&G or its designee is responsible for obtaining the appropriate documentation for RAD screening, and monitoring of all field samples for shipment off site.

The following departments will need to be contacted before sample shipment.

- Construction Management Coordinator - To obtain property passes for shipment of materials off site
- Radiation Site Survey Office - For radiation monitoring and clearance of off site shipment of coolers
- On-site General Laboratories - For radiological screening and categorization of field samples

6.0 PROCEDURES

Procedures for the containerizing, preserving, handling and shipping of soil and water samples detailed in this SOP follow strict criteria of the USEPA's Contract Laboratory Program. This SOP is intended to present general guidelines for proper sample handling, and any deviations or modifications will be documented in the Scope of Work or specific Task Order as well as SOP addendum forms.

6.1 SAMPLE CONTAINERS AND PRESERVATIVES

Only sample containers certified as clean by the manufacturer will be used for sample collection. The containers and preservatives may be obtained from the contracted analytical laboratory, their

designated supplier, or a suitable chemical supply company. Any preservative(s) required may be added to the container by the contracted analytical laboratory, field sampling team, sample manager, and/or on-site chemist prior to or during sample collection.

The matrices discussed in this SOP for chemical and radiological parameters are:

Soil Matrix - to include soils, sediments, and sludges (see SOP 3.8, Surface Soil Sampling; SOP 4.6, Sediment Sampling)

Water Matrix - to include surface water, groundwater and process liquids (see SOP 2.6, Groundwater Sampling; SOP 4.3, Surface Water Sampling; SOP 4.7, Collection of Tap Water Samples; SOP 4.8, Pond Sampling; and SOP 4.9, Industrial Effluent and Pond Discharge Sampling)

Tables A-1 and A-2 show both CLP and non-CLP parameters of interest for water and soil matrices with the associated container size, preservatives (chemical and/or temperature); and holding times. Tables A-3 and A-4 show radiological parameters, containers, preservatives, and holding times for water and soil matrices.

6.2 CONTAINER LABELING, DECONTAMINATION, AND FIELD PACKAGING

Prior to sample collection, the sample bottles will be labeled by the sample manager or an assistant. Collection time and date will be marked in the field by the sampler. The labels will indicate:

- Activity name and/or number
- Unique sample number
- Sampling time and date
- Chemical preservative used

- Sample type (grab, composite)
- Analyses required
- Filtered/unfiltered
- Comments or special precautions, as needed
- Samplers Initials

The sample label will be marked with a black waterproof pen. If needed, clear tape will be placed over labels before sampling to assure that the labels remain legible.

Subsequent to sampling, the exterior of the sample containers will be decontaminated according to SOP No. 1.3, General Equipment Decontamination, bagged in plastic bags, and placed in coolers dedicated for sample and sample container transportation. The temperature in the coolers will be maintained at approximately 4°C by adding sealed plastic bags containing blue ice (or an equivalent) to the coolers.

During the initial stages of field work, the sample manager should use a thermometer to verify that an adequate amount of blue ice is being used to maintain sample temperature at approximately 4°C.

6.3 CHAIN OF CUSTODY RECORD

Official custody of samples must be maintained and documented from the time of collection until the time that valid analytical results have been obtained or the laboratory has been released to dispose of the sample. The sampling team will be responsible for initiating the original chain of custody (COC) form and will sign and date this form when relinquishing custody of samples to the sample manager. Upon receipt, the sample manager will check the COC and all sample labels to ensure that all samples are accounted for and in good condition, and that no errors were made in labeling and/or completing the COC.

A sample is considered to be in a person's custody if any of the following conditions are met:

- The sample is in the person's physical possession.
- The sample is in line of sight of the person after he/she has taken possession.
- The sample is secured by that person so that any tampering can be detected.
- A sample is secured by the person in possession in an area which only authorized personnel can enter.

6.3.1 Tampering of Sample Containers

If, at any time after samples have been secured, custody seals are identified as having been tampered with, this procedure will be followed to ensure that sample integrity has not been compromised.

- Check cooler temperature to verify 4°C.
- Check with all personnel having access to sample coolers to verify possible inadvertent tampering.
- Check every sample container for any signs of tampering, such as loose lids, foreign objects in containers, broken or leaking containers, etc.
- Check to ensure adequate and appropriate packaging.
- Document all findings of the incident in the sample manager's field log book.

If it is determined that malicious tampering of samples has occurred and/or it is believed that sample integrity has been compromised, the subcontractor will immediately contact EG&G.

If it can be determined that sample integrity has not been compromised based on the above criteria, document findings in sample manager's field logbook and proceed with this standard operating procedure.

6.3.2 Chain of Custody Form

The three-page carbonless COC Form (Form 1.13A) is shown in Section 8.0, Documentation. An example of a completed COC Form is illustrated in Figure 1.13-1. The original and second (yellow) copy will be included with the samples to be shipped enclosed in a plastic bag and taped inside the lid of the cooler. The third (pink) copy along with a photocopy of the original will remain on file at the subcontractors on-site facility. The contract laboratory will sign as having received the samples and return the yellow copy of the COC to the project management office for verification by the QA/QC officer or their designee. The yellow and pink copies will then be matched and filed to complete the chain of custody procedure.

The chain of custody form will include the following information:

- Unique sample number and sample location
- Project number
- Date and time of sample collection
- Signature of collector or field custodian
- Laboratory designation
- Sample matrix

**EG&G ROCKY FLATS PLANT
EMAD GEOTECHNICAL SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.13, Rev. 0
12 of 18
February 18, 1991
ER&WM**

**Safety Related
Category 1**

- Condition of sample on receipt at the laboratory
- Chain of custody control number
- Signature and date blocks for personnel relinquishing or receiving sample custody
- Space for additional comments
- Name and phone number of emergency contact person
- Analysis requested
- Out of spec reporting

6.4 FIELD DATA DOCUMENTATION

All field descriptions, measurements, and observations will be recorded on the appropriate field data Form (Form 1.13B) in accordance with SOP 1.2, Field Data Documentation. The original data forms will be collected and filed on site by the designated subcontractor's data entry personnel. These forms are to be bound and submitted to EG&G with an accompanied transmittal letter, for the duration of the task, on a monthly schedule for the entire duration of the task. This form is an example of data entries required for the Rocky Flats Environmental Data System (RFEDS) database. Data may also be recorded in field logbooks if desired. Field data will be filled out at the time a sample is taken and will include, but not be limited to, the following information:

- Sampling activity name and number
- Sampling point name and number
- Sample number*
- Name(s) of collector(s) and others present
- Date and time of sample collection*
- Sample container tag number (if appropriate)*
- Preservative(s) used*

* Items will be documented on the COC form.

- Requested analyses*
- Sample matrix*
- Filtered/unfiltered*
- Designation of QC samples* (ONLY for MS and MSD)
- Collection methods
- Chain of custody control numbers
- Field observations and measurements during sampling (comment section)
- Signature of responsible observer

6.5 PACKAGING AND SHIPPING

Prior to commencement of field activities, estimated levels of chemical and/or radiological contaminants will be determined from known historical data for all matrices to be sampled by EG&G or its designee. This SOP addresses procedures for low, medium, and high level concentrations. The three levels of concentrations are defined as follows:

- **Low-Concentration Samples** - The contaminant of highest concern is present at less than 10 parts per million (ppm). Examples include background environmental samples.
- **Medium-Concentration Samples** - The contaminant of highest concern is present at a level greater than 10 ppm and less than 15 percent (150,000 ppm). Examples include material that is obviously weathered.
- **High-Concentration Samples** - At least one contaminant is present at a level greater than 15 percent. Samples from drums and tanks are assumed to high concentration unless information indicates otherwise.

Radiation screening of field samples as determined by EG&G and their prime contractors will be sent to the on-site General Laboratory. The RAD screening procedures determine which laboratory receives samples based on results of greater than (GT) QR less than (LT) 50 picocuries/liter for waters or 50 picocuries/gram for soils. The RAD screening procedures will also enable the subcontractor to follow applicable Department of Transportation (DOT) guidelines for shipment of these environmental samples.

All sample containers will have been decontaminated and bagged in the field. Upon receipt and verification of sample containers and COC forms, the following steps will be taken:

- The designated laboratory will be notified prior to shipment if samples collected in the field are suspected of containing any other substance for which the laboratory personnel should take additional safety precautions.
- Contact the Radiation Site Survey Office so that all containers to be shipped off site can be radiologically cleared.
- Obtain Property Passes signed by the Construction Management Coordinator and the Radiation Site Survey Officer so that coolers may be shipped off site.
- Line the sample cooler with a large plastic bag.
- Place approximately 3 inches of vermiculite in the bottom of the cooler.
- Wrap glass containers in bubble pack.
- Verify that all samples requiring screening have reported estimated radiological activity levels.

- Place bagged and wrapped sample containers (except VOC vials) upright in the cooler with approximately 1 inch between them.
- Place bagged and wrapped sample containers upright, except for the volatile organic compounds (VOC) vials, in the cooler with approximately 1 inch between them and the sides of the cooler.
- Fill the cooler approximately three-quarters full of vermiculite, making sure that sample containers are securely packed.
- Insert the two VOC vials upright in the center of the cooler.
- Fill the cooler with vermiculite, allowing adequate space at the top for blue ice.
- Bag the blue ice (or equivalent) and place several packages in the top space of the cooler**
- Seal the signed COCs in a plastic bag and tape it to the underside of the lid of the cooler.
- Tape the drain of the cooler shut.
- Wrap strapping tape around the cooler in two locations to secure the lid.
- Place the airbill on top of the cooler. If more than one cooler is sent to the same laboratory, an address label and a manifest label are needed.

** See Appendix A, Tables 1 and 2 for parameters requiring $4^{\circ}\text{C} \pm 2^{\circ}\text{C}$.

EG&G ROCKY FLATS PLANT
EMAD GEOTECHNICAL SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.13, Rev. 0
16 of 18
February 18, 1991
ER&WM

Safety Related
Category 1

- Place "This Side Up" labels on all four sides and "Fragile" labels on the top and two sides of the cooler.
- Place "Environmental Samples" label on top of cooler. For coolers over 75 pounds, an additional "Heavy Weight" label is required in the upper left corner on top of the cooler.
- Place signed and dated custody seals in two locations sealing the cooler lid so that tampering will be evident.

The following steps will be taken for samples determined of containing both medium and/or high level concentrations:

- Enclose all sample containers in clear plastic bags.
- Pack all medium and high level water and soil samples in metal paint cans.
- Label paint cans with sample number of sample contained inside.
- Surround contents of can with non-combustible, absorbent packing material.
- Use freezer packages cool samples to 4°C.
- Pack sealed paint cans or plastic-enclosed sample bottles in shipment container.
- Use a metal ice chest for shipment (do not use cardboard or styrofoam containers to ship samples).

**EG&G ROCKY FLATS PLANT
EMAD GEOTECHNICAL SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.13, Rev. 0
17 of 18
February 18, 1991
ER&WM**

**Safety Related
Category 1**

- Surround contents with non-combustible, absorbent packing material (do not use earth or ice packing materials).
- Tape paperwork in plastic bags under cooler lid.
- Close cooler and seal with custody seals.

Sample coolers may be received by courier at a predetermined area at the Rocky Flats Plant. If arrangements cannot be made, a company vehicle is required to deliver sample coolers to the laboratory and/or courier office.

7.0 QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

Quality Assurance (QA) and Quality Control (QC) will be administered according to the QAPjP, the project-specific Quality Assurance Addendum (QAA), and QC requirements presented in this SOP.

8.0 DOCUMENTATION

Documentation of observations and data acquired in the field will provide information on the handling and preparation of the samples collected in addition to a permanent record. Sampling personnel will be responsible for documenting the handling, preparation, packaging, and shipping of the samples. These observations and data will be recorded with black waterproof ink on subject specific data sheets, (i.e. instrument calibration data sheet, field measurement data sheet and/or field logbooks).

Copies of the chain of custody records for the samples shipped during the data collection task will be kept on file at the site office and the prime contractor's main office.

APPENDIX A

NON-RADIOLOGICAL AND RADIOLOGIC TABLES

TABLE A-1
SAMPLE CONTAINERS, SAMPLE PRESERVATION, AND SAMPLE HOLDING TIMES FOR
TARGET COMPOUND AND TARGET ANALYTE LISTS

WATER MATRIX

Parameter	Container	Preservative	Holding Time
<u>Liquid - Low to Medium Concentration Samples</u>			
Organic Compounds:			
Purgeable Organics (VOCs)	2 x 40-mL VOA vials with teflon lined septum lids	Cool, 4°C ^a with HCl to pH < 2	7 days 14 days
Extractable Organics (BNAs), Pesticides and PCBs	1 x 4-L amber ^b glass bottle	Cool, 4°C ^a	7 days until extraction, 40 days after extraction
Organophosphorus Pesticides and Herbicides	1 x 4-L amber ^b glass bottle	Cool, 4°C	7 days until extraction, 40 days after extraction
Dioxins/Furans	2 x 1-L amber ^b glass bottles	Cool, 4°C	7 days until extraction, 40 days after extraction
Inorganic Compounds:			
Metals (TAL)	1 x 1-L polyethylene bottle	Nitric acid pH < 2	6 mo ^c
Cyanide	1 x 1-L polyethylene bottle	Sodium hydroxide ^d pH > 12; Cool, 4°C	14 days
Sulfide	1 x 1-L polyethylene bottle	1 mL-zinc acetate sodium hydroxide to pH > 9; Cool, 4°C	7 days

^a Add 0.008% sodium thiosulfate (Na₂S₂O₃) in the presence of residual chlorine

^b Container requirement is for any or all of the parameters given.

