

**Appendix A. Idaho National Laboratory Lithological Core
Storage Library Standard Operating Procedures**

July 31, 2017

DOE-ID/USGS	Title: INL LITHOLOGIC CORE STORAGE LIBRARY	SOP No.: CSL-SOP- 8.1.1
WATER RESOURCES DIVISION		
STANDARD OPERATING PROCEDURE	Approved: <u>B. C. Bailey</u> Project Chief	Date: 07/31/17

1. Introduction

1.1 Purpose

The purpose of this document is to establish operational guidelines, policies, and procedures for the Idaho National Laboratory (INL) Lithologic Core Storage Library. This Standard Operating Procedure is being developed to:

- Ensure proper organization, preservation, and security of geologic materials generated at the INL.
- Provide the scientific community access to samples for research purposes, and
- Establish an accessible database detailing availability of samples and associated data and analyses.

1.2. Background

The INL Lithologic Core Storage Library was established to catalog and store geologic materials from subsurface investigations conducted in the past, as well as those which will be conducted in the future at the INL. Materials collected in the past had been stored in surplus buildings and other areas at the INL prior to the establishment of the core library. Prior to the establishment of a core library, no attempt was being made to properly catalog or identify the locations of core which may be useful to the scientific community for study, which resulted in duplication of work efforts, loss of valuable technical information, and increased expense from drilling additional core. The amount of existing core from subsurface investigations at the INL in 1990 was unknown, although estimates were at about 20,000 ft.

1.3. INL Lithologic Core Storage Library

The INL Lithologic Core Storage Library is located at the INL Central Facilities Area in building CF-663. It is a 6,000 ft² building consisting of approximately 4,000 ft² of core storage space, 1,200 ft² of laboratory space, 400 ft² of office space, a restroom, and a mechanical room. The laboratory is furnished with equipment and supplies necessary to examine, test, and sample core. The core storage area is equipped with metal shelving on which pallets of core will be stored. A 10-foot-high rollup door to the outside with an adjoining truck ramp is used in moving the core from transport vehicles to the staging area where it is inventoried and processed for storage. A small forklift is used to move the core on and off the shelving. The office is a work area for library personnel to manage the database and associated records. See figure 1-1 for a schematic diagram of the Core Storage Library.

