

Rocky Flats Environmental Technology Site

PRO-947-LOCATION/SURVEYING REVISION 0

LOCATION CODE AND SURVEYING CONTROL

Responsible K-H Organization: K-H EES&Q Programs Effective Date: October 2, 2000

Approved By: Manager, Environmental Media Management 9-26-00
Title Date

Robert C. Nining

Print Name

[Signature]
Approval Signature

NA
Print Name of Responsible Manager (N/A if RM is Approval Authority)

The Responsible Manager has determined the following organizations' review is required. Review documentation is contained in the document history file:

ESS Environmental
Media Management
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371/374 Closure
Project

707 Closure Project
771 Closure Project
776 Closure Project

USE CATEGORY 2

This procedure is performed as written and need not be in hand for the performance of the described tasks. The procedure **SHALL** be available at a known location for reference.

IMPORTANT NOTES

Periodic Review Frequency: 4 years from the effective date.
This procedure is a complete revision and supersedes procedure 5-21000-OPS, GT.17, Rev. 2, Land Surveying
Use Category: N/A
ISR Review: N/A
SES/USQD Review: N/A

PADC-2000-03479

ADMIN RECORD

Classification Review Waiver
Per CEX-072-99

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1.0 PURPOSE

Environmental Data Management requires documentation of all pertinent data information for environmental media samples or environmental media structures or components used for the collection of environmental data at RFETS. This procedure establishes the administrative guidelines for surveying of unique location codes used for the collection of environmental media samples or environmental remediation structures or components at the Rocky Flats Environmental Technology Site (RFETS). This procedure is implemented through Environmental Media Management, Environmental Systems and Stewardship (ESS) under Engineering, Environmental, Safety & Quality (EES&Q) Programs. The Location Code and Surveying Control Procedure (LCSCP) is designed to comply with the procedures for Environmental Data Management at RFETS.

Surveying data are essential to determining accurate horizontal and vertical datum of data acquisition (sampling or other media) points and ties these points to established map coordinates. The LCSCP also furnishes guidance to the user regarding the interface between this procedure, 1-K92-RFP-94-001, Rev. 1, Well Control Program; Spatial Data Map Control; and PRO-1058-ASD-005, Environmental Data Management. This procedure is to be followed prior to, during, and after survey datum collection activities.

2.0 SCOPE

This procedure applies to all Responsible Managers in charge of environmental media sampling or remedial construction activities where environmental measurements or samples are collected. The Responsible Manager ensures that the location code(s) are unique per PRO-1058-ASD-005, Environmental Data Management and surveyed in accordance with this procedure and that the data is captured into an RFETS database (e.g., Soil Water Database [SWD]).

This procedure addresses surveying methods, minimum requirements for coordinate survey data, and surveying records data capture. This procedure identifies the responsible groups, states the responsibility of each affected group, and furnishes instruction for implementation. This procedure identifies the requirements for surveying activities for environmental sampling or environmental construction activities at RFETS as implemented through this procedure and applicable Standard Operating Procedures (SOPs) or other work control documents.

This procedure does not provide specific survey procedures as performed by a licensed Colorado Professional Land Surveyor or Global Positioning System (GPS) surveying performed in accordance with manufacturer's instructions and training. This procedure is a complete revision and supersedes procedure 5-21000-OPS, GT.17, Rev. 2, Land Surveying. This procedure is written to comply with MAN-001-SDRM, Site Documents Requirements Manual, INS-816-DM-02, Writing Instruction Guide, PRO-815-DM-01, Developing, Maintaining, and Controlling Documents, and is controlled through MAN-063-DC, Site Document Control Program Manual.

3.0 DEFINITIONS/ACRONYMS

3.1 Definitions

Environmental Media Environmental media is defined as, but not limited to, surface soil, subsurface soil, sediment, groundwater, and surface water. Survey coordinate data for environmental media may consist of survey coordinates collected in support of a remedial action or construction (excavation, source removal, or treatment system).

