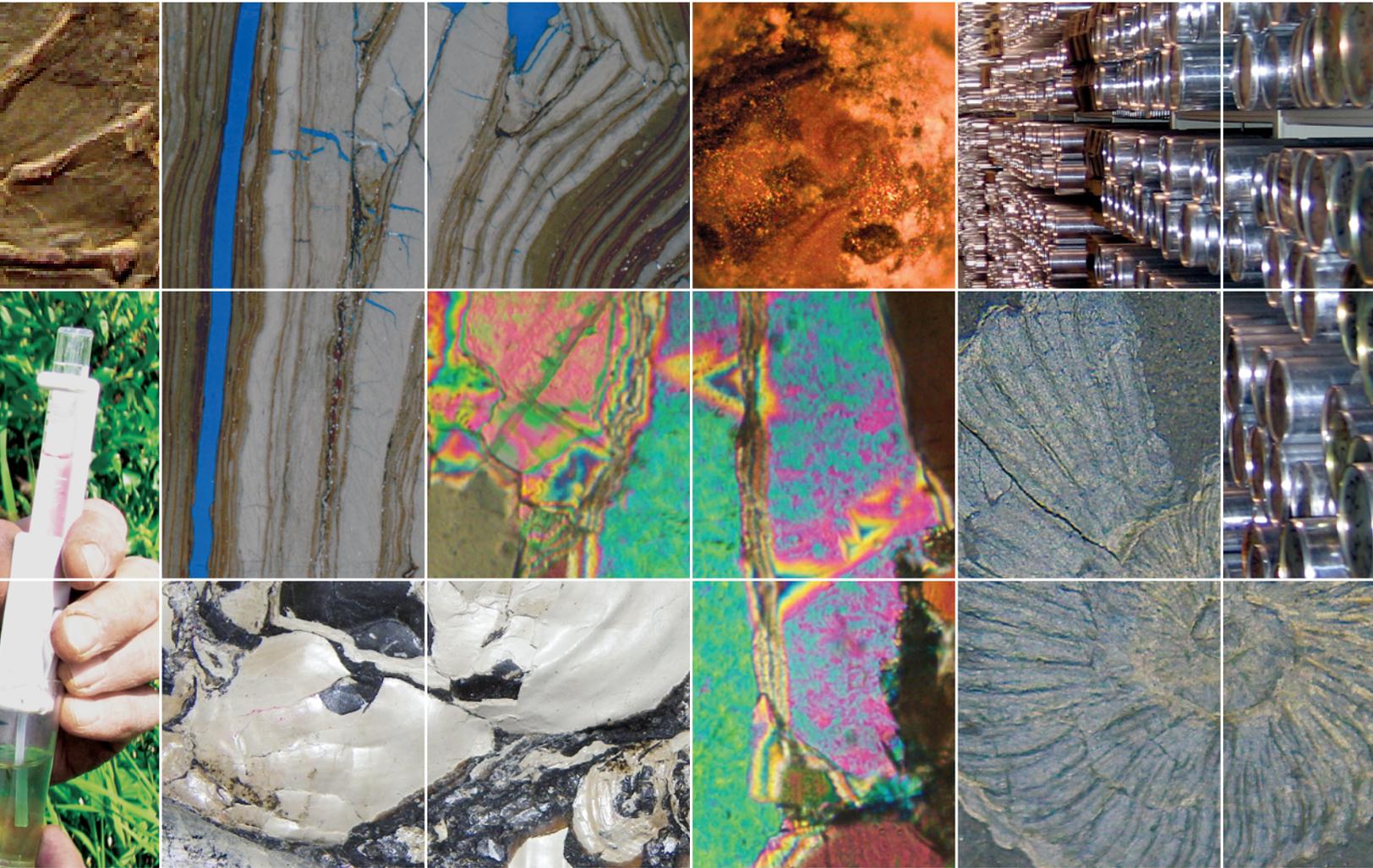


# The U.S. Geological Survey Geologic Collections Management System Procedural Handbook

*GEMS*



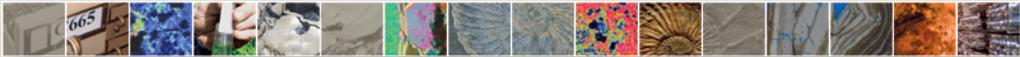
Circular 1410—Appendix 4

# GEMS



# GCMS Procedural Handbook Contents

Evaluation of Collections .....1  
Collection Storage .....2  
Labeling .....2  
Indexing .....2  
Access to Collections .....2  
Re-sampling Collections .....2  
Documentation and Records Retention .....2



**GCMS Procedural Handbook for Collections Repositories .....3**



# GCMS Procedural Handbook

*The primary responsibilities of any repository are to preserve the integrity and longevity of its collections, to offer access to the physical specimens, and to provide accountability for its practices. To accomplish these goals, the repository should address the physical conditions of sample storage, the cataloging of pertinent sample data, and the documentation of all actions and decisions affecting a collection.*

*This document provides examples of a procedural handbook and forms (respectively) for development of a collections management plan. They have been designed to educate repository staff on the management of their collections according to minimum standards of care.*

*The handbook is organized into ten procedural elements of collections management. Each element, in turn, is described in three distinct aspects:*

1. **Principles**—the reasons for performing that activity.
2. **Policy**—the rules that govern that activity.
3. **Implementation**—the actions needed to carry out that activity.

*The Geologic Materials Repository (GMR) Working Group acknowledges that specific practices and methodologies for sample management will depend on the resources of the individual repositories and the nature of their collections. It is intended, therefore, that the local repositories use this handbook as a template and modify it as needed when preparing their governing documents. The procedures outlined herein are not set in stone, and each repository is encouraged to develop a procedural handbook that is specific to its collections.*

*The following questions and discussions should be given serious consideration when adapting the procedural models given here and the forms templates in appendix 5 to the individual repositories.*

## Evaluation of Collections

When accessioning collections into the repository, the collections manager will need to be able to answer the following questions:

