Ocean Drilling Program

Shipboard Curatorial Cookbook

v. June 2004

INTRODUCTION

BEFORE GETTING STARTED

Before leaving for sea copies of all sample requests are posted to an unlinked Web site. The URL can be obtained from the Web master. At crossover with the off-going Curatorial Specialist, obtain passwords for all accounts needed during the cruise, including

- Curatorial Specialist's network log-in
- Curatorial Specialist's e-mail
- Janus Shiptest
- Janus/Janus Repository Sampling (JRS)
- JAVA Repsam (aka JAVA JRS)

PURPOSE

The Curatorial Cookbook is a guide for the Ocean Drilling Program (ODP) Curatorial Specialist sailing on the research vessel, the *JOIDES Resolution* (JR). This guide is a starting point; procedures should be modified as the need arises. The material included in the Curatorial Cookbook is drawn from a variety of sources including the following:

- Older versions of the Curatorial Cookbook
- Telexes and memos from the hard copy Curatorial Reference File
- *ODP Core Lab Cookbook*
- Shipboard Scientist's Handbook (SSH), *ODP Technical Note*, 3
- Sample Distribution, Data Distribution, and Publications Policy (**www-odp.tamu.edu/publications/policy.html**)
- Old CURLOG entries stored on the Curatorial Specialist's computer hard drive.

REVISING PROCEDURES

The Curatorial Specialist is responsible for updating this cookbook during each leg. Incorporate any additions or changes made during a leg into this document, highlight, and include in the "Action Items" section of the leg's Curatorial Notebook. Maintain an up-to-date copy of the cookbook on the *JOIDES Resolution* and at each of the repositories.

Notify the ODP Curator should of any changes before or immediately after they are first implemented. If a new situation arises that is not covered in the cookbook, the shipboard Curatorial Specialist should solve the problem in a way he or she deems appropriate. However, the solution must be documented in the cookbook so that the next time the situation arises both Curatorial Specialists know what to do.

PRECRUISE

NOTE FOR NEW CURATORIAL SPECIALISTS

Once the Curatorial Specialist's name appears on the official staffing list for a given cruise, the ODP Travel Department will contact that person concerning required visas and vaccinations. The Curatorial Specialist must have a valid passport at all times. Additional information pertaining to travel to and from the ship can be obtained from the ODP Technical Support office. They can also provide the final date for shipping a personal box. The Curatorial Specialist is required to pass yearly physical examinations; a record of this examination is kept on file in the Human Resources department.

The Curatorial Specialist should become familiar with the upcoming cruise by doing the following:

- Attend the precruise meeting in College Station.
- Obtain a copy of the *Scientific Prospectus* for the leg, which is prepared by the Co-Chief Scientists and Staff Scientist and is published on the Web site approximately 3 months before the cruise. It lists the scientific objectives, proposed sites, drilling operations, sampling strategy, and staffing for the leg.
- Read (new Curatorial Specialists) *The ODP Core Lab Cookbook*, an in-house cookbook describing Core Laboratory procedures for new Marine Laboratory Specialists (MLSs).
- Read (new Curatorial Specialists) the *Shipboard Scientist's Handbook* (SSH), *ODP Technical Note,* 3, which summarizes the laboratories and facilities aboard ship and the responsibilities of scientists and MLSs at sea. Copies of the SSH can be requested from the Publications Department (**distribution@odpemail.tamu.edu**). There is also a copy in the Curatorial Office on the ship.
- Read the latest version of the Sample Distribution, Data Distribution, and Publications Policy (**www-odp.tamu.edu/publications/policy.html**).
- Meet with the shore-based Curator and the Staff Scientist ~1 month before the cruise to review sample requests. Assist in identifying potential conflicts or overlaps with the Sample Distribution Policy or between requestors. The shore-based Curator and Staff Scientist contact the Co-Chief Scientists about problematic sample requests and suggest possible ways to resolve conflicts before the cruise. In addition, shipboard scientists are sent a copy of a spreadsheet prepared by the Staff Scientist and shore-based Curator that outlines each of the requests and identifies potential overlaps. Shipboard scientists are also encouraged to contact the shore-based Curator should they need to see any requests before the cruise begins.
- Work with the shore-based Curator and Staff Scientist to flag requests that require special equipment or handling. Notify the Laboratory Officer (LO) of special requests for supplies or procedures and prepare for these circumstances.

In general, precruise preparation and planning should require no more than 5 working days on shore. Be aware of the transit time to arrival at the first site and budget time wisely, keeping in mind how much work can be accomplished during the port call and transit. Be sure to allow contingency days on land for last-minute shore assignments and personal business.

PORT CALL

Port call is a hectic and confusing time as everyone orients and adjusts to the ship. The Curatorial Specialist is also an MLS, so in addition to curatorial duties help may be needed with loading and unloading freight. The LO, Assistant Laboratory Officers (ALOs), and Marine Logistics Coordinator (MLC) direct port call activities and assign specific port call duties.

Many beginning-of-the-cruise curatorial tasks may be undertaken while in port or during transit to the first site. Curatorial Specialist duties may be best scheduled according to the time available, but a good rule of thumb is “the earlier, the better.” If the curatorial “to do” list is too long and the port call too short, the Curatorial Specialist can ask the LO to be excused from routine shipment handling to finish preparations for the first site. The shipboard curatorial office is shown in **Figure 1.**

CROSSOVER

The Curatorial Specialist crosses over with his or her counterpart, the off-going Curatorial Specialist, during the port call. Together, review the Curatorial Report from the previous cruise and address any residual problems/projects that may be encountered on the outgoing cruise. Remember to review any significant changes to the Core Laboratory/Sampling Area, computer changes, and the Curatorial Cookbook. Obtain all passwords for the Curatorial Specialist’s network log-in and e-mail, Janus Shiptest, Janus/JRS, and JAVA Repsam and any new accounts. Most importantly, review handling of the off-going frozen sample, ambient sample, and core shipments with the off-going Curatorial Specialist.

CORE SHIPMENT

The Curatorial Specialist takes part in off-loading cores, making sure the core boxes are handled carefully. After consulting the ALO, either help with direct unloading of the core refrigerators or with loading the containers on the dock. Be sure the containers are loaded safely and properly, with no more than 10 core boxes stacked on each other. Keep in mind that it is not necessary for the core boxes to be kept in sequential order during transit to the core repository.

The following procedures apply to core shipments:

- Place one digital temperature/humidity data logger (Dickson brand, without probe) (**Fig. 2**) inside each refrigerated container.
- Apply peel-off, stick-on temperature indicators to a few core boxes located in the back, middle, and front of the refrigerator container.
- Tape a “Core Box Inventory” to one of the core boxes nearest the door of the container.
- Document any cores dropped or damaged before or during shipping on the outside of the core box itself with ODP preprinted “caution” stickers.

Frozen Shipments

Following are steps for packing frozen shipments, divided into tasks for the off-going and oncoming Curatorial Specialists.

Off-Going Curatorial Specialist Tasks

- Provide the ALO, ALO Storekeeper, and LO with a list of names, addresses, and sample codes for all frozen shipments.
- Meet with the ALO Storekeeper during the final transit to preweigh the frozen shipments. On that day, obtain a 5-day Igloo shipping container from Hold Stores.
  - Working very quickly, wrap one container volume of frozen samples (regular frozen: –20°C or deep frozen: –80°C) in a plastic garbage bag to prevent contact between sample bags and the dry ice that will be added later (the ice can rupture the bags, causing cross-contamination of the samples).
  - Tie a knot in the bag and wrap fiber tape around the knot (most tape, e.g., polyethylene, duct, used at –80°C does not stick well, so knotting the garbage bag is a better way to contain the sample).
  - Write the sample code on the fiber tape clearly and legibly.
  - Weigh the bag containing the samples and put the labeled bag back into the freezer.
- All frozen shipments must be accompanied by a digital temperature/humidity data logger with probe (probes are necessary because the data logger does not function if inserted directly inside the Igloo with the dry ice).
  - To insert the probe, drill a hole into the top of the shipping container to allow the probe to sit above the dry ice (**Fig. 3**). The off-going Curatorial Specialist can do this task.
  - The oncoming Curatorial Specialist should set up and activate the data logger just before the shipment is offloaded.