GPS Global Positioning System, a surveying method used to collect horizontal and vertical coordinates using satellites.

Location Code A location code is a unique identifier which identifies where an environmental sample(s) or field measurement was collected. A location code need not have analytical data in electronic form to be a viable location code.

Survey Coordinates Horizontal (northing [latitude] and easting [longitude]) coordinates using UTM and the State Plane Coordinate system and vertical (elevation [altitude]) datum in reference to NAD 27 CONUS. Also referred to as a spatial data set and survey coordinate data.

Surveying Collection of horizontal (northing and easting) and vertical (elevation) survey coordinate data using industry standard techniques (traditional engineering surveying or GPS methods) for use in locating property boundaries, construction layout, and maps.

3.2 Acronyms

ASD	Analytical Services Division, Kaiser-Hill, LLC
AST	Analytical Services Toolkit
CDPHE	Colorado Department of Public Health and Environment
DGPS	Differentially Corrected GPS
DQO	Data Quality Objective
DOE	U.S. Department of Energy
EES&Q	Engineering, Environmental, Safety, and Quality
EPA	U.S. Environmental Protection Agency
ESS	Environmental Systems and Stewardship
GDL	Geographic Information Systems Data Lead
GIS	Geographic Information Systems
GPS	Global Positioning System
IHSS	Individual Hazardous Substance Site
LCSP	Location Code Surveying Procedure

PAC	Potential Area of Concern
QA	Quality Assurance
QC	Quality Control
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
SAP	Sampling Analysis Plan
SARF	Sample Analysis Request Form
SME	Subject Matter Expert
SOP	Standard Operating Procedure
SWD	Soil Water Database
UBC	Under Building Contamination
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
WIN	Well Installation Notification

4.0 RESPONSIBILITIES

4.1 Analytical Services Division (ASD)/Environmental Data Manager

- A designee(s) of the Analytical Services Division responsible for administrative functions of SWD.
- Advises Responsible Manager or Project Manager regarding administrative and operating procedures relating to Analytical Services Toolkit (AST) user interface and the LCSCP.
- Ensures capture of data into one of the RFETS electronic databases.
- Removes unused location codes from SWD upon project or task completion per notification by Project Manager/Field Supervisor.

4.2 Geographic Information Systems (GIS) Data Lead (GDL)

- Assists Project Manager/Field Supervisor in preparation of GIS maps for work control documents (e.g., sampling analysis plans [SAP]) and final reports (e.g., final project documentation as a deliverable).
- Ensures that the survey coordinate data are correct as reviewed and approved by the Project Manager/Field Supervisor for upload into the SWD or applicable database.
- Enters final approved location code survey coordinates and data into SWD per *PRO-1058-ASD-005*, Environmental Data Management.
- Maintains the GIS spatial database per *PRO-1130-ASD-006*, Spatial Data Map Control.

4.3 Project Manager/Field Supervisor

- Assigns an individual Subject Matter Expert (SME) to act on behalf of the project or program regarding environmental media sampling, environmental construction activities, and implementation of this procedure.
- Notifies ASD Environmental Data Manager and GDL of planned environmental media sampling or construction activities.
- Assigns an individual as the AST user to enter each new location code and associated field data into the SWD database per *PRO-1058-ASD-005*, Environmental Data Management.
- Notifies Environmental Media Management, Water Operations, of planned monitoring well installation activities in accordance with *1-K92-RFP-94-001, Rev. 1*, Well Control Program.
- Prior to any surveying activities, the Project Manager/Field Supervisor **SHALL** have a meeting with the surveyor to review the surveying requirements and to supply the necessary information to complete the surveying program (e.g., draft or sketch map of locations to be surveyed).
- Ensures the survey coordinate data meets project or program-specific data quality objectives.
- Provides oversight of environmental media survey coordinate data collection activities to ensure that the activities comply with environmental regulations and permits, in conjunction with:
 - Engineering, Environmental, Safety & Quality Programs (EES&QP),
 - Rocky Flats Cleanup Agreement (RFCA),
 - State of Colorado, Division of Water Resources, Water Well Construction Rules, and
 - This procedure.
- Acts as the Responsible Manager's designee in the review of field forms to ensure survey coordinate data are entered per the applicable procedures and submittal of the field forms to the appropriate groups.
- Provides the GDL with the survey coordinate data for each new environmental media location code.
- Performs quality assurance review and approval of the survey data. In-coordination with the GIS group.