1. What are these samples?
2. Do they have field or laboratory numbers associated with them?
3. Who collected them?
4. Where and when were they collected?
5. Why were they collected?
6. Are there nondigital records (such as field notes, collection permits, laboratory analysis folders, or metadata) that need to be preserved to provide additional sample documentation?

This information will be used in the GCMS Collections Determination Process to evaluate a collection for retention or other disposition (see chart on page 6).

## Collection Storage

It is imperative to evaluate collections in order to determine what the samples are and what is the best way to protect them from deterioration. Once the preservation needs of each collection have been identified, the storage conditions needed to adequately house the samples can be addressed. Managers should consider the following:

1. What are the physical natures of the samples in this collection?
2. Do the samples require specific storage conditions?
3. Are there hazardous materials in this collection that require permits or special handling?
4. Does this repository have the capability to store the samples in an optimum fashion?
5. How will the collections be stored for maximum ease of retrieval?
6. Should the collections be moved to a more permanent and (or) more suitable facility?

## Labeling

A sample with a label can be associated with field records, analytical results, and publications; unlabeled samples have limited use for future scientific research. Repositories will need to decide on a consistent methodology to physically associate the GCMS Registration Number with its sample.

## Indexing

The GCMS will provide the digital template that will be used in cataloging pertinent sample data. Repositories may incorporate any additional fields necessary to fully describe their collections. It is the responsibility of collections managers and project scientists to ensure the quality and completeness of the data entered.

## Access to Collections

Although USGS collections The following issues should be addressed:

1. Are there restrictions on who has access to the collection?
2. How will onsite access to the collections be managed?
3. Are there safety issues to consider before granting access?
4. Do certain collections require safeguards to prevent contamination?