Oncoming Curatorial Specialist Tasks

The oncoming Curatorial Specialist is responsible for the previous cruise’s frozen shipment. The LO or the MLC provides the Curatorial Specialist with the arrival time of the dry ice.

- When the dry ice arrives:
  - Take the preweighed and bagged samples from the freezer and put them inside the 5-day Igloo shipping container.
  - Leave the container one-third empty to allow space for the dry ice.
  - Place a sheet of bubble wrap on top of the bagged samples (during the final 2 years of ODP, frozen shipments were re-iced during transit).
- Wearing goggles and gloves carefully break the dry ice into large chunks using a heavy hammer. Place large chunks of dry ice on top of the bubble wrap.
- Obtain two peel-off, stick-on temperature indicators (one L1 and one 10L) from the Hold Refrigerator Stores:
  - Stick the two monitors on the underside of the lid of the frozen shipping container above the samples.
  - Activate the temperature indicators by pulling the tabs.
- Insert the probe for the temperature/humidity data logger through the predrilled hole in the lid of the 5-day Igloo.
  - Attach the probe to the temperature/humidity datalogger.
  - Velcro the data logger to the outside of the Igloo.

    - Set the data logger sample rate to cover the entire transit time for the shipment.
    - The computer in the Curator's office contains the Dickson software used to set up and download data from the dataloggers.
- Place a data logger letter to the scientist (inside a zip-top freezer bag) in the cooler instructing the scientist to send the data logger to the Supervisor of Technical Support for downloading the temperature data.
- Place an ODP shipping label and shipping papers on the outside of the container.
    - Tape over the label and papers.
    - Wrap filament tape around the cooler and the lid to keep it from opening.
- Immediately after packing is complete, pass the shipment to the LO and/or the MLC, who will turn it over to the shipping agent.

If there is a particularly large frozen shipment, it may be shipped to ODP/Texas A&M University (TAMU) or elsewhere in a freezer container. In this case, pack samples in standard ODP cardboard sample boxes according to sample code. Make an inventory and keep a copy.

Handling Dry Ice

Dry ice needs special care in handling and storage:

- Do not handle with bare hands; it can cause burns. Use heavy gloves, tongs, or cloth.
- Do not taste or put in mouth.
- Do not place in tightly sealed container. Dry ice makes CO_2 gas as it sublimates and may cause a sealed container to explode.
- Do not inhale. Work with dry ice in areas with adequate ventilation; heavy CO_2 vapor may cause suffocation.
- For short-term storage, wrap in brown paper in a heavy plastic bag, then in a towel.
- For longer-term storage, place wrapped dry ice in a cooler. Do not place in freezer or refrigerator!
- For disposal, unwrap and leave at room temperature in a well-ventilated area. It will sublimate from a solid state to a gas.

Physical and Chemical Properties of Dry Ice

- Dry Ice: Carbon Dioxide; synonym: carbonic anhydride
- Chemical Formula: CO_2
- Chemical Family: Inorganic
- Temperature: –78.5°C (109.3°F)
- DOT Shipping Class: ORM-A UN-1845 Pkg. GROUP 111 Class 9
- Nonflammable Gas: UN2187
- Molecular Weight: 44.0004
- Density Liquid: 63.69 lb/ft^3@ 0°F
- Density Gas: 0.1234 lb/ft^3 @ 32°F
- Triple Point: –69°F, 75.1 PSIA
- Critical Temperature: 87.8°F
- Critical Pressure: 1066.3 PSIA
- Critical Density: 28.9855 lb/ft^3

- Latent Heat of Vaporization: 122 BTU/lb @ 0°F
- Viscosity Gas: 0.015 Centipoises @ 32°F
- Viscosity Liquid: 0.14 Centipoises @ 0°F
- Solubility in H_2O: 1.79 ft^3 CO_2 gas/ft^3 H_2O (32°F)

Refrigerated Shipments

Off-Going Curatorial Specialist Tasks

Some samples require refrigeration immediately after collection and during shipment (e.g., microbiology, some chemistry, some pore waters, and physical properties whole rounds). The following procedure for packing refrigerated shipments is divided into tasks for the off-going and oncoming Curatorial Specialists.

- Provide the ALO, ALO Storekeeper, and LO with a list of names, addresses, and sample codes for all refrigerated shipments.
- Meet with the ALO Storekeeper during the final transit to preweigh the refrigerated shipments. On that day, obtain a 5-day Igloo shipping container from Hold Stores.
  - Non-whole rounds
    - Box the smaller samples in standard ODP personal boxes (13" × 18" × 7").
    - Place the box inside a plastic bag inside of an Igloo cooler (preferably a 5-day cooler).
  - Pore water in glass ampoules
    - Pack in foam protectors and then in a standard ODP personal box.
    - Place the box inside a plastic bag inside of an Igloo cooler (preferably a 5-day cooler), keeping the samples upright in the box.
  - Physical properties whole rounds: On the ship, the waxed (see **"Physical Properties Whole Rounds"** in "In the Laboratory" in "On Site") whole rounds are stored upright in a seawater-filled Igloo container in the core refrigerator. The whole rounds require special packaging for shipping.
    - Remove the whole rounds from the seawater and place in zip-top bags with moist sponges.
    - Stand upright in an Igloo cooler (preferably a 5-day cooler) and surround with plenty of packing material.
- Weigh the cooler with the bagged box.
  - Label the cooler with the sample code.
  - Place the cooler in the core refrigerator until ready for shipment.

Oncoming Curatorial Specialist Tasks

The oncoming Curatorial Specialist is responsible for the previous cruise's refrigerated shipment. The LO or the MLC notifies the Curatorial Specialist when the shipment leaves the ship.

- When ready to offload, place a sheet of bubble wrap on top of the bagged samples and add a generous amount of blue ice on top. Leave space for either a digital or analog temperature data logger. During the final 2 years of ODP, refrigerated shipments were being re-iced during transit.

- A digital or analog temperature data logger must accompany all refrigerated shipments. If using a digital temperature/humidity data logger (see **Fig. 2**), set the sample rate to cover the entire shipment transit time using the Dickson software on the computer in the Curatorial Office. A disposable strip temperature chart recorder (**Fig. 4**) needs no set-up. The disposable recorders usually have a 20-day recording time.
- Place a data logger letter to the scientist (inside of a zip-top freezer bag) in the cooler instructing the scientist to send digital data loggers to the Supervisor of Technical Support to download the temperature data or to read disposable recorders and notify the Supervisor of Technical Support if the shipment was not kept cool. As a precaution, add a peel-off, stick-on temperature indicators to the underside of the cooler lid.
- Place an ODP shipping label and shipping papers on the outside of the container. Tape over the label and papers. Wrap filament tape around the cooler and the lid to keep it from opening.
- Immediately after packing is complete, hand the shipment over to the LO and/or the MLC, who will turn it over to the shipping agent.

UNDERWAY/PRESITE

UNDERWAY GEOPHYSICAL WATCH

The Curatorial Specialist may be assigned up to a 3-hr watch in the Geophysical Laboratory each day the ship is in transit and streaming gear. The LO schedules the watches and provides training. If you are unsure about how things are done do not hesitate to ask the underway geophysics MLS for help. If the scheduled watch conflicts with the shipboard scientists' meeting or some other important event, arrange to swap schedules with another MLS.