4.4 Responsible Manager

- Funds the task or project in the applicable work package.
- Designates the Project Manager/Field Supervisor, as needed, to implement the Location Code and Surveying Control Procedure.
- Ensures that adequate time and resources are allotted for surveying, quality assurance review and approval of survey coordinates and submittal of final survey coordinates to the GDL for upload into the SWD.
- Ensures that surveying activities are performed in compliance with the requirements of this procedure, *1-K92-RFP-94-001*, Well Control Program, other applicable SOPs, Water Well Construction Rules (2 CCR 402-2[DWR, 2000]), and the Rocky Flats Cleanup Agreement guidelines (DOE, 1996).

- Ensures that the surveying of environmental media and location codes are completed, reviewed, approved, and provided to the GDL for upload into one of the Sites electronic databases. Noncompliance with this procedure will result in entry into the Environmental Corrective Action Tracking System (ECATS) and assigned to the Responsible Manager for environmental noncompliance.

4.5 Surveyor

Site personnel or subcontractor personnel that perform surveying duties in accordance with this procedure and in accordance with the surveying equipment's SOP(s), manufacturers operating instructions, and/or Colorado Land Surveying requirements.

4.6 Environmental Media Management (Water Operations)

- The Water Operations Manager or designee **SHALL** be responsible for the maintenance of this procedure. Periodic review of this procedure **SHALL** be required at a minimum of a four-year period from its effective date.
- Acts as the primary point of contact for implementation of this procedure.
- Reviews location codes in the SWD to ensure final coordinate data is entered on a biannual frequency. Checks Field Event sample collection date versus date of Location Code survey coordinate data entry in SWD for environmental noncompliance. Submits environmental noncompliance report form to ECATS if noncompliance is observed.

5.0 INSTRUCTIONS

The following instructions, including sequential reviews, will guide the user through the necessary steps to ensure collection of quality survey coordinate data.

5.1 Project Planning and Preparation

One of the more important things to consider in the planning process is to determine what positions within a site are going to be located by GPS (for example, the front door, main gate, at the treatment unit, the centroid of the site, etc.). The plan should also be formulated to collect data in a logical manner, making best use of available time. Personnel should become familiar with the site(s) before data collection begins. Maps and directions to the site(s) and site maps should also be obtained.

5.1.1 Project Manager/Field Supervisor

The Project Manager/Field Supervisor has ultimate responsibility for the quality of the surveying coordinate data to ensure that project or program-specific data quality objectives are met. Before entering the field, the objectives, methods, and accuracy requirements of the survey should be established. Factors that might limit the use of the GPS equipment should also be assessed. If GPS data is properly collected and processed, users can expect to obtain location

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data that, for horizontal measurements, will be accurate to within 3-5 meters for the Basic Plus and GeoExplorer and within 1 meter for the Pro XL (XR) using standard code phase data collection. You can expect vertical accuracy's to be 2-3 times worse than horizontal accuracy's. However, horizontal and vertical accuracy's can be significantly improved by collecting point features using carrier phase data procedures. Unfortunately, carrier phase data is more difficult to collect. Traditional surveying techniques (e.g. using Theodolites or equivalent surveying equipment) may need to be used to meet project or program specific data quality objectives. The Project Manager/Field Supervisor may choose to estimate or locate the sample location on existing maps/aerial photos and then digitize the coordinates if sufficient to meet the project or program-specific data quality objectives. However, monitoring well installations **SHALL** be surveying in accordance with this procedure.