## Re-sampling Collections

If samples are made available for study by personnel outside the science center, then the following issues should be considered:

1. Who has the authority to govern the loan process?
2. What policies should govern those loans?
  - What is the loan application procedure?
  - Who approves or denies loan requests?
  - How long will samples be loaned out?
  - Will there be restrictions regarding the amount of sample to be loaned?
3. How will resulting data be returned to the repository?

## Documentation and Records Retention

All collections transactions and decisions are to be documented by written records in the repository's permanent files. An appropriate filing system will need to be set up to manage those records.

# GCMS Procedural Handbook for Collections Repositories



## Contents

- Prologue .....4
- Working Definitions .....4
- Minimum Standards of Care .....4
- GCMS Procedural Elements .....4
  - A. Acquisition and Accessioning .....4
  - B. Sample Data .....5
  - C. Collections Information .....6
  - D. Inventory .....7
  - E. Preservation .....7
  - F. Risk Management and Security.....7
  - G. Access .....8
  - H. Loans .....8
  - I. Deaccessioning .....8
  - J. Special Considerations .....9
- References and Resources.....10

## Figure

- Chart showing the collection determination process used by the Geologic Collections Management System.....6

## Prologue

Once samples are deemed valuable and appropriate for retention, each repository develops and implements a written procedural handbook for the physical care and management of collection materials at that repository. The plan should detail the specific activities, procedures, and protocols that will be employed at the repository.

## Working Definitions

- An **active collection** (also known as a working collection) contains material from ongoing research and is actively used by the project scientists. New samples are added as research continues. Upon completion of the research topic, the materials will be evaluated for permanent retention in a Geologic Collections Management System (GCMS) repository.
- A **legacy collection** contains samples from research scientists who are no longer with the U.S. Geological Survey (USGS). With proper documentation, these collections will be incorporated into the GCMS and treated as resource collections.
- An **orphan collection** consists of poorly documented samples with little foreseeable research value and do not warrant inclusion in the GCMS. They might still have value for education or outreach, however, and may be transferred to another entity with use for them.
- A **reference collection** contains samples of a distinct nature that provide an objective standard against which other samples are compared. This type of collection may be augmented with new samples to improve the standard.
- A **resource collection** contains materials, from completed research or projects, that remain significant as research assets and are made available for current and future research. These materials are expected to be preserved for an indefinite period of time.

## Minimum Standards of Care

- **Identification**—The sample is easily linked to its documentation.
- **Documentation**—The metadata associated with the sample are useful for (1) placing that sample in space and time and (2) locating research results associated with that sample.
- **Documentation status**—The documentation associated with the sample is legible, physically stable, and correctly stored to preserve its utility.
- **Processing**—The samples are logged in, unpacked, sorted, and stored as is appropriate for their conservation.
- **Individual container**—The sample is housed in a container appropriate for its type.
- **Conservation status**—The physical state of the sample is stable.
- **Housing**—The samples are not crowded in their storage space and are arranged for easy retrieval.
- **Bulk storage**—The storage space is structurally sound and protects the samples from the environment, vermin, and tampering.

## GCMS Procedural Elements

### A. Acquisition and Accessioning

**Acquisition** of samples can occur through field collection, donation, or permanent transfer. **Accessioning** is the formal process used to deposit a physical collection into a USGS repository.

### Principles

The acquisition of geoscience materials is critical to the science mission of the USGS. The USGS acquires geologic samples primarily through field collection by USGS scientists. Occasionally, the USGS acquires a collection from an academic or industrial source through the permanent legal transfer of ownership.

### Policy

All collections acquired by the USGS, either through field work, donation, or permanent transfer, should be considered for accession into the GCMS. These collections would be evaluated using the GCMS Collections Determination Process flowchart. If these samples and collections meet the standard criteria proposed by the GCMS, the collections should be formally accessioned into the long-term care of the USGS and incorporated into the GCMS.

## Implementation

### Active and Reference Collections

1. Work with project scientists to develop a collections management strategy prior to project proposal.
2. Educate project personnel about required sample data to be gathered in the field.
3. Once the samples are no longer needed for active research, follow procedures for evaluating and accessioning resource collections (see below).