PRESITE PREPARATION

Once on the ship, ask the Staff Scientist for hard copies of any last-minute sample requests submitted by oncoming scientists and/or provide the Staff Scientist and Co-Chief Scientists with last-minute requests that they do not have.

Remind those scientists who have yet to submit requests that they must do so before arriving at the first site. Get the schedule for all science meetings concerning sample requests or sampling; the Curatorial Specialist should attend as many of these meetings as possible.

MEETINGS

Sample Allocation Committee

Request a meeting with the Sample Allocation Committee (SAC; composed of the Staff Scientist, Co-Chief Scientists, and Curatorial Specialist) before any scientist-involved sampling meetings take place. This meeting should provide an overall impression of the sampling strategy the Co-Chief Scientists have in mind. At this time discuss either all sample requests one by one or only "problem" requests. Try to resolve as much as possible at this meeting.

First Scientist's Meeting

At the first scientist's meeting introduce yourself and identify where the office is and what the office hours are. Briefly mention the current ODP sampling policy and the concept of permanent archives. Notify the scientists that they will be asked to do sampling shifts, scheduled by the Staff Scientist. General sampling strategy can be discussed at this meeting, or this discussion can be deferred to the smaller sampling classes. Encourage everyone who has not submitted requests to do so before reaching the first site.

Additional Sampling Meetings

The SAC usually holds at least one meeting where all the groups (sedimentology, pore water, isotopes, biostratigraphy, structure, etc.) convene to discuss sample requests and any overlap or possible collaborations. The scientists usually break into groups to further clarify and develop their request. If one group has an inordinate number of conflicts, the Staff Scientist/Co-Chief Scientists encourage the group to negotiate and resolve the conflicts. The Curatorial Specialist can attend these meetings or talk to scientists individually to determine curatorial details such as "How many samples per core?" or "What volume?" or "Until the Miocene?" The answers to some of these have to wait until the groups have a better idea of lithology and sedimentation rates, but try to get as much written down as early as possible. Be sure to cover the frequency of shipboard samples (interstitial water [IW], physical properties [PP], paleomagnetics [PMAG], X-ray diffraction [XRD], and carbonate analysis [CARB]).

Back to the Drawing Board

After the meetings and one-on-one discussions with the scientists, go back to the Janus Curation Sample Request Detail window for each request and enter any changes or additions needed. Print the first Site Sampling Plan.

Compile two duplicate copies of notebooks with sample requests. One is for the Curation Specialist and the other is for the scientific party's use during discussions of sampling strategy at science meetings. Arrange a meeting with the Staff Scientist and Co-Chief Scientists to discuss sample requests, conflicts, and the operational plan for the upcoming sites.

Be sure to address the status of requests submitted by shore-based participants. As soon as possible, the approval status of requests by shore-based investigators should be sent to the Curator on shore, who will contact the investigators.

SAMPLE SHIFTS

The Staff Scientist prepares a sample shift schedule. Scientists usually work in pairs for 2 hr per day. This is especially important if there is a lot of shipboard sampling. Review the schedule for possible conflicts. For example, there should not be two micropaleontologists on the same shift. Likewise, avoid scheduling sedimentologists during the major midnight and noon changeovers.

SAMPLING CLASSES FOR SCIENTISTS

Hold orientation sessions at the beginning of the cruise to train new crews of sampling assistants. As soon as possible, post a sign-up sheet for scientists to take sampling class. Take into account the other classes being held when developing the class schedule. Each session should include 4–8 people and last about 30 min.

CORE LABORATORY ORIENTATION FOR SCIENTISTS/NEW MLS

Core Receiving Platform

Begin each sampling session with a catwalk/Core Laboratory tour (**Fig. 5**) and a discussion of core handling and core flow (**Fig. 6**).

- Starting on the catwalk, discuss core-handling procedures of particular interest to the scientists:
  - Whole-round sampling (chemists and physical property specialists)
  - Core catcher (CC) sampling (paleontologists)
  - Hydrocarbon monitoring procedures (chemists)
- Stress safety on and around the rig floor when during core handling.
- At the core entry area discuss core data entry into the database at the Janus Corelog entry station.

Core Entry/Splitting Room

- Introduce the core entry whiteboard (**Fig. 7**), and explain the core numbering and labeling scheme.
- During hard rock legs discuss orientation and labeling pieces within the core. A separate meeting may be held with the structural geologists for this purpose.
- Brief scientists on the whole-core measurements performed in the Core Lab. They may also visit the splitting room to see how various types of cored material are split (**Fig. 8**).
- Discussion at the description table should cover the proper treatment of archive halves and the handling and storage of smear slides.
- The tour should end at the sampling table (**Fig. 9**), with a discussion of sampling.

Sampling Table

- Introduce scientists to the ODP curatorial sampling application Janus Sample.
- Allow scientists to enter and save data and print labels in “Janus Shiptest.”
- Discuss sampling tools, techniques, volumes, and the whiteboard.
- Review the Sample Distribution Policy.
- Remind the scientists that gold, platinum, or other precious-metal jewelry may not be worn at the sampling tables or anywhere else in the laboratory. This policy reduces the potential for rare earth element contamination (e.g., iridium content at the Cretaceous/Tertiary [K/T] boundary).
- Other topics to cover include thin sections, resampling, labeling d-tubes, and curatorial office hours.
- Ask the scientists to be on time for their shifts and to announce over the public-address (PA) system when core is ready for sampling (e.g., “Core 12 is on the sampling table. Please come and select your samples.”).
- Mention that if a request requires flagged rather than assigned intervals the investigator needs to designate a “buddy” on the opposite shift to look after his or her interests.
- Ask the photographer/imaging specialist to meet with each sample session group to discuss whole-core imaging, core photography, and the procedure for requesting close-up photos.

CORE LABORATORY AND SAMPLING AREA SETUP/SUPPLY

Before arriving at the first site, prepare the sampling area for the flurry of activity about to begin.

- Restock sampling supplies and gather sample tools.
- Label sample bins: Once sample codes have been assigned, label sample bins with the corresponding sample codes.
- Sample code flags/dots on meter sticks:
  - For sediment legs, print ~50 sample flag labels for each code on sheets of file folder labels (e.g., Avery 5266) or ask each scientist to make his own set of flags by hand—don't forget the shore-based requests.
  - Place the coded flags in the flag tray constructed from 10-cm^3 sample tubes and stored in the curatorial supply cabinet in the Core Laboratory.
  - Set them on the sampling table or put them at the base of the whiteboard.
  - For routine sample flags it's helpful to put colored dots with sample codes and volumes right on the meter sticks.

See **Table 1** for a general list of Core Laboratory supplies and their locations. Remember to check out all supplies on the checkout sheets located in each storage area.

Reference Tables

A number of reference tables are useful at the sampling station. Of particular help to the samplers on watch are the following:

- List of length-to-volume conversions
- Display of sampling tools
- Sampling guidelines
- Summary of the Sample Distribution Policy

Post the sampling watch schedule and a list of sample codes/request names for quick reference. A copy of all sample requests should be available for the scientists to review should there be sampling questions while you are not around.

Sample Table Supplies

The Curatorial Specialist is responsible for keeping the sample table area supplied during the leg (**Fig. 10**). Obtain supplies from Upper Tween Stores (UTS), Lower Tween Stores (LTS), Hold Stores (HS), Hold Refrigerator Stores (HRS), and Casing Hold (CASE). Please remember to check out all supplies on the checkout sheets located in each storage area. Just above the core log entry computer station there is a list of supplies for the Core Laboratory and where they are stored. If time, resupply the area for the oncoming Curatorial Specialist at the end of the cruise.

