

**ROCKY FLATS  
ENVIRONMENTAL TECHNOLOGY SITE**

**PRO-1130-ASD-006  
REVISION 0**

**SPATIAL DATA MAP CONTROL**

**Responsible K-H Organization:** RISS Analytical Services Division  
**Effective Date:** September 30, 2001

**APPROVED BY** Kaiser-Hill, Remediation and Industrial Site Services/

Title	Date
Nancy Tuor	9/10/01
PRINT NAME	APPROVAL SIGNATURE
Virgine Ideker	

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

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**1. PURPOSE**

This procedure provides instructions for use of the Rocky Flats Environmental Technology Site (RFETS) Geographic Information System (GIS) to generate coverages and maps using spatial data collected at RFETS and defines the responsibilities of RFETS GIS users and off-site contractors using RFETS GIS coverages and maps.

Using spatial data collected at RFETS, GIS users can produce GIS coverages and maps that accurately portray current conditions at the site. These maps support interpretations made during remediation activities required under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Resource, Conservation and Recovery Act (RCRA), the Clean Water Act and the Rocky Flats Cleanup Agreement (RFCA) (DOE, 1996). They also support building deactivation & decommissioning (D&D) activities, land use planning, and other activities where it is important to display accurate spatial map data. For detailed project process flow, see Appendix A.

## 2. SCOPE

A GIS is a computer-based tool for mapping and analyzing spatial data and events. GIS technology integrates database operations, such as query and statistical analysis, with the visualization and geographic analysis benefits of maps. These abilities distinguish GIS from other information systems and make it valuable to a wide range of industries for explaining events, predicting outcomes, and planning strategies.

This procedure is applicable to all RFETS GIS users including the GIS Data Administrator, GIS Specialists, and the GIS User Community. Procedures for maintaining the integrity of RFETS production coverages and generating coverages using new data also apply to off-site contractors providing GIS services in support of RFETS projects. Specific items addressed in the procedure include the following:

- General structure of the RFETS GIS server
- Requesting user space on the GIS server
- Initiation and execution of a GIS Project
- Data management
- Modifying and placing into production GIS coverages
- Metadata standards and quality control of spatial data
- GIS mapping standards
- Archiving of historical GIS coverages/maps
- Distribution of completed and approved maps within and outside RFETS
- Updating of Soil Water Database (SWD) Master Location Table

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.

This procedure supercedes the Map Control Document, Identification and Preparation of New Spatial Data (2-N93-ER-ADM-06.04), therefore revision bars are omitted.

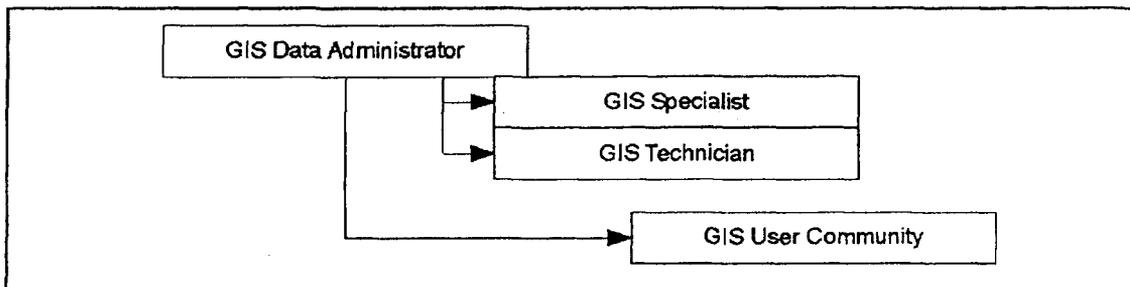
**3. OVERVIEW**

**3.1 General Information**

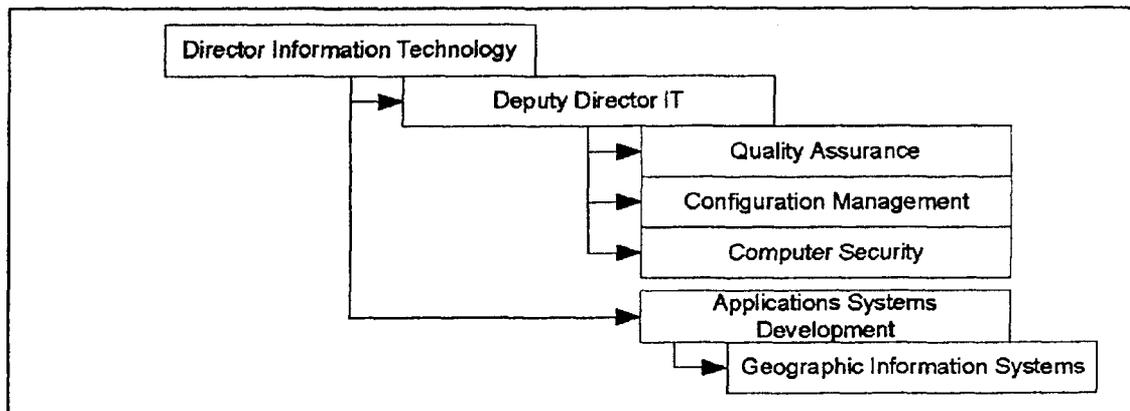
The RFETS GIS is used by different groups at Rocky Flats to present and help interpret data. The GIS server structure, personnel responsibilities, and instructions for use provided in this procedure will ensure that all base data provided to GIS users and customers are current and user work products are safely maintained for future use.

The overall purpose of the GIS Spatial Data Map Control is to establish control of RFETS GIS data and define the responsibilities and tasks within and associated with the GIS Department. In particular, this document establishes the responsibilities of the GIS Data Administrator to maintain the GIS server, establishes user accounts, and for posting all production coverages. More detail on the responsibilities of the GIS Data Administrator can be found in Section 6.1.

**3.2 GIS Team Organization**



**3.3 Intergroup Coordination**



**3.4 Guidance Documents**

This Standard Operating Procedure (SOP) is just one of many guides that oversees the quality of GIS work performed by DynCorp I&ET employees and subcontractors at RFETS. Other important DynCorp I&ET guides include:

- DynCorp I&ET Site Configuration Management Plan (Document No. RFETS-PLN-CM-001).

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- DynCorp I&ET Site Quality Assurance Plan (Document No. RFETS-PLN-QA-001).
  - DynCorp Software Development Handbook Number 1, Software Project Planning, Tracking and Oversight, Version 1.3.
  - DynCorp Software Development Handbook Number 2, Software Quality Assurance, Version 1.4.
  - DynCorp Software Development Handbook Number 3, Software Requirements Management, Version 1.3.
  - DynCorp Software Development Handbook Number 4, Software Configuration Management, Version 1.3.
  - DynCorp Software Development Handbook Number 5, Software Subcontracts Management, Version 1.3.
  - DynCorp Software Development Handbook Number 6, Peer Reviews, Version 1.0-Draft.
  - DynCorp Software Development Handbook Number 7, DynCMM, Version 1.0-Draft.

#### 4. DOCUMENT ORGANIZATION

Each step detailed in this SOP includes specific process descriptions. The procedural section of this document (Section 9) is divided into five separate sections. These sections include the five primary tasks for processing a GIS project from the initial request to the final completion. The primary tasks are as follows:

- Receive Project Requests
- Determination of Project Requirements
- Project Execution
- Project Review and Approval
- Project Management

There are also explanatory sections which deal with the following topics:

- Responsibilities
- System Architecture
- Spatial Data Management
- Quality Assurance
- Mapping Standards
- Historical Coverages and Maps
- Updates to SWD Master Location Table

The final sections of the document include a Glossary and the Appendices containing the material referenced in the text.

