U. S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

SAMPLE HANDLING AND CURATION PROTOCOL FOR THE WESTERN INTERIOR SEAWAY SCIENTIFIC DRILLING PROJECT

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INTRODUCTION

The Western Interior Seaway (WIS) Scientific Drilling Project was undertaken as part of the U.S. Continental Scientific Drilling Program (CSDP). CSDP was created as a mandate under the Continental Scientific Drilling and Exploration Act of September, 1988 (PL 100-441). CSDP is supported by the USGS, NSF, and DOE, and individual drilling projects are coordinated by representatives of these three agencies that comprise the Interagency Coordinating Group (IGC). Careful handling, analyses, and curation of all samples and data gathered during the WIS Project are vital to the following critical elements of CSDP:

1. Provide materials and information required to accomplish the science goals of the research drilling project.
2. Provide permanent documentation of the geological, geochemical, and hydrological environments encountered in the drill hole.
3. Correlate sample properties with geophysical, drilling, and mud logs to enhance the interpretation of such logs and allow correlation with results of surface geological, geophysical, geochemical, and hydrological studies.
4. Provide timely information to the drilling staff and project scientists to maximize the scientific value of the project.
5. Preserve samples and relevant data for future scientific studies.

OBJECTIVES

The objectives of this protocol are to insure that all samples and related data collected during the WIS drilling project are properly handled and curated, and to provide a permanent physical record of the drill hole for future studies. Basic concepts for handling and curation of research drilling samples and related data are as follows:

1. Samples and data are owned by the USGS and represent a present and future national resource.
2. After appropriate analyses are completed, the samples along with a suite of descriptive data from the project will be permanently archived for future access at the USGS Core Research Center (CRC) on the Denver Federal Center. As new scientific ideas and analytical tools become available, the archived halves of the cores will provide opportunities to restudy the material and hence maximize the value of this drilling project.
3. A portion of the core (the Working Half) will be available for sampling and analysis by the Principal Investigators and Project Scientists or their delegated representatives. It is the obligation of all scientists conducting investigations for this project to curate samples in their possession in such a manner as to preserve their integrity, identity, orientation, and location. Upon completion of the project studies, any remaining sample with analytical results, will be archived at the USGS-CRC.
4. A timely and complete record of observations, measurements, and techniques will be added to the data base following each step of sample handling and analysis.

CURATION AND ARCHIVING PROCEDURES

A longitudinal slab of appropriate thickness will be made at the CRC of each core section. For cores that are 3" in diameter or less, the core will be cut in half longitudinally. One half will be designated the Archive Half and will be marked, photographed, and boxed by the CRC staff. The

remainder then becomes the Working Half and will be available for sampling under the direction of the CRC Curator and according the sampling priorities and guidelines established by the Principal Investigators. No sample may be removed from the CRC until assigned a unique identification number as describved below.

The CRC Curator is responsible for the preparation and documentation of Working and Archive Halves of all cores; procurment, distribution, and documentation of samples from the Working Half of each core; and curation of project cores, samples, thin sections, and data acquired from project samples. The CRC Curator also has the authority and responsibility to solicit the return of project samples, data, and associated documentation.

The project samples shall be protected from general distribution for a period of two years following completion of drilling in order to allow Project Scientists time to complete their studies. At the end of the two year period the Principal Investigators shall establish a policy and set of procedures for general distribution of samples to outside investigators. All investigators shall return all unused samples, analyses, data compilations, etc. to the CRC Curator within two years after distribution of samples. The CRC Curator assumes responsibility for the maintenance of both Archive and Working Halves, including indexing and filing for availability by other investigators two years after beginning of sample distribution to Project Scientists.

SAMPLE DISTRIBUTION POLICY

Distribution of samples is undertaken to provide scientists with material to achieve the scientific objectives of the WIS Drilling Project. The policy for distribution of samples will be set by the Principal Investigators, and generally will follow that currently being used by the Ocean Drilling Project (ODP). The following addresses and telephone numbers are relevant to this policy:

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Denver, CO 80225-0046

(303)236-1930
Thomas Michalski, Curator
Dianna Richards, Assistant Curator
William Whitus, WIS Drilling Project Curator

The CRC Curator is responsible for distributing - in accordance with the sample distribution guidelines established by the Principal Investigators- and preserving, as well as conserving, sample materials. The CRC Curator is responsible for maintaining a record of all samples that have been distributed, indicating the names of the recipients and the nature of investigations proposed. This information is available to interested investigators upon written request. Distribution of sample materials will be made from the CRC. The CRC Curator will assign a unique identification number to each sample. The CRC Curator will keep a careful record of the identification number, nature and size of the sample, date of allocation, name of investigator, and name and location of facility for each sample allocated for scientific investigation. Because samples associated with this drilling project may be exchanged between investigators at several locations, careful records will be taken by the appropriate Principal Investigator and sent to the CRC Curator whenever such an exchange occurs.

Procedures for archiving samples and cores will follow those used by the CRC. Core boxes are given permanent labels containing a CRC library number, the number of boxes from each drill hole, the drill hole identifier, plus a subidentifier if appropriate. This information is simultaneously entered into the archive's master file. Core boxes are then stored. Thin sections, photographs, logs, and analytical data are stored in a manner specified by the CRC Curator and cross-referenced to samples from the same drill hole.