The Project Manager/Field Supervisor **SHALL** be responsible for:

- [1] Acts as the Responsible Manager's designee in the review and submits field forms in the following procedures or other applicable procedures or work control documents, including, but not limited to, the following:
 - *RMRS/OPS-PRO.101*, Logging Alluvial and Bedrock Materials, or equivalent;
 - *RMRS/OPS-PRO.114*, Drilling and Sampling Using Hollow-Stem Auger and Rotary Drilling and Rock Coring Techniques, or equivalent;
 - *PRO-1059-Well-118*, Monitoring Well Installation; and
 - *RMRS/OPS-PRO.124*, Push Subsurface Soil Sampling, or equivalent.
- [2] Provides Environmental Media Management (Water Operations) and Environmental Restoration with copies of the geologic borehole logs, well completion forms, and survey coordinates, including ground and well casing elevations, for each new monitoring well or piezometer installed.
- [3] Determines the need for new location codes. Reviews and incorporates Standard Location Code Nomenclature Convention identified in *PRO-1058-ASD-005*, Environmental Data Management, for new location codes.
- [4] Works with the GDL to prepare a proposed sample location map showing proposed sample locations with reserved location codes.
- [5] Enters and reserves Location Code(s) in SWD per *PRO-1058-ASD-005*, Environmental Data Management, for the planned sample location(s).
- [6] Includes a copy of proposed sample location map with Readiness Preparation Package (if required) and the Soil Disturbance Package.
- [7] Identifies surveying quality control requirements to meet project specific data quality requirements if different from those specified herein.

- [8] Identifies site personnel required for surveying support or subcontracts for surveying support.
- [9] Completes surveying activities and submits survey coordinates to GDL within 30 days of completion of sampling activities at a given location code.
- [10] Ensures the survey coordinate data meets project or program-specific data quality objectives.

5.2 Surveying of Environmental Media

This Section describes the surveying requirements for obtaining environmental media survey coordinate data from a project site. Appendix 2 presents the Location Code and Survey Control Data Management Flow Diagram and relevant procedures.

Note: Each step references the applicable controlling procedure.

5.2.1 Project Manager/Field Supervisor

The Project Manager/Field Supervisor **SHALL**:

- [1] Schedule a meeting with the surveyor to review the surveying requirements and to supply the necessary information to complete the surveying program (e.g., list of sample location codes, site access control requirements, GIS map of proposed survey locations, and methods of marking points).
- [2] Provide oversight of the surveyor during surveying activities and ensures that the surveyor performs the work safely in accordance with site specific hazard analyses and meets the surveying requirements in 5.2.2.

5.2.2 Surveyor

The Surveyor **SHALL** meet the following surveying requirements:

- [1] The minimum relative accuracy for surveying depends on the project or program-specific data quality requirements. Horizontal measurements **SHALL** be recorded in UTM and State Plane Coordinates converted from NAD 27 CONUS datum.
 - [A] Using traditional surveying equipment the minimum relative accuracy **SHALL** be 0.1 foot (horizontally and vertically).
 - [B] Monitoring wells **SHALL** be surveyed to 0.01 foot. Monitoring well horizontal measurements **SHALL** be taken to the well center. Monitoring well ground surface elevations **SHALL** be recorded from the north side of the grout/concrete apron and top of casing elevations **SHALL** be recorded from the north side of the

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inner well casing. Field observations and notes **SHALL** be recorded per 2-S47-ER-ADM-05.14, Use of Field Logbooks and Forms.

- [C] Using GPS surveying equipment the minimum relative accuracy **SHALL** be +/- 3 meters horizontally and vertically. If data quality objectives require more precise use of GPS surveying equipment, precision methods such as Differential GPS may be used to achieve up to 3 centimeters horizontal and vertical accuracy.