Each section is presented on a new page with standard formatting that describes the essential information. The DynCorp ETV system is used to clearly depict tasks, responsibilities, and deliverables required by each step. The ETV system comprises:

**Entry Criteria (E)** – defines what entry or launch activities initiate the task.

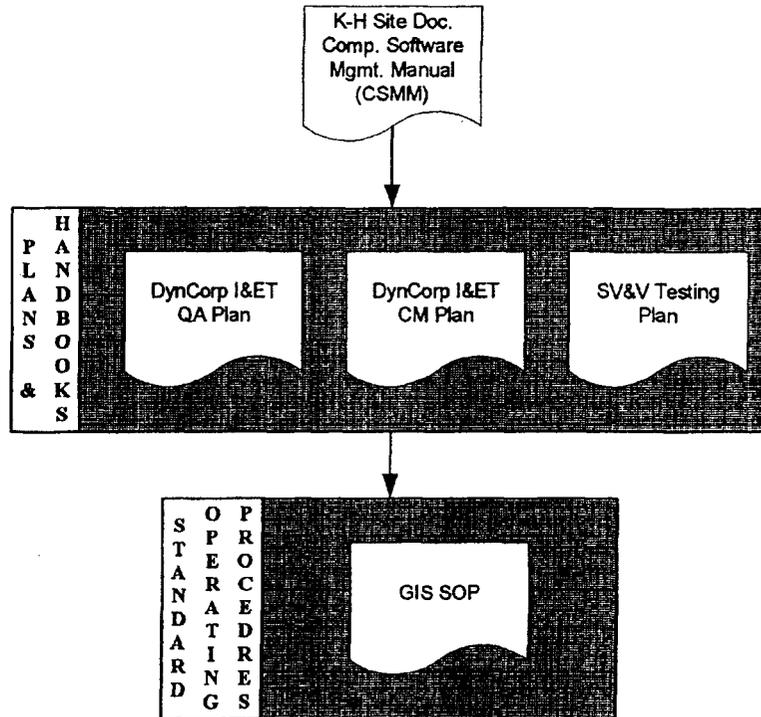
**Task (T)** – defines what tasks are performed to complete a process.

**Validation Criteria (V)** – defines what artifacts or documentation of methods are used to verify or validate the completion of a process.

The document is organized and numbered according to DynCorp I & ET standards for the RFETS Information Technology (IT) project.

5. **POLICY REFERENCE AND COMPLIANCE**

This SOP is a framework that details how the process flow of GIS related project work is performed by the GIS team at RFETS. The process flow diagram below illustrates the document hierarchy used at RFETS.



This SOP provides guidelines for GIS team members in securing, creating, testing, documenting, maintaining, and completing custom solutions for RFETS personnel. It prompts the developer to produce specific documentation throughout the development cycle, provides guidance for the creation of these documents, and directs (guidelines to not direct, they suggest or prompts) the distribution of the documents for review, approval, and archival. The SOP presents a complete methodology for managing projects and the GIS team members are required to utilize the SOP along with other appropriate tools to complete their work.

## **6. RESPONSIBILITIES**

### **6.1 GIS Data Administrator**

The GIS Data Administrator manages the GIS server, provides new users with access to the GIS server, places production coverages/maps on the server, oversees the work of the GIS Department, responds to requests on the RFETS GIS web site and provides maps for the Environmental Data Dynamic Information Exchange (EDDIE) website.

The GIS Data Administrator is responsible for the following specific tasks:

- Working with the Site's Client Server department to establish user areas, and accounting for new users
- Performing spatial data management and integrity checking
- Arranging periodic backups of the GIS server
- Maintaining the scripting file, general file, and data directories (excluding the data files in individual user directories)
- Ensuring that all requested services received through the RFETS GIS website have been assigned to a GIS Specialist, completed on schedule, and contain the requested spatial data set requested by the requestor
- Ensuring that all data or map requests received through the GIS web site have been reviewed and the data provided are approved by the Project Manager (PM)
- Placing coverages and maps in the Production directory once they have been approved by the Subject Matter Expert (SME)
- Monitoring the quality of maps produced by the GIS Department to ensure that all mapping standards are followed
- Controlling access to historic GIS coverages and maps
- Maintaining the SWD Master Location Table
- Acquisition and setup of client GIS software for all GIS users

### **6.2 GIS Specialist**

The GIS Specialist is responsible for the following specific tasks:

- Producing GIS coverages and maps according to specifications of the requestor and GIS mapping standards in this procedure
- Providing GIS production coverages and scripting language, and other general files to GIS Data Administrator for writing to GIS Department directory or posting to the Production directory
- Checking the GIS web site for requests for GIS services and coordinating with the GIS Data Administrator

### **6.3 GIS Technician**

The GIS Technician is an entry-level GIS Specialist whose job description may also include fieldwork and document assembly including cutting and collating maps. The GIS Technician also performs the functions of the GIS Specialist as directed and to the extent of the GIS Technician's capabilities.

### **6.4 GIS User Community**

The GIS User Community includes all RFETS GIS users. GIS users are responsible for the following items:

- Requesting access to the GIS server through the RFETS GIS website
- Using the assigned GIS server directory for all GIS-related files
- Periodically removing unnecessary or outdated files from working directory
- Following the GIS mapping standards provided in this procedure
- Coordination of SME review of coverages

### **6.5 Requester of GIS Services**

It is the responsibility of the GIS requester to fill out a form on the RFETS GIS web site <http://rfetshp/gis>. A GIS Specialist will then be assigned to the project. The requestor is responsible for the following tasks:

- Evaluates scope of GIS services required to support project. Coordinates with the Project Manager and a Contract Technical Representative (CTR) to prepare a cost estimate (Appendix G). Contacts the GIS Data Administrator for labor rates and estimated number of hours for GIS services to support project.
- CTR completes a task order, provides a statement of work (as necessary), and allocates funding via a purchase requisition, under a valid project charge number, prior to making a request for GIS products and services (Appendix G).
- Establishes the schedule for GIS deliverables.
- Provides GIS Specialist with clear instructions regarding the GIS service deliverable.
- Describes or provides the data to be included on map, where the data is located, and when the data will be available.
- Reviews and edits draft maps, and provides final SME approval of the GIS deliverable.

### **6.6 GIS Data Originator**

The GIS Data Originator has the following responsibilities when working with the GIS Department or on the GIS Server.

- Providing spatial coordinate system data, attributes, and/or annotations to the GIS Specialist for creation of a spatial data set and coverage
- Reviewing and approving draft map
- Receiving approval from SME (if GIS Data Originator is not SME)

- Notifying the GIS Specialist of any issues with or changes to spatial data

If a spatial data set is to be modified by a person other than the Data Originator, then the new data modifier becomes the owner of the modified data set. The individual who wishes to modify a spatial data SHALL consult with the GIS Data Originator prior to modifying a data set.

#### **6.7 Project Manager (PM)**

The PM is the principal contact for GIS Department through whom all requests SHALL be coordinated. GIS map requests SHALL be approved by the PM.

When project maps are generated through the GIS Department or by an RFETS user, the PM SHALL verify that the procedures in this document are followed. When GIS maps and coverages are produced off-site by a contractor, The PM establishes the data requirements in the Statement of Work. Although it is the CTR's responsibility to enforce compliance, the PM SHALL ensure that the off-site contractor has access to the current production coverages and understands how they should be used. As per existing procedures, the CTR is charged with ensuring contractual obligation of the off-site contractor to comply with this procedure and, in the case of outsourcing GIS work, any contractual responsibilities for data sharing are to be monitored by the PM. (See Section 9.1 for more details.)

The PM is also the principal decision maker for control of the distribution of the project map(s) and the spatial data they exhibit. If UCNI or other sensitive information is to be displayed on the map, then the PM SHALL establish a distribution list to be stored in the directory where all other project data are stored and maintained. This list itemizes how many of each size map were created and to whom they were distributed. In the future, if any changes are made to this map, all persons on the distribution list SHALL receive updated maps to replace the previous version. See Sections 9, 11, and Appendix A for more details.

## **7. SYSTEM ARCHITECTURE**

### **7.1 User Work Areas**

In an effort to increase data security of the GIS users and the GIS server, the GIS Department will isolate each non-GIS Department user group and grant each non-GIS Department user group defined access levels. All access levels will be documented and stored in the GIS server and within the GIS Department.