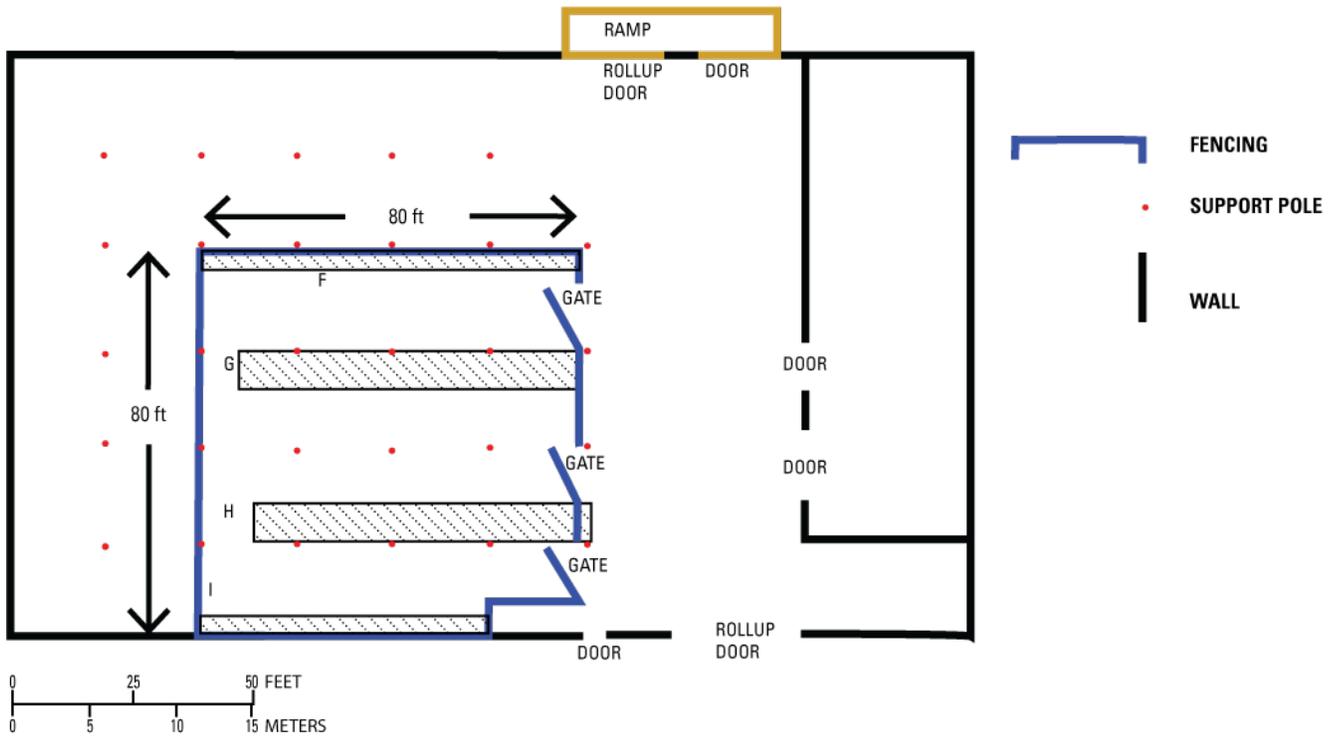
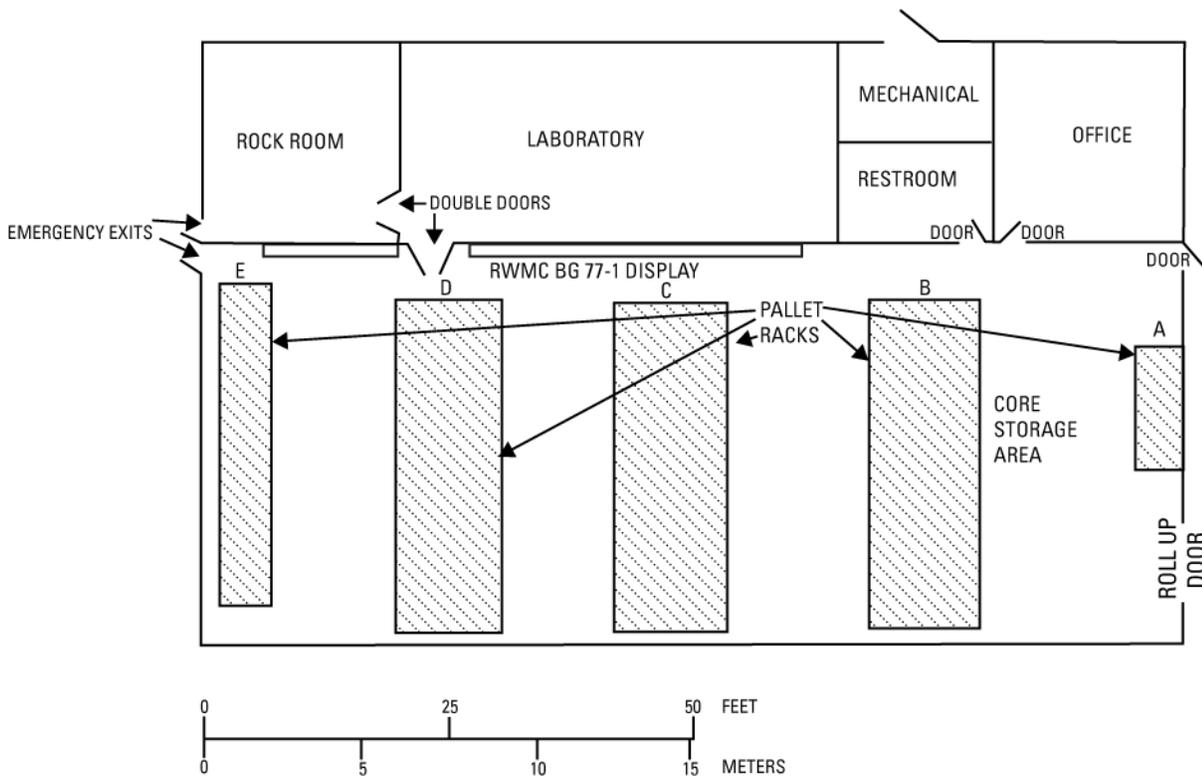


Figure 1-1. Schematic diagrams of the Core Storage Library, CF-663 and Annex, CF-674.