Sample Numbering

The basic format for numbering each sample is the abbreviation for the well followed by the depth in decimal feet of the top of the sample, separated by a colon (e.g. AA-nnn.n). The following are the abbreviations for key cores or sections of the WIS project:

BO	AMOCO #1 R. K. Bounds, Greeley Co. KS
BS3	Berthoud State #3, Larimer Co., CO
BS4	Berthoud State #4, Larimer Co., CO
ES	USGS #1 Escalante, Kaiparowitz Plateau, UT
MV	Mesa Verde National Park, CO, Mancos Section
PO	USGS #1 Portland, Cañon City Basin, CO
PU	Princeton University, Pueblo core
SE	Plains Resources #1 Schock Errington, KS
WE	USGS #1 Wetmore, Cañon City Basin, CO

A sample beginning at 297.6' from the Bounds core would be labeled "BO-297.6". The forms from the CRC that record samples taken also will record the sample interval (length), size, and purpose for taking the sample.

Sampling Limits

All core samples will be limited to one half of the Working Half and 5 cm in length. Investigators requesting larger amounts will provide justification for the larger sample sizes or for

frequent intervals within the core. Such requests must be approved by the Principal Investigators in coordination with the CRC Curator. No interval will be completely depleted without approval from the Principal Investigators and CRC Curator.

Requests for samples from thin layers, stratigraphically important boundaries, sections that are badly depleted or sections that are in unusually high demand may be delayed in order to coordinate requests from other investigators. Exceptional sample request will require more time for processing than routine requests.

Science Plan Experiments and Outside Scientists

WIS Principal Investigators identify scientists (Project Scientists) to receive samples for analyses. Allocation of samples to Project Scientists will be done in accordance with the guidelines set up by the Principal Investigators and the CRC Curator. Project Scientists wishing to acquire additional project samples may submit a written proposal to the Principal Investigators. The request should include a statement on the nature of the proposed research, size and approximate number of samples required to complete the study, and any particular sampling technique or equipment required. Approval or disapproval will be based upon the scientific merits of the project and degree of overlap with studies by other investigators.

The Principal Investigators may invite or approve applications from Outside Scientists to perform studies of selected samples in direct support of project activities but not included in studies by Project Scientists. In such instances, a careful record of samples removed will be kept by the CRC Curator. Such investigations will contribute to the project reports to the same extent as the original Project Scientists. All requirements of the Sample Distribution Policy apply to Outside Scientists.

Sample Requests

Researchers who wish to use samples for studies beyond the scope of the WIS project should submit sample requests to the Principal Investigators for consideration in coordination with the CRC Curator. Requestors are required to specify nature of the proposed research, size, quantities and intervals of samples required, any particular sampling technique or equipment required, time required to complete the work, and to submit results for publication, funding status, and availability of analytical equipment and space for the proposed research.

If the requestor has received samples previously he/she will account for the disposition of the samples by citing published works, two copies of which must be sent to the CRC Curator. If no report has been published, the requestor will send a brief report on the status of the research. Unused and residual samples will be returned to the CRC Curator when the project has terminated.

Responsibilities

Investigators who receive samples incur the following obligations:

1) To publish results promptly in the open literature or in project volumes. However, project-related reports may not be submitted for publication prior to approval by the Principal Investigators. Such publication will be permitted only after the scientist has submitted a suitable

manuscript for publication in the WIS Scientific Results volume (e.g., GSA Special Paper?). Project scientists must honor one another's proprietary data and should not include data or ideas of other Project Scientists without permission and/or coauthorship. For the first 12 month period (9/1/92 to 8/30/93) abstracts of talks or other papers citing WIS Project data must be coauthored by all original Project Scientists.

2) To acknowledge in publications that the samples were supplied by the USGS as part of the U.S. Continental Scientific Drilling Program and funded, in part, by the U.S. Department of Energy.

3) To submit two (2) reprints of all published works to the CRC Curator

4) To submit copies of all final analytical data obtained from the samples to the Principal Investigators and the CRC Curator. Project Scientists should submit their data on 31/2" diskettes prepared in either IBM-compatable or Macintosh format, and in either Lotus, Excel, or ASCII tables. The first column of each data set should contain the unique core-depth sample identifier.

5) To return all unused or residual samples in good condition and with a detailed explanation of any processing they may have experienced, upon termination of the proposed research. In particular, an original or duplicate of each thin section or peel made in the repository or by the scientist is to be returned to the CRC Curator.

Repositories

The Archive and Working Halves will be available for examination by interested parties at the USGS Core Research Center. The Working Half may be sampled only with the approval of the Principal Investigators and CRC Curator for a period of 2 years (until 9/1/94). Only the CRC Curator or delegate will remove samples from the archived materials.

Reference Library

A reference library of WIS Project-generated thin sections, peels, sample photographs, and drilling and analytical data will be maintained at the CRC for the eventual use of visiting scientists. It is recognized that Project Scientists may require further use of thin sections and peels in the course of later research. Such samples must be returned to the CRC Curator after a borrowing period of three (3) months.

REFERENCES

Campbell, W. R., 1992, Sample handling and curation protocol for the Creede caldera moat scientific drilling project: U.S. Geological Survey Open-File Report 92-410.

Ocean Drilling Program (ODP), 1985, Shipboard Scientists Handbook: Ocean Drilling Program, Texas A & M University, ODP Tech. Note 3, 170 p.