Each GIS Data Administrator, GIS Specialist, GIS Technician (collectively the GIS Department), or GIS User Community user SHALL have a user directory on the GIS Server before using any GIS files. That directory is granted by the GIS Data Administrator after a formal request has been made. Only the requesting user or user group and the GIS Data Administrator will have access to post or modify data in this area. The GIS Department also has read access to these directories. Users SHALL store all work files within the GIS server directories to ensure that the files are backed up in accordance with site requirements and that the files are adequately managed to avoid lost or damaged files as closure progresses.

Subdirectories under the user directories SHALL be Projects, and General Files. Each project will have a subdirectory under Projects; all work with data files SHALL be stored under the Project subdirectory, and any special symbols, etc. developed by the user(s) SHALL be stored in the General Files subdirectory. GIS Department Users have work areas similar to GIS Community Users, except they also have access to the read-only AML, data, and general files on the general GIS server area.

### **7.2 GIS Production Coverages**

GIS base coverages (such as buildings, roads, fences, topographic contours, well locations, etc.) SHALL be located in Production directory on the GIS server. Subdirectories of the Production directory SHALL contain approved production coverages/maps for the Ecology Group, Surface Water Group, or other users that have developed coverages or maps for general use. All files in the Production directory SHALL be approved by the SME before being posted by the GIS Data Administrator for use by RFETS GIS users. Templates for the coverages SHALL be provided in the Production directory for use by GIS Community Users. These templates SHALL be used by GIS Community Users to ensure that the data files accurately reflect the current data.

### **7.3 Scripting Files, Data, and General Files**

These files SHALL be located in a separate directory that can only be accessed by the GIS Data Administrator and GIS Specialists. Only the GIS Data Administrator has write access for these files. When a GIS Department member has developed a new file that should be placed in this directory for general use, he will transmit it to the GIS Data Administrator along with a GIS Base Coverage Change Request Form (Appendix E). The GIS Data Administrator SHALL check the file for completeness and accuracy and post it to the directory. The task of updating production data may also be relegated to one of the GIS Data Administrator's designees. The same procedures and responsibilities apply to updating production scripts and macros using the AML Change Request Form (Appendix F).

September 30, 2001

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**8. SPATIAL DATA MANAGEMENT****Participants**

- Data Owners
- Data Originator
- SME
- GIS Data Administrators
- GIS Specialists
- GIS Users

**Entry Criteria/Inputs**

- Request to modify spatial data

**Tasks to Perform**

- [1] IF the request to modify data is approved by the SME and the GIS Data Administrator via a GIS Base Coverage Change Request Form (Appendix E),

**THEN:**

- [a] Archive the old spatial data.
- [b] Make modification(s) to spatial data

**ELSE:**

- [a] Make a formal request using the GIS Base Coverage Change Request Form (Appendix E)
- [2] Perform regular maintenance to the GIS Production share
- [3] Continue to update Metadata

**Special Interfaces**

- GIS Requester
- GIS Data Administer
- SME
- Spatial Data Map Control SOP (PRO-1130-ASD-006), Appendix A

**Outputs**

- Controlled Map Distribution List (refer to Section 9.5)
- Updated Spatial Data files (See Section 8)
- Updated Metadata (See Sections 9.3, steps [12-14] and Section 11.4)

**Verification Criteria**

- Metadata update validation

**9. PROJECT ACTIVITIES****9.1 Receive Project Request****Participants**

- GIS Requester
- GIS Data Administrator
- GIS Specialist
- GIS Technician
- GIS User Community

**Entry Criteria/Inputs**

- Request for new work

**Tasks to Perform****GIS Data Administrator**

[1] Evaluate the nature of the new work request.

[2] **IF** the request is for new work,

**THEN:**

[a] Inform the GIS Data Administrator.

[b] **IF** the work is to be outsourced,

**THEN:**

[i] Acquire signed agreement stating:

- The subcontractor **SHALL** be approved to use spatial data only for the project specified.
- All new or derived project data generated during the project execution **SHALL** be returned to the GIS Department with complete metadata upon project completion.
- See PM Responsibilities (Section 6.7) for control of outsourced work.

**ELSE:**

[c] Follow Task Order Process (Appendix G).

**ELSE:**

[3] Determine if the request was made on the GIS website.

[4] **IF** the request was not made on the GIS website,

**THEN:**

[a] The requestor is asked to make a formal request on the GIS website.

[b] Proceed to Step [5] of this section.

**ELSE:**

- [5] Assign project to a GIS Specialist or GIS Technician.
- [6] Project information is copied from GIS Request Inbox into e-mail section of next available GIS Logbook entry. (See Appendix C. GIS Project Logbook)
- [7] The web site request is entered into the GIS Project Logbook Database with information about the assignment requestor and the data sets which may be created or modified by the project are noted in as much detail as possible. (See Appendix C. GIS Project Logbook)
- [8] Populate all GIS log fields with project data noting data to be potentially modified, due date, name, e-mail address, and phone number.

**All GIS Staff**

- [9] Check the GIS Request Inbox for New Projects.
- [10] Meet with the GIS Data Administrator to discuss and assign the day's tasks.
- [11] Copy the request form into the GIS Logbook text area.
- [12] Fill out all Logbook fields.
- [13] Indicate all "refer to" directories.
- [14] Continue to work on projects as they arrive while checking for new requests.

**Special Interfaces**

- Site Internet
- Outlook Mailbox
- Request email
- Confirmation email

**Outputs**

- New GIS Logbook file

**Verification Criteria**

- New GIS Logbook file
- E-mail messages

**9.2 Determine Project Requirements****Participants**

- GIS Data Administrator
- GIS Specialist
- GIS Technician
- GIS Requester
- SME

**Entry Criteria/Inputs**

New GIS Logbook file

**Tasks to Perform**

[1] **IF** this is a new project,

**THEN:**

[a] Create a new project directory using the **GIS Number** field from the GIS Project Logbook (See Appendix D - Project Directory).

[b] Document all information about the project.

**ELSE:**

[c] Copy all coverages and data files from an old project directory that may be needed and placed into the new directory using the **GIS Number** field from the GIS Project Logbook (See Appendix D - Project Directory).

[i] During the copy process, unneeded files are also copied. The GIS specialist **SHALL** delete unneeded files so the new project directory contents only include necessary files for the new project.

[d] The GIS Technician or specialist **SHALL** add the following to the first line after the arguments in the old aml which is being copied:

```
&return This map has been updated in
%new_log_book_entry%. Unless this is an
historical map request please run the new
version in %new_log_book_entry%. Otherwise
comment this line and re-run aml.
```

[e] Make a note of all "refer to" directories in the Logbook.

[2] GIS Specialist or GIS Technician informs the GIS requester via e-mail that he/she will be taking responsibility for the project, confirming the following information:

- Designated Contact Name and Number
- Specific task(s) requested to be performed
- Due date of requested products and services
- Confirmation of Schedule of deliverables
- Cost estimate based on number of hours
- Spatial data which will be created or modified
- Datasets for which the requester will become the SME
- CC the GIS Data Administrator on the e-mail

[3] Define the scope and requirements of the project.

[4] **IF** there are questions or additional details are required,

**THEN:**

- [a] Contact the GIS requestor to resolve the issues.
- [b] Document the information received.

**ELSE:**

- [c] Call or e-mail the GIS requestor to confirm that all the details are correct.
- [5] List the tasks and respective due dates.
- [6] Generate a labor estimate and schedule.
- [7] Record all pertinent information in the Logbook.
- [8] Log any anticipated project issues and assumptions.
- [9] Submit the estimate to the customer for approval.
- [10] **IF** the customer does not approve the project,

**THEN:**

- [a] Discuss the issues with the customer.
- [b] Redefine the scope and requirements
- [c] Submit a revised proposal to the customer

**ELSE:**

- [11] **IF** project data or production are deemed sensitive or UCNI and are (or should be) controlled by a distribution list,

**THEN:**

- [a] Requester is added to distribution list.
- [b] **IF** there are changes to an existing map,

**THEN:**

- [i] Ensure version control protocol (See Section 9.3 [9]) is followed and continue work. All personnel on the distribution list get a copy of the new map when complete along with a memo asking them to please discard any old versions of the map.