1.4. References

Refer to DOE Order 5480.19 for the guidelines used in preparing this document.

2. Policies

2.1. Organizational Structure

The INL Lithologic Core Storage Library is owned and funded by the U.S. Department of Energy (DOE). Personnel from the U.S. Geological Survey (USGS), Water Mission Area, INL Project Office will conduct day-to-day operation of the facility.

2.2 Responsibilities

Responsibilities of the personnel at the library are outlined below. As time passes, these responsibilities may be redefined and more may be added. See figure 2-1 for an organizational diagram.

2.2.1. Department of Energy, Idaho Operations Office:

Assistant Manager for Waste Disposition. Conducts state-wide environmental compliance, restoration, and waste management activities/programs and facilities and attendant environmental quality assurance, compliance, permits, and monitoring.

Assistant Manager for Nuclear and Safety Performance. Develops and maintains requirements and standards for ES&H, including radiological, environmental, industrial, and safety programs. Serves as primary interface for regulators and permittees.

2.2.2. USGS, Water Mission Area:

Project Chief. Supervises all core storage library operations. Acts as technical and program consultant to core library personnel. Serves as primary liaison between core library personnel and DOE on programmatic and technical issues.

Curator. Responsible for organization, preservation, and security of samples. Supervises receipt and distribution of samples and maintains chain-of-custody records for samples when required. Maintains sample inventory and use records on computer database. Generates response on library usage. Develops technical and operational procedures for core library operations. Supervises technical staff.

Technicians. Assists the curator in all phases of receiving, inventory, storage, and distribution of samples. Performs or schedules routine preventative maintenance of library equipment.