Stock the bins under the sample table with the following:

- 5- and 10-cm^3 sample tubes and scoops
- 5- and 10-cm^3 foam plugs
- Pop-top vials
- Sample bags
- Foam rods
- Other supplies as labeled

Core Rack Area

Stock the core rack area and adjacent bins with the following:

- Kapak bags (for frozen/organic samples)
- Bucket to hold foam sponges (under core rack)
- Black d-tube end caps (in bins)
- Black permanent markers
- Core boxes
- d-tubes
- Ethafoam rod
- Filament tape
- Foam sponges
- Polyethylene tape
- Sample bags
- Shrink wrap
- Utility knives
- Zip-top bags

Curatorial Supply Cabinet

Stock the curatorial supply cabinet located aft of the sample table beneath the rock saw with the following:

- Stationery supplies
- Black ball-point pens
- Permanent felt-tip markers
- Avery colored dot labels (for easy identification of igneous/metamorphic rock, critical boundary cores, critical material, dropped cores, and hard rock sampling parties; see **"Labeling D-Tubes"** in "The Core Storage System" in "On Site").
- Sampling tools (spatulas, hammers, and chisels)
- Hard rock labeling supplies (including red grease pencils, epoxy, mixing sticks, Brady thermal adhesive labels and ribbons, and glass scribes)
- Extra utility knives

Computer Stations

Stock the computer stations at both the core entry and sampling stations with bar code labels and ribbon.

Description Table Supplies

The MLS(s) working in the Core Laboratory (including the Curatorial Specialist) are jointly responsible for maintaining the description table supplies (**Fig. 11**).

Supply the core description area with the following:

- Glass slides
- Toothpicks
- Mounting media (typically Norland optical adhesive [for ultraviolet curing], but sometimes Canada balsam, permount, and piccolyte)

- Coverslips
- Smear slide cases and labels
- Glass sample vials with snap lids
- Miscellaneous glassware
- Visual core description (VCD) forms (the scientists will usually know which ones they need; if not, ask the Staff Scientist)
- Desk supplies, including pens, pencils, Liquid Paper, rulers, etc.
- "Glad Wrap" cut into thirds for the archive multisensor track (AMST).
  Note: Based on geochemical testing, Glad Wrap brand is the only acceptable brand of plastic wrap that can come into contact with the surface of ODP cores.

Photo Table Supplies

Supply the photo area (**Fig. 12**) with materials for storing and photographing core as well as the following items:

- Box of sponges
- Bucket of sponges
- "Caution" stickers
- Colored dot labels (to mark sections left out for color close-ups)
- Core boxes
- d-tubes
- Filament tape
- Polyethylene tape
- Red d-tube end caps
- Red ball point pens
- Red permanent markers
- Sponges
- Core box staples

Catwalk Supplies

The MLS(s), including the Curatorial Specialist, are jointly responsible for maintaining the stock of catwalk supplies. These include the following:

- 4-in stainless steel spatulas
- Acetone in red squirt bottles (with "acetone" label)
- China markers for hard rock and marking liners on wet days
- Chisel and mallet for harder sediment and hard rock
- Clean, absorbent rags
- Clear, blue, and yellow end caps
- Cutters (for core liners) with good blades
- Hammer, hacksaw, plunger at CC bench
- Hearing protection (bin by catwalk entry door)
- Liner puncture tool
- Air drill to drill liner when recover gassy sediments
- Wooden meter sticks (cut to 149 cm)
- Nitrile gloves, various sizes (bin by catwalk entry door)

- Permanent red and black markers
- Safety glasses (bin by catwalk entry door)

Be particularly aware that these supplies must be clean.

Trim meter sticks slightly short (149 cm) to yield 150-cm core sections.

Clean or replace rusty tools—a small amount of rust can ruin core material for paleomagnetism and geochemistry.

The chemistry specialists provide their own supplies for taking headspace and vacutainer samples. IW samples require no special supplies aside from yellow end caps. Work with the shipboard scientists to maintain the supply of equipment for any special catwalk sampling.

Installing a whiteboard on the catwalk can be very helpful for the MLS(s) so they know what type of catwalk samples will be taken and at what frequency. It is also helpful to make note of any special core-handling procedures such as handling gassy cores, hydrates, and so on. On cruises where only routine catwalk samples are taken, this information can be written directly on the whiteboard in the core entry area.

SAMPLING PLANS

Precruise Sampling Plan

The Precruise Sampling Plan (PCSP) is typically a spreadsheet (Excel) assembled on shore by the shore-based Curator and the Staff Scientist. The Curatorial Specialist should receive an electronic version of this document before leaving for sea. A well-assembled PCSP serves as a primary resource when assembling subsequent Site Sampling Plans to post in the laboratory. In the early stages of the cruise, the PCSP is an ever-evolving document that can quickly change based on discussions that take place during the scientists' sampling meetings. Make note of these changes for incorporation into the posted sample plans.

If you do not receive an electronic copy of this plan with your sample request package, ask the Staff Scientist for a copy (or e-mail the shore-based Curator). The PCSP format includes:

- Request number and request part
- Request name
- Request status (new, approved, rejected, revised, deferred, decision deferred, decision pending)
- Sampling frequency
- Whole-round lengths
- Sample volumes
- Comments related to sample handling or placement

Table 2 shows an example of part of a PCSP. Note the option to produce a PCSP via a predefined query from the ODP Web site (**www-ODP.tamu.edu/janusweb/inhouse/requests.shtml**, using "Precruise Sampling Plan" as the preferred output), but this Web report does not contain the detail that the PCSP spreadsheet prepared precruise by the shore-based Curator and Staff Scientist does.

Site Sampling Plans

During soft-sediment cruises, it may be useful to prepare (in addition to the cruise sample plan) a Site Sampling Plan (**Table 3**) that maps the sample intervals or requested lithologies at a given site.

The Site Sampling Plan serves as the basis for the plan posted on the whiteboard near the sampling table. Unlike the more formal PCSP or the Final Cruise Sampling Plan (FCSP; see **"Final Cruise Sampling Plan,"** below), the Site Sampling Plan is for shipboard use only and is not returned to the Curator at the end of the cruise.

Consider variables such as type of drilling, type of request, and purpose of request when plotting the sample intervals. The type of drilling determines the degree of disturbance in the core, constraining the amount of core usable by certain investigators. Advanced piston coring (APC) often disturbs the top 30–40 cm of the core, precluding the use of this interval for paleomagnetic or physical properties sampling. Rotary core barrel (RCB) or extended core barrel (XCB) drilling commonly yields disturbances and drilling artifacts (known as biscuits), often surrounded by churned-up sediment (or slurry). In these cores the ideal sample interval is a location of least disturbance, usually found in the more consolidated material.

Remember when choosing sample intervals that routine IW whole rounds normally eliminate some fraction of the core for sampling (usually the bottom 5–15 cm of sections). Realizing this, there are other considerations before plotting the remaining routine samples:

- Check with the shipboard scientists to determine if any of the investigators want their samples at or near the same interval.
- Some investigators may be seeking high resolution across the core and may require sampling intervals spread evenly throughout. A typical example is in fulfilling three nannofossil requests, each requiring 2 cm^3 per section. Plotting these samples at or near the same interval duplicates the results of the three investigators. Separating the samples at approximately equal distances along the section, say at 40 cm, 90 cm, and 150 cm, might give the desired resolution. Similar interval selection may be appropriate for such routine samples as inorganic carbon or other paleontology samples.

Circulate the plan among the scientific party and Staff Scientist for comment or correction. Before arriving on site, simplify the final plan and post on the whiteboard at the sample table.

The Whiteboard

The posted whiteboard plan (**Table 4; Fig. 13**) is the streamlined sampling guide for the scientific party during their individual 2-hr sampling shifts.