**ELSE:**

- [ii] Only the requester gets a copy.

**ELSE:**

- [c] Ensure version control protocol is followed and continue work.
- [12] Make note of any maps controlled by a distribution list in the GIS Logbook.
- [13] The project is prioritized and initiated in coordination with the Data Administrator and other GIS staff to balance the workload.

**Special Interfaced**

- None

**Outputs**

- New GIS Logbook file

**Verification Criteria**

- New GIS Logbook file
- E-mail messages

**9.3 Project Execution****Participants**

- GIS Staff
- Client

**Entry Criteria/Inputs**

- New GIS Logbook file

**Tasks to Perform**

[1] IF there are changes to the spatial data or new data required for project,

**THEN:**

- [a] Determine if the changes effect production coverages (i.e., building, roads, etc).
- [b] Proceed to step [2] of this section.

**ELSE:**

- [c] Proceed to step [5] of this section.

[2] IF changes effect production coverages (i.e., building, roads, etc.)

**THEN:**

- [a] Determine if a GIS Base Coverage Change Request Form has been submitted (Appendix E).
- [b] Proceed to step [3] of this section.

**ELSE:**

- [c] Proceed to step [4] of this section.

[3] IF a GIS Base Coverage Change Request Form has not been submitted,

**THEN:**

- [a] Fill out the GIS Base Coverage Change Request Form (Appendix E) and submit to Data Administrator.

**ELSE:**

- [4] Create and/or modify data and metadata.
- [5] Submit information to the SME for approval.
- [6] IF the SME does not approve the changes to the spatial data,

**THEN:**

- [a] Discuss the issues with the SME.
- [b] Make the necessary changes in order to obtain the SME approval.
- [c] Return to Step [1] of this section

**ELSE:**

- [7] Generate or regenerate all AML Graphic files (.gra), Hewlett Packard Graphic Language (HPGL) or Postscript, CorelDraw (.cdr), ArcView (.apr), or other file format products.
- [8] Definitions are updated.
  - [i] During the execution of tasks, if GIS software populate the workspace with unneeded files, remove them to maintain work focus.
- [9] Make note of any changes in the GIS logbook.
- [10] Record labor hours on timesheets as the project progresses.
- [11] Solicit feedback from other GIS staff throughout project duration as time allows.
- [12] **IF** the GIS staff does not have access to the approved metadata software,

**THEN:**

- [a] GIS staff **SHALL** interface with the GIS Data Administrator to obtain the necessary access.

**ELSE:**

- [b] GIS staff update metadata for all created or modified datasets.
- [13] Record any quality assurance/ quality control (QA/QC) procedure changes in the GIS logbook.
- [14] Record any basic metadata requirements changes in the GIS logbook.
- [15] Ensure that all draft and final maps:
  - [i] Identify the originator and/or owner of the data sets portrayed on the map as detailed in the metadata for the spatial data
  - [ii] Modify the legend area of all maps to clearly identify the status of the map as either a final approved map or a draft map
  - [iii] The word "DRAFT" will appear in the legend area where the company logo would normally appear while all work is in progress

**Special Interfaces**

- Contact with the client for clarifications

**Outputs**

- Completed project

**Verification Criteria**

- Project documentation

**9.4 Project Review and Approval****Participants**

- GIS Staff
- Client

**Entry Criteria/Inputs**

- Completed Project

**Tasks to Perform**

- [1] Complete a first round self-assessment (inline with site terminology). Perform QA/QC (global search and change) of the draft maps for overall quality and completeness relative to the initial request.
- [2] Make any changes resulting from the self-assessment.
- [3] Submit the map to the GIS Data Administrator or designee for peer review QA/QC.
- [4] Make any changes resulting from the peer review.
- [5] Submit the final project QA/QC through the GIS Data Administrator
- [6] Submit the map to the SME and/or the map requester for final review QA/QC with a DRAFT Designation.
- [7] **IF** the SME and/or the map requester (if the same person) provides edits to the map,  
**THEN:**
  - [a] Make any necessary changes.
  - [b] Document changes in the GIS Logbook
  - [b] Repeat steps [1] through [6] of this Section.**ELSE:**
  - [c] Obtain the SME's and/or the map requester's signed approval.
  - [d] Retain the signed copy in the GIS map gallery.
  - [e] Replace the DRAFT designation with DynCorp (or appropriate company) logo.
  - [f] File the approved map in the GIS archives.
  - [g] Update the metadata file. (See Section 9.3 [12-14])
  - [h] Update the GIS Logbook.

**Special Interfaces**

- Client

**Outputs**

- Completed map
- Project approved by the client

**Verification Criteria**

- Review/Approval form
- E-mail
- Completed map

**9.5 Project Management****Participants**

- GIS Staff
- Requester
- SME

**Entry Criteria/Inputs**

- New project request

**Tasks to Perform**

- [1] **IF** the map content is either UCNI, sensitive, need to know, or otherwise requires a controlled Distribution List.

**THEN:**

- [a] Add Requester to controlled Distribution List and store in the same directory as the project. In the case of outsourcing GIS work any contractual responsibilities for map distribution are to be enforced by the PM.
- [b] **IF** Changes were made to an existing map with a controlled Distribution List or if it is a new map with a new Distribution List created by the requester

**THEN:**

- [i] Print copies for all personnel in the distribution list
- [ii] Distribute new maps with a memo requesting that all previous maps be replaced.
- [iii] Proceed to step [2] of this Section.

**ELSE:**

- [iv] Print copies for requester only.
- [v] Proceed to step [2] of this Section.
- [c] Store list in the same directory as the project.
- [d] Create access restrictions to project directory.

**ELSE:**

- [e] No Distribution List is necessary.
- [f] Proceed to step [2] of this Section.
- [2] Record each task performed and issues encountered in GIS Logbook.
- [3] Record relevant lessons learned, in the GIS\_FYI information directory.
- [4] Record alterations to master macros and scripts in the AMLs directory.
- [5] Record all projects and data used in highlights and summary reports.
- [6] Record the total number of each size map created in the Logbook.
- [7] Record the totals for time spent on each project in the Logbook.
- [8] Record the completion date in the Logbook.

**Special Interfaces**

- None

**Outputs**

- Updated records in the Logbook
- New info in the in the GIS\_FYI information directory
- Updated Standard Operating Procedures
- Updated scripts and/or processes
- Controlled Distribution List

**Verification Criteria**

- Dated records in the various outputs
- E-mail messages

## 10. QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

To ensure that all spatial data used in coverages and on maps are accurate, the SME or Data Owner or Originator SHALL review and approve the spatial data used and the draft map before they are finalized and placed in production. All GIS Specialists, Users, and Data Administrator SHALL follow the process steps for ensuring QA/QC standards in the Tasks to Perform section below.

### 10.1 Quality Assurance Process

#### **Participants**

- Client
- GIS Staff
- QA

#### **Entry Criteria/Inputs**

- Any request for new GIS information
- Any request for a modification to existing GIS information

#### **Tasks to Perform**

- [1] When a request is received in, the GIS Data Administrator assigns the project to the GIS Specialist. If the Request comes directly to the GIS Specialist, the Requester is asked to use the web site to make a formal request. If the Request comes directly to a GIS Community User, he/she SHALL log the request into the GIS Log Book (See Appendix C and Section 9.1 [6]).
- [2] The GIS Specialist or User to assume responsibility enters the information into the GIS Logbook. Detail about the requester and the data sets, which may be created or modified by the project, are noted in as much detail as possible.
- [3] The GIS Specialist or User informs the requester via email that he/she will be taking responsibility for the project, confirming the due date and the specific task(s) requested and making particular note of spatial data that will be created or modified of which the requester takes ownership. CC the GIS Data Administrator on the email.
- [4] As work progresses on all changes to spatial data sets whether they are created or modified, the GIS Specialist or User SHALL create metadata using approved metadata software. If the GIS User does not have access to the approved metadata software, he/she SHALL interface with the GIS Data Administrator to attain access (See Section 9.3 [12– 14]).
- [5] All draft and final maps SHALL identify the originator and/or owner of the data sets portrayed on the map as detailed in the metadata for the spatial data (See Section 9.3 [12–15]).
- [6] The explanation area of all maps will be modified clearly to identify the status of the map as either a final approved map or a draft map.
- [7] The word “DRAFT” will appear in the legend area where the company logo currently appears while all work is in progress.