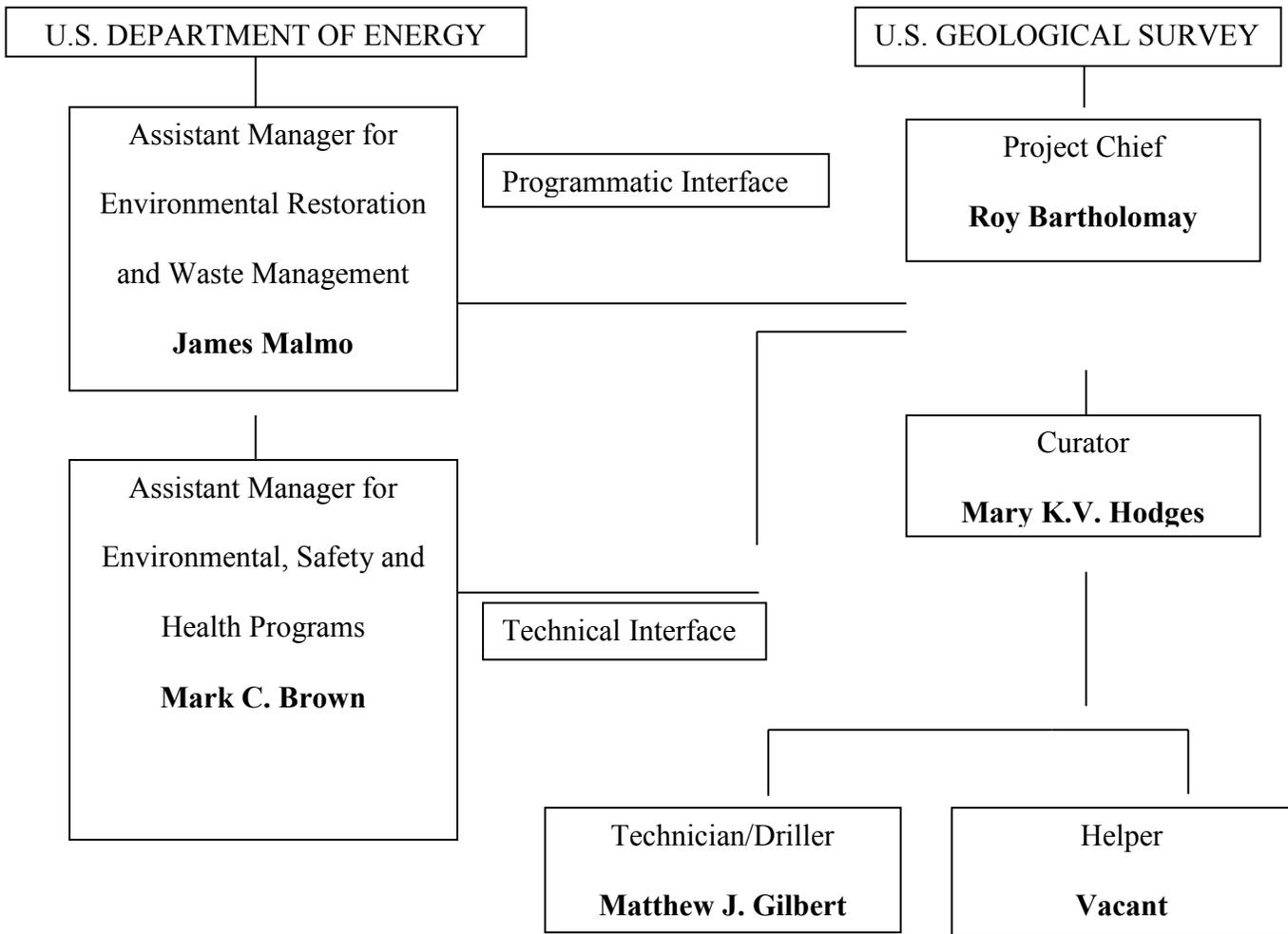


Figure 2-1. INL Lithologic Core Storage Library Organizational Structure.

3. Functions of the Core Storage Library

The main functions of the INL Lithologic Core Storage Library are as follows:

1. Locate existing core both at the INL and other facilities and transport them to the core storage library or additional space in CF 774.
2. Identify and catalog existing core utilizing a computerized database.
3. Accept and process newly drilled core.
4. Permanently store processed core in an orderly and easily retrievable form.
5. Maintain chain-of-custody records on newly drilled core if requested.
6. Operate the core storage library's laboratory for examination, testing, and sampling of core by INL scientists, university professors and students, and others who have a legitimate research need.
7. Maintain a computerized database on core availability and analyses performed on samples of core.
8. Preserve the integrity of stored core for future study.

3.1. Access

The core storage library will be a restricted access area. The three levels of authorized access are as follows:

1. **Unrestricted access:** Persons with unrestricted access will be issued a key to the building, and are not required to sign in or have an escort.
2. **Restricted access 1:** Persons will be required to sign in and out of the building. No escort is required.
3. **Restricted access 2:** Persons will be required to sign in and out of the building, and an escort is required at all times.

The curator of the core storage area will prepare lists of individuals who may enter with and without restrictions. Under special conditions, the curator may elect to grant unrestricted access to certain individuals on a temporary basis.

General categories of personnel who may enter under various access levels are:

1. Unrestricted access:
 - USGS personnel
 - Security guards
 - Fire department
2. Restricted access 1:
 - Health physics technicians
 - Health and safety personnel
 - Scientists and technicians in official business
 - Maintenance and janitorial personnel
3. Restricted access 2:
 - Subcontractors
 - Service personnel
 - All other personnel

3.2 Control of Entry

Anyone who has been granted unrestricted access status will be issued a key and may enter any portion of the library at any time. All other persons must enter through the main visitor's entrance on the north side of the building. A doorbell is provided to alert library personnel of their presence. These persons must report to the curator's office, sign in, state their purpose, and receive permission from the curator or his/her designees prior to entering any other part of the building. Under special circumstances, it may be necessary for the curator to grant special access for subcontractors or service persons who have a need to come and go frequently. This may require sign-in and issuance of a key daily.