^c Holding time for mercury is 28 days.

^d Use ascorbic acid only if the sample contains residual chlorine. Test a drop of sample with potassium iodine-starch test paper; a blue color indicates need for treatment. Add ascorbic acid, a few crystals at a time, until a drop of sample produces no color on the indicator paper. Then add an additional 0.6g of ascorbic acid for each L of sample volume.

TABLE A-1 (continued)
 SAMPLE CONTAINERS, SAMPLE PRESERVATION, AND SAMPLE HOLDING TIMES
 FOR MISCELLANEOUS PARAMETERS

WATER MATRIX

Parameter	Sample Volume /Container	Preservative	Holding Time
<u>Liquid - Low to Medium Concentration Samples</u>			
Acidity	200 mL/P, G	Cool, 4°C	14 days
Alkalinity	200 mL/P, G	Cool, 4°C	14 days
Bacteriological	1 L/P,G	Cool, 4°C	6 hr
Static Bioassay	4 L	Cool, 4°C	48 hr
Biochemical Oxygen Demand (BOD)	2 L/P, G	Cool, 4°C	48 hr
Chemical Oxygen Demand (COD)	300 mL, P, G	Cool, 4°C, Sulfuric Acid to pH < 2	28 days
Chloride	200 mL/P, G	None	28 days
Chlorine Residual	In situ, beaker or bucket	None	Analyze immediately
Color	200 mL	Cool, 4°C	48 hr
Conductivity	300 mL/P, G	Cool, 4°C	28 days (determine on-site if possible)
Chromium, Hexavalent	200mL/P, G	Cool, 4°C	24 hr
Dissolved Oxygen (Probe)	In situ, beaker or bucket	None	Determine on-site
Dissolved Oxygen (Winkler)	300 mL glass, BOD bottle	Fix on site, store in dark	8 hr (determine on-site if possible)

TABLE A-1 (continued)

**SAMPLE CONTAINERS, SAMPLE PRESERVATION, AND SAMPLE HOLDING TIMES
FOR MISCELLANEOUS PARAMETERS**

WATER MATRIX

Parameter	Sample Volume /Container	Preservative	Holding Time
<u>Liquid - Low to Medium Concentration Samples (continued)</u>			
Toxicity Characteristic Leaching Procedure (TCLP)	4 L amber glass	Cool, 4°C	Extract within 7 days, analyze within 40 days
Fluoride	1 L/P	None	28 days
Hardness	300 mL/P, G	1:1 Nitric Acid, pH < 2	6 mo
Nutrients ^e	2 L/P, G	1:1 Sulfuric Acid, pH < 2, Cool, 4°C	28 days
Oil and Grease	2 x 1-L widemouth glass with Teflon liner	1:1 Sulfuric Acid, pH < 2, Cool, 4°C	28 days
Organic Halides - Total (TOX)	250 mL amber glass with Teflon lined septum closure	Sulfuric Acid, pH < 2; Cool, 4°C	14 days
pH	In situ, beaker or bucket	None	Analyze Immediately
Phenols	1-L amber glass with Teflon lined closure	1:1 Sulfuric Acid, pH < 2, Cool, 4°C	28 days
Phosphate-Ortho	500 mL/P, G	Filter-on-site, Cool, 4°C	48 hr
Phosphorus, Total Dissolved	500 mL/P, G	Filter-on-site, 1:1 Sulfuric Acid, pH < 2, Cool, 4°C	28 days

^e May include nitrogen series (ammonia, total Kjeldahl, nitrogen, nitrate-nitrite), total phosphorus, chemical oxygen demand.

TABLE A-1 (continued)

**SAMPLE CONTAINERS, SAMPLE PRESERVATION, AND SAMPLE HOLDING TIMES
FOR MISCELLANEOUS PARAMETERS**

WATER MATRIX

Parameter	Sample Volume /Container	Preservative	Holding Time
<u>Liquid - Low to Medium Concentration Samples (continued)</u>			
Solids, Settleable	2 L/P, G	Cool, 4°C	48 hr
Solids (Total and Suspended, etc.)	1 L/P, G	Cool, 4°C	7 days
Sulfates	500 mL/P, G	Cool, 4°C	28 days
Sulfides	1 L/P, G	2 mL Zinc Acetate Sodium Hydroxide to pH > 9 Cool, 4°C	7 days
Temperature	In situ, beaker or bucket	None	Analyze Immediately
Turbidity	200 mL/P, G	Cool, 4°C	48 hr

Abbreviations: ASAP - as soon as possible
 NS - not specified
 P - Plastic
 G - Glass

Note: When nonspecific container type is listed (e.g., 8-oz. wide-mouth glass jar), select a container appropriate to the volume and container requirement given. Samples for more than one parameter can be collected into a single container if container and preservation requirements are the same (e.g., sulfate and turbidity).

TABLE A-2
SAMPLE CONTAINERS, SAMPLE PRESERVATION, AND SAMPLE HOLDING TIMES
FOR TARGET COMPOUND AND TARGET ANALYTE LISTS

SOIL MATRIX

Parameter	Container	Preservative	Holding Time
<u>Soil, Sediment or Sludge Samples - Low to Medium Concentrations</u>			
Organic Compounds:			
Purgeable Organics (VOCs)	2 x 120-mL wide-mouth glass vials	Cool, 4°C	7 days
Extractable Organics (BNAs), Pesticides and PCBs	1 x 8-oz wide-mouth glass jar	Cool, 4°C	7 days until extraction, 40 days after extraction
Organophosphorous Pesticides and herbicides	1 x 8-oz wide-mouth ^b glass jar	Cool, 4°C	7 days until extraction, 40 days after extraction
Dioxins/Furans	1 x 8-oz wide-mouth glass jar	Cool, 4°C	7 days until extraction, 40 days after extraction
Inorganic Compounds:			
Metals (TAL)	1 x 8-oz wide-mouth glass jar	None	6 mo ¹
Cyanide	1 x 8-oz wide-mouth glass jar	None	14 days
Sulfide	1 x 8-oz wide-mouth glass jar	None	7 days

¹Holding time for mercury is 28 days.

TABLE A-2 (continued)
SAMPLE CONTAINERS, SAMPLE PRESERVATION, AND SAMPLE HOLDING TIMES FOR
MISCELLANEOUS PARAMETERS

SOIL MATRIX

Parameter	Sample Volume /Container	Preservative	Holding Time
<u>Soil, Sediment or Sludge Samples - Low to Medium Concentrations</u>			
Toxicity Characteristic Leaching Procedure (TCLP)	8-oz wide-mouth glass with Teflon®-lined lid closure	None	Extract 7 days, Analyze within 40 days
Nutrients, including: Nitrogen, Phosphorus, Chemical Oxygen Demand	8-oz wide-mouth glass with Teflon®-lined closure	None	ASAP
Other Inorganic Compounds	8-oz wide-mouth glass with Teflon®-lined closure	None	ASAP

Abbreviations: ASAP - as soon as possible
 NS - not specified
 P - Plastic
 G - Glass

Note: When no specific container type is listed (e.g., 8-oz. wide mouth glass jar), select a container appropriate to the volume and container requirements given. Samples for more than one parameter can be collected into a single container if container and preservation requirements are the same.

TABLE A-3
 SAMPLE CONTAINERS, SAMPLE PRESERVATION, AND SAMPLE HOLDING TIMES
 FOR RADIOLOGICAL SAMPLES

WATER MATRIX

Parameter	Container	Preservative	Holding Time
Radiological tests ¹	12.0 L-plastic ²	HNO ₃	6 mo
Tritium	125 ML glass	None	None

¹ For Radiological Testing, the specific analyses will be defined as some or all of the following: Gross Alpha, Gross Beta, Uranium 233 + 234, 235 and 238, Americium 241, Plutonium 239 + 240, Tritium, Strontium 90, 89, Cesium 137, Radium 226, 228.

² Full suite

TABLE A-4
SAMPLE CONTAINERS, SAMPLE PRESERVATION, AND SAMPLE HOLDING
TIMES FOR RADIOLOGICAL SAMPLES

SOIL MATRIX

Parameter	Container	Preservative	Holding Time
Radiological tests ¹ and Tritium	1-liter glass ²	None	None

¹ For Radiological Testing, the specific analyses will be defined as some or all of the following: Gross Alpha, Gross Beta, Uranium 233 + 234, 235 and 238, Americium 241, Plutonium 239 + 240, Tritium, Strontium 90, 89, Cesium 137, Radium 226, 228.

² Full suite

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.14, Rev. 0
1 of 12
February 18, 1991
ER&WM**

**Safety Related
Category 1**

**TITLE:
DATA BASE MANAGEMENT**

Approved By:

J. W. Langmaier

1.0 TABLE OF CONTENTS

1.0	TABLE OF CONTENTS	1
2.0	PURPOSE AND SCOPE	2
3.0	RESPONSIBILITIES AND QUALIFICATIONS	2
4.0	REFERENCES	3
4.1	SOURCE REFERENCES	3
4.2	INTERNAL REFERENCES	4
5.0	PROCEDURES	5
5.1	HARDWARE AND SOFTWARE REQUIREMENTS	5
5.2	FIELD DATA COLLECTION	6
5.3	DATA RECEIPT AND COMPLETENESS CHECK	6
5.4	TECHNICAL DATA VALIDATION	7
5.5	DATA ENTRY	7
5.6	DATA VALIDATION	8
5.6.1	Field Data	8
5.6.2	Tracking Data	9
5.7	DATA ARCHIVING AND FILING	9
5.8	SECURITY	10
6.0	DOCUMENTATION	11
7.0	FORMS	11

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.14, Rev. 0
2 of 12
February 18, 1991
ER&WM**

2.0 PURPOSE AND SCOPE

This standard operating procedure (SOP) describes procedures that will be used at the Rocky Flats Plant (RFP) to provide an orderly method by which field data will be recorded, entered into electronic form, validated, transferred, and filed. This applies to field data generated by any field-related sampling activities performed for the Rocky Flats Environmental Restoration (ER) Program. This procedure encompasses the data handling process from the point of data collection by field personnel to the filing and transmission of data to EG&G personnel.

This SOP describes hardware and software requirements, field data collection, data entry, data validation, data archiving and filing that will be used for field data collection and documentation to attain acceptable standards of accuracy, precision, comparability, representativeness, and completeness.

3.0 RESPONSIBILITIES AND QUALIFICATIONS

The designated subcontractor has the overall responsibility for implementing this SOP. The subcontractor's project manager will be responsible for assigning project staff to implement this SOP and for assuring that the procedures are followed by all subcontractor personnel.

The personnel responsible for maintaining the data in the data base shall have, at a minimum, a two-year degree in Computer Science or 4 years relevant experience, a working knowledge of DOS, data bases, Lotus 1-2-3 and personal computers. If personnel are used who do not have this background, appropriate training will be provided by the sub-contractor.

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.14, Rev. 0
3 of 12
February 18, 1991
ER&WM**

**Safety Related
Category 1**

A designated EG&G subcontractor shall be responsible for maintaining the custom designed RFEDS data base. This subcontractor will also provide timely updates and fixes to the software. Any program updates will be provided to all subcontractors who are required to use the RFEDS data base.

4.0 REFERENCES

4.1 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.

Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA. Interim Final. October 1988.

RCRA Facility Investigation Guidance. (EPA). Interim Final. May 1989.

Rocky Flats Plant Environmental Restoration Program, Quality Control Plan. Rockwell International. January 1989.

The Environmental Survey Manual. DOE/EH-0053. Volumes 1-4. August 1987.

Rocky Flats Environmental Data System, Users Manual. Rockwell InternatioNal. June 1990.

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.14, Rev. 0
4 of 12
February 18, 1991
ER&WM**

4.2 INTERNAL REFERENCES

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

- SOP 1.13, Containerizing, Preserving, Handling, and Shipping of Soil and Water Samples
- SOP 2.1, Water Level Measurements in Wells and Piezometers
- SOP 2.4, Collection of Tap Water Samples
- SOP 2.6, Groundwater Sampling
- SOP 2.8, Installation, Operation, and Sampling with Soil-Water Samplers
- SOP 3.1, Logging Alluvial and Bedrock Material
- SOP 3.2, Drilling and Sampling Using Hollow-Stem Auger Techniques
- SOP 3.4, Rotary Drilling and Rock Coring
- SOP 3.7, Logging of Test Pits and Trenches
- SOP 3.8, Surface Soil Sampling
- SOP 3.9, Soil Gas Sampling and Field Analysis
- SOP 4.4, Surface Water Discharge Measurements

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.14, Rev. 0
5 of 12
February 18, 1991
ER&WM**

5.0 PROCEDURES

This procedure is based primarily on the Rocky Flats Environmental Data System User's Manual and conversations held with representatives from EG&G.

5.1 HARDWARE AND SOFTWARE REQUIREMENTS

The purpose of this section is to define the minimum computer system required for the entry and transfer of the field data to EG&G.