- [8] Once deemed complete by the GIS Specialist or user, the GIS Specialist or user SHALL complete a self-audit QA/QC of the draft maps for overall quality and completeness, relative to the initial request.
- [9] Once thoroughly self-audited, the GIS Specialist or user SHALL submit the map to the GIS Data Administrator or designee for peer review QA/QC.
- [10] Once thoroughly checked for peer review QA/QC, the GIS Specialist or user SHALL submit the map to the SME and/or the map requester for final review QA/QC.
- [11] The SME and/or Data Owner or Originator reviews spatial data and provides written approval by signing draft map. The SMEs are responsible for the quality and interpretation of their data presented on maps.
- [12] The "DRAFT" designation will not be removed until the SME of the data set portrayed on the map has approved the map for distribution.
- [13] Once the map has been approved for distribution by the SME, the "DRAFT" designation will be removed and the company logo will be added.
- [14] The final map is prepared with the preparing Company's name and logo replacing the "DRAFT" designation.
- [15] The approved draft map SHALL be kept on file in the GIS department as part of the permanent file.
- [16] The GIS User updates metadata for all affected spatial data sets(See Section 9.3 [12-14]).
- [17] The GIS User updates GIS Logbook with all QA/QC issues encountered.

#### **Special Interfaces**

- QA Process Flow Diagram (Appendix A)
- Quality Assurance Program Manual (MAN-131-QAPM)
- DynCorp I&ET Site Quality Assurance Plan (RFETS-PLN-QA-001)

#### **Outputs**

- QA reports in GIS Logbook

#### **Verification Criteria**

- Approved map changes

### **10.2 Records Processing**

Individual spatial data sets (in hard copy form) generated in accordance with this procedure and provided to a specific project/program may contain classified data or be considered a Site "Record" and records management shall be performed by the project/program requesting the spatial data set. However, electronic spatial data records generated by this procedure shall comply with the RFETS Joint Records Management Strategy for Site Closure and 1-V41-RM-001, Records Management Guidance Records Sources. The following records are initiated, processed, or maintained as a result of this procedure:

<b>Record Identification</b>	<b>Record Type Determination</b>	<b>Protection / Storage Methods</b>	<b>Processing Instructions</b>
Draft Final Map in hard copy form.	<i>In-Process QA Documents</i> Final Draft map as approved by SME.	<i>In-Process QA Documents</i> Responsible Manager implements a reasonable level of protection to prevent loss and/or degradation. Records shall be stored in standard office filing cabinets	<i>In-Process QA Documents</i> Responsible Manager implements a reasonable level of protection to prevent loss and/or degradation. Records shall be stored in standard office filing cabinets. Final map as approved by SME becomes part of the project/program specific records management.
Project specific electronic data sets or script routines	<i>In-Process QA Documents</i> Contains a project specific data sets and/or script routines.	<i>In-Process QA Documents</i> Responsible Manager coordinates storage on GIS server and file naming per this procedure.	<i>In-Process QA Documents</i> Responsible Manager coordinates automatic daily backup of GIS server to tape medium per Site Configuration Management Plan (RFETS-PLN-QA-001).
GIS Logbook and Project specific electronic data sets or script routines	<b>Record:</b> GIS logbook contains a project specific unique identifier and summary of all project information. Contains a final SME approved project specific data sets and/or script routines.	<b>Record:</b> Responsible Manager coordinates automatic daily backup of GIS server to tape medium and archives GIS Logbook annually onto a CD per Site Configuration Management Plan (RFETS-PLN-QA-001). Responsible Manager ensures electronic record material is handled, duplicated, and stored in a manner which provides protection of the information from loss or change, whether inadvertent or intentional, through the use of passwords, physical protection, etc.	<b>Record:</b> Upon Site Closure the Responsible Manager completes Standard Form 258, Request to Transfer, Approval, and Receipt of Records to National Archives of the United States per 1-V41-RM-001. Completes NA Form 14097 or its equivalent per 1-V41-RM-001. Submits the GIS Logbook (code book specifications) defining the data elements and their value. Contacts Records Management regarding the specific electronic medium format to be used for electronic records transfer.

## 11. MAPPING STANDARDS

All RFETS GIS Users SHALL follow the mapping standards outlined below. These standards describe the required map layout, information to be provided in the explanation, and data source information that must be included on each coverage or map. Use of these mapping standards for GIS maps will establish conformity among RFETS GIS products and standardize map production.

### 11.1 Map Layout

The three areas of RFETS GIS map layout approved presentation are:

- Presentation area is where the spatial data are displayed.
- Border area is blank space around the presentation area in which the x-y coordinates are posted. The user may post the x-y coordinates along the sides of the presentation area or post only the coordinates at the corners of the map.
- Explanation presents and describes all of the symbols used on the map, the data source, the location of the map of the GIS server, and other information as required to understand or locate the map.

### 11.2 Explanation

All GIS created maps SHALL include descriptive explanations that identify all symbols used on the map as well as the map's status (draft or final). The list below contains the minimum information required in all map explanations.

- **Map Title:** Should be descriptive of data presented
- **North Arrow:** Map component that shows the map orientation.
- **Map Scale:** Scale should be represented with both a bar scale and text (e.g. 1:100,000).
- **Map Projection:** Coordinate system and zone of map; GIS Department maps normally use State Plane coordinates, Colorado Central Zone although other projection systems may also be used
- **Map Datum:** 1927 North American Datum.
- **Base Feature Information:** Describe source or location of base features on map.
- **Prepared by:** The "DRAFT" designation is used in this space until the map is approved by the SME. Upon approval, the DynCorp (or appropriate company) logo replaces the "DRAFT" designation.
- **Prepared for:** Kaiser Hill, LLC or other applicable entity.
- **Map Date:** The date the map was finalized by SME or date printed if "DRAFT".
- **Site Name:** DOE Rocky Flats Environmental Technology Site.
- **Map Code:** Unique project-specific number used for tracking maps distributed site-wide.
- **Map Path:** Path that identifies where the map file lies on the GIS server.

- **Data Source:** Each data element includes the data type, originator (Data Owner or SME), and creation date.
- **Data Location:** Path to the data set reviewed and approved by the SME and presented on the map.
- **Map Symbols:** All map symbols are presented in the explanation if space permits. Only those symbols necessary to understand the map appear in the explanation.

### **11.3 Modifications to Explanations**

All map explanations SHALL include the "DRAFT" notation in the area where "prepared by" information will be placed until the map has been reviewed and approved in writing by the SME. Once the SME has provided written approval of the map, the company name and logo will be placed in the "prepared by" area on the map.

### **11.4 Metadata**

The spatial dataset information required in RFETS GIS metadata files is summarized below. The following information will be included in the explanation.

- Description and purpose of dataset
- Geographic/physical extent of the data
- Origination date (new data) or revision data (modification of existing data)
- Source of new data (including Data Owner or Originator)
- Source of modified data (including owner of both original and modified data sets)
- Coordinate system (including zone, central meridian, or standard parallels)
- Datum (RFETS uses North American Datum for 1927)
- Scale of source data
- Method of coordinate capture (survey, global positioning system, digitized, etc.)
- Identification of all attributes associated with spatial features
- Format of stored data (Arc/Info, DXG, etc.)
- Item definition of database records (if applicable): format for each record in the file, including data type, number of characters or bytes, display width, number of significant figures, etc.

**12. HISTORICAL COVERAGES AND MAPS**

When a coverage or map is updated and placed into the Production directory, the previous version is considered "historical." These files must be maintained to record the history of changes to the spatial data over time, as well as give RFETS personnel the ability to reproduce previously issued maps if required. The GIS Data Administrator has sole responsibility for maintenance of the historical data files.