### Resource Collections

1. Once a research project has concluded, consult with the project scientists to determine which samples are still needed for active research.
2. Samples that are of no immediate use to active research projects will be considered for accession into the local repository.
3. Obtain field records from project scientists to compile ancillary documentation.
4. Using the 4-point standard (see chart on page 6), work with the scientists to determine which samples are appropriate for retention within the repository. It might not be necessary to retain all duplicate samples or bulk remainders; these types of samples may be considered for disposal.
5. Enter sample data into repository catalog and begin processing samples for permanent retention according to guidelines in Sections B, C, and D of this handbook.
6. Samples that are not suitable for retention may be removed from the repository according to guidelines in Section I of this handbook.
7. Complete and retain the evaluation and accessioning documents in the repository's permanent files.

### Legacy and Orphan Collections

1. Define the scope of the collection to be evaluated, usually defined by the research project for which the sample was originally collected.
2. Consult the field records associated with the project to compile the ancillary documentation that pertains to the samples in the collection.
3. Using the flowchart in figure 3, determine which samples are appropriate for retention by the repository.

4. Enter sample data into repository's catalog and begin processing samples for long-term retention according to guidelines in Sections B, C, and D of this handbook.
5. Samples that are not suitable for retention may be removed from the repository according to guidelines in Section I of this handbook.
6. Complete and retain the evaluation and accessioning documents in the repository's permanent files.

## B. Sample Data

### Principles

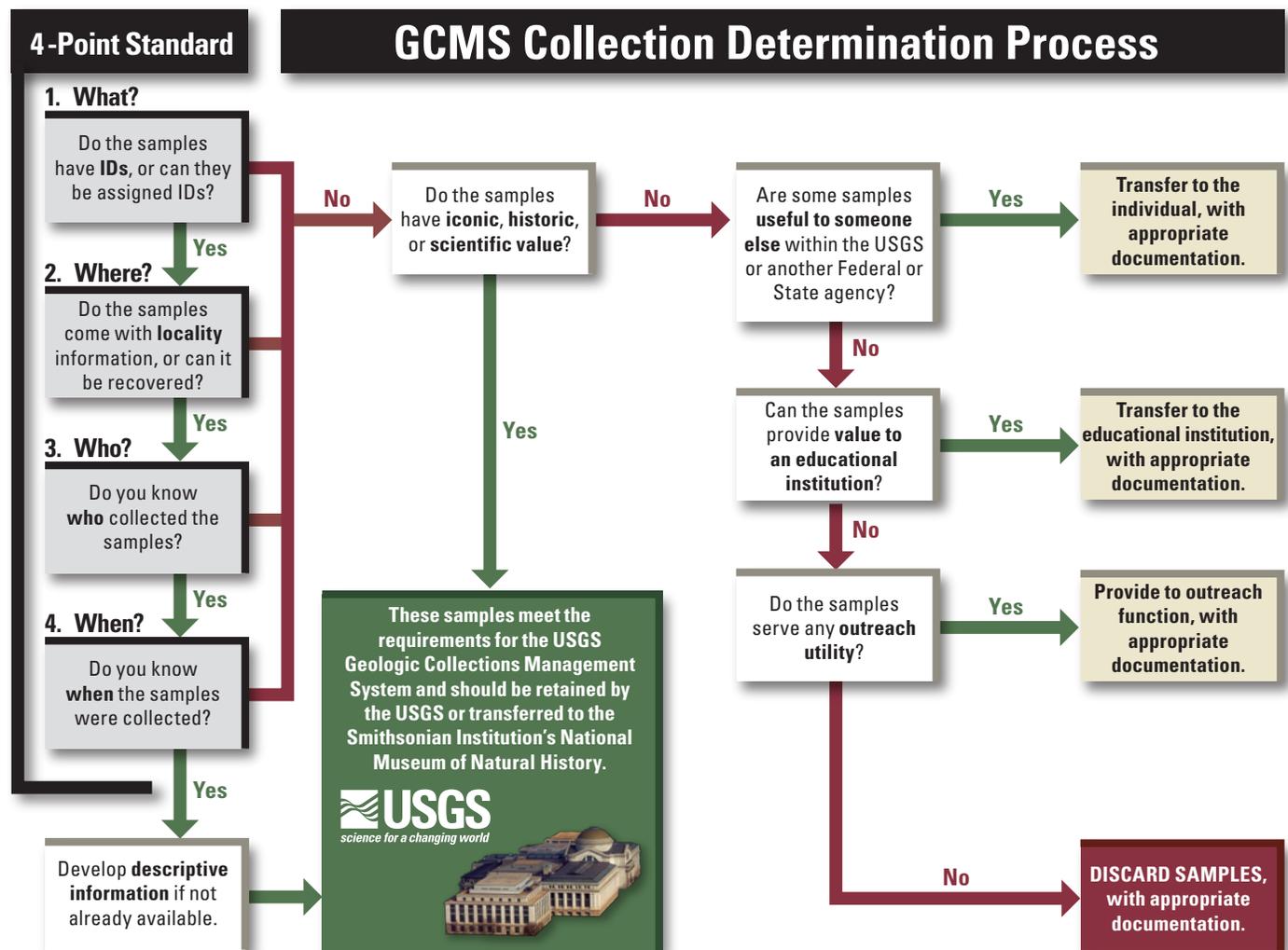
Samples are most useful for research when they can be identified in space and time. Where and when the sample was collected, who collected it, and why it was collected are critical pieces of information that identify the uniqueness and character of the individual samples in a collection.