A few points to keep in mind when making the whiteboard plan:

- Emphasize that all written changes on the whiteboard can be made only by the Curatorial Specialist or Staff Scientist.
  - If a requested change is small (e.g., increase sample volume from 5 cm^3 in calcareous material to 10 cm^3 in siliceous material), the request can be verbal.
  - If the change is significant (e.g., unexpected occurrence of porcellanite leads investigator to request all such occurrences), then the investigator must submit a written statement to the Co-Chief Scientists for approval.

- When the need arises, post a second overflow whiteboard. This is useful for samples that need flagging (“special picks”), which require more detailed information for the samplers, or when the sheer number of requests requires its use.
- Ask that flagging requestors have representatives to choose samples for them during all shifts.
- Changes to the whiteboard need to be **very** noticeable because people have a tendency to memorize the whiteboard and may not look closely from day to day.
- Note special handling requests on the whiteboard (e.g., Kapak bags for organic geochemistry, double bagging, and refrigeration of samples).
- When creating a whiteboard plan, divide the board into sections:
  - Routine Samples: Those that the watch crew can take easily (e.g., assigned intervals at a constant volume).
  - Flagged Samples: Ranging from lithology (calcareous vs. siliceous, organic rich, ash layers, contacts, etc.), structure (e.g., microfaults), or age (e.g., Maastrichtian–Campanian) dependent. Long before the core is split the age is known, as determined from paleontology (PAL) analyzed on the CC sample. It is sometimes helpful to note which core to start or stop at for samples that are age dependent.

Chemistry Laboratory Sampling Plan

Before reaching the first site, meet with the Chemistry Lab MLS to discuss the leg sampling plan. Provide copies of each request associated with the Chemistry Laboratory and a list of sample codes to be used in Janus Sample during the leg.

Be sure the chemistry MLS(s) know how to use the Janus Sample application, and help them if they have questions or problems.

Be sure the chemistry MLS(s) are aware of curatorial policies and procedures regarding IW whole rounds, archiving, hydrocarbon, and carbonate sampling. If downhole tools are expected to recover pore water, discuss the appropriate division of that water and assign sample codes. Most often, this discussion is a chance to learn how samples flow through the Chemistry Laboratory. Chemistry MLS(s) and scientists who have sailed before can suggest the most sensible procedures to the Curatorial Specialist and the scientific party. Keep in mind that you are responsible for ensuring that current curatorial policy is followed.

Meet with the chemistry MLS(s) and scientists to discuss the chemistry sampling plan for the leg. Provide them with copies of each request associated with the Chemistry Laboratory and with Chemistry Laboratory Sampling Plan (**Table 5**), which includes all samples that will be taken in the Chemistry Laboratory and recorded by the chemists in Janus Sample in that laboratory. Included in the Chemistry Laboratory plan should be the proposed sample codes that you plan to assign to all requests recorded in Janus Sample for that laboratory. Have the chemistry MLS(s) and the chemists double-check the list of codes to make sure there is nothing missing and that there are no conflicts in code names.

Final Cruise Sample Plan

The FCSP is the grand summary of all that took place with regard to sampling during a cruise. Send a copy of the FCSP in the Curatorial Notebook to the shore-based Curator. It also appears as a chapter in the “Hole Summary” publication that is sent to all participating scientists. The Curator, Staff Scientist, Co-Chief Scientists, shipboard party, and repository staff refer to the

FCSP in the Hole Summary for at least a year after the cruise. Since this is not simply an in-house document, it is important that it be as accurate and as professionally prepared as possible.

Update all request information (including Request Detail) in Janus Curation. Most of the data will have been entered on shore by the Curator's administrative assistant, but it is useful to check the entered data against the actual electronic (or hard copy) sample request. Refer to the *Guide to Janus Curation, Corelog and Sample for Curators* for details of data entry. Check accuracy in the following areas:

- **Request Number and Part:** Assigned by the Curator, the request number uniquely identifies each approved sample request. Should any new requests be submitted during the cruise, telex to shore the name, purpose, and sampling requirements of the request. The Curator will provide a request number.
- **Sample Code:** Assigned by the Curatorial Specialist, the code (up to six letters) is usually the first three letters of the investigator's last name. Include in the FCSP both the investigator's samples and all samples taken for routine shipboard analysis that were also checked out.
- **Type of Request:** All requests received and processed during the leg are considered "Shipboard" even if the request is from a shore-based participant.
- **Final Status:**
  - Approved: XXX# (number of samples actually taken during the cruise)
  - No samples recovered (NSR)
  - Modified with caveats
  - Partially deferred
  - Deferred: Deferred
  - Deferred to Postcruise Sampling Party
  - Rejected (followed by a brief explanation)**
  - Withdrawn
  - Decision pending

  **Include rejected requests in the Action Items section of the Curatorial Notebook, along with a brief explanation of why the request was rejected so the ODP Curator can pass this information on to the principal scientist.

- **Request Name:** Include the names of all of the investigators requesting the samples. Unless otherwise indicated, the principal investigator is listed first and all correspondence and materials are sent to the principal investigator. The only exception is when someone other than the principal investigator is a member of the shipboard party. The Request Name should read as it appeared on the original Sample Request.
- **Shipping Address:** Used not only by curatorial personnel, but also by the ship's storekeeper and by publications and database groups. Included in the address are the full first and last names of the sample recipient, business address (with street if appropriate), phone number, e-mail address, and fax number. Updated address information is available from the Yeoperson near the end of the cruise.
- **Purpose of Request:** This two- or three-line sentence describing the study is abstracted from the original sample request.
- **Site(s):** Investigators often list the sites from which they want samples. If the sample request does not provide this information, you may want to ask them. Often investigators want

material from all sites, specifying only age or lithology. By the time the FCSP is finalized at the end of the cruise, all presite names should be replaced with their corresponding actual sites. List the presite/site conversion on the first page of the FCSP.

- **Age/Depth Range/Lithology:** Lithology and geological age of the requested material; may be gleaned from the sample request or by talking with the investigator on board.
- **Frequency:** Frequency of sampling requested. The shipboard party usually modifies this information to coordinate sampling efforts and objectives.
- **Volume:** Sample volume measured in cubic centimeters.
- **Shape/Tool:** What type of sample requested: cubes, quarter rounds, minicores, half rounds, and whole rounds.

Open **www-odp.tamu.edu/janusweb/inhouse/requests.shtml** with a Web browser (ideally Netscape). Go to Preferred Output format and choose Final Cruise Sampling Plan. Click on Submit Request (**Fig. 14**). The FCSP should appear.

Go to File>Save As. Save as *FCSP.htm*, for example. Start Microsoft Word and open *FCSP.htm*. Edit the document as needed. To get table columns to auto fit text, select table and control click on right side of table. Note that sometimes there are cells in the table that are two lines instead of one.

Give three unbound hard copies and one electronic copy to the Yeoperson. An example of an FCSP is shown in **Figure 15.**

ON SITE

CORE RECOVERY

With the first call of “CORE ON DECK!” you assume your primary duties as Curatorial Specialist. During the cruise it is your responsibility to ensure that every core is handled according to ODP policy and procedure. Though the MLS(s) generally receive, measure, section, and cap the cores, your participation in catwalk activities will facilitate the proper handling and labeling of the cores and keep you aware of unusual core conditions such as voids, poor recovery, or expansion.

ODP Core Naming

ODP has a specific naming convention for identifying cores, data, and samples. Each is named with the following:

- Leg number
- Site number
- Hole letter
- Core number
- Core type
- Section number
- Half (working or archive).