3.3 Acceptance Criteria for Geologic Materials

Most of the samples stored in the library will consist of drill core; however, there may be a need to store other types of materials under special circumstances. Materials stored may include, but are not limited to, drill core, soil cores or samples, and drill cuttings from subsurface investigations related to INL activities. No attempt will be made to solicit materials from other sources, and none will be accepted unless related to INL activities.

The following policies apply to geologic materials collected prior to establishment of the library, as well as those submitted for storage after the date of this document:

1. The core storage library is to be a non-nuclear, no radioactivity area; therefore, radioactively contaminated materials will not be stored there.
2. All materials which are submitted to the core storage library must be accompanied by a certification stating that the materials are free of contamination. This determination must be made by Health Physics personnel, and it is the responsibility of the "owner" of the materials to arrange for this certification prior to delivery to the core storage facility.
3. To preserve the integrity of stored materials, and ensure that no information related to samples is lost, it is suggested that the entire core or sample suite be delivered to and cataloged by the core storage library prior to any sampling of the material. Should it be necessary to test sample materials prior to delivery to the core storage facility, intervals sampled should be clearly indicated.
4. Because many investigations and site characterization studies at the INL are politically sensitive and subject to legal actions, materials submitted for storage after the date of the final draft of this document may be held under chain-of-custody procedures during storage at the core storage library at the request of the "owner" of the materials. This will allow documentation of samples should any legal questions arise. Chain-of-custody procedures must be initiated by the owner of the samples at the sampling or drill site. If no chain-of-custody instructions are given at the time the core is delivered to the core library, the curator and the project chief will decide who will be allowed to sample the core.
5. No provisions have been made for storage of radioactive materials should they be for storage. Contaminated core is not accepted.

3.4. Laboratory Facilities

A laboratory in the core storage library will be available for use by the USGS and DOE and their contractors. Use of laboratory space and equipment will be on a first-come, first-serve basis. Arrangements should be made for laboratory space at least 24 hours in advance. Testing which requires long term use of the laboratory should be scheduled as soon as possible in order that the space be allocated for that time frame.

3.5. Sampling and Loan of Materials

Samples may be loaned out for examination or nondestructive testing. The loan period will be one year with extensions granted at the discretion of the curator. The borrower must agree that the samples will not be cut, broken, contaminated, or destructively analyzed without the written permission of the curator. On special request, core may be cut or sampled provided the requester has a valid scientific purpose. Any test which will involve destruction of sampled material must be approved either by the curator, the owner, or a committee consisting of a representative of the owner, a DOE representative, and a USGS representative. The USGS representative will act only as a nonvoting committee member. The curator or library staff will update the distribution and loan records annually.

A copy of any analyses performed on samples will be required to be submitted to the core storage library for inclusion in the database. This will help eliminate duplication of efforts by scientists and technicians, and provide needed pieces of data to individuals.

4. Procedures

4.1. Receipt, Cataloging, and Storage of Samples (CSL-1)

4.1.1. Purpose

The purpose of this section is to outline the procedures for receipt, cataloging, and storage of geologic materials submitted for storage at the INL Lithologic Core Storage Library to ensure standardization of storage methods. Examples of forms are found in appendix B.

Organizations or individuals wishing to store material at the core storage library should contact the curator, currently Mary Hodges, preferably by e-mail, at mkhodges@usgs.gov. Please use "core library" in the subject line. The curator will send the requestor a core/cutting storage notification form (see appendix B).

Once the completed storage notification form is returned to the curator, arrangements can be made to deliver material to the core storage library.

Core will be accepted only if prior arrangements have been made.

Core boxes must be in good condition, and legibly labeled with the corehole name, and beginning and ending footage in feet below land surface marked on the top and bottom of each core box. The top and bottom of the core interval contained in each box must be indicated. Lexan™ tubes must be labeled with the well name, and top and bottom footage such that the orientation may be discerned. Cuttings must be clearly labeled with the well name and the footage represented by the cuttings.