### Policy

The GCMS recommends stipulated the information required for the identification and description of individual samples. Repositories are encouraged to use the GCMS data catalog (Microsoft Excel template, based on appendix 2) for their collections database. While not all metadata fields may be completed for every sample, the goal is to capture as much information as possible pertaining to the sample.

### Implementation

1. For active collections, project scientists provide sample information for the repository's database when they return from the field, or as soon as may be feasibly possible thereafter.
2. For resource collections, sample information is gathered from the project scientists and incorporated into the repository's database in preparation for collections accession.
3. For legacy and orphan collections, required sample information is entered into the repository's database after the collections have been evaluated for retention or disposal.



The Collection Determination Process used by the Geologic Collections Management System is a graphical representation of the factors to be considered and the steps to be taken when evaluating a sample for retention or disposal by the U.S. Geological Survey. (GCMS, Geologic Collections Management System; ID, identifier; USGS, U.S. Geological Survey)

### C. Collections Information

**Collections information** is the documentation of the physical condition, storage location, research project, and any other pertinent information relating to collections items.

#### Principles

As a rule, the fundamental scientific value of any collection is enhanced as knowledge and information about it increases. Proper documentation serves to provide access to the physical samples, associated analytical data, and research results.

#### Policy

Collections information should be acquired and documented as collections evaluation proceeds. These records should be incorporated into the National Digital Catalog and would then be provided along with collections catalogs and inventories online. This information will be made available to the public to aid in locating samples for further research and study.

## Implementation

1. Compile collections information during the collections evaluation process.
2. Enter pertinent data into the repository's catalog.
3. Upon completion of collection processing, forward collections information to the National Digital Catalog.
4. Complete and retain the collections information documents in the repository's permanent files.

## D. Inventory

### Principles

Collection inventories and catalogs provide a reference for searching each repository's holdings and provide accountability for collections management and care. These inventories are tools that access the extent and scope of collections and aid in the development of policies and procedures.

### Policy

Each repository should maintain a collections inventory for its holdings. This inventory should document all collections accessioned by the repository and the pertinent collections information. These inventories and collections catalogs should be made available to the public through the National Digital Catalog.