An example is Section **203-1243B-6R-5.**

Core Types

The following is a list of all the valid core types and their associated code; those most commonly used are in bold:

- A resistivity at the bit to log while coring (RAB-C)
- B bit sample
- C center bit recovery
- D positive displacement coring motor (PDCM)
- E Hyacinth rotary corer (HRC) recovered under in situ pressure
- G ghost cores, redrilled intervals
- **H** originally referred to as hydraulic piston coring; now called advanced piston coring (APC)
- M miscellaneous
- N originally called Navi-drill core barrel (NCB); now replaced by motor-driven core barrel (MDCB)
- P pressure coring system (PCS) or pressure core barrel (PCB)
- **R** rotary core barrel (RCB)
- S sidewall sample
- V vibra-percussive corer (VPC); no longer a viable coring system anymore
- W wash core sample
- **X** extended core barrel (XCB)
- Y Fugro pressure corer (FPC) recovered under in situ pressure
- Z originally called Diamond Coring System (DCS); now replaced by advanced diamond core barrel (ADCB)

CORE HANDLING—CATWALK

After the liner is removed from the core barrel (**Fig. 16**) it is placed on the catwalk holders working-side-up, where it is temporarily capped at either end to keep sediment from falling out during the initial handling stages. Full core barrels are usually 9.5 m long and yield six 150-cm sections, a shorter seventh section, and a CC section. Recovery of material in length of the cored interval is considered full, or 100% recovery. However, the length of the recovered material may differ from the length of the cored interval. Recovery less than the cored interval may occur for a variety of reasons. Apparent recovery greater than the cored interval may also occur; this is typically a result of gaseous expansion of the sediment.

Cores taken from a hole are numbered serially from the top of the hole downward. When full recovery is obtained, the core sections are numbered 1 through 7, the last section being shorter than 1.5 m.

- Sediments: the CC sample is extruded into a short piece of plastic liner and treated as a separate section below the last core section.
- Hard rock: material recovered in the CC is included at the bottom of the last section.

When sediment recovery is less than 100%, regardless of whether the recovered material is contiguous, the recovered sediment is placed at the top of the cored interval and then 1.5-m sections are numbered serially, starting with Section 1 at the top. Sections are cut starting at the top of the recovered sediment, and the last section may be shorter than the normal 1.5-m length (**Fig. 17**).

Handle core on the catwalk as follows:

- With the MLS(s) measure and mark the ends of each section, labeling each with core, core type, and section number and adding an arrow pointing upward.
- At the section breaks, cut the liner with a circular cutting tool and part the contained sediment with a spatula. If the material is well lithified, use a hacksaw or hammer and chisel to section the core.
- After separating into sections, take whole-round ("catwalk samples") samples (see next section).
- After the whole-round and headspace samples are removed from the catwalk, the rest of the core may be capped and glued with acetone. Place blue end caps at the top of each section, clear end caps at the bottom, and yellow end caps at the end of any section from which a whole-round sample was taken.
- Once labeled, sectioned, and capped, the core is ready to be brought into the Core Laboratory for processing.

Special Core Handling

Soupy Cores

Cores from the top of a hole (in particular the first few cores) tend to be soupy. A special tool called a piglet was developed during Leg 144 to drain some of the water out of soupy cores and enhance biogenic resolution within the cores. The piglet is an O-ring-covered cylinder that fits into the core liner and contains a disposable green scrubby pad.

- When the core barrel first comes up on deck, the core MLS on the drill floor drops the piggy into the top of the barrel.
- The disposable green scrubby pad inside the tool strains the upper layer of soupy sediment as the piggy falls gently to the water/sediment boundary.
- When the barrel is laid out on the rig floor the water flows out the top of the barrel, leaving behind a core of somewhat better consistency than before.
- The piglet is then cut out of the liner with a core cutter.
- The scrubby pad is removed and replaced and the piggy returned to the rig floor so that it can be used again.

Voids

Cores may contain void spaces, typically caused by gas expansion. If voids form because of gas expansion, first allow the chemistry MLS to take a vacutainer sample, then puncture the liner along the cut-line between sections with the air-powered drill to vent the gas. Close the voids as needed. Voids can be closed in two ways:

- (preferred) cut the void liner sections out while the core is still in whole round (empty sections need not be preserved) or

- while the core is still in whole round, punch a hole in the liner at the void and push the pieces of sediment together with a plunger stick, making sure that the core does not start to compact.

Close a void only when it can be accomplished without harming the core. In such a case, simply cut the void liner section out or gently push the pieces back together after the core has been split. Note that if the science party plans to use composite depths on double- or triple-APC holes, record all unclosed voids greater than 5 cm in Janus Corelog in the Core Subsections window (see “Logical Subsections” in the *Guide to Janus Curation, Corelog and Sample for Curators*).

Remember to rerun depths after void information is recorded in Janus Corelog.

If you know that a void is caused by a gas hydrate (icelike solids in which water molecules trap gas molecules in a cagelike structure known as a clathrate) or possibly a washed-out sand layer, do not close it.

Voids are routinely closed in lithified sediments and igneous and metamorphic rocks; therefore, this does not have to be noted in the Janus Core application.

Expansion

If there is evidence that core sediment is expanding on the catwalk, puncture the length of the liner around the cut-line using the air-powered drill, making sure that the drill holes are not in a straight line (**Fig. 18**). In a situation where cores are explosively gassy, this may deteriorate the integrity of the liner, and it may crack or even shatter explosively along these lines. Be sure everyone is wearing safety glasses when handling expanding cores (**Fig. 19**). Allow the core to degas.

- Delay measuring and cutting the core into sections as long as possible. The length of time the core should sit depends on the gas content and the core recovery rate. Allowing as much “resting” time as possible eliminates handling the excess material that expands beyond the cut section lengths.
- Measure and cut the sections only after the core has degassed.
- Once the sections are racked, slit or puncture the end caps of the sections to relieve pressure, or delay putting end caps on until the core is ready to be split.

If these steps are not possible because of catwalk sampling or if the core continues expanding, then sections may be cut shorter than the standard 150-cm length (140 cm should be sufficient).

- Attach premade ~15-cm liner patch extenders with pre-acetoned end caps to the bottom or top of the liner to accommodate the excess sediment, creating a 150-cm or less section length.
- Note that the end cap may be fastened securely to the INSIDE of the liner patch with the aid of a small slit in the side of the end cap. Handling expanding core in this way eliminates oversized sections.
- Keep the patch on loosely without acetone until the sections are ready to be split in case of more expansion.
- When the core is ready to be split, permanently acetone and sonic weld the patch in place.

- Enter a final curated length into Corelog if necessary.

If, after the core is curated on the catwalk, the core MLS brings a piece of cored sediment found in the pipe:

- Determine its location in the pipe.
- Create a new section.
- Make the appropriate changes in Corelog and on the whiteboard.
- Notify the rig floor of the new recovery number.

If the sediment does not expand on the catwalk but does so after the core is brought into the Core Laboratory or after splitting:

- Acetone or weld a liner patch to the split core at either end of the section.
    - Fasten the end cap securely to the INSIDE of the liner patch with the aid of a small slit in the side of the end cap.
    - The cap can be acetoned and sonic welded on. Be sure to change the curated length of that section in the core application.
    - Since d-tubes can only contain 155 cm, further expansion of the core will create additional sections or subsections. In the case of subsections, divide the afflicted section should into two smaller sections of roughly 75–80 cm. Label the subsections as A and B parts of a single section. The curated length in Corelog is the sum of the two lengths.
    - Store the subsections in separate d-tubes. The number of sections created should match in both the archive and working halves.
- If sediment oozes out of the top of a core before it is cut into sections on the catwalk, begin Section 1 at the top of this overflow material.
- Do not place sponges in d-tubes containing sections of swelling clays. This prevents swelling during transport to the repository. Place a “caution” sticker on the end cap of expanding cores marked with the word “expanding.”