- 80286 based micro computer
- 1 parallel port
- 5 1/4 high density disk drive or 3 1/2 high density disk drive
- 40 MB hard-disk drive
- EGA or VGA monitor and compatible drive
- 80-column printer
- 4MB RAM memory
- Autocad - version 10.0 or higher
- Oracle database software - version 5.1C or higher
- Lotus 1-2-3
- DOS, version 3.31 or higher
- Maynstream 60 tape drive backup or equivalent

These requirements may be changed, when necessary, by RFP to comply with their available data transfer needs. RFP will inform all subcontractors of any necessary changes by way of a memo.

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.14, Rev. 0
6 of 12
February 18, 1991
ER&WM**

5.2 FIELD DATA COLLECTION

All data collected from the field will be recorded on preprinted forms. At a minimum, the sample number, site designation, and initials of the collector should be recorded on the form. To the extent possible, the format of the form should be in the same order as the electronic form in the data base. This should assist the field personnel in entering data into the data base with more efficiency and accuracy. See Section 7.0 for samples of the field data forms.

5.3 DATA RECEIPT AND COMPLETENESS CHECK

The purpose of the receipt and checking is to start the validation process by receiving and briefly reviewing the data. The preliminary validation should be conducted as soon as possible after receipt of the completed data forms. This task ensures that the forms are complete before entry into the data base.

- The field data form should be delivered to the designated staff person by the field personnel by the end of each day of field operations.
- The designated staff person receiving the form should initial and date the form upon receipt.
- Upon receipt, all forms should be checked for completeness. The Site Supervisor should be consulted to verify that all of the field forms have been received. At this time, any discrepancies should be discussed with the field personnel and clarified or completed immediately. Any changes to the field forms will be initialed and dated by the person making the changes.

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.14, Rev. 0
7 of 12
February 18, 1991
ER&WM**

**Safety Related
Category 1**

- The following forms should be included with the field data package:
 - Field data transmittal form
 - Appropriate field data forms, depending on the sampling activity

5.4 TECHNICAL DATA VALIDATION

When the data completeness has been verified, a technical validation should be performed on the data by a qualified validator. This person should be able to technically review the data to ensure that the data are consistent with known chemical and physical properties of the media being sampled. For example, if the dissolved oxygen has a reading of 15, there is an indication of a problem since this is above the level of saturation. The validator should check all calculations and reported units and all of the data on all of the forms. If the validator detects an error in the data report sheet, the validator must confer with the samples and the project manager prior to changing any information. Any change made must be reflected in the project manager's logbook.

5.5 DATA ENTRY

Once the field data have been reviewed and found to be complete, the data should be input to the Rocky Flats Environmental Data System (RFEDS) with the menu-driven data base program provided by International Technology. Since this SOP is not intended to be a user's manual, please refer to the Rocky Flats Project Data base User's Manual for specific questions regarding the use of the data base software.

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.14, Rev. 0
8 of 12
February 18, 1991
ER&WM**

**Safety Related
Category 1**

Field tracking information should also be entered at this time into the Lotus 1-2-3 form provided by EG&G. This form will track only a few pieces of data, including:

- Sample number
- Sample location
- Bottle code and analyte
- Sampler's initials
- Date sampled
- Date shipped
- Lab
- Chain of custody number

5.6 DATA VALIDATION

This step ensures that the data recorded in the electronic data base are the same as the data recorded on the field data forms.

5.6.1 Field Data

When all of the data for the day have been entered into the data base, the data should be printed using the report option of the data base program. The reports should then be delivered along with the original field data forms to the designated data validation person. Under no circumstance should the data validator be the same as the person who entered the data originally.

The original field data form and the printed report should be compared for accuracy. If transcription errors are found, the errors should be highlighted on the printed report and returned to the data entry person for corrections. A new copy of the report should be

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.14, Rev. 0
9 of 12
February 18, 1991
ER&WM**

**Safety Related
Category 1**

generated at this time and the old copy destroyed. This process should be repeated until the printed reports match the field data forms. When the validation process is complete, the validator should initial and date both the original field forms and the printed report.

5.6.2 Tracking Data

The next subtask is to enter the sample tracking information into the Lotus spreadsheet. Always keep one copy of this Lotus form available in its original form. This form should be used as a template and copied each week to a new file to be used that particular week.

When all of the appropriate data are entered into the Lotus tracking form, it should be printed and given to the person responsible for validating the data. This subtask should be done at the same time as the field data reports. Under no circumstance should the data validator be the same as the person who entered the data originally.

When the validation process is complete, the printed form should be initialed and dated by the validator.

5.7 DATA ARCHIVING AND FILING

Upon completion of the daily validation, a copy of field data reports should be made. The initialed, dated reports should then be filed with the original field data forms. A copy of the initialed and dated computer printed report will be sent to EG&G in the weekly data package.

At the end of each week, when all field data have been validated for the week, the data base should be archived by using the archive option. The RFEDS program will make a

EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.14, Rev. 0
10 of 12
February 18, 1991
ER&WM

Safety Related
Category 1

copy of the electronic data on diskette. This diskette is to be labeled with the type of data it contains: e.g. soil boring data, well data, etc. The tracking data should also have been validated at this point. A copy of the file containing the tracking data should also be made on diskette. Be sure to use only 3½-inch double-sided, double-density diskettes for all disks to be sent to EG&G.

The original data diskette containing the data base data, the tracking data diskette, along with all of the original data base reports and the field data transmittal forms should be hand-delivered to the designated EG&G representative. A duplicate copy of these diskettes should be made at this time and filed with the original field data forms and the copies of the validated, initialed, and dated reports. A paper copy of the tracking data is kept on file for quick reference.

The original data base data remains on the hard disk in an archived form until the next set of data is archived. At this point, the new archive will OVERWRITE the old archive. This is the primary reason for copying the data to a diskette at the same time as the diskette is prepared for EG&G. The computer will be backed up weekly, using a tape drive.

5.8 SECURITY

The computers will be kept in a secure location and locked when not in use. The data base itself will utilize a password security system. The passwords required shall be known only to the personnel who enter the data onsite, the onsite manager, and a representative of EG&G.

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.14, Rev. 0
11 of 12
February 18, 1991
ER&WM**

**Safety Related
Category 1**

6.0 DOCUMENTATION

A permanent record of the implementation of this SOP will be kept by documenting field observations and data on field data forms, and validation observations in a data validation notebook. Field observations and data will be recorded with black waterproof ink on field data forms. Data validation observations will be recorded with black waterproof ink in a bound observation notebook with consecutively numbered pages. Documentation of the validation of the data base and the tracking data should be recorded and include the following data.

- Date of validation
- Initials of the validator
- Date delivered to EG&G

The task manager will be responsible for ensuring that this documentation is completed.

See Section 7.0, Forms for examples of the data forms.

7.0 FORMS

The following data management forms are the current RFEDS requested field data as of February 1991. Data are collected in compliance with the related SOP. Each SOP will include a copy of the appropriate data forms. Forms for the collection of soil and rock boring data have currently not been developed. Those data base modules are currently in the process of completion.

The current RFEDS data base does not address all the parameters which are collected in the field. These additional parameters are in the field data sampling forms included in the

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.14, Rev. 0
12 of 12
February 18, 1991
ER&WM**

**Safety Related
Category 1**

cross-referenced SOPs. Additions to the RFEDS program can capture and maintain this data.

Included within this SOP are the following preliminary forms:

- Form 1.14A Transmittal Form (RFEDS)
- Form 1.14B Groundwater Data Collection Form
- Form 1.14C Groundwater Level Measurement Data Collection Form
- Form 1.14D Sediment Data Collection Form
- Form 1.14E Surface Soil Data Collection Form
- Form 1.14F Sub-Surface Soil Data Collection Form
- Form 1.14G Surface Water Data Collection Form

**ROCKY FLATS ENVIRONMENTAL DATA SYSTEM
FIELD DATA TRANSMITTAL FORM**

Type of Form (check one)

- Soil Boring
- Rock Boring
- Groundwater Sampling
- Surface Water Sampling
- Sediment Sampling
- Groundwater Level Measurements
- Sub-Surface Soil Sampling
- Surface Soil Sampling

Total Number of Forms _____ Sampler _____ (initials)

Sample # _____ Location Code _____

Computer Entry and Validation

Data Entered by _____

Data Validation _____

Technical Validation _____

Delivery to EG&G

Received by _____

Groundwater Sampling Field Data Collection Form

Sample Number : _____
Well Number : _____
Collection Date : _____ Quarter: _____
Collection Time : _____
Type. : GW

Purpose : _____
Collection Technique : _____
QC Type : _____ QC Partner: _____
Volume Collected : _____ Units: _____
Sample Team Leader : _____
Sample Team Member : _____
Sample Team Member : _____
Prepared By : _____

Purge Volume : _____ Units(gal/cu ft.): _____
Purge Rate : _____ Units: _____
Purging Method : _____
Depth to Water : _____ feet

Field Analytical Parameters:

Specific Conductance: _____ uS/cm pH _____
Conductivity: _____ Units: _____ eH _____
Conductivity Temp.: _____ uS/cm pH _____
Sample Temp.: _____ Units: _____ eH _____ mV
Dissolved Oxygen: _____ mg/L Color _____
Headspace Reading: _____ Odor _____
Total Alkalinity: _____ mg/L Turbidity _____ NTU
Sample Filtered (Y/N): _____ Nitrate _____ mg/L

SEDIMENT FIELD DATA COLLECTION FORM

Sample No.: _____
 Collection Date: _____ Quarter: __
 Collection Time: _____
 Type: SD Purpose: __
 Location Code: _____

North or Y: _____ East or X: _____

Sample Location: _____
 Composite (Y/N): _____
 Composite Description: _____
 QC Type: _____ QC Partner: _____
 Collection Method: _____
 Sample Team Leader: _____
 Sample Team Member: _____
 Sample Team Member: _____
 Volume Collected: _____ Units: _____
 Prepared By: _____

Depth of Water: _____ feet
 Depth of Take: _____ inches
 Comments: _____

Matrix: _____
 Request for Analysis No.: _____
 Chain of Custody No.: _____
 Ship Date: _____

Test Panels	Laboratory	Preservative	Due Date
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Additional Comments: _____

Signature of Observer: _____ Time: _____ Date: _____

SURFACE SOIL FIELD DATA COLLECTION FORM

Sample No.: _____
Collection Date: _____ Quarter: __
Collection Time: _____
Type: SQ Purpose: __
Location Code: _____

North or Y: _____ East or X: _____

Sample Location: _____
Composite (Y/N): __
Composite Description: _____
QC Type: _____ QC Partner: _____
Collection Method: _____
Sample Team Leader: _____
Sample Team Member: _____
Sample Team Member: _____
Volume Collected: _____ Units: _____
Prepared By: _____

Depth of Take: Start End
_____ feet _____ feet
_____ feet _____ feet
_____ feet _____ feet
_____ feet _____ feet

Headspace Reading: _____ ppm
Comments: _____

Matrix: _____
Request for Analysis No.: _____
Chain of Custody No.: _____
Ship Date: _____

Table with 4 columns: Test Panels, Laboratory, Preservative, Due Date. Multiple rows of blank lines for data entry.

Additional Comments: _____

Signature of Observer: _____ Time: _____ Date: _____

SUB-SURFACE SOIL FIELD DATA COLLECTION FORM

Sample No. : _____
Collection Date : _____ Quarter: __
Collection Time : _____
Type : SB Purpose: __
Location Code : _____

North or Y : _____ East or X: _____

Sample Location : _____
Composite (Y/N) : __
Composite Description : _____
QC Type : _____ QC Partner: _____
Collection Method : _____
Sample Team Leader : _____
Sample Team Member : _____
Sample Team Member : _____
Volume Collected : _____ Units: _____
Prepared By : _____

Soil Type : _____
Depth of Take : Start End
_____ feet _____ feet
_____ feet _____ feet
_____ feet _____ feet
_____ feet _____ feet

HNU Background : _____ ppm
Reading : _____ ppm
OVA Background : _____ ppm
Reading : _____ ppm
Comments: _____

Matrix: _____
Request for Analysis No.: _____
Chain of Custody No.: _____
Ship Date: _____

Table with 4 columns: Test Panels, Laboratory, Preservative, Due Date. Multiple rows for data entry.

Additional Comments: _____

Signature of Observer: _____ Time: _____ Date: _____

SURFACE WATER DATA COLLECTION FORM

Sample No. : _____
Collection Date : _____ Quarter: __
Collection Time : _____
Type : SW Purpose: __
Location Code : _____

North or Y : _____ East or X: _____

Sample Location : _____
Composite (Y/N) : _____
Composite Description : _____
QC Type : _____ QC Partner: _____
Collection Method : _____
Sample Team Leader : _____
Sample Team Member : _____
Sample Team Member : _____
Volume Collected : _____ Units: _____
Prepared By : _____

Stream Conditions
Type of Water Body : _____ Dry (Y/N) : _____
Depth of Take : _____ feet Stream Width : _____
Flow Rate : _____ Total Depth : _____
Flow Rate Method : _____

Field Analytical Parameters
Eh : _____ mV Dissolved Oxygen : _____ ppm
pH : _____ Dissolved Oxygen Temp. : _____
Specific Conductance : _____ umhos/cm Chlorine : _____
Air Temperature : _____ (F/C): C End point #1 : _____
Sample Unit Temperature : _____ (F/C): C End point #2 : _____
Total Alkalinity : _____

Comments: _____

Matrix: _____
Request for Analysis No.: _____
Chain of Custody No.: _____
Ship Date: _____

Table with 4 columns: Test Panels, Laboratory, Preservative, Due Date. Multiple rows for data entry.