During the restructuring of the GIS server, the GIS Data Administrator sets up a Historical directory on the server. All of the out-of-date files were transferred to this directory and renamed to indicate the day that they were superseded. When the GIS Data Administrator moves a modified file to the Production directory, he will archive the old version, and transfer it to the Historical directory. The GIS Data Administrator archives the previous version of the coverage or map (if there was one in the Production directory), and moves it to the Historical production coverage or map directory. Such changes are documented in the metadata in both versions.

The GIS Data Administrator is also responsible for posting new and revised files to the EDDIE and the Integrated Sitewide Environmental Data System (ISEDS) web sites. Superseded files from EDDIE will also be renamed and added to the Historical directory if they are included there.

In the case of outsourcing GIS work any contractual responsibilities for data sharing are to be enforced by the PM including the subsequent misuse of a previous map version.

**13. UPDATES TO SWD MASTER LOCATION TABLE**

This is a brief overview of GIS Department's involvement with the Location Code and Survey Control (PRO-947-LOCATION/SURVEYING). Complete and detailed procedures are found in PRO-947-LOCATION/SURVEYING. The Master Location Table (MLT) allows SWD users to query the SWD database for sample locations in various media, including surface water, groundwater, surface soil, subsurface soil, and sediment. Attribute data are stored in the MLT to perform queries within the boundaries of the Individual Hazardous Substance Site (IHSS), Potential Area of Concern (PAC), Under-Building Contamination (UBC), White Space, Area Designation, or IA Grouping areas. The GIS Department manages additions and changes to the MLT according to the following process:

- The GIS Specialist prepares a draft map showing proposed sampling locations provided by Project Manager or SME.
- The Project Manager or SME assigns location codes to the proposed sample locations on the draft map.
- The Project Manager or SME has environmental sample locations identified with survey coordinates upon completion of sampling and provides the survey coordinates to the GIS Specialist. The GIS Specialist prepares a revised draft map presenting the final sampling locations and location codes.
- The Project Manager or SME approves map sampling locations and location codes in writing.
- The GIS Specialist adds IHSS, PAC, UBC, White Space, Area Designation, and IA Grouping fields to location codes based on the approved sample locations, survey coordinates, and the most recent approved Historical Release Report (HRR).
- The GIS Specialist submits location code, survey coordinates, and IHSS, UBC, PAC, White Area, and Area Designation fields to the Analytical Services Toolkit (AST) Stage Results Table (SRT) for upload to the SWD.

14. GLOSSARY

TERM	DEFINITION
Access Levels	Software accessibility, read only or read-write.
AML	Arc Macro Language, a software programming language.
Annotation	Descriptive text used to label spatial features.
Area Designation	<ul style="list-style-type: none"> <li data-bbox="571 513 1356 639">▪ Area – A homogeneous extent of the earth bounded by one or more arc features (polygon) or represented as a set of polygons (region). Examples: states, counties, lakes, land-use areas, and census tracts.</li> <li data-bbox="571 658 1349 823">▪ Polygon – A coverage feature class used to represent areas. A polygon is defined by the arcs that make up its boundary and a point inside its boundary for identification. Polygons have attributes (PAT) that describe the geographic feature they represent.</li> <li data-bbox="571 842 1372 1203">▪ Region – A coverage feature class used to represent a spatial feature as one or more polygons. Many regions can be defined in a single coverage. Regions have attributes (PAT) that describe the geographic feature they represent. As they relate to underlying areas below environmental sample data locations, the region attribute can include one or more of the following: IA Grouping, IHSS, PAC, underground building contamination, or white space. Region designations are subject to change and are provided for information only to data users to assist in data management and reporting. Region locations are derived from the most current update of the RFETS Historical Release Report.</li> </ul>
Attribute	A characteristic of a map feature; attributes of a river might include its name, length, average depth, etc. A desktop GIS stores attributes in tables and links them to the map features they describe.
Base Data Sets or Coverages	Base coverages are spatial data sets showing features such as buildings, paved and dirt roads, contours, fences, boundaries, barriers, streams, ditches, or other drainage features.
Coordinate System	A method of representing the location of a feature on the Earth's surface. A coordinate system can be represented by planar (x,y) coordinates, which show a feature's location relative to an origin or by geographic coordinates, which show a feature's location expressed in degrees of latitude and longitude.
Coverage	The naming convention used by Environmental Systems Research Institute's (ESRI) GIS software for digitally stored spatial data. A coverage is a set of data with a common theme, such as roads, which are stored as a unit. It stores mapping features as primary features (such as arcs, nodes, polygons, and label points), secondary features (such as tics, map extents, links, and annotations), and associated feature attribute data/tables (such as names, classifications, and item descriptions).

Draft Map	Map showing unapproved spatial data or coverages used for quality assurance review and approval by the SME or Data Owner; also known as a working map.
EDDIE	Environmental Data Dynamic Information Exchange website maintained by RFETS for distribution of approved reports, maps, and data to the public, regulatory agencies, and organizations (stakeholders) outside of RFETS. Stakeholders can download copies of GIS maps in Adobe format from EDDIE. Off-site groups can also request data or maps not on EDDIE through the web site.
Explanation	Reference area on a map that lists and explains the colors, symbols, line patterns, shadings, and annotations used. Also includes the scale, orientation, map projection, and descriptive map title(s).
Geographic Information System (GIS)	An organized collection of computer hardware, software, and geographic data designed for capturing, storing, updating, manipulating, analyzing, and displaying all forms of geographically referenced information in the form of maps or reports.
GIS Data Originator or Owner	Person or organization that requests the creation of or creates a new spatial data set(s). If a person or organization requests modification of or modifies an existing spatial data set, he/she is the data owner of the modified data set.
GIS Database	A collection of map data sets called coverages, themes (including features and related descriptive information) organized for efficient storage and retrieval by many users.
GIS Data Administrator	Responsible for overseeing GIS server and directories, setting up GIS user directories for RFETS employees and contractors, and maintaining RFETS GIS web site and EDDIE.
GIS Specialist	Provides geographic analysis, cartographic production, and maintenance of spatial tabular data sets, and maps. Creates, corrects, and modifies land base coverages and generates an association between spatial data and external database records as tasked for geographic analysis and cartographic production.
GIS Technician	The GIS Technician is an entry-level GIS Specialist whose job description may also include fieldwork and document assembly including cutting and collating maps. The GIS Technician also performs the functions of the GIS Specialist as directed and to the extent of the GIS Technicians' capabilities.
GIS User	GIS Specialist, GIS Technician, or other GIS Community User
GIS User Community	Individuals or groups at RFETS that perform GIS functions.
GIS Web Site	This web site is accessed through the main page of the RFETS intranet. From the main page, select news and information and then the link to the GIS web site. The GIS web site is used to request a user directory on the GIS server, communicate with the GIS Data Administrator and GIS Specialists, and request assistance from the GIS Department.

IA Grouping	As identified by the Industrial Area Characterization and Remediation Strategy – the 194 IHSSs, PACs, and UBC sites in the IA were consolidated into 58 Groups (Kaiser-Hill, 1999)
Image Data	Graphic representations of objects; examples include satellite pictures, aerial photographs, and scanned documents.
Individual Hazardous Substance Site (IHSS)	Based on the RFCA (Rocky Flats Cleanup Agreement, [DOE, 1996], page 21: "Individual Hazardous Substance Site (IHSS) means specific locations where solid wastes, hazardous substances, pollutants, contaminants, hazardous wastes, or hazardous constituents may have been disposed or released to the environment within the Site at any time, irrespective of whether the location was intended for the management of these materials."
Interpretive Data Sets	Interpretive data sets are created from original data sets in order to create a new data set. Example: If you want to show a buffer of 20 ft. around a drum for safety reasons, you can take the point location spatial data of the drum and ask the software to buffer 20 feet around the drum. The results are interpretive data.
ISEDS	Integrated Sitewide Environmental Data System, a secure, password protected website maintained by RFETS for distribution of data and maps to the regulatory agencies in electronic format.
Location Code	A unique identifier that identifies where an environmental sample(s) or field measurement was collected.
Map	An abstract representation of a planet's surface features graphically displayed on a planar surface. Maps display spatial relationships among the geographic features, using shapes to represent objects and symbols to describe their nature.
Map Datum	A set of parameters and control points that define the three-dimensional shape of the Earth; for example, North America Datum for 1927.
Map Units	Units of the spatial data coordinates such as feet, miles, meters, or kilometers.
Master Location Table	SWD table that correlates the survey coordinates of a sampling location with its location in relation to IHSS, PAC, UBC, white space, Area Designation, and IA Grouping areas.
Metadata (Data Dictionary)	A catalog containing information about the data stored in a spatial data set. A GIS data dictionary includes descriptions of the purpose status, relevant time period, access limitation, and publication information. The full names of attributes, meanings of codes, scale of the source data, accuracy of locations, version of the data, the update cycle of the data, the owner or SME of the data, and the map projection used.
Metadata Standards	Adopted from the Federal Geographic Data Committee (FGDC) Content Standards Version FGDC-STD-001-1998 and the ESRI Metadata profile available at <a href="http://www.esri.com/metadata/esriprof80.html">http://www.esri.com/metadata/esriprof80.html</a>
North Arrow	Map component that shows the map orientation.