NOTE:

For GPS surveyed points, the surveyor **SHALL** survey known conventionally surveyed control points, such as wells and USGS benchmarks to confirm the reported accuracy of the GPS survey. Five percent of the total number of points in a GPS survey should be collected from existing survey control locations and/or locations previously GPS surveyed. The combination of existing control points and repeated points will provide data to ensure that the newly acquired survey data are accurate and meet the data quality objectives specified by the Project Manager and that the survey can be repeated with similar accuracy. Should the accuracy of repeatability be outside the expected range for even one point, the entire survey must be viewed as suspect and an explanation **SHALL** be provided for the observed discrepancy.

- [2] The surveyor **SHALL** submit a survey report in hard copy and electronic copy (email report in ASCII, or Excel format on 3-1/2 inch disk) to the Project Manager/Field Supervisor. The report **SHALL** include, at a minimum, for each location code or environmental media survey point (See Appendix 1):

- the northing (latitude) in UTM (meters) and State Plane Coordinates (feet);
- the easting (longitude) in UTM (meters) and State Plane Coordinates (feet);
- the elevation of ground surface in feet;
- the elevation of top of casing in feet (where applicable);
- a physical description of what was surveyed (e.g., media type, such as borehole, well, surface soil or other environmental location codes surveyed, or environmental construction items such as southwest corner sump 1A B779);
- date and time collected;
- standard deviation of point features (indicate if Differentially Corrected GPS [DGPS] was used);
- correction status; and
- the type of survey equipment (brand and model if GPS) and method used.

5.3 Operating Procedures and Records

All forms and logs requiring survey data will be prepared in accordance with the specifications and deliverable requirements given in the respective operating procedures.

5.3.1 Project Manager/Field Supervisor

The Project Manager/Field Supervisor **SHALL**:

- [1] Adds coordinates to Form PRO.101A, in accordance with *RMRS/OPS-PRO.101*, Logging Alluvial and Bedrock Materials, following collection of survey data.
- [2] Adds coordinates to the Monitoring Well Report Form, Form PRO.118, in accordance with *PRO-1059-Well-118*, Monitoring Well Installation, following collection of survey data.
- [3] Submits completed and quality-reviewed field forms and records to Records Management per *1-V41-RM-001*, Records Management Guidance for Records Sources.
- [4] Submits surveyor report to GIS in electronic format per Appendix 1 for preparation of a draft map of the location code(s) or environmental media for Project Manager/Field Supervisor to perform quality assurance review and concurrence of the accuracy of the survey coordinate(s) within 30 days of sample activity completion.
- [5] Provides approval of the final location code coordinate(s) in electronic format to the GDL for upload into SWD within 60 days of completion of sample activities at a given location. Non-compliance **SHALL** result with a nonconformance report entry into ECATS (or PATS).
- [6] Submits final environmental media coordinate(s) in electronic format per Appendix 1 to Environmental Media Management (Water Operations) and to Environmental Restoration within 60 days of sample activity completion.
- [7] Submits unused sample location codes to the ASD/Environmental Data Manager upon completion of sampling activities.

5.4 Records Review

5.4.1 Environmental Restoration

Environmental Resoration designee **SHALL**:

- [1] Review the records and perform one of the following:
 - [A] Accept the records as completed by Requestor.
 - [B] Reject the records and request further documentation from Requestor.

5.4.2 Environmental Media Management (Water Operations)

Environmental Media Management (Water Operations) **SHALL**:

- [1] Review the records and perform one of the following:
 - [A] Accept the records as completed by Requestor.

[B] Reject the records and request further documentation from Requestor.

6.0 RECORDS

Management of all records **SHALL** be consistent with 1-V41-RM-001, Records Management Guidance for Records Sources.

6.1 Project Manager/Field Supervisor

Project Manager/Field Supervisor **SHALL**:

- [1] Ensure that a sufficient number of copies of approved forms and logbooks are obtained for records filing and submit to the following:
 - Environmental Media Management (Water Operations), as required;
 - Environmental Restoration, as required;
 - Site Records; and
 - DOE, as required.
- [2] Ensure that copies of the following quality assurance (QA) records are transmitted to Environmental Media Management (Water Operations), in accordance with 1-K92-RFP-94-001, Well Control Program, and this procedure:
 - WIN form as instructed in Well Control Program;
 - Field forms and information, as required;
 - Monitoring Well Installation Report Form; and
 - Rocky Flats Environmental Technology Site Borehole Log.
- [3] Submit final Environmental Media and location code survey coordinates and elevations with the minimum information required per Appendix 1, to the GDL for upload into SWD within 15 days of completion of sampling activities at a given location code.