### Implementation

1. Compile a list that specifies all collections in the repository.
2. Provide copies of indexes and catalogs to the National Digital Catalog according to the guidelines set by the GCMS Governing Board.

## E. Preservation

### Principles

Collections are subject to diminishing scientific value through physical degradation. USGS repositories contain a wide variety of materials in their geologic collections, and each sample type (rock, sediment, cutting, fossil, and so forth) requires specific storage and preparation techniques for proper management and preservation.

## Policy

Minimum standards of care would be required for sample preservation. Each repository should evaluate its holdings to determine the best methods of preservation for its collections. If the repository cannot meet these standards, alternate solutions for the storage and preservation of these collections may be made, including transfer to another GCMS repository.

### Implementation

1. Inventory the different types of materials within the repository's collections.
2. Determine the minimum conditions needed for preservation of those materials.
3. Evaluate the repository's capabilities for supplying those conditions.
4. If the repository cannot provide adequate conditions for preservation, begin the process for transfer of collection to an alternate USGS repository (see the GCMS Web site [<http://datapreservation.usgs.gov/GCMS>] for an up-to-date listing of USGS repositories).

## F. Risk Management and Security

### Principles

Prudent collections management requires the identification, mitigation, or elimination of risks that have the potential to affect the collections. Risk management requires the thoughtful review of potential hazards from natural and manmade causes.

### Policy

Each repository is encouraged to work with local safety and security personnel to develop a risk management assessment program. This program should identify potential threats to the repository's collections and attempt to address solutions to prevent damage or loss.

## Implementation

1. Identify factors that affect the security of the repository's collections.
2. Take steps to minimize those risks as is appropriate to the repository's needs.
3. Provide the appropriate storage environment to protect the collections from damage, deterioration, or contamination.
4. Establish protocols for controlling access to the repository's collections.
5. Document and review risk assessment policies on a regular basis to ensure the safety of the collections; retain in repository's permanent files.

## G. Access

### Principles

The mission of the USGS is to provide scientific information and interpretation to the public. Open access to catalogs, metadata, and collections is integral to this mission.

### Policy

Repositories using GCMS guidelines should provide access to their collections and collections information consistent with their stewardship responsibilities. Access to the collections should be balanced by concerns for preservation and security. Repositories should control, monitor, and document access to their collections.

## Implementation

1. Establish and post protocols for allowing access to the repository's collections.
2. Require visitors to the repository to comply with these established protocols.
3. Monitor visitors during their period of access to the collections.
4. Document visitor activities and retain in repository's permanent files.

## H. Loans

### Principles

On occasion, the USGS allows samples to be used by outside parties for research purposes. These loans benefit the public by generating new data and ideas outside the purpose for which the samples were originally collected.

### Policy

Samples in USGS repositories should be loaned in accordance with the recommended GCMS protocols. Samples may be lent for research, public exhibition, or educational purposes. To ensure the security of the collections, requesting parties should provide proof of credentials. All loan transactions should be documented through formal loan agreements.

## Implementation

1. When a request is received, determine the affiliation of the requesting party and the validity of the request.
2. Determine if enough sample material is available for loan.
3. Establish the terms of the loan with regard to the timeframe, purpose, amount of sample, condition of material upon return, and deadlines for submitting any derived data to the USGS repository.
4. Use pertinent forms (see Geologic Materials Repository Working Group, 2015, appendix 5) to document the loan.
5. Obtain signatures from appropriate parties acknowledging the conditions of the loan agreement.
6. Upon return of samples, update all loan documents and retain in repository's permanent files.

## I. Deaccessioning

**Deaccessioning** is the formal process by which collections are permanently removed from the custody of a USGS repository.

### Principles

Ongoing evaluation of collections is an integral part of repository management. Samples and collections may be deemed unsuitable for continued preservation because of changes in the mission or focus of the agency's research goals or constraints in funding or space. Those samples will need to be formally removed from the repository's holdings.