Desiccation

Some recovered shales begin to disintegrate as they dry.

- To slow the process during core description, ask the scientists to keep the cores covered with Glad Wrap while they are sitting on the description table and not being used.
- When they are ready to put into d-tubes it’s always helpful if they are shrink-wrapped.
- Ethafoam sponges can be placed in the bottom of the d-tube. This appears to reduce the problems of cracks and other signs of deterioration.
- Keep these cores out of strong, direct light since this will hasten the drying process.

Split Liners

Cores are often recovered with split, shattered, or crushed liners (**Fig. 20**). Depending on the severity of the damage, tape or patch the liner, or transfer material to another liner. In anticipation of this situation, MLS(s) can prepare a supply of split and capped liners for use when whole sections need to be removed and transferred from a damaged liner.

Patch or transfer material after sectioning, and preserve the original orientation of the whole-round core. Use great care when extracting cores from damaged liners because they are very sharp.

If a liner patch is used to repair a damaged liner

- Cut it just short of the liner's end to allow an end cap to fit on.
- Secure the patch with acetone or with the sonic welder. Cores fitted with a liner patch cannot be run through the MST, so you may want to try another method.
- Shattered liner cores are generally not desirable for whole-core measurements, so let the physical properties scientist know you intend to liner patch the core. They may not want to run the core.

After the damaged liner is repaired, label and engrave in the usual manner. Remember to put "caution" stickers on damaged cores with an explanation of what happened. Make note of these cores in Corelog via Core Comments or Section Comments (see the *Guide to Janus Curation, Corelog and Sample for Curators*).

Critical Intervals

Critical intervals are handled and sampled following special guidelines. The critical intervals category includes important stratigraphic boundaries, structural phenomena, key macrofossils, rare volcanic glass, and so on. Specific examples follow:

- Cretaceous/Tertiary boundary (K/T boundary)
- Paleocene/Maastrichtian boundary
- Eocene Impact (NP21)
- volcanic glass
- Cenomanian/Turonian Boundary Event (CTBE)
- Mediterranean Messinian/Tortonian boundary
- Oligocene/Miocene boundary
- Eocene/Oligocene boundary
- Late Paleocene Thermal Maximum (LPTM also called the PETM)
- Sediment/basement interface
- Salt cores
- Macrofossils
- Sulfides
- Sapropels
- Evaporites (anhydrites, halite, gypsum)
- Soil horizons

The Co-Chief Scientists may define additional critical materials as needed. If an interval is deemed "critical," it is prudent to exclude all personal sampling 3 m above and below the boundaries. Selected shipboard sampling as approved by the Co-Chief Scientists should be done to define the nature and limits of the interval. Sampling of the critical interval can either take place later in the cruise or may be deferred to shore to allow sufficient time for investigators to assess their sampling needs and to work out cooperative studies to maximize the science gained from this unusual material. For additional information about critical intervals, see the ODP Sample Distribution Policy at **www-odp.tamu.edu/publications/policy.html.**

Cores Containing Hydrogen Sulfide

Low levels of hydrogen sulfide (H_2S) gas may be encountered in cores in which microbial sulfate reduction is occurring or in cores from hydrothermal vent areas in which seawater sulfate has reacted with high-temperature intrusions. H_2S is a highly reactive and toxic gas that is normally maintained at negligible concentrations by rapid reaction with iron or other metals present in the sediment.

In some cases, such as iron-deficient carbonate sediments and sediments where gas hydrates or sulfate-rich brines are present, H_2S concentrations may high enough to cause a toxic gas breathing hazard, especially when cores are being handled in confined or poorly ventilated areas.

If H_2S odor is present, alert the LO or ALO. He/she will ask you to monitor the cores with handheld “PackRat” H_2S gas detectors (**Fig. 21**). The drill crew on the rig floor should also measure the gas with PackRats.

The *JOIDES Resolution* is equipped with permanently mounted H_2S sensors on the rig floor, the core-receiving platform, and in the interior core-handling areas. H_2S levels of 10–20 ppm activate audible and visual alarms on these large monitors and initiate an H_2S alert. H_2S odor is apparent at levels below those detectable by sensors or analytical instruments. If H_2S gas is suspected, the hydrocarbon monitoring techniques should include analysis by thermal conductivity detector gas chromatography (natural gas analyzer [NGA]) to provide information on concentration levels and trends of H_2S occurrence in cores.

Core Laboratory Operating Procedure for H_2S Alert

Official procedures for responding to an H_2S alert are fully described in the H_2S *Drilling Contingency Plan,* ODP *Technical Note,* 19. Following is a brief summary from a curatorial standpoint:

- After receiving a core on the catwalk, cut the first section while monitoring with the handheld PackRat detector (**Fig. 21**).
    - If the H_2S level is over 10 ppm, all core-handling personnel (microbiologists and geochemists included) must put on self-contained breathing apparatus (SCBA; **Fig. 22, Fig. 23**).
    - Nonessential personnel must clear the catwalk.
    - If time permits, degas the core on the core holder on the catwalk for ~20–30 min before capping and scribing.
    - When the core is ready to be sectioned, turn on the large hanging catwalk fan to disperse the gas as cuts are made.
    - The outside core rack should be set up on the aft end of the catwalk so the cores are downwind of the living quarters as they degas.
    - All scribing should be done outside.
    - Core should remain outside until splitting takes place.
- When a core is ready to be split, the MLS should don an SCBA in the splitting room (**Fig. 24**), cut the section, and immediately place it under a split piece of rubber ducting (1.5 m long) that feeds into the H_2S suction system. Letting the core sit under the ducting for ~10

min should yield acceptable H_2S readings. The core can then be safely given to the scientists in the laboratory.

- The fact that cores with H_2S are stored in an unventilated and confined space in the refrigerator can make for a potentially dangerous situation. Be sure that the H_2S monitors are working properly whenever operating under an H_2S alert. If you have any concerns, bring them to the attention of the LO as soon as possible.

Slowing Oxidation in Sulfide-Rich Cores

- Rinse each section (working and archive) with alcohol. This is to dry the core of all water.
- Allow a few hours for the IW to evaporate.
- Place the section in nitrogen-flushed shrink tubing.
- Place the wrapped section in a silver tri-laminate Kapak foil tubes. These bags have a polyethylene inner layer and a polyester outer layer.
- Place desiccant in the Kapak tube with the section.
  Note: the need for prepackaged desiccant should be identified precruise by the Staff Scientist or shore-based Curator and ordered.
- Purge Kapak foil tube with nitrogen gas to expel all oxygen.
- Evacuate the tube and heat seal with a high-temperature handheld heat sealer.
- Place in cold storage immediately.
- The bag should be 5–10 cm longer than the section so that it may be sealed at the outer edge, reopened, and resealed again several times without bag replacement.

Radium-Bearing Rocks

The Staff Scientist, Curatorial Specialist, and LO should be aware precruise that there is a possibility of recovering radioactive samples, especially if drilling in hydrothermal vent areas is planned. Proper handling procedures should be discussed and necessary precautions should be in place before actually recovering this type of material. Concerns about preparedness that remain after reading the *Scientific Prospectus*, should be taken to the Staff Scientist, Curator, and/or LO. The following is from an interoffice memo dated 16 July 1991 from Tim Francis, who was Deputy Director of ODP at the time:

The United States Geological Survey (USGS) has conducted a safety study, examining the radioactivity of barite samples from seafloor hydrothermal vents. They have proposed the following procedure for handling possible radioactive materials:

- Identify the samples that contain the radioactive material. To do this you will have to acquire an appropriate survey instrument.
- All samples identified as being radioactive should be sealed in plastic bags and marked with “Caution! Radioactive Materials” label. During this operation personnel should wear plastic or rubber gloves.
- These samples should be kept separate from other samples to avoid contaminating nonradioactive samples.
- The entrance to the laboratory should be posted as follows: “Caution! Radioactive Materials—No Eating, Smoking, or Drinking Allowed—Wash Hands Before Leaving.”