Contact the USGS INL Project Office at (208) 526-2438 to request core delivery. The administrative assistant will contact the CSL curator and the project chief. USGS INL Project Office staff work in the Willow Creek Building in Idaho Falls, ID, most of the time, so the curator must travel to the site to receive core and fill out the intake paperwork. On rare occasions, staff members other than the curator may accept core if prior arrangements have been made.

Deliver cores and supporting documentation to the INL, CF-663, at the agreed-upon time and date. Supporting documentation includes, but is not limited to:

- A. Location data, including horizontal datum, vertical datum, and geographic information
- B. Project proposals, engineering design files, field sampling plans\
- C. Signed certification by a Radiation Control Technician that the material is within acceptable radiological limits
- D. List of intervals sampled, researcher or project for which samples were taken, and purpose for sampling
- E. Chain of custody forms, if applicable
- F. Lithologic logs (copies of rig geologist's log book notes are acceptable)
- G. Additional information, such well logs, well construction diagrams, etc.,

4.1.2. Equipment

1. Receiving Log (see appendix B for an example)
2. Core boxes
3. Indelible markers
4. Labels
5. Strapping machine
6. Wooden pallets
7. Forklift
8. Lexan™ tubes
9. Computer databases

4.1.3. Safety Precautions

Care should be exercised when utilizing the electric forklift to remove or place boxes or pallets on metal shelving. Only persons who have been instructed in the proper use of the forklift may operate it. Appropriate personal safety equipment should be worn.

4.1.4. Methods

As samples are submitted to the library, the curator or technical staff will:

1. Check that samples submitted are related to INL projects. Reject any samples not related to the INL. (Exceptions may be made at the discretion of the curator for samples taken near the INL which may be valuable.)
2. Complete a Receiving Log (see appendix B-Forms for example) showing samples and intervals received for storage. Determine if samples are in the proper sequence, and that top and bottom of intervals are identified and samples are oriented in the same direction.
3. Determine if the samples require chain-of-custody records. If so, sign the chain-of-custody form provided by core library staff (see example in appendix B) after inventory to determine if all intervals indicated were received. Reconcile any differences between the shipper's manifest and samples actually received. Chain-of-custody forms should remain with the samples, and copies filed with other documents pertaining to the core.
4. Ascertain that samples received have been surveyed for radioactive contamination by health physics personnel and that radiation levels are within INL administrative control limits, and that proper radiological surveys have been done and signed. Certification of radiation levels accompanies the material intended for storage in the CSL (see example of Health Physics certification in appendix B-Forms). The certification should be filled permanently in the main office of the core storage library. Reject samples that do not have a radiological control survey and accompanying documentation. Surfaces or objects which exhibit contamination levels below background levels are considered to be free of radioactive contamination.
5. Determine if it is necessary to rebox samples. Reboxing will be required when:
 - core boxes or Lexan™ tubes are in poor shape,
 - core boxes are not the same type used by the core storage library, and/or
 - core boxes are only partially filled.
6. Follow these steps should the material require reboxing:
 - Mark all segments of core with longitudinal lines, red on the right indicating the up direction, and footage.
 - Determine if intervals of sample are missing. Mark plastic foam blocks with the word "MISSING" and the depth intervals missing if the sample was never recovered. Mark the block with the word "SAMPLE" and the interval missing if segments were taken for testing prior to receipt at the core storage library.
 - Footage should be marked in feet below land surface on the core in the box, followed by additional core segments in the proper sequence, using the "LOST" or "SAMPLED" blocks as appropriate where intervals are missing.

7. Properly label materials committed to storage. Labels will include:
 - exact location from which the sample was (a surveyed location, including longitude, latitude, and elevation, including horizontal and vertical datum as well as geographic location, is preferred.)
 - sample identifier (well name/number, project name/number) as well as who is the "owner" of the core,
 - exact depth or depth interval from which the sample was taken,
 - box number, which is a sequential number beginning with one (1), indicating the box of core with the shallowest interval submitted, andIf any of the above information is not supplied with the samples, contact the owner of the samples to obtain that information.
8. Place two identical labels on the core box. One label will be on the bottom half of the box (on the end with the wooden block indicating beginning footage). The second label will be on the top of the core box on the end which will face into the core storage area.
9. Stack core boxes on wooden pallets in proper sequence with the deepest intervals on the bottom right hand side.
10. Bind core boxes to pallets and place pallets in the rack using the electric forklift.
11. Log all information received with the samples into the computer database. File hardcopies of Receiving Logs, Chain-of-Custody Records, Health Physics certification, and any lithologic, driller's, or geophysical logs in the main office.