Additional Comments: _____

Signature of Observer: _____ Time: _____ Date: _____

EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.15, Rev. 0
1 of 6
February 18, 1991
ER&WM

Safety Related
Category 1

TITLE:
PHOTOIONIZATION DETECTORS
(PIDs) AND FLAME IONIZATION
DETECTORS (FIDs)

Approved By:

J. W. Langman Jr.

1.0 TABLE OF CONTENTS

1.0	TABLE OF CONTENTS	1
2.0	PURPOSE AND SCOPE	2
3.0	QUALIFICATIONS	2
4.0	REFERENCES	2
4.1	SOURCE REFERENCES	2
5.0	FID EQUIPMENT AND PROCEDURES	3
5.1	DESCRIPTION AND THEORY	3
6.0	PID EQUIPMENT AND PROCEDURES	4
6.1	DESCRIPTION AND THEORY	4
7.0	DECONTAMINATION	5
8.0	QUALITY ASSURANCE/QUALITY CONTROL	5
9.0	DOCUMENTATION	6

LIST OF APPENDIXES

APPENDIX A	Foxboro OVA-128	A-1
APPENDIX B	HNU Sustems P1-101	B-1

EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.15, Rev. 0
2 of 6
February 18, 1991
ER&WM

Safety Related
Category 1

2.0 PURPOSE AND SCOPE

This standard operating procedure (SOP) describes procedures that will be used at Rocky Flats to define the standard operating procedure for the use of flame ionization detectors (FID) and photoionization detectors (PID) in the field. FIDs and PIDs are used to detect and measure volatile organic compounds. An FID or PID is typically calibrated to measure the concentration of a known calibration gas. The instrument can detect other volatile organic compounds, but the concentration indicated will not be accurate. Therefore, these instruments are typically used in the field to screen samples or to monitor the environment for health and safety purposes. They will not be used at Rocky Flats Plant (RFP) for the purpose of obtaining analytical chemistry data.

3.0 QUALIFICATIONS

Only qualified personnel will be allowed to perform measurements with FIDs and/or PIDs. The subcontractor's Site Safety Officer will determine who is qualified based on experience and demonstrated competence. Those qualified will use FIDs and PIDs in accordance with this SOP and the manufacturer's written instructions.

4.0 REFERENCES

4.1 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.

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

EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.15, Rev. 0
3 of 6
February 18, 1991
ER&WM

Safety Related
Category 1

RCRA Facility Investigation Guidance. Interim Final. EPA. May 1989.

RCRA Groundwater Monitoring Technical Enforcement Guidance Document. EPA OSWER.9950.1. September 1986.

Rockwell International. Rocky Flats Plant Environmental Restoration Program Quality Assurance/Quality Control Plan. January 1989.

The Environmental Survey Manual. DOE/EH-0053. Volumes 1-4. 1987.

5.0 FID EQUIPMENT AND PROCEDURES

5.1 DESCRIPTION AND THEORY

A FID uses ionization as the detection method, in which the ionization is caused by a hydrogen flame, rather than an ultraviolet (UV) light, as in a PID. The flame has sufficient energy to ionize any organic chemical species with an ionization potential (IP) of 15.4 or less.

Inside the detector chamber, the sample is exposed to a hydrogen flame, which ionizes the organic vapors. When most organic vapors burn, positively charged carbon-containing ions are produced, which are collected by a negatively charged collecting electrode in the chamber. As the positive ions are collected, a current proportional to the hydrocarbon concentration is generated on the input electrode. This current is measured with a preamplifier that has an output signal proportional to the ionization current.

An FID consists of a probe, a pumping system, a particle filter, a hydrogen gas container, a scrubber, a burning chamber, an electrical detection and amplification system, and a read-out device (meter).

FIDs must be calibrated, used, and maintained in accordance with the manufacturer's instructions for each specific instrument. See Appendix A for an example of some instructions for a specific instrument.

6.0 PID EQUIPMENT AND PROCEDURES

6.1 DESCRIPTION AND THEORY

A PID operates on the principle of photoionization. When a photon of UV radiation strikes a chemical compound, it ionizes a molecule of the compound if the radiation is equal to or greater than the ionization potential (IP) of the compound. Because ions are capable of conducting an electrical current, an electron flow can be generated within the instrument.

In a PID, an electrical pump or fan moves the gas being sampled past a UV source. The sample is ionized and ion pair production occurs for each molecule ionized. The free electrons produce a current directly proportional to the number of ions produced. The current is amplified, detected, and displayed on a meter. Chemical species having IPs less than or equal to the lamp rating will generate an appropriate instrument response. Chemical species that have IPs greater than the lamp rating will display a poor instrument response or no response at all.

Employing an 11.7 electron volt (eV) rated lamp would provide a relatively wide range of detectable species; however, that lamp requires frequent replacement. More commonly, a 10.2-eV lamp is used. A 10.2-eV lamp offers relatively high radiation levels without frequent lamp replacement and will detect many species, with the notable exception of chlorinated aliphatics.

PIDs must be used, calibrated, and maintained in accordance with the manufacturer's instructions for each specific instrument. The PID consists of a probe, readout assembly, and a battery charger. The probe contains the sensing and amplifying circuitry, the readout assembly contains the meter

controls, and the power supply is a rechargeable battery. There are numerous models of PIDs available (see Appendix B for example information on one specific instrument).

7.0 DECONTAMINATION

PIDs and FIDs will be placed in plastic bags with the sensing probe protruding through the bag prior to use in the field to reduce the potential for gross contamination. The bag will be fastened in such a way as to allow viewing of the meter readout and access to instrument controls. Bags should be discarded during decontamination at the end of the workshift. The external surfaces of the PIDs and FIDs should be wiped with Kim-wipe or a similar material prior to its return to the equipment manager. Equipment should be decontaminated in accordance with SOP 1.3, General Equipment Decontamination.

8.0 QUALITY ASSURANCE/QUALITY CONTROL

Daily calibration and operational checks are required to ensure that the instrument is functioning properly. Manufacturer's calibration instructions must be accomplished prior to daily use, and calibration must be confirmed at the end of each day.

PIDs and FIDs will be checked periodically during use to ensure that they are responding to contaminants. A Magic Marker® used as a source of volatile gas works well to demonstrate that the instrument is responding.

The manufacturer's operating manual will be used for the operation, calibration, maintenance, and care of FIDs and PIDs. The manual will be present on site at all times.

**EG&G ROCKY FLATS PLANT
EMAD FIELD PROCEDURES SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.15, Rev. 0
6 of 6
February 18, 1991
ER&WM**

**Safety Related
Category 1**

9.0 DOCUMENTATION

Use of PIDs and FIDs will be in accordance with the Health and Safety Plan or SOPs requiring its use. Observations or calculations will be documented by personnel in a bound, water-proof field notebook. Observations that need to be documented will be entered into the site manager's daily logbook. Entries will be signed and dated by field personnel making the entries. Form 1.15A, Calibration Record, will be used to document daily calibrations. The Calibration Record asks for the following information:

- **Date/Time.**
- **Initial Response - Initial Response is the first meter reading obtained with calibration gas to either adjust instrument or note how far off the instrument is drifting depending on whether an HNu or Thermal Environmental is used.**
- **Alarm Setting.**
- **Calibration Sequence Initiated - Cal sequence is a feature specific to the Thermal Environmental System Model 580B. Calibration must be done twice on Model 580B in order to store in memory. If only done once, the calibration is not stored in memory.**
- **Results.**
- **Calibrator's Name.**

APPENDIX A

The following appendix provides information pertaining to the Foxboro OVA-128.

A.1 LIMITATIONS

- The OVA will not detect inorganics.
- The OVA will detect methane, which is explosive but relatively nontoxic.
- Current DOT shipping regulations (Title 49CFR) must be researched before shipping an OVA containing pressurized hydrogen to determine proper shipping name, DOT index number, proper shipping container, packaging, labeling, restrictions, and placarding requirements.
- A relative humidity greater than 95 percent will cause inaccurate and unstable responses.
- A temperature less than 40°F will cause slow and poor response.
- Actual contaminant concentrations are measured relative to the calibration gas used. Therefore, specific contaminants and their quantities cannot easily be identified.
- The OVA responds differently to different compounds. Table A-1 is a list, provided by the manufacturer, of the relative sensitivities of the OVA to some common organic compounds. Since the instrument is factory calibrated to methane, all relative responses are given in percent, with methane at 100.

TABLE A-1
RELATIVE RESPONSE SENSITIVITY FOR OVA

Chemical Compound	Instrument Indication in Percent of Actual Level
Methane	100
Ethane	90
Propane	64
N-butane	61
N-pentane	100
Ethylene	85
Acetylene	200
Benzene	150
Toluene	120
Acetone	100
Methyl ethyl ketone	80
Methyl isobutyl ketone	100
Methanol	15
Ethanol	25
Isopropyl alcohol	65
Carbon tetrachloride	10
Chloroform	70
Trichloroethylene	72
Vinyl chloride	35

A.2**MAINTENANCE AND CALIBRATION RESPONSIBILITIES**

It is preferable to minimize the number of people responsible for maintenance and calibration of the OVA. These people shall also be responsible for logging the equipment in and out. Documentation of instrument user, dates of use, instrument identification number, maintenance and calibration procedures, and project identification shall be maintained.

A.3**SPECIFIC PROCEDURES****A.3.1****Startup Procedures**

- Connect the probe/readout connectors to the side-pack assembly.
- Check the battery condition and hydrogen supply.
- For measurements taken as methane-equivalent, check that the GAS SELECT dial is set at 300.
- Turn the electronics on by moving the INST switch to the ON position, and allow 5 minutes for warm-up.
- Set the CALIBRATE switch to X10; use the CALIBRATE knob to set the indicator at 0.
- Open the H₂ tank valve and the H₂ supply valve completely. Check that the hydrogen supply gauge reads between 8.0 and 12.0 psig.
- Turn the PUMP switch to ON.
- Check that the BACKFLUSH and INJECT valves are in the UP position.

- To light the flame, depress the igniter switch until a meter deflection is observed. The igniter switch may be depressed for up to 5 seconds. Do not depress the switch for longer than 5 seconds, as it may burn out the igniter coil. If the instrument does not light, allow the instrument to run several minutes and then repeat the ignition attempt.
- Confirm an OVA operational state by using an organic source, such as a Magic Marker®. Any meter deflection will indicate that the OVA is operating.
- Establish a background level in a clean area or by using the charcoal scrubber attachment to the probe (depress the sample inject valve), recording background measurements for reference.
- Set the alarm level, if desired.

A.3.2 Shutdown Procedure

- Close the H₂ supply valve and H₂ tank valve (do not overtighten the valves).
- Turn the INST switch to OFF.
- Wait until the H₂ supply gauge indicates that the system is purged of H₂ (approximately 10 seconds); then switch off the pump.
- Put the instrument on an electrical charger at completion of day's activities.

A.3.3 Maintenance and Calibration Schedule

<u>Function</u>	<u>Frequency</u>
Check particle filters	Weekly or as needed
Check quad rings	Monthly or as needed
Clean burner chamber	Monthly or as needed
Check secondary calibration	Prior to project startup
Check primary calibration	Monthly, or if secondary calibration is off by more than ± 10 percent
Check pumping system	Before project startup
Replace charcoal in scrubber attachment	120 hours of use, or when background readings in a clean environment are higher with the inject valve down than with the inject valve up
Factory service	At least annually

Note: Instruments that are not in service for extended periods of time need not meet the above schedule. However, they must be given a complete checkout before their use, addressing the maintenance items listed above.

A.3.4 Calibration Procedures

A.3.4.1 Primary Calibration.

- Remove the instrument components from the instrument shell.

- Turn on **ELECTRONICS** and **ZERO INSTRUMENT** on the **X10** scale. Set the gas-select dial to **300**.
- Turn on **PUMP** and **HYDROGEN**. Ignite the flame. Go to **SURVEY MODE**.
- Introduce a methane standard near **100 parts per million (ppm)**.
- Adjust **R-32 Trimpot** on the circuit board to make the meter read to standard.
- Turn off the hydrogen flame, and adjust the meter needle to read **40 ppm (calibrate @ X10)** using the calibration adjust knob.
- Switch to **X100** scale. The meter should indicate **0.4** on the **1 to 10** meter markings ($0.4 \times 100 = 40$ ppm). If the reading is off, adjust with **R33 Trimpot**.
- Return to **X100** scale and adjust the needle to **40 ppm** with calibration; adjust the knob, if necessary.
- At the **X10** scale, adjust the meter to read **0.4** on the **1-to-10** meter markings using the calibration adjust. Switch to the **X1** scale. The meter should read **4 ppm**. If the reading is off, adjust using the **R31 Trimpot**.

A.3.4.2 Secondary Calibration.