## Policy

Samples no longer suitable for retention should be made available to other repositories or groups within the USGS for research, education, or outreach. If there is no interest within the USGS, these samples may be offered to institutions outside the USGS. Disposal of samples degraded beyond utility may be allowed, but it should be the last alternative considered. Appropriate documentation should accompany all deaccession decisions.

## Implementation

1. Establish the criteria that will govern decisions regarding sample retention or removal.
2. Conduct periodic evaluations of collections to ascertain their usefulness and physical stability of samples.
3. Determine if there are samples that should not be retained by the repository.
4. Provide appropriate documentation stating the reason for permanent removal of samples from the repository, and obtain approval from appropriate personnel to deaccession the identified samples.
5. Broadcast the availability of those samples within the USGS, then to outside institutions.
6. Document ultimate disposition of the samples and retain in repository's permanent files.

## J. Special Considerations

### Principles

Some collections and samples may require special handling because of Federal regulations or the presence of hazardous materials.

### Policy

The USGS should adhere to the standards and procedures established by any relevant agencies for proper and safe handling of these materials.

## Implementation

The following issues might need to be addressed by repositories holding certain materials. The topics detailed below provide general guidance in dealing with these special circumstances.

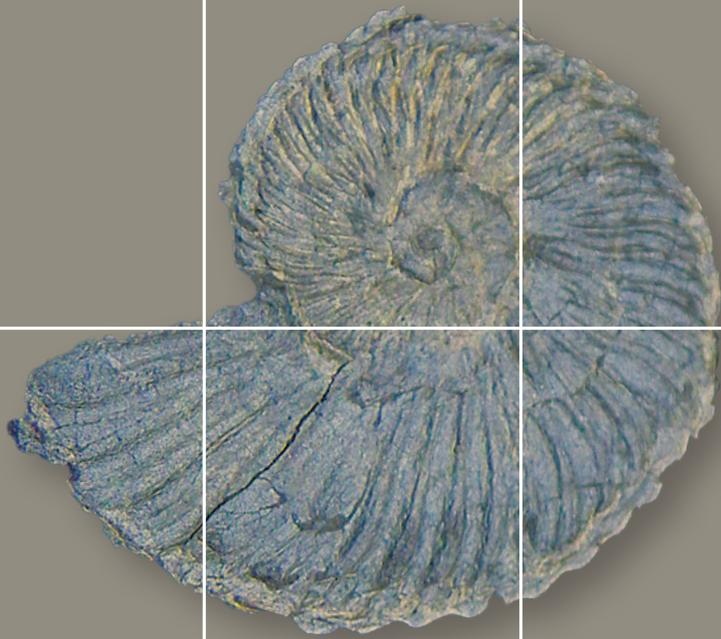
- **Chain of custody**—Samples that have been used as evidence in legal proceedings have specific handling, security, and storage needs. It is critical that these samples be secured to prevent tampering and to maintain evidentiary documentation. An example of chain of custody implemented within the USGS can be found in this document:  
<http://pubs.usgs.gov/circ/1997/c1138/c1138.pdf>
- **Soil samples**—The shipment and storage of all foreign soil and “regulated domestic” soil samples must comply with U.S. Department of Agriculture Federal quarantine(s) and (or) regulations. A repository can incur significant penalties for noncompliance. Additional information is available at these sites:  
[http://www.aphis.usda.gov/plant\\_health/permits/organism/soil/downloads/soil-circular.pdf](http://www.aphis.usda.gov/plant_health/permits/organism/soil/downloads/soil-circular.pdf)  
[http://minerals.cr.usgs.gov/intranet/chem/USDA\\_shipping.htm](http://minerals.cr.usgs.gov/intranet/chem/USDA_shipping.htm)
- **Vertebrate fossils**—Generally, vertebrate fossils may only be collected on Federal lands with a permit, and permits are only granted to persons who show a sufficient level of training and experience in collecting fossils. All vertebrate fossils that are collected under such a permit must be held in an approved repository.
- **Asbestos**—Some samples may contain asbestiform minerals that pose health risks (for example, fibrous amphibole, serpentine, and zeolite). Storage, handling, and disposal of these samples can be controlled by various Federal regulations. At a minimum, known asbestos-bearing samples should be stored in airtight containers resistant to breakage or puncture and marked with a distinctive warning label. Consider providing a specific segregated location for these samples. A repository with asbestos-bearing samples should inform and work with its local safety office. Additional information is available at these sites:  
<https://www.osha.gov/Publications/OSHA3507.pdf>  
<http://www2.epa.gov/asbestos>