Note: There are no non-QA records generated by this procedure.

6.2 Environmental Media Management (Water Operations)

Environmental Media Management (Water Operations) **SHALL**:

- [1] Ensure that the original records, as required per 1-K92-RFP-94-001, Well Control Program are transmitted to the State Engineer in accordance with Water Well Construction Rules, 2 CCR 402-2 (DWR, 2000).
- [2] Ensure that two copies, as required, per 1-K92-RFP-94-001, Well Control Program, QA records are transmitted to Records Management in accordance with 1-V41-RM-001, Records Management Guidance for Records Sources.

- [3] Incorporates the borehole geologic log and well construction data into the geologic log database.
- [4] Reviews location codes in SWD to ensure final coordinate data is entered on a biannual frequency. Checks Field Event sample collection date versus date of Location Code survey coordinate data entry in SWD for environmental noncompliance. Submits the environmental noncompliance report form to ECATS if noncompliance is observed.

6.3 Geographic Information Systems (GIS) Data Lead (GDL)

The GDL SHALL:

- [1] Enter final approved location code survey coordinates and data into SWD per *PRO-1058-ASD-005*, Environmental Data Management and per *PRO-1130-ASD-006*, Spatial Data Map Control.
- [2] Maintain the spatial data for RFETS, incorporates survey data for remedial construction or remedial action activities per *PRO-1130-ASD-006*, Spatial Data Map Control.

7.0 REFERENCES

Rocky Flats Cleanup Agreement, 07/19/96

1-V41-RM-001, Records Management Guidance for Records Sources

MAN-063-DC, Document Control Program Manual

PRO-1058-ASD-005, Environmental Data Management

1-K92-RFP-94-001, Rev. 1, Well Control Program

PRO-1059-Well-118, Monitoring Well Installation

2-S47-ER-ADM-05.14, Use of Field Logbooks and Forms

RMRS/OPS-PRO.101, Logging Alluvial and Bedrock Materials

PRO-1130-ASD-006, Spatial Data Map Control

State of Colorado, Division of Water Resources, Board of Examiners of Water Well

Construction and Pump Installation Contractors, Water Well Construction Rules (2 CCR 402-2), June 2000 and Board Bulletin 2000-1, Using GPS for the Location of Wells, April, 2000.

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APPENDIX 1
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SURVEY COORDINATES SUBMITTAL FORM (example)

*Rocky Flats Environmental Technology Site
Environmental Media Management*

PRO-947-LOCATION/SURVEYING
REVISION 0

Project Name (Code) _____ Task Code _____ Responsible Project Manager/Requestor (Person/Organization) _____

Purpose of Survey: _____
Phone Number/ Pager _____ Building _____

Work Control Document or Sampling Analysis Plan: _____

Project Task Start Date: _____ Project/Task Completion Date: _____ Survey Method: GPS Conventional Survey Methods

Type of Environmental Media Surveyed
 Surface Soil Subsurface Soil (borehole) Groundwater (well) Surface Water Sediment Other _____

NOTE: The following should be submitted in electronic form using excel or a similar format.