- Fill an air sampling bag with 100 ppm (certified) methane calibration gas.
- Connect the outlet of the air-sampling bag to the air-sampling line of the OVA.
- Record the reading obtained from the meter on the calibration record.

A.3.4.3 Documentation

All field calibrations will be documented on the calibration record form, Attachment 1.15A (see Section II).

- Instrument calibrated (I.D. or serial number)
- Date of calibration
- Results of the calibration
- Identification of person who calibrated the instrument
- Identification of the calibration gas (source, type, concentration, lot number)

A.3.4.4 Pump System Checkout.

- With the pump on, hold the unit upright and observe the flow gauge.
- See if the ball level is significantly below a reading of 2; if so, flow is inadequate.
- Check connections at the sample hose.
- Clean or replace particle filters if the flow is impaired or if it is time for scheduled service.
- Reassemble and retest flow.
- If the flow is still inadequate, replace the pump diaphragm and valves.
- If flow is normal, plug the air intake. The pump should slow and stop.
- If there is no noticeable change in the pump, tighten the fittings and retest.
- If there is still no change, replace the pump diaphragm and valves.
- Document this function in the maintenance records.

A.3.4.5 Burner Chamber Cleaning.

- Remove the plastic exhaust port cover.
- Unscrew the exhaust port.
- Use a wire brush to clean the burner tip and electrode. Use a wooden stick to clean the Teflon surfaces.
- Brush the inside of the exhaust port.
- Blow out the chamber with a gentle air flow.
- Reassemble and test the unit.
- Document this function in the maintenance records.

A.3.4.6 Quad Ring Service.

- Remove OVA instruments from their protective shell.
- Remove the clip ring from the bottom of the valve.
- Unscrew the nut from the top of the valve.
- Gently pull the valve shaft upward and free it of its housing.
- Examine the rings for signs of damage; replace them as necessary.
- Lightly grease the rings with silicone grease.
- Reassemble the valve; do not pinch the rings during shaft insertion.
- Document this function in the maintenance records.

A.3.4.7 Troubleshooting.

<u>Indication</u>	<u>Possible Cause</u>
High background reading (More than 10 ppm)	Contaminated hydrogen Contaminated sample line
Continual flameout	Hydrogen leak Dirty burner chamber Dirty air filter
Low air flow	Dirty air filter Pump malfunction Line obstruction

Flame will not light

Low battery
Igniter broken
Hydrogen leak
Dirty burner chamber
Air flow restricted

No power to pump

Low battery
Short circuit

Hydrogen leak
(instrument not in use)

Leak in regulator
Leak in valves

A.3.4.8 Hydrogen Recharging.

- High-grade hydrogen (99.999 percent) is required. Maximum pressure the instrument can handle is 2,300 psig.
- Connect the fill hose to the REFILL FITTING on the side pack assembly with the FILL/BLEED valve in the OFF position.
- Open the H₂ SUPPLY BOTTLE valve.
- Place the FILL/BLEED valve on the fill hose in the BLEED position MOMENTARILY to purge any air out of the system.
- Open the instrument TANK valve.
- Open the REFILL valve on the instrument.
- Place the FILL/BLEED valve in the FILL position until the instrument pressure gauge equalizes with the H₂ SUPPLY BOTTLE pressure gauge.
- Shut the REFILL valve, FILL/BLEED valve, and H₂ SUPPLY BOTTLE valve, in quick succession.
- Turn the FILL/BLEED valve to BLEED until the hose pressure equalizes to atmospheric pressure.
- Turn the FILL/BLEED valve to the FILL position; then turn the valve to the BLEED position; then turn to the OFF position.
- Close the TANK on the instrument.
- Disconnect the FILL HOSE and replace the protective nut on the REFILL FITTING.

A.3.4.9

Particle Filter Servicing.

Filters have been placed at two points in the air sampling line of the OVA to keep particulates from entering the instrument. The first filter is located in the probe assembly, and the second filter (primary filter) is located on the side pack assembly. Cleaning procedures are as follows:

- Detach the probe assembly from the readout.
- Disassemble the probe (unscrew the components).
- Clean the particle filter located within the probe by blowing air through the filter.
- Reassemble the probe.
- Gain access to the primary filter, located behind the sample inlet connector on the side pack assembly, by removing the sample inlet connector with a thin-walled, 7/16-inch socket wrench. Remove the filter, and clean it as above.
- Reassemble the sample inlet fitting and filter to the side pack assembly.
- Check the sample flowrate.

Note: The manufacturer's operating instruction and calibration manual for the specific model of flame ionization detector must be used.

APPENDIX B

B.1 THE HNU SYSTEMS PI-101 PHOTOIONIZATION DETECTOR (HNU)

The HNU is a portable, nonspecific, vapor/gas detector employing the principle of photoionization to detect a variety of chemical compounds, both organic and inorganic.

The HNU contains an UV light source within its sensor chamber. Ambient air is drawn into the chamber with the aid of a small fan. If the IP of any molecule present in the ambient is equal to or lower than the energy of the UV light source, ionization will take place, causing a deflection in the meter. Response time is approximately 90 percent at 3 seconds. The meter reading is expressed in parts per million (ppm). All readings must be stated as equivalent readings that depend on the calibration gas being used. For example, the standard gas used to calibrate the HNU is benzene, which allows the instrument to provide results in benzene equivalence. Table B-1, modified from the "Instruction Manual for Model PI-101 Photoionization Analyzer" (HNU Systems, Inc., 1975), lists the relative sensitivities for various gases.

B.2 LIMITATIONS

- If the IP of a chemical contaminant is greater than the UV light source, this chemical will not be detected.
- It should be noted, specifically, that the HNU will not detect methane.
- During cold weather, condensation may form on the UV light source window, resulting in erroneous results.
- Instrument readings can be affected by humidity and powerlines, making it difficult to interpret readings.
- Total concentrations are relative to the calibration gas used. Therefore, actual contaminant species and their quantities cannot be identified. Also, while the

instrument scale reads 0 to 2,000 ppm, response is linear to benzene, for example, only from 0 to about 600 ppm. Greater concentrations may be "read" at a higher or lower level than the true value.

TABLE B-1
RELATIVE HNU PHOTOIONIZATION SENSITIVITIES FOR VARIOUS GASES
(10.2 eV Lamp)

Species	Photoionization Sensitivity*
P-xylene	11.4
M-xylene	11.2
Benzene	10.0 (reference standard)
Toluene	10.0
Diethyl sulfide	10.0
Diethyl amine	9.9
Styrene	9.7
Trichloroethylene	8.9
Carbon disulfide	7.1
Isobutylene	7.0
Acetone	6.3
Tetrahydrofuran	6.0
Methyl ethyl ketone	5.7
Methyl isobutyl ketone	5.7
Cyclohexanone	5.1
Naptha (86% aromatics)	5.0
Vinyl chloride	5.0
Methyl isocyanate	4.5
Iodine	4.5
Methyl mercaptan	4.3
Dimethyl sulfide	4.3
Allyl alcohol	4.2
Propylene	4.0
Mineral spirits	4.0
2,3-Dichloropropene	4.0

TABLE B-1 (continued)
RELATIVE HNU PHOTOIONIZATION SENSITIVITIES FOR VARIOUS GASES
(10.2 eV Lamp)

Species	Photoionization Sensitivity*
Cyclohexene	3.4
Crotonaldehyde	3.1
Acrolein	3.1
Pyridine	3.0
Hydrogen sulfide	2.8
Ethylene dibromide	2.7
N-octane	2.5
Acetaldehyde Oxime	2.3
Hexane	2.2
Phosphine	2.0
Heptane	1.7
Allyl chloride (3-chloropropene)	1.5
Ethylene	1.0
Ethylene oxide	1.0
Acetic anhydride	1.0
Alpha pinene	0.7
Dibromochloropropane	0.7
Epichlorohydrin	0.7
Nitric oxide	0.6
Beta pinene	0.5
Citral	0.5
Ammonia	0.3
Acetic Acid	0.1
Nitrogen dioxide	0.02
Methane	0.0
Acetylene	0.0
Ethylene	0.0

* Expressed in ppm (v/v)

Source: Instruction Manual for Mode PI-101
 Photoionization Analyzer, HNU Systems, Inc., 1975

- Wind speeds of greater than 3 miles an hour may affect fan speed and readings, depending on the position of the probe relative to wind direction.

B.3 MAINTENANCE AND CALIBRATION

The instrument user is responsible for properly calibrating and operating the instrument. When the instrument is scheduled for or requires maintenance, these functions should be conducted only by qualified individuals. If possible, maintenance responsibilities should be restricted to one or two individuals who will also bear responsibilities for logging the equipment in and out. Documentation of instrument user, dates of use, instrument identification number, maintenance and calibration functions, and project identification shall be maintained.

B.4 SPECIFIC PROCEDURES

B.4.1 Startup Procedures

- Check the FUNCTION switch on the control panel to make sure it is in the OFF position. Attach the probe to the readout unit. Match the alignment key, and twist the connector clockwise until a distinct locking is felt.
- Turn the FUNCTION switch to the BATTERY CHECK position. Check that the indicator reads within or beyond the green battery arc on the scale plate. If the indicator is below the green arc, or if the red LED comes on, the battery must be charged before using.
- To zero the instrument, turn the FUNCTION switch to the STANDBY position and rotate the ZERO POTENTIOMETER until the meter reads zero. Wait 15 to 20 seconds to confirm that the zero adjustment is stable. If it is not, then readjust.

Check to see that the SPAN POTENTIOMETER is set at the appropriate setting for the probe being used (5.0 for 9.5 eV probe, 9.8 for 10.2 eV, and 5.0 for 11.7 eV).

- Set the FUNCTION switch to the desired ppm range. A violet glow from the UV lamp source should be observable at the sample inlet of the probe/sensor unit. (Do not look directly at the glow, since eye damage could result.)
- Listen for the fan operation to verify fan function.
- Check instrument with an organic point source, such as a Magic Marker®, to certify instrument function. A meter reading should be observed.
- The unit will operate for approximately 8 to 10 hours on full charge.

B.4.2 Shutdown Procedures

- Turn the FUNCTION switch to the OFF position.
- Disconnect the probe connector.
- Place the instrument on the charger.

B.4.3 Periodic Instrument Response Checks

The HNU should periodically be exposed to the solvents in a Magic Marker® to verify that the PID is responding. These "response checks" are key to providing confidence to the user that the instrument is functioning and responding to contaminants.

B.4.4 Maintenance and Calibration Schedule

<u>Function</u>	<u>Frequency</u>
Perform routine calibration	Prior to each use (During extended field use, the HNU PI-101 must be calibrated at least once a day.)
Factory checkout and calibration	Yearly or when malfunctioning or after changing UV light source
Wipe down readout unit	After each use

Clean UV light source window	Every month or as use and site conditions dictate
Clean the ionization chamber	Monthly
Recharge battery	After each use

B.4.5 Cleaning the UV Light-Source Window

- Turn the **FUNCTION** switch to the **OFF** position, and disconnect the sensor/probe from the Readout/Control unit.
- Remove the exhaust screw located near the base of the probe. Grasp the end cap in one hand and the probe shell in the other. Separate the end cap and lamp housing from the shell.
- Loosen the screws on the top of the end cap, and separate the end cap and ion chamber from the lamp and lamp housing, taking care that the lamp does not fall out the lamp housing.
- Tilt the lamp housing with one hand over the opening so that the lamp slides out of the housing into your hand.
- The lamp window may be cleaned using lens paper with any of the following compounds:
 - Use HNU Cleaning Compound on all lamps except the 11.7 eV lamp.
 - Clean the 11.7 eV lamp with a freon or chlorinated organic solvent. Do not use HNU cleaner, water, or water miscible solvents (i.e., acetone and methanol).
- Following cleaning, reassemble the unit by first sliding the lamp back into the lamp housing. Place the ion chamber on top of the housing, making sure the contacts are properly aligned.
- Place the end cap on top of the ion chamber, and replace the two screws. Tighten the screws only enough to seal the O-ring. Do not overtighten.

- Line up the pins on the base of the lamp housing with pins inside the probe shell, and slide the housing assembly into the shell. It will fit only one way.
- Replace the exhaust screw.

B.4.6 Cleaning the Ionization Chamber

- Turn the FUNCTION switch to the OFF position and disconnect the sensor/probe from the Readout/control unit.
- Remove the exhaust screws located near the base of the probes. Grasp the end cap in one hand and the probe shell in the other. Separate the end cap and lamp housing from the shell.
- Loosen the screws on the top of the end cap and separate the end cap and ion chamber from the lamp and lamp housing, taking care that the lamp does not fall out of the lamp housing.
- The ion chamber may be cleaned according to the following sequence:
 - Clean with methanol using a Q-tip.
 - Allow to dry.
- Place the ion chamber on top of the housing, making sure the contacts are properly aligned.
- Place the end cap on top of the ion chamber and replace the two screws. Tighten the screws only enough to seal the O-ring. Do not overtighten.
- Line up the pins on the base of the lamp housing with pins inside the probe shell and slide the housing assembly into the shell. It will fit only one way.

B.4.7 Troubleshooting

- The meter does not respond in any switch position (including BATT CHK):
 - Meter movement is broken. Tip the instrument rapidly from side to side: The meter needle should move freely and return to zero.