Off-Site Distribution	Provision of approved GIS maps or data after request is made through GIS Environmental Data Dynamic Information Exchange (EDDIE) web site.
Potential Area of Concern (PAC)	Qualitative spatial representations of particular hazardous sites as identified in the Historical Release Report (HRR).
Production Data Set (Production Coverage)	Any spatial data set or coverage created on the RFETS GIS, checked and approved by the designated SME, and made available for use on RFETS GIS maps by all RFETS GIS users.
Project Manager	Person responsible for overseeing an RFETS Site activity.
Quality Assurance and Quality Control Procedures.	Procedures that ensure that only the highest quality product is produced and delivered by the GIS Department. The QA/QC process is established and detailed in the QA/QC standard operating procedures found in Section 10.1 and Appendix A.
Requester	Person who requests the creation of spatial data sets, coverages, or GIS maps.
Revision Date	Date that the spatial data set, coverage, or map was put into production.
Revision Number	Unique reference number used to identify each new release of a production spatial data set or coverage because of a modification to the data. The revision number is composed of the coverage name and an alpha character, (for example: BuildingsA, BuildingsB).
Scale	Relationship between the dimensions of features on a map and the geographic objects they represent on the earth, commonly expressed as a fraction or a ratio. A map scale of 1/100,000 or 1:100,000 (for example) means that one unit of measure on the map equals 100,000 of the same unit on the Earth; that is, features on the map are 100,000 times smaller than what they represent in the real world.
Scale Bar	Map component that graphically shows a map's scale. Scales are useful because they maintain their relationship with the map features even if the map has been reduced or enlarged on a copy machine.
Spatial Analysis	Study of the locations and shapes of geographic features and the relationships among them.
Spatial Data	Locations and shapes of geographic features; one of the three basic kinds of geographic data (image and tabular data are the others).
State Plane Coordinate System	A two-dimensional measurement system that locates features on a map based on their distance from an (0,0) along two axes, a horizontal x-axis representing east-west (longitude) and a vertical y-axis representing north-south (latitude).
Symbol	Graphic element used on a map to identify and provide information about a feature.
SME (Subject Matter Expert)	Person designated as an expert in a certain area; responsible for checking GIS coverages and maps for accuracy before they are issued in final.
Survey Coordinates	A spatial data set of horizontal (northing [latitude] and easting [longitude]) coordinates using the State Plane Coordinate system and vertical (elevation [altitude]) coordinates referenced to NAD1927.

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Site-Wide Distribution Map	Map to be distributed as a standardized map throughout RFETS; produced using production coverages.
Topographic Map	Graphic representations of natural and man-made features on the Earth's (or another planet's) surface showing their relative positions and elevations.
Under-Building Contamination (UBC)	Underground Building Contamination - defined as qualitative spatial representations of particular hazardous sites associated with buildings as identified in the Historical Release Report (HRR).
User	Individual at RFETS that performs GIS functions using Arc/Info or ArcView.
White Space	Area of IA outside of IA Grouping (IHSS, PAC, UBC).

**15. REFERENCES**

DOE, 1996. Rocky Flats Cleanup Agreement, Rocky Flats Environmental Technology Site, Golden, CO.

DynCorp I&ET Site Configuration Management Plan (Document No. RFETS-PLN-CM-001).

DynCorp I&ET Site Quality Assurance Plan (Document No. RFETS-PLN-QA-001).

*INS-816-DM-02*, Writing Instruction Guide

*MAN-001-SDRM*, Site Documents Requirements Manual

*MAN-063-DC*, Site Document Control Program Manual

*MAN-131-QAPM*, Quality Assurance Program Manual

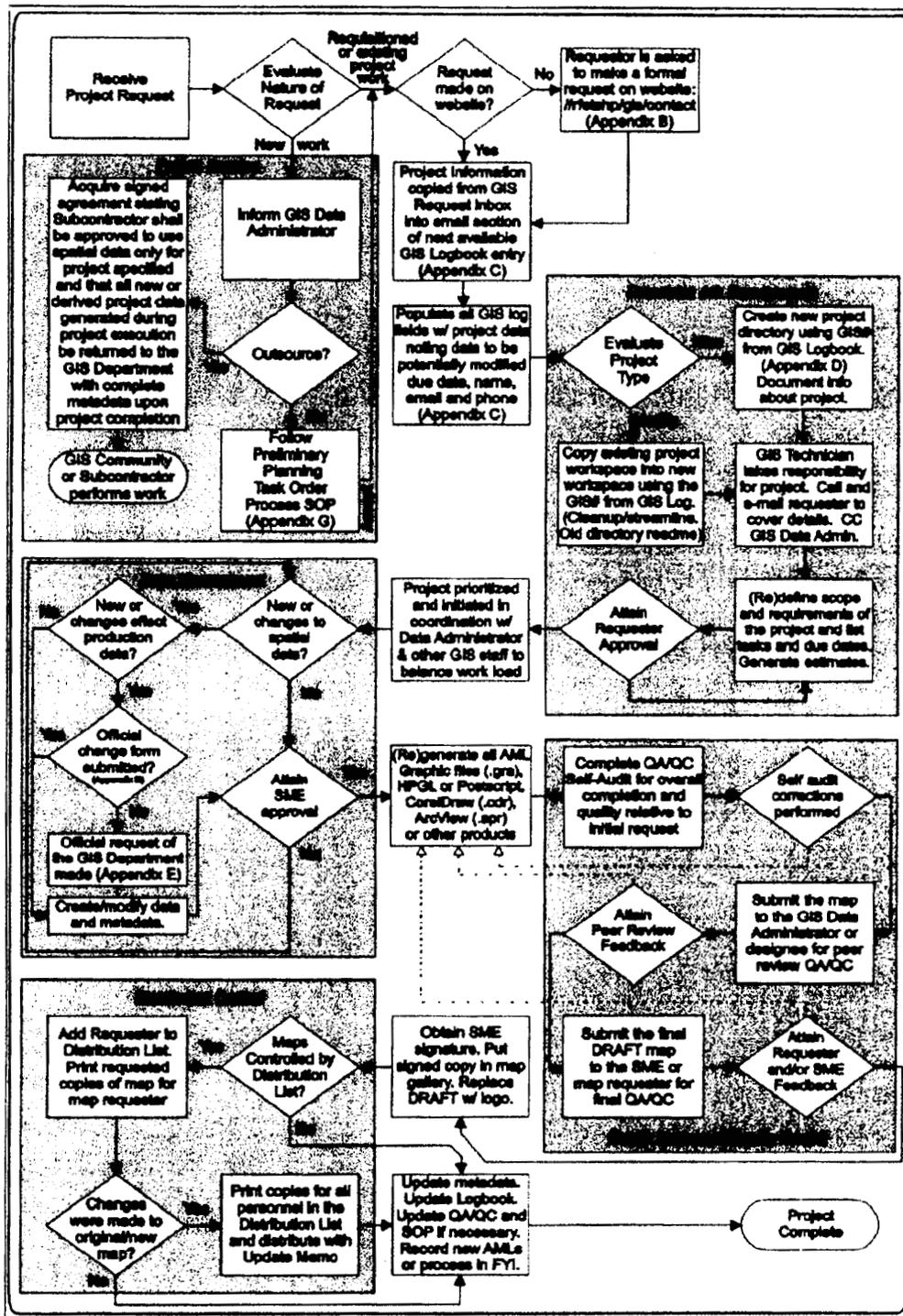
*PRO-815-DM-01*, Developing, Maintaining, and Controlling Documents

*PRO-947-LOCATION/SURVEYING*, Location Code and Survey Control

*I-V41-RM-001*, Records Management Guidance for Records Sources

*JRMS*, RFETS Joint Records Management Strategy for Site Closure, Version 1.2 (PADC-1998-00897).