Location Code or survey point	Description	Media Type	Latitude (State Plane)	Longitude (State Plane)	Latitude (UTM)	Longitude (UTM)	Elev.	Elev. Casing	Date and Time	DGPS	Correct ion status	Derivation Code (Survey Method)

GIS ADMINISTRATION USE ONLY

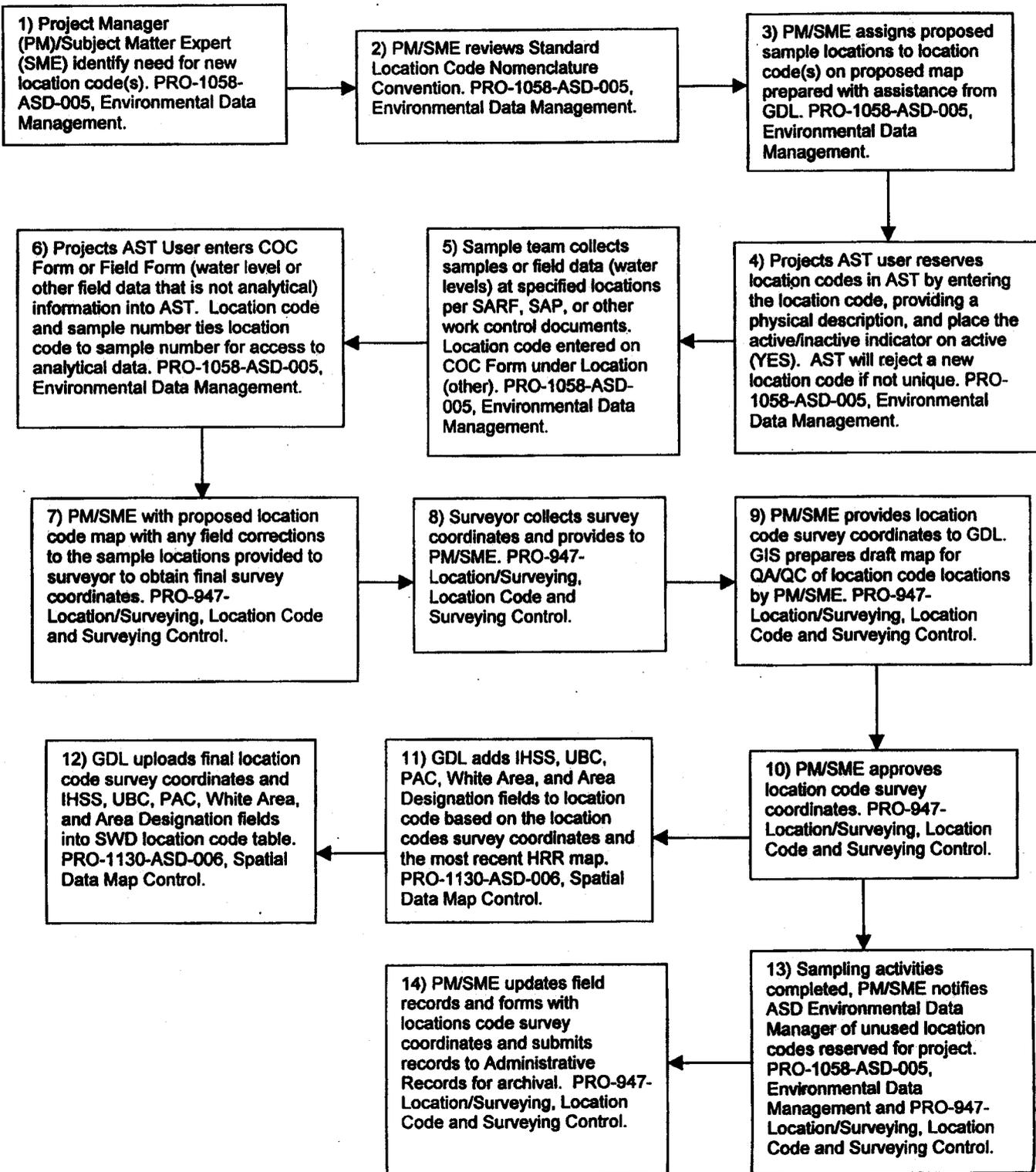
Approved Survey Coordinates File Name: _____ Date SWD Upload _____ GDL Name _____

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APPENDIX 2

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LOCATION CODE AND SURVEY CONTROL DATA MANAGEMENT FLOW DIAGRAM



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