- Electrical connection to meter is broken.
 - (a) Check all wires leading to meter.
 - (b) Clean the contacts of quick-disconnects.
 - Battery is completely dead
 - (a) Disconnect battery.
 - (b) Check voltage with a volt-ohm meter.
 - Check the fuse.
- If none of the above solves the problem, consult the factory.
- Meter responds in BATT CHK position, but reads zero or near zero for all others.
 - Power supply is defective. Check power supply voltages as shown in the *HNU Instruction Manual*. If any voltage is out of specification, consult the factory.
 - Input transistor or amplifier has failed.
 - (a) Rotate the zero control; the meter should deflect up or down as control is turned.
 - (b) Open the probe, Both transistors should be fully sealed in sockets.
 - Input signal connection is broken in probe or readout.
 - (a) Check the input connector on the printed circuit board. The input connector should be firmly pressed down.
 - (b) Check components on back of printed circuit board. All connections should be solid, and no wires should touch any other object.
 - (c) Check all wires in the readout for solid connections.
 - Instrument responds correctly in BATT CHK and STBY but not in measuring mode.
 - Check to see that the light source is on. Do not look directly at the UV light source, as eye damage could result.
 - Check the high-voltage power supply.
 - Open the end of probe, remove the lamp, and check the high voltage on the lamp ring with a volt-ohm meter.
 - If high voltage is present at all above points, the light source has probably failed. Consult the factory.
 - Instrument responds correctly in all positions, but the signal is lower than expected.

- Check the span setting for the correct value.
 - Clean the window of the light source.
 - Double check the preparation of standards.
 - Check the power supply 180 V output.
 - Check for proper fan operation. Check the fan voltage.
 - Rotate the span setting. Response should change if the span potentiometer is working properly.
- Instrument responds in all switch positions but is noisy (erratic meter movement).
 - Open the circuit in the feedback circuit. Consult the factory.
 - Open the circuit in the cable shield or probe shield. Consult the factory.
- Instrument response is slow and/or nonreproducible.
 - The fan is operating improperly. Check the fan voltage.
 - Check the calibration and operation.
- The battery indicator is low.
 - Indicator comes on if battery charge is low.
 - Indicator also comes on if ionization voltage is too high.

NOTE: The manufacturer's operating instruction for the specific model of photoionization detector must be used.

OVAs are non-destructive analyzers, so the sampled species is also discharged intact to ambient air. Calibrations using isobutylene can be done in room air due to isobutylene's non-toxic properties.

B.4.8 Calibration Procedure No. 1

For HNU calibration canisters without regulators:

- Run through the startup procedures.
- Fill a sampling bag with HNU calibration gas of known contents.

- Connect the HNU probe to the sampling bag by using flexible tubing.
- Allow the sample bag contents to be drawn into the probe, and check the response in ppm.
- Adjust the span potentiometer to produce the concentration listed on the span gas cylinder. This procedure shall be followed only until the span potentiometer reaches the following limits:

<u>Probe</u>	<u>Initial Span Pot. Setting</u>	<u>Maximum Acceptance Span Pot. Setting</u>
9.5 eV	5.0	1.0
10.2 eV	9.8	8.5
11.7 eV	5.0	2.0

If these limits are exceeded, the instruments must be returned for maintenance and recalibration.

Each responsible organization must develop a mechanism for the documentation of calibration results. This documentation includes the following:

- Date inspected
- Person who calibrated the instrument
- The instrument number (serial number or other ID number)
- The results of the calibration (ppm, probe eV, span potentiometer setting)
- Identification of the calibration gas (source, type, concentration)

B.4.9 Calibration Procedure No. 2

For HNU calibration canisters equipped with a regulator:

- Run through the startup procedures.
- Connect one end of a sampling hose to the regulator outlet and the other end to the sampling probe of the HNU.

- Crack the regulator valve.
- Take a reading after 5 to 10 seconds.
- Adjust the span potentiometer.

All field calibrations will be documented on the calibration record form (Form 1.15A, Section 11).

EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.16, Rev. 0
1 of 16
February 18, 1991
ER&WM

Safety Related
Category 1

TITLE:
FIELD RADIOLOGICAL
MEASUREMENTS

Approved:

J. W. Langmuir

1.0	TABLE OF CONTENTS	
1.0	TABLE OF CONTENTS	1
2.0	PURPOSE AND SCOPE	3
3.0	RESPONSIBILITIES AND QUALIFICATIONS	3
4.0	REFERENCES	4
4.1	SOURCE REFERENCES	4
4.2	INTERNAL REFERENCES	4
5.0	EQUIPMENT	4
5.1	MONITORING DEVICES	5
5.2	SUPPLIES	5
6.0	PROCEDURES	6
6.1	WORK AREA CHARACTERIZATIONS	6
6.2	MONITORING BY EG&G	7
6.2.1	Monitoring Techniques To Be Used By EG&G	7
6.2.2	Monitoring Tasks To Be Accomplished By EG&G	7
6.3	MONITORING BY SUBCONTRACTORS	8
6.3.1	Monitoring Techniques To Be Used By Subcontractors	8
6.3.1.1	Monitoring With A Ludlum Model 12-1A	8
6.3.1.2	Monitoring With A Large Area Swipe	9
6.3.1.3	Monitoring With A Small Area Smear	10

6.3.2	Monitoring Tasks To Be Accomplished By Subcontractors	11
6.3.2.1	Work Areas	11
6.3.2.2	Wastes	11
6.3.2.2.1	Drilling Cuttings	13
6.3.2.2.2	Waste Containers	13
6.3.2.3	Sample	14
6.3.2.4	Equipment	15
6.3.2.4.1	Heavy Equipment	15
6.3.2.4.2	General Equipment	15
6.3.2.4.3	Microwave Oven	16
7.0	DOCUMENTATION	16

FIGURES

FIGURE 1.16-1	MINIMUM MEASUREMENT POINTS FOR A PRE-WORK AREA SURVEY	12
---------------	--	----

**EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.16, Rev. 0
3 of 16
February 18, 1991
ER&WM**

2.0 PURPOSE AND SCOPE

This standard operating procedure (SOP) describes procedures and specifies who will conduct those procedures at the Rocky Flats Plant (RFP) to gather radiological data for monitoring wastes, samples, and equipment during field activities involving sediments conducted under the Environmental Restoration (ER) Program. In particular, this SOP describes monitoring for the presence of radioisotopes. This SOP does not describe procedures for predicting or assessing personnel exposures to radioisotopes.

3.0 RESPONSIBILITIES AND QUALIFICATIONS

EG&G Radiation Protection Technicians (RPTs) will conduct radiation monitoring activities for equipment, samples, and personnel before they leave potentially contaminated work areas. EG&G will establish the qualifications for RPTs and ensure that all RPTs are fully qualified.

Subcontractor personnel will conduct radiation monitoring activities within the work area for the purpose of waste handling. All subcontractor personnel assigned to conduct monitoring activities will have attended the three-day EG&G radiation worker safety course and will be familiar with the contents of this SOP and the applicable manufacturer's instructions for any radiological monitoring instrument they use. The subcontractor will maintain documentation of training at the work site.

**EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS SOP**

**Manual:
Procedure No.:
Page:
Effective Date:
Organization:**

**5-21200-FOP
1.16, Rev. 0
4 of 16
February 18, 1991
ER&WM**

4.0 REFERENCES

4.1 SOURCE REFERENCES

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

Nuclear Weapon Accident Response Procedures (NARP) Manual. July 2, 1984. The Defense Nuclear Agency.

Radiological Operating Instruction 3.1. Performance Of Surface Contamination Surveys. August 9, 1989. Rocky Flats Plant Department of Health, Safety, and Environment.

4.2 INTERNAL REFERENCES

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

- SOP 1.3, General Equipment Decontamination
- SOP 1.4, Heavy Equipment Decontamination
- SOP 1.6, Handling of Personal Protective Equipment
- SOP 1.8, Handling of Drilling Fluids and Cuttings
- SOP 1.10, Receiving, Labeling, And Handling Waste Containers

5.0 EQUIPMENT

The following monitoring devices and supplies or equivalent items will be required for each subcontractor to complete the monitoring activities described by this SOP. The responsible EG&G project manager will determine if a proposed alternate radiation monitoring device is equivalent to those items specified below.

5.1 MONITORING DEVICES

- Ludlum Model 12-1A alpha counter with an air proportional probe
- Ludlum Model 4310 alpha sample counter
- Ludlum Model 2000 scaler/timer

5.2 SUPPLIES

- Smear papers sized to fit in the Ludlum Model 4310 alpha sample counter tray
- Plastic bags to contain Ludlum Model 12-1A instrument (excluding the detector probe)
- Microwave oven that is clearly labelled to indicate that it will NOT be used to heat foods or drinks and that it is used to dry potentially radioactive smear test papers
- Replacement probe faces for the Ludlum Model 12-1A
- Swipe material such as Kimwipes
- Glassine envelopes
- Stainless steel scoop

6.0 PROCEDURES

6.1 WORK AREA CHARACTERIZATIONS

Each project area will be characterized by EG&G prior to any field activity. Work area characterizations will be based on the historical background of the work area and includes the results of field radiological surveys conducted by EG&G RPTs. Work areas associated with the ER program field operations fall into two characterizations: potentially contaminated and not potentially contaminated. Work areas currently characterized as potentially contaminated include the following:

- Individual Hazardous Substance Sites (IHSS)
- Identified Groundwater Plume Areas
- Americium Zone at OU No. 2
- Surface sediment sampling stations which have not been verified as background locations

See SOP 1.10, Receiving, Labeling, and Handling of Waste Containers, for specific work areas currently characterized as potentially contaminated.

Sediment sampling stations that have been verified as background stations (uncontaminated) as of December 1990 are listed below.

<u>Sediment</u> <u>Station Number</u>	<u>Location</u>
SED 04	Tributary of Walnut Creek
SED 15	Offsite Gravel Pits
SED 16	Woman Creek Drainage

SED 17	Tributary of Woman Creek
SED 18	Tributary of Woman Creek
SED 19	Tributary of Women Creek
SED 20	Rock Creek Drainage
SED 21	Rock Creek Valley Wall
SED 22	Rock Creek Drainage
SED 23	Rock Creek Drainage

Unless specified in the project specific work plans, all other work areas will be considered as potentially contaminated.

6.2 MONITORING BY EG&G

6.2.1 Monitoring Techniques To Be Used By EG&G

EG&G RPTs will follow the procedures and apply the contamination limits established for alpha contamination by Radiological Operating Instruction (ROI) 3.1, Performance of Surface Contamination Surveys.

6.2.2 Monitoring Tasks To Be Accomplished By EG&G

EG&G RPTs will monitor waste containers, sample containers, and equipment exiting potentially contaminated work areas and work areas characterized as not potentially contaminated if monitoring by subcontractors indicates the potential presence of contamination with radioisotopes. EG&G RPTs will also conduct prework area monitoring of potentially contaminated work sites, excluding surface sediment sampling sites. Prework area monitoring will be scheduled with an EG&G RPT as far in advance as possible. A minimum notice of one workday is required.

EG&G ROCKY FLATS PLANT
EMAD FIELD OPERATIONS SOP

Manual:
Procedure No.:
Page:
Effective Date:
Organization:

5-21200-FOP
1.16, Rev. 0
8 of 16
February 18, 1991
ER&WM

6.3 MONITORING BY SUBCONTRACTORS

Subcontractors will use one or more of the monitoring techniques described in Subsection 6.3.1 to accomplish the monitoring tasks described in Subsection 6.3.2 without regard to the work area characterization by EG&G.

6.3.1 Monitoring Techniques To Be Used By Subcontractors

At a minimum, disposable protective gloves will be worn when screening procedures are conducted. When the Ludlum Model 12-1A is being used, it will be placed in a plastic bag, with the exception of the probe, to prevent contamination of the instrument.

The following subsections describe the field monitoring techniques that will be accomplished by subcontracting personnel. It is important that the following monitoring techniques be thoroughly understood before the monitoring tasks descriptions provided in Subsection 6.3.2 are reviewed.

6.3.1.1 Monitoring With A Ludlum Model 12-1A

Monitoring with a Ludlum Model 12-1A will normally be done at the work area. It should be noted that alpha radiation will not penetrate the upper layer of a wet surface nor will it travel farther than approximately an inch in air. Therefore, the Ludlum Model 12-1A cannot be used to screen wet surfaces and must be held parallel to and within one quarter inch of the surface being screened.

The Ludlum Model 12-1A count rate meter with an air proportional probe will be used as described in this subsection to monitor wastes, samples, and equipment as field work. Direct surface monitoring with a Ludlum Model 12-1A is a relatively speedy method of determining the presence and extent of potential radiological contamination. However, this method will not distinguish between fixed and removable radiological contamination.

The preferable method of using a Ludlum Model 12-1A to monitor for surface contamination is to make sequential overlapping measurements with a stationary probe. However, slowly sweeping the probe over the surface will also produce accurate results if the Ludlum probe is not moved faster than 2 inches per second over the surface being screened and the probe is stopped and held stationary over any indicated counts per minute (cpm) value.

Monitoring results greater than 250 cpm as indicated by the Ludlum Model 12-1A will be considered indicative of the presence of radiological contamination on the surface. Decontamination procedures for various items are contained in the SOPS listed in Subsection 4.2.