- **Heavy metals**—Many samples collected for resource evaluation contain elevated concentrations of heavy metals. These samples pose a couple of problems for repositories.
  - **Cross contamination**—Samples that can be analyzed for their elemental content should be stored in such a manner as to prevent cross contamination and, if possible, should be labeled so that highly enriched samples are easily identified. Mercury-bearing samples require special containment because of volatilization.
  - **Disposal**—Materials containing elevated concentrations of arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver may fall under U.S. Environmental Protection Agency regulations for “characteristic hazardous waste” and require special handling for disposal. A repository with these types of materials needs to work closely with its local safety office before considering disposal options. Additional information is available at these sites:
    - <http://www.epa.gov/epawaste/hazard/index.htm>
    - [http://www.epa.gov/wastes/hazard/testmethods/faq/faq\\_tclp.htm](http://www.epa.gov/wastes/hazard/testmethods/faq/faq_tclp.htm)
    - <http://www.epa.gov/wastes/hazard/testmethods/sw846/index.htm>
- **Radioactive materials**—Geologic samples that contain radioisotopes are classified as naturally occurring radioactive materials (NORM). Storage requirements are regulated by both State and Federal agencies based on activity, exposure, or quantity. Samples with elevated NORM should be kept in a designated, labeled, and controlled facility that reduces public exposure to radiation and prevents the buildup of radon gas. The transfer, shipment, or disposal of radioactive samples may also be subject to Federal and State regulation. Employees overseeing a repository with NORM samples need to work with their local Radiation Safety Officer (RSO) to ensure that they are in compliance.
- **Other materials**—Some repositories may contain environmentally sensitive samples from disaster sites (such as the World Trade Center, Hurricane Katrina, and the Haiti Earthquake), industrial waste sites, residential remediation sites, and mine waste sites. These samples may contain hazardous or carcinogenic forms of heavy metals or organic chemicals that require special precautions and handling. Consider segregation and special labeling for these samples. Additional information is available at:
  - <http://www.epa.gov/epawaste/hazard/international/index.htm>
  - <http://www.epa.gov/radiation/tenorm/oilandgas.html>

## References and Resources

*The following procedural handbooks were used as models when developing this document:*

- Dunnum, J.L., Ramotnik, C.A., Bogan, M.A., and Cook, J.A., 2009, Division of Mammals collection management procedures manual [draft]: Albuquerque, N. Mex., University of New Mexico, Museum of Southwestern Biology, 40 p. [Cindy Ramotnik, U.S. Geological Survey, 2010, written commun.]
- The Geologic Materials Repository Working Group, 2015, The U.S. Geological Survey Geologic Collections Management System (GCMS)—A master catalog and collections management plan for U.S. Geological Survey geologic samples and sample collections: U.S. Geological Survey Circular 1410, XX p.
- Perry, K.D., ed., 1999, The museum forms book: Austin, Tex., Texas Association of Museums, 461 p.
- Thompson, J.W.M., comp., 1997, Department of Paleobiology collections management policy and procedures (rev. ed.): Washington D.C., Smithsonian Institution, National Museum of Natural History, 79 p.
- Thompson, J.W.M., 2010, Minimum standards of care for museum collections: Washington D.C., Smithsonian Institution, National Museum of Natural History, 1 p. [Jann Thompson, National Museum of Natural History, 2010, written commun.]



# GCMS