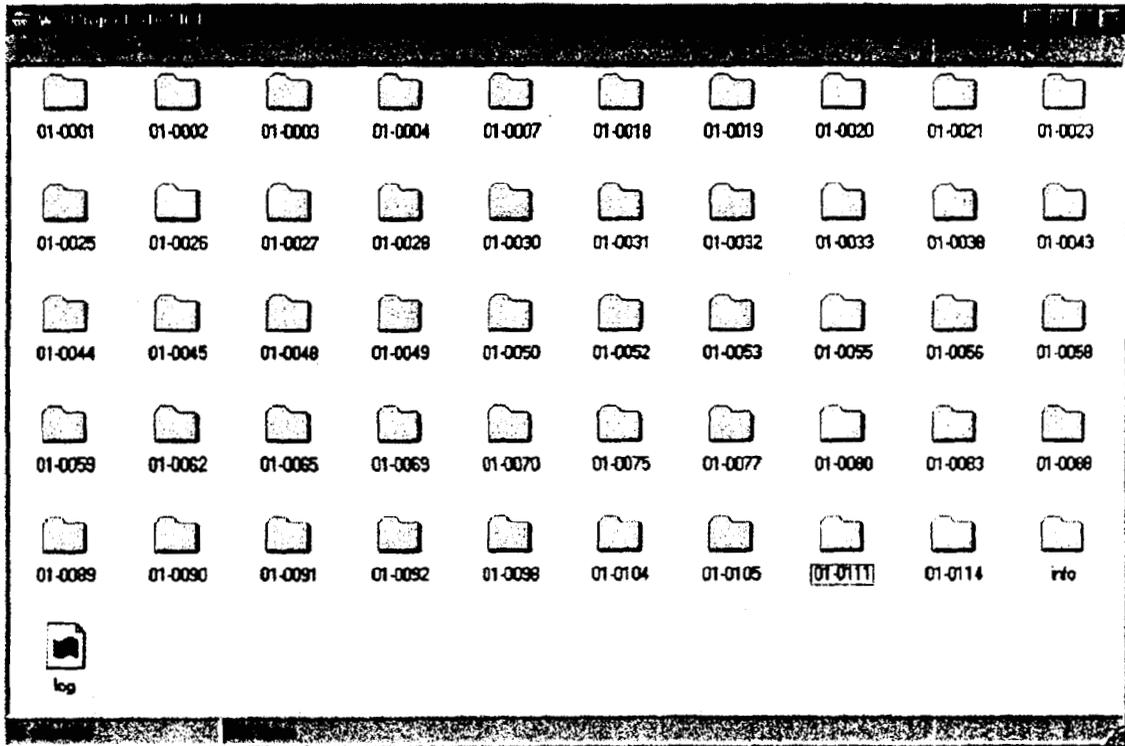
16. APPENDIX A – GIS DEPARTMENT PROCESS FLOW







19. APPENDIX D – PROJECT DIRECTORY



20. APPENDIX E – GIS BASE COVERAGE CHANGE REQUEST FROM

## DynCorp I&ET GIS Base Coverage Change Request Form

Date:

GIS Technician:

Coverage name:

Description of requested change::

Approval: \_\_\_\_\_  
*Data Administrator signature*

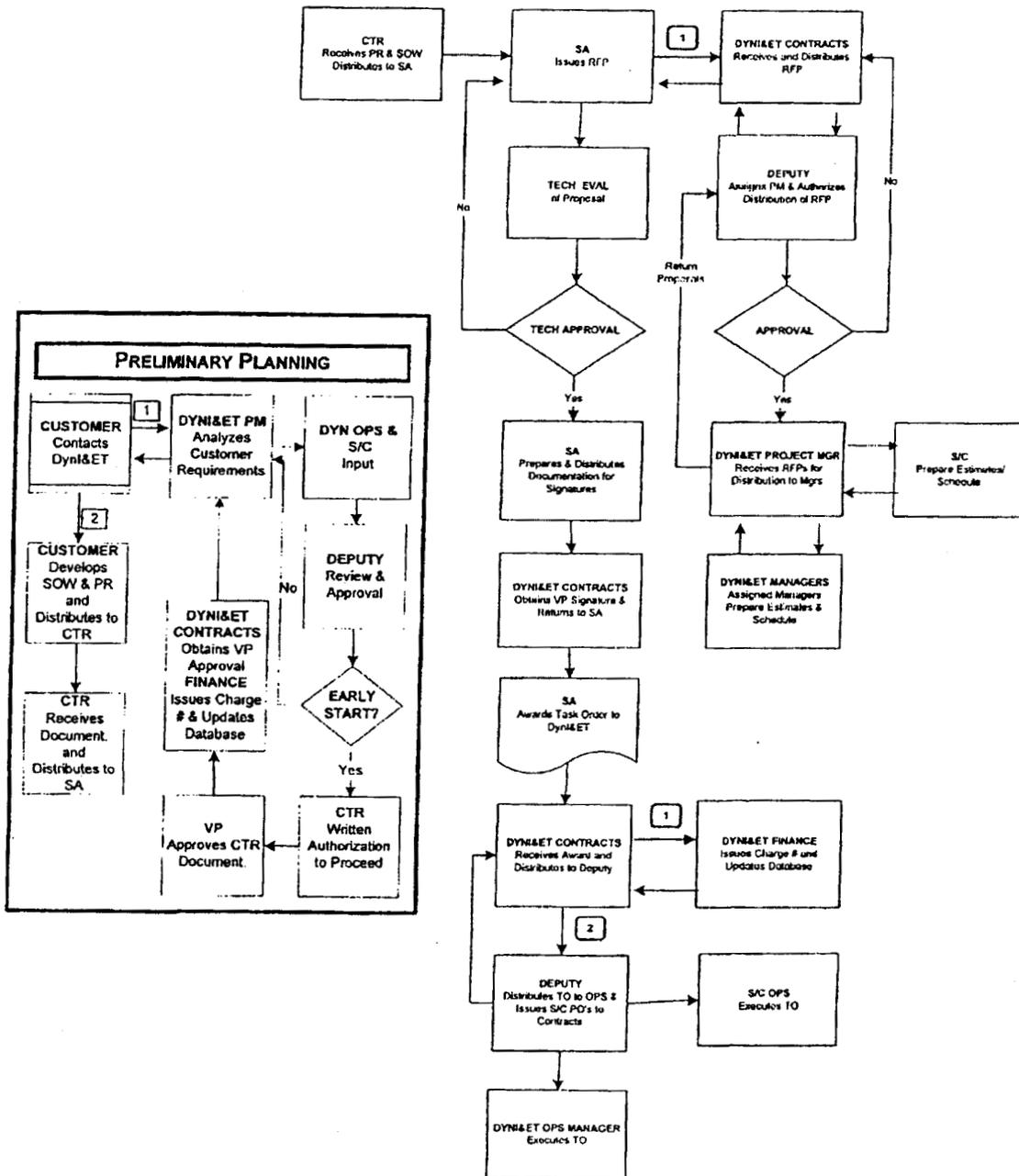
Date:

Archive Coverage name::



22. APPENDIX G – TASK ORDER PROCESS

TASK ORDER PROCESS



214/44