6.3.1.2 Monitoring With A Large Area Swipe

Monitoring with large area swipes will normally be accomplished at the work area.

Large area swipes are used to detect removable surface radiological contamination. Swipes will be performed by firmly wiping an area greater than 100 square centimeters (cm²) but not exceeding 1 square meter with a soft absorbent material (i.e., Kimwipes). The monitoring will be completed by using a Ludlum Model 12-1A to monitor that area of the swipe material that contacted the potentially contaminated surface. The swipe being monitored should be relatively flat as it is being screened.

Monitoring results greater than 250 cpm from a large area swipe as indicated by monitoring with a Ludlum Model 12-1A will be considered indicative of the presence of radiological contamination and will necessitate locating the contamination on the surface being monitored by the large area swipe. The contamination will be located by monitoring the surface with a Ludlum Model 12-1A as described in Subsection 6.3.1.1. Decontamination procedures for various items are contained in the SOPs listed in Subsection 4.2.

Wastes found to have an activity greater than 250 cpm as indicated by the Ludlum Model 12-1A will be treated as low-level radioactively contaminated waste. Swipes found to have an activity less than 250 cpm will be handled as uncontaminated waste.

6.3.13 Monitoring With A Small Area Smear

Monitoring small areas with smear paper and counting the smears in the Ludlum Model 4310 alpha sample counter is the most sensitive of the three monitoring techniques subcontractors will normally use. Whenever radioactive contamination is detected during the monitoring tasks described in Subsection 6.3.2, small area smears will be done to verify removal of that contamination. Small area smears may be taken from wet surfaces provided that the smears are dried before being counted. A microwave oven may be used to speed the drying process prior to counting.

Use caution when smearing rough surfaces so as not to abrade or tear the smear paper. Damaged smear paper might not provide a representative level of the contamination present. Prior to use, a small "X" will be made with a pencil on the face of the small area smear paper that will contact the surface being monitored. Hold the smear paper between the thumb and fingers, with the back of the smear against the fingers. Place the face of the smear paper against the surface to be smeared. Apply moderate pressure across the smear to ensure that at least one half of the face of the smear comes in contact with the surface being surveyed. Wipe (smear) an area of approximately 100 cm² (approximately a 4 inch by 4 inch square). Rotate the smear paper one-half turn and smear the same area again. All smear papers will be handled carefully to avoid cross-contamination and will be identified as to the location/surface smeared, placed in a glassine envelope, and transferred to the Ludlum Model 4310 alpha sample counter for counting after the smear paper is removed from the glassine envelope.

Small area smears that indicate an activity level of greater than 20 disintegration per minute (dpm) as measured with a Ludlum Model 4310 alpha sample counter and Ludlum Model 2000 scaler/timer

will be considered as indicative of potential radioactive contamination. Decontamination procedures for various items are contained in the SOPs listed in Subsection 4.2.

Small area smear papers found to have an activity of greater than 20 dpm as measured with a Ludlum Model 4310 alpha sample counter and Ludlum Model 2000 scaler/timer will be treated as low-level radioactively contaminated waste. Small area smear papers found to have an activity of less than 20 dpm will be handled as uncontaminated waste.

6.3.2 Monitoring Tasks To Be Accomplished By Subcontractors

6.3.2.1 Work Areas

Work area monitoring will be accomplished (prior to work starting) to indicate if surficial radioactivity exists in the immediate work area. Prework area monitoring will be accomplished by making direct soil surface measurements with a Ludlum Model 12-1A. A minimum of 17 measurement points will be used for a prework area survey. A grid of the measurement points that is centered on the point of the intrusive activity is depicted in Figure 1.16-1. A measurement of 250 CPM or less as measured by a Ludlum Model 12-1A indicates only background levels of radioactivity are present. At surface sediment sampling sites a single monitoring with a Ludlum Model 12-1A at the sampling point will constitute prework area monitoring. Documentation of area monitoring will be accomplished by completing Section I of Form 1.16A, Results of Radiological Measurements In The Field.

If snow cover is present at a work area or the ground surface is wet, area monitoring shall not be accomplished. In that situation, waste management decisions will be based upon results of monitoring drilling cuttings and drilling cores.

6.3.2.2 Wastes

6.3.2.2.1 Drilling Cuttings. During soil boring and well construction, the point of intrusive activity will be monitored with the Ludlum Model 12-1A before the auger bit is set on the ground. Normally, as the auger starts rotating, the soil cuttings will be wetted as they are generated, and the wetting process will preclude monitoring of the soil cuttings with a Ludlum Model 12-1A. However, each time the auger is stopped for the addition of another auger flight, the accumulated wetted soil cuttings will be removed from the ground around the auger. As the augers begin rotating again, a small (approximately 1 cup) sample will be collected from the dry soil cuttings brought to the surface before the wetting process begins. The sample of dry soil cuttings will be spread evenly over a surface known (by prior monitoring) to be free of radiological contamination and monitored with the Ludlum Model 12-1A. Drilling cutting's monitoring results will be recorded on Form 1.8B, Record of Drilling Fluids And Cuttings, as described in SOP 1.8, Handling of Drilling Fluids and Cuttings.

If the soil cuttings being generated are wet as they appear at the ground surface, monitoring those cuttings with a Ludlum Model 12-1A will not produce useful data. Therefore, the results of small area smears from the interior of the split-spoon sampler will be used.

6.3.2.2.2 Waste Containers. Sealed waste containers will be monitored in the work area if the work area was characterized as potentially contaminated by EG&G. Sealed waste containers used in an area characterized by EG&G as uncontaminated will also be monitored in the work area if the potential presence of radioactive contamination was indicated during any of the monitoring tasks conducted as field work progressed.

If the waste containers are dry, the top and side will be monitored with a Ludlum Model 12-1A. When monitoring the sides, the long axis of the Ludlum probe will be held parallel to the long axis of the waste container. If the waste container is wet, the top and sides will be monitored with small area smears.

After decontamination at the main decontamination facility, sealed waste containers will be monitored with small area smears if the containers were found to be radioactively contaminated during monitoring tasks completed in the field. Four small area smears will be conducted around the side of the top one-third of each drum. And, the four small area smears will be spaced around the drum so that each individual small area smear is 90° around the drum from the nearest adjoining small area smear site. Documentation of waste container monitoring will be accomplished by completing Section II of Form 1.16A, Results of Radiological Measurements In The Field.

6.3.2.3 Samples

Drilling cores that are dry will be monitored with the Ludlum Model 12-1A after the split-spoon sampler is opened. If the drilling core is wet, a small area smear will be conducted on the interior side of the empty half of the split-spoon sampler. The results of each core monitoring will be assigned to the core number that represents the core screened.

If field radiological monitoring conducted during intrusive activities (see SOP 1.8, Handling of Drilling Fluids And Cuttings) reveals the potential for radioactive contamination, a small area smear of the exterior of the sample container will be taken and the small area smear counting results used to verify decontamination of the sample container. Documentation of sample monitoring will be accomplished by completing Section III of Form 1.16A, Results of Radiological Measurements In The Field.

All drilling core intervals will be monitored and the results recorded. If the space provided is insufficient to record all the monitoring results, additional core monitoring results will be recorded on the reverse side of the form, and an annotation made on the front of the form regarding the location of additional results.

6.3.2.4 Equipment

6.3.2.4.1 Heavy Equipment. In the field, heavy equipment that has been used in an area characterized as potentially contaminated and heavy equipment used in an area characterized as uncontaminated where monitoring tasks indicated the potential presence of radiological contamination will be monitored. Surfaces that have been in direct contact with soil will be monitored with a Ludlum Model 12-1A after contamination-reduction activities have been accomplished as described in SOP 1.4, Heavy Equipment Decontamination. Special attention will be paid to the tires/tracks, augers, etc.

Heavy equipment found to be radioactively contaminated in the field will be monitored with small area smears after decontamination at the main decontamination facility. The small area smears will be accomplished without regard to the results of field monitoring after contamination reduction activities in the field.

Documentation of all heavy equipment monitoring will be accomplished as described in SOP 1.4, Heavy Equipment Decontamination.

6.3.2.4.2 General Equipment. General equipment that has been in direct contact with soil will be screened with a Ludlum Model 12-1A. Large area swipes will be conducted on non-uniform objects and/or surfaces (such as odd shapes, inside surfaces, small items, etc.).

General equipment found to be radioactively contaminated in the field will be monitored by small area smears after final decontamination. The small area smears will be accomplished without regard to the results of field monitoring after decontamination activities in the field.

Documentation of all general equipment monitoring will be accomplished as described in SOP 1.3, General Equipment Decontamination.

6.3.2.4.3

Microwave Oven. Each of the interior surfaces of the heating cavity within the microwave oven will be monitored by small area smears immediately after the oven is used to dry any small area smears collected from potentially contaminated items. If potential radioactive contamination is indicated (see Subsection 6.3.1.3) the oven cavity will be decontaminated by wiping all surfaces with premoistened towelettes, and the effectiveness of decontamination will be verified by conducting additional small area smears after the oven cavity has dried. Small area smear papers that have indicated the potential presence of radioactive contamination within the oven cavity, premoistened towelettes used to decontaminate the oven cavity, and the original smear test paper that resulted in the oven cavity becoming potentially contaminated will be returned (for disposal as low level radioactive waste) to the field activity that generated the original smear test paper.

7.0 DOCUMENTATION

Documentation will be maintained concerning the results of radiological monitoring specified in this SOP. Form 1.16A, Results of Radiological Monitoring In The Field, will be used to record the required information.

Results of Radiological Measurements In the Field

Project Location: _____

Date: _____

Project Number: _____

I. Work Area Monitoring

_____ Site Number (i.e., bore site, well, sediment, etc.)

_____ Snow cover was present

_____ Work surface was wet

Instrument Used (Check appropriate line):

_____ Ludlum Model 12-1A alpha counter with an air proportional probe Serial No. _____

_____ Other (Specify manufacturer, model, serial number, and type probe): _____

_____ Calibration Date

Pework Monitoring Results:

_____ cpm at point of intrusive activity

_____ highest measured cpm

Illustrate all measurement sites and results on the reverse side of this sheet.

(Printed Name and Signature/Date)

(Subcontractor) (Phone)

II. Waste Monitoring

_____ Waste monitoring not required. Work area was characterized as uncontaminated and field radiological screening as work progressed did not indicate the presence of potential contamination.

Instrument Used (check appropriate line):

_____ Ludlum Model 12-1A alpha counter with an air proportional probe Serial No. _____

_____ Other (Specify manufacturer, model, serial number and type probe): _____

_____ Calibration date

Drums Monitored By A Ludlum Model 12-1A And Large Area Swipes at the Work Site:

<u>Drum ID No.</u>	<u>Surface Smear</u>	<u>Results (cpm)</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

(Printed Name and Signature/Date) (Subcontractor) (Phone)

III. Sample Monitoring:

_____ Ludlum Model 12-1A alpha counter with an air proportional probe

_____ Smear test counter (Specify manufacturer and model): _____

_____ Calibration date

Drilling core intervals monitored and associated sample numbers that the results were assigned to:

<u>Interval(ft)</u>	<u>Highest Level(cpm) Noted</u>	<u>Associated Sample Numbers</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Sample containers checked with small area smears and results (cpm)

<u>Sample Number</u>	<u>Initial Wipe Results</u>
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

(Printed Name and Signature/Date)

(Subcontractor) (Phone)

DECISION DIAGRAM

HANDLING OF DISPOSABLE PERSONAL PROTECTIVE EQUIPMENT (PPE)