4.2 Distribution and Loan of Samples for Nondestructive Use (CSL-2)

4.2.1. Purpose

The purpose of the section is to outline the procedure for the distribution and loan of samples to requestors for examination or nondestructive testing.

4.2.2. Equipment

1. Sample Request form (see appendix B-Forms for examples)
1. Sample Distribution form
2. Chain-of-Custody Record (if required)
3. Forklift
4. Sample Ticket form
5. Strapping Machine

4.2.3. Safety Precautions

Refer to procedure CSL-1, Section 4.1, regarding the use of the forklift and personal protective equipment.

4.2.4. Method

1. Requestor must complete a Sample Request form (see appendix B-Forms for example) providing all requested information.
2. Curator reviews Sample Request form to ensure that there is a valid scientific purpose for the use of materials. In some cases, the requestor may be asked to provide additional information before the request is granted.
3. Curator determines if chain-of-custody records are required on requested sample(s). If necessary, the Chain-of-Custody Record is completed.
4. Provided all paperwork is in order, the curator or technical staff retrieves the requested sample(s) from the storage area utilizing the forklift, completes the Sample Distribution Record (see appendix B-forms for example) and Chain-of-Custody Record (if required), places a copy of the Sample Ticket(s) (appendix B) in the core box in lieu of the distributed sample(s), and releases sample(s) to the requestor.
5. The curator or technical staff then rebinds the core box or boxes using the strapping machine and returns them to the metal shelving.
6. Copies of the Sample Request form, Sample Distribution form, Chain of-Custody Record (if applicable), and Sample Ticket form are to be filed in the main office. All information on sample distribution and loan are logged into the computer database.

4.3. Distribution and Loan of Samples for Destructive Use (CSL-3)

4.3.1. Purpose

The purpose of this section is to outline the procedure for distribution of samples to requestors for destructive testing.

4.3.2. Equipment

1. Sample request form
2. Sample distribution record
3. Chain-of-custody record (if required)
4. Sample ticket form
5. Forklift
6. Strapping machine

4.3.3. Safety Precautions

Refer to procedure CSL-1, Section 4.1, regarding the use of the forklift and personal protective equipment.

4.3.4. Method

Distribution and loan of samples requiring destructive analysis are subject to the same procedures outlined in CSL-2 above, with the exception that written permission must be gained from the owner of the sample or committee prior to distribution as detailed in the policies section of this document. The curator or technical staff of the core storage library is responsible for gaining permission to distribute samples.

4.4. Return of Distributed Samples (CSL-4)

4.4.1. Purpose

The purpose of this section is to outline the procedure for logging in samples returned after distribution for testing or examination.

4.4.2. Equipment

1. Completed Sample Distribution Record
2. Completed Sample Ticket form
3. Forklift
4. Core boxes from which samples were distributed
5. Strapping machine

4.4.3. Safety Precautions

Refer to procedure CSL-I, Section 4.1, regarding the use of the forklift and personal protective equipment.

4.4.4. Method

As samples are returned to the storage facility, the curator or technical staff will:

1. Determine if samples have been returned intact, or as agreed upon at the time of distribution. If not, determine the reason and take appropriate actions pertaining to the situation.
2. If samples are returned intact, the Sample Distribution Record will be stamped "Returned Intact (date)" and filed in a Sample Return file. Any deviation from the agreed upon condition of the sample at the time of return shall be noted.
3. Boxes/Lexan™ tubes which originally contained the returned samples will be retrieved from shelving. Sample Tickets will be removed from boxes/tubes and samples returned to their proper position. Sample boxes shall be re-bound, utilizing the strapping machine, prior to return to shelving.
4. Sample Ticket forms, Sample Distribution Records, and associated paperwork will be filed in the main office, and the computer database will be updated to reflect return transactions.