5-21200-FOP
1.6, Rev. 0
9 of 13
February 18, 1991
ER&WM

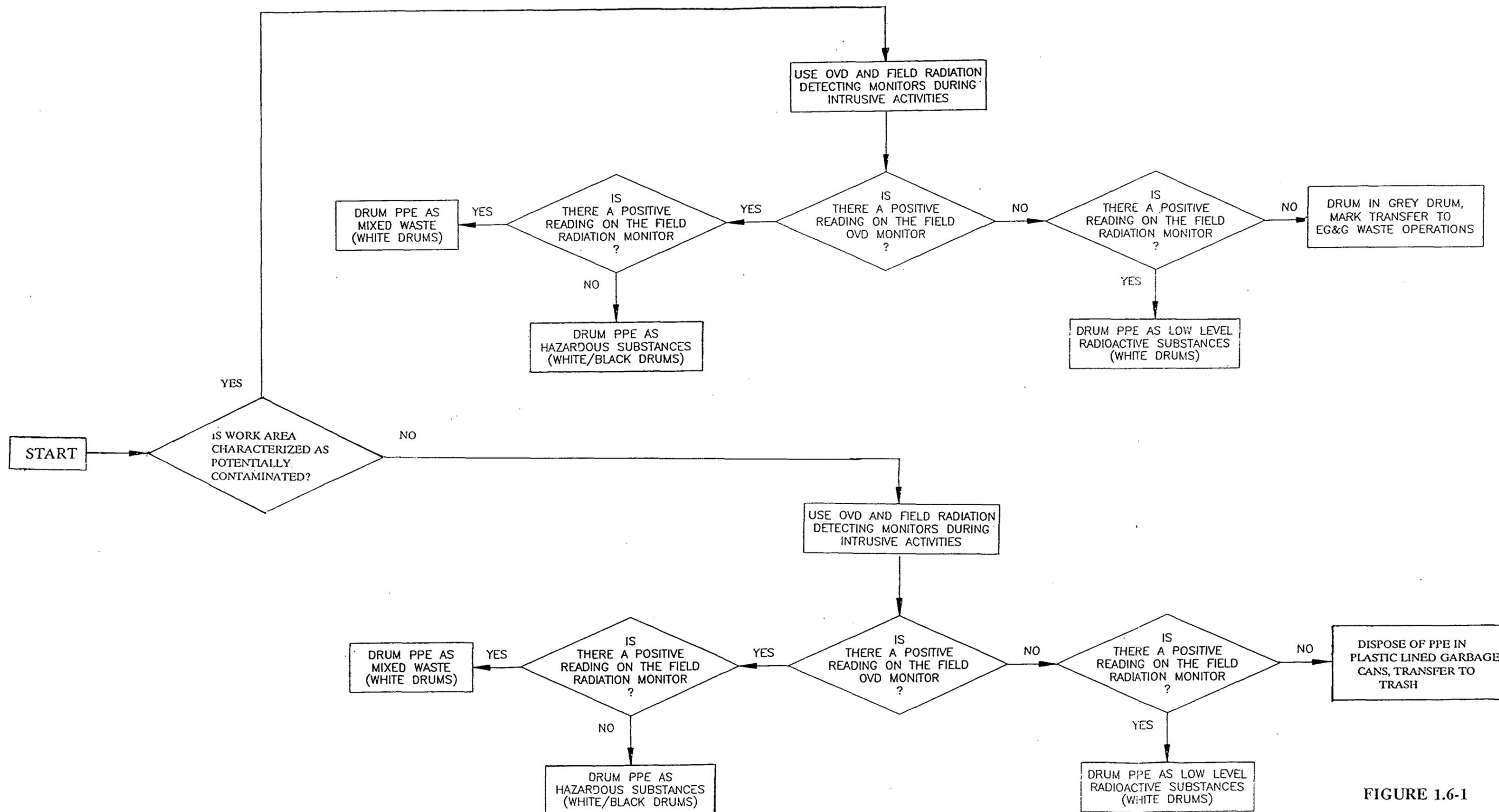


FIGURE 1.6-1

DECISION DIAGRAM
 HANDLING OF ALLUVIAL DRILL CUTTINGS

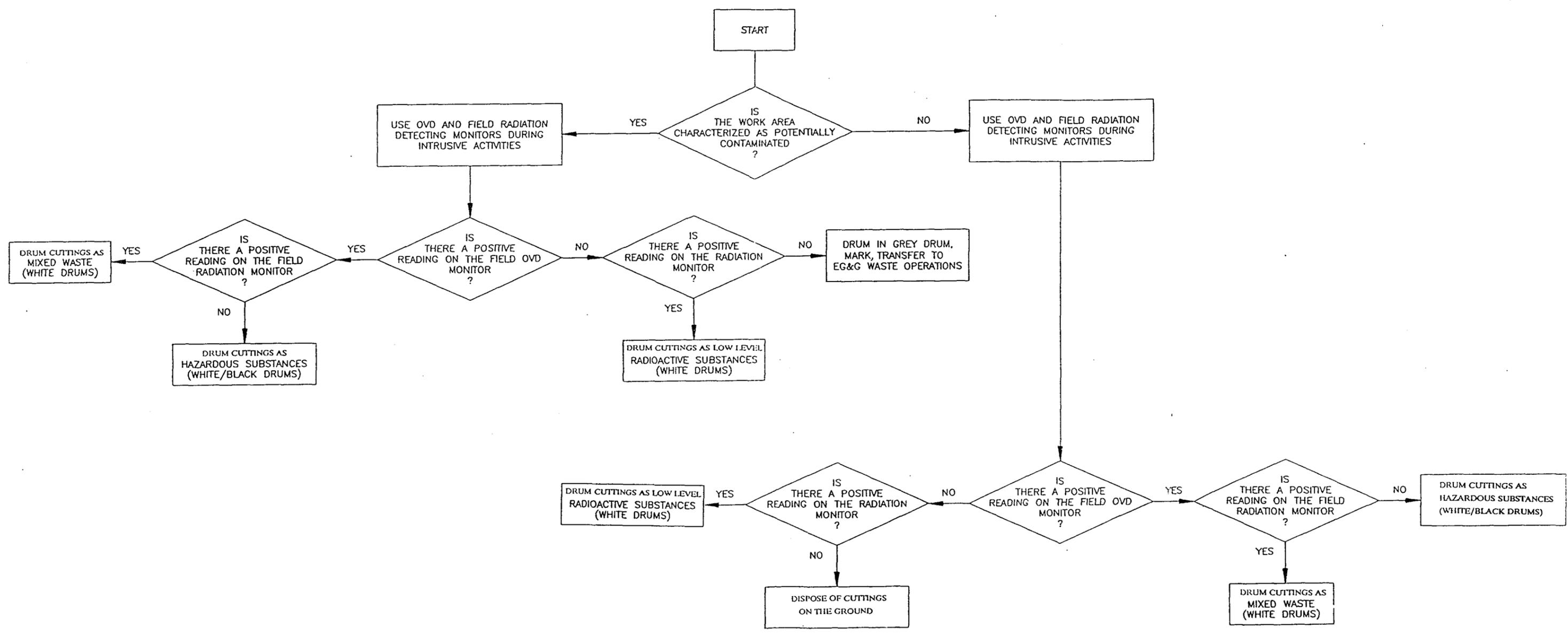
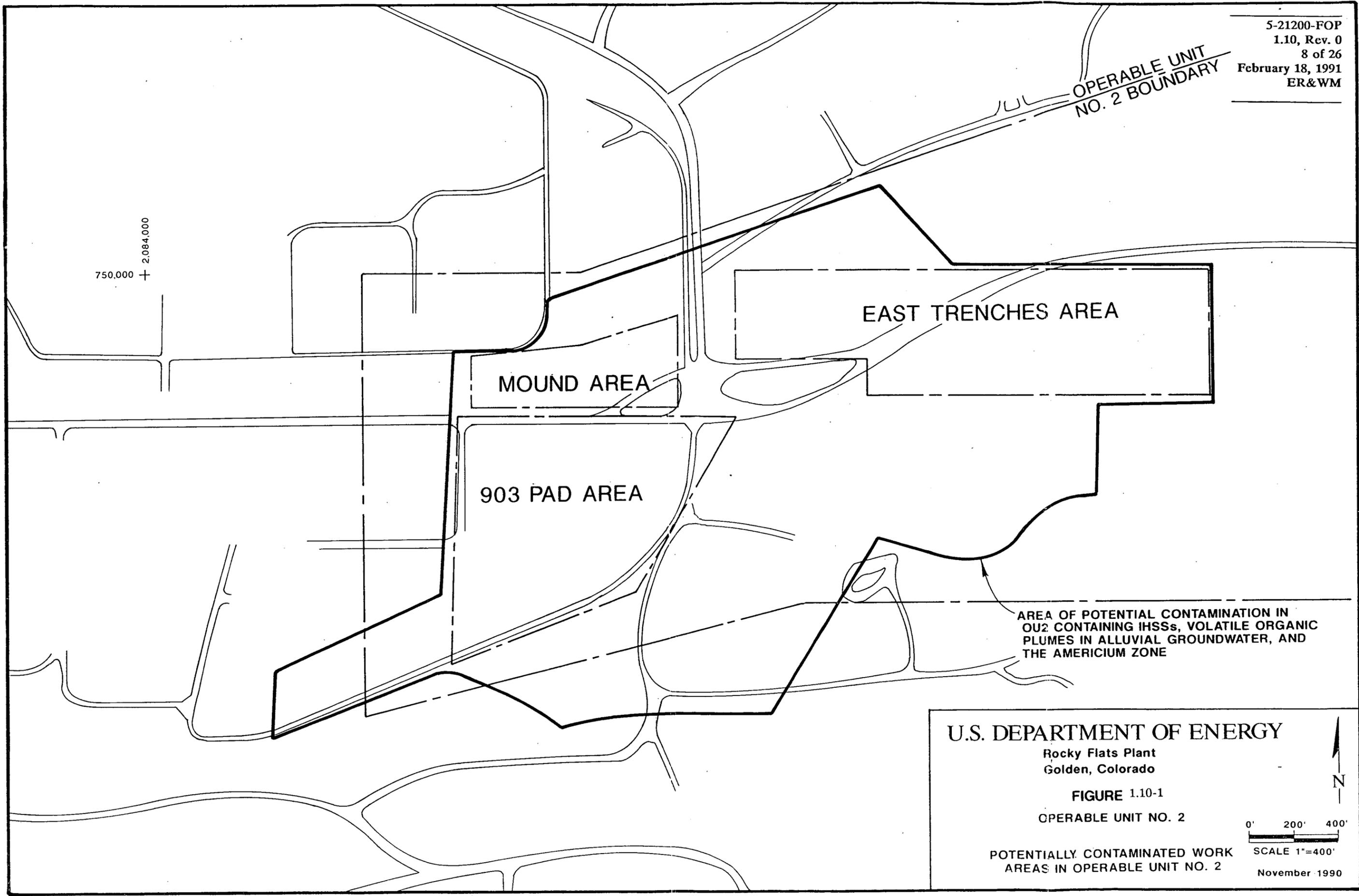


FIGURE 1.8-1

OPERABLE UNIT
NO. 2 BOUNDARY

750,000 +
2,084,000

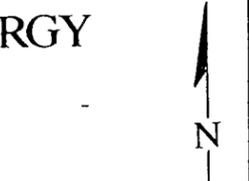


AREA OF POTENTIAL CONTAMINATION IN
OU2 CONTAINING IHSSs, VOLATILE ORGANIC
PLUMES IN ALLUVIAL GROUNDWATER, AND
THE AMERICIUM ZONE

U.S. DEPARTMENT OF ENERGY

Rocky Flats Plant
Golden, Colorado

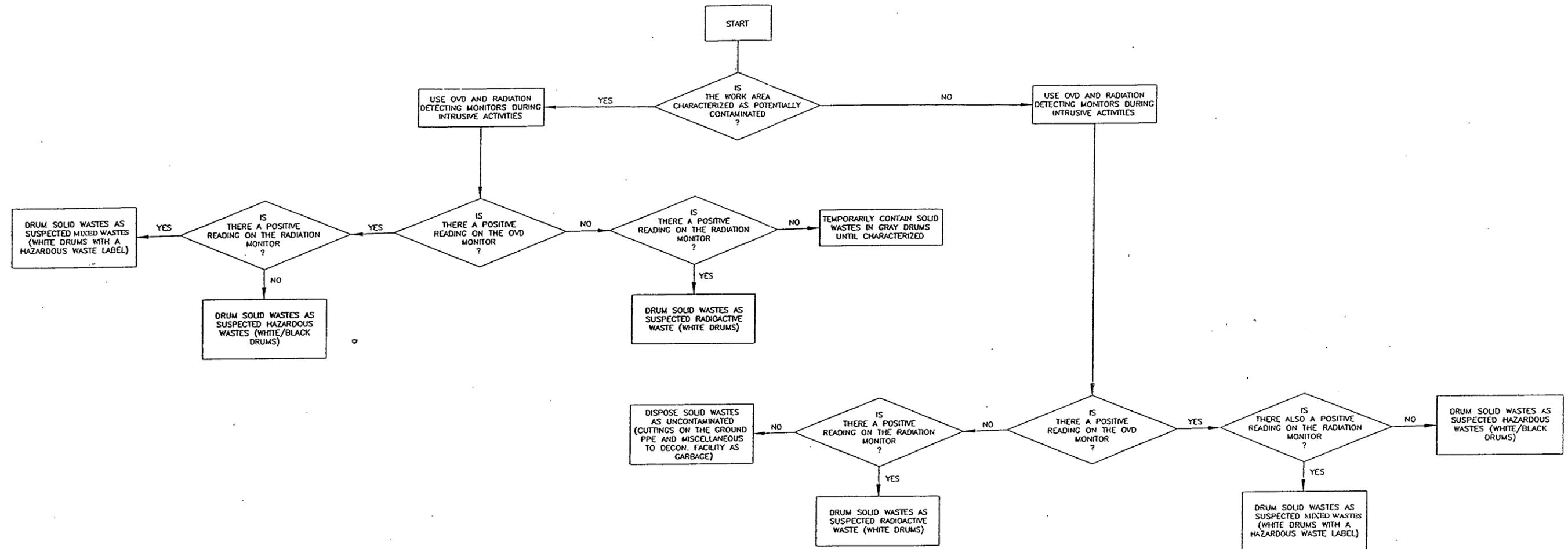
FIGURE 1.10-1
OPERABLE UNIT NO. 2



0' 200' 400'
SCALE 1"=400'

POTENTIALLY CONTAMINATED WORK
AREAS IN OPERABLE UNIT NO. 2

November 1990



U.S. DEPARTMENT OF ENERGY

Rocky Flats Plant
 Golden, Colorado

FIGURE 1.10-2

COLOR CODED DRUMS FOR SUSPECTED CONTAMINATED SOLID WASTES