4.5. Laboratory Usage (CSL-5)

4.5.1. Purpose

The purpose of this section is to outline procedures for use of the laboratory at the core storage library by the scientific community.

4.5.2. Equipment

1. Existing laboratory equipment as necessary, or additional equipment provided by the user(s)
2. Chemical reagents normally utilized in the core storage laboratory, or additional reagents required and supplied by the user(s)

4.5.3. Safety Precautions

Refer to Procedure CSL-I, Section 4.1, regarding the use of the forklift and personal protective equipment. When working with chemicals, safety glasses should also be worn.

4.5.4 Method

Use of the laboratory facilities is available to all persons requesting laboratory time, provided a valid scientific purpose for utilizing core library samples is detailed. Persons desiring limited laboratory space/time must make their request at least 24 hours in advance. Persons desiring extended use of laboratory space/time must request time as far in advance as possible. Use of laboratory space/time is subject to prior scheduling commitments, and all laboratory use is granted at the discretion of the curator or technical staff of the core storage library.

Equipment available for use includes a Rotap mechanical shaker, porosimeter, permeameter, drying oven, balances, drill press, trim and slab saws, and miscellaneous general laboratory supplies.

Persons desiring use of laboratory space/time must

1. Make a formal request detailing length of use, amount of space needed, type of testing to be performed, and type and length of use required of core storage laboratory equipment. Any additional equipment or chemicals required must be supplied by the user.
2. Provide Material Safety Data Sheets (MSDS) or Safety Data Sheets (SDS) for any chemicals used in the laboratory which are not normally in stock.
3. Provide operations manuals or use procedures and safety requirements for equipment brought into the laboratory.
4. Follow operating procedures for laboratory equipment. Users must wear recommended protective clothing or glasses associated with operation of equipment. Manuals detailing use of equipment will be available in the laboratory.
5. Maintain clean work areas and equipment, and clean glassware daily.
6. Alert core storage library personnel of any chemical spills, laboratory accidents, or safety hazards.

Use of laboratory space will be restricted to normal operating hours unless testing requires sampling, etc. at odd times, and prior arrangements are made with the curator. Additional laboratory policies and procedures will be established as needed. Failure to follow laboratory policies may result in suspension of privileges.

4.6. Laboratory Safety (CSL-6)

4.6.1. Purpose

The purpose of this section is to outline the procedure for dealing with spills or accidents in the laboratory.

4.6.2. Equipment

1. MSDS or SDS
2. Supplies detailed in each MSDS necessary for spill clean-up

4.6.3. Safety Precautions

Refer to procedure CSL-1, Section 4.1, regarding the use of the forklift and personal protective equipment. When working with chemicals, safety glasses should also be worn.

4.6.4. Method

MSDSs and/or SDSs are in a binder in the laboratory for all chemicals stored and used. Laboratory users are encouraged to read the MSDS or SDS for all chemicals used to determine safety precautions and/or protective clothing recommended. In the event of a spill, laboratory users should refer to the MSDS of the reagent or substance to determine if the spill can be cleaned up in-house or if safety personnel should be notified. If the spill can be taken care of in-house, follow instructions on the MSDS regarding clean-up methods. In the event of a personnel accident, seek medical attention as necessary. Alert core storage library personnel of all spills, accidents, or safety hazards.

4.7. Recordkeeping (CSL-7)

4.7.1. Purpose

The purpose of this section is to define how records will be kept, their location, and format.

4.7.2. Equipment

All records associated with operation of the core library, including forms dealing with the receipt, distribution, storage, and cataloging of samples are necessary. Back-up disks of computer files are also considered records.

4.7.3. Method

1. All records must be legible, retrievable, and in a permanent form.
2. Erasures are not allowed in written records. In the case of an error, personnel should draw a line through the error and make corrections as necessary. Corrections should then be initialed and dated.
3. Paper copies of all records will be stored in the main office of the core storage library. Back-up copies of computer records will be housed in the main office indefinitely in a fire safe. Back-ups of computer files will be performed at least monthly.

These guidelines and policies are provisional and subject to revision as new procedures or situations specific to the operation of the INL Lithologic Core Storage Library arise.