- Before any work is done with these samples they should first be opened in a well-ventilated area such as a hood to allow built up radon to escape. Samples should only be manipulated remotely (i.e., gloves and tongs).
- Any operation that requires cutting or grinding of these samples should be reviewed on a case-by-case basis. All cutting operations should be conducted in water to ensure that no dust is generated from the material. Wash down the sampling area carefully after handling the cores. Onshore, any wastewater generated from these activities must be disposed of in accordance with the Nuclear Regulatory Commission (NRC) requirements for radioactive waste.

Sonic Core Monitor/Hard Rock Orientation

The sonic core monitor (SCuM) is used in conjunction with the Tensor tool to orient hard rock cores. Three sharp edges built in to the CC scribe makes lines along the pieces long enough to be oriented in the core. These three planes of orientation are similar to the orientation used on ODP liners. For curation purposes the middle orientation line corresponds to the single line along the archive half of the liner. Please be sure to let the structural geologists on duty know that the major scribe line must be in the archive half of the core and oriented perpendicular to the cut face. Cores should be photographed as whole rounds for archival/demonstration purposes before they are split.

Catwalk Sampling

In addition to the usual hard-rock/soft-rock sample requests, biologists and chemists collect real-time samples on the catwalk. Because most of these analyses are sensitive to the geochemical nature of the material, it is important to keep the catwalk area acetone-free until the shipboard scientists have finished taking their samples. All samples taken on the catwalk should be recorded in Janus.

Paleontology Whole Rounds

A small amount of CC material is removed immediately and taken to the Paleontology Laboratory for age determination. Generally, a 5-cm whole round is sufficient, but in unfossiliferous material a greater volume may be required. This sample typically comes from the bottom of the CC, but scientists may request the more suitable material from the top or middle of the CC. Usually the paleontologists consume all of the material given to them, but any residues may be checked out by the scientific party or returned to the repository.

After the PAL sample is taken:

- Place the CC in a plastic liner.
- Cap, glue with acetone, and label with black marker. The location of the PAL sample is marked with permanent marker on the outside of the liner.
- In the laboratory, record this sample as sample code PAL in Janus Corelog.
- After splitting the CC, insert an Ethafoam spacer marked “PAL” into the void (**Fig. 25**).

Headspace Gas

The shipboard chemist or chemistry MLS will take at least one 5-cm^3 sample for analysis of hydrocarbon composition and concentration. These samples are immediately analyzed to determine if it is safe to continue drilling.

- Sediment sample for headspace [HS] gas analysis
- If present, free gas samples (vacutainer [VAC])

Headspace samples are taken from the top or bottom of a freshly cut section, depending on the condition and lithology of the core, usually adjacent to the IW whole-round sample (**Fig. 26**). The pencil-size cylinder used for HS removes material from the working side of the core. In the case of lithified sediments, scrapings or chips are taken. These samples are entered by the Curatorial Specialist via Janus Corelog as sample code HS. It is also acceptable if the chemistry MLS prefers to enter the sample in from the Chemistry Laboratory sample station.

When gassy voids are present the chemist may need to take free gas samples using a puncture tool and a vacutainer (**Fig. 27**). Shipboard scientists may take as many vacutainer gas samples as desired for immediate or later analysis. No documentation is required; however, the location of each sample can be entered in Janus Corelog as sample code VAC.

Headspace samples that are taken solely for a scientist to remove from the ship for later analysis should be given a sample code and noted in the sample request.

Interstitial Water Samples

Interstitial waters for geochemical analysis samples are generated from the whole-round samples removed on the catwalk (**Fig. 28**). In less consolidated sediments at the top of a borehole, IW samples are generally 5 cm long (176 cm^3). The size of the sample may be increased as the sediment becomes more lithified with depth.

The Curatorial Specialist and the chemistry MLS(s) work together to develop an IW sampling plan that best meets the needs of the shipboard party. Depending on the preference of the Curatorial Specialist and chemistry MLS(s), the IW sample may be recorded at the core entry computer via Janus Corelog or in the Chemistry Laboratory by the chemistry MLS via Janus Sample.

When core recovery is less than about two sections, whole-round sampling is often suspended. However, there is no official policy limiting the amount of whole-round sampling when recovery is low. The unofficial policy is that the Co-Chief Scientists, Staff Scientist, and Curatorial Specialist define appropriate limits on whole-round sampling to safeguard the scientific interests of the cruise. MLS(s) should always obtain approval from the Curatorial Specialist (or his/her representative) before cutting IW samples.

After the whole-round samples are removed from the catwalk, cap the remainder of the core and glue with acetone.

- Blue end caps at the top of each section
- Clear end caps at the bottom of each section
- Yellow end caps at the end of any section from which a whole-round sample was taken

Once labeled, sectioned, and capped, the core is ready for transfer into the Core Laboratory for processing.

Meanwhile, in the Chemistry Laboratory, the chemistry MLS(s) squeeze the IW whole rounds to collect IW (**Fig. 29**). Before squeezing, they trim the contaminated outer layer of sediment from the whole round. Water derived from the whole round is used for shipboard analyses and sample requests. Whereas there is no official limit on the amount of water that can be given to an investigator, most studies can manage with 10 mL or less.

- Water not apportioned for shipboard analyses or sample requests is archived in sealed glass ampoules (IWG) or plastic tubing (IWP).
- Water remaining after the shipboard alkalinity analysis is also archived (IWPA).
- The squeeze cake (IWS) retrieved from the press when the squeezing is done is also preserved and often divided among the chemists as part of their sample request.

The chemistry MLS(s) sort and label the IW subsamples and enter the appropriate data into Janus at the sampling station located in the Chemistry Laboratory.

CORE HANDLING—LABORATORY

Inside the Core Laboratory, the MLS(s) scribe the working (double line) and archive (single line) side of the liners with the standard ODP identifier, “Leg-Site-Hole-Core-Core Type-Section,” an A or W to indicate archive or working half, and an “up” arrow (e.g., 180-1108A-1H-1, W). This ensures that each section is permanently and uniquely distinguished. The engraving should be as clear as possible (**Fig. 30**). Mark the blue end caps of each section with the core, core type, and section number (**Fig. 31**).

The Curatorial Specialist or MLS(s) then enter the pertinent data into Janus Corelog. Refer to the *Guide to Janus Curation, Corelog and Sample for Curators* for detailed instructions. Janus Corelog generates the bar-coded labels for each section.

- Use Netscape or Internet Explorer to print four hard copies of the Core Tracking Report (**Fig. 32**):
  - Yeoperson’s box, left of the Janus Corelog entry station computer
  - Sampling station
  - Photo table
  - Core description table, as a useful reference while sampling and boxing cores
- Print three sets of labels (archive and working):
  - Core liner
  - d-tube
  - d-tube cap
- Print a fourth set of archive labels for use with the digital imaging system (DIS).

The number of copies of reports and labels needed for the laboratory is not mandatory and depends on the needs of the technical staff, the scientists, and the Curatorial Specialist. Flexibility is the key.

Once properly marked and recorded, the sections are left in the rack to equilibrate to room temperature before they are measured on the MST (**Fig. 33**) and for thermal conductivity (**Fig. 34**).

Physical Properties Whole Rounds

If physical properties whole-round samples are requested, the scientist chooses them after the core is run through the MST. Physical properties whole rounds are generally 10–15 cm in length.

- The Curatorial Specialist or physical properties MLS cuts the whole round on the catwalk and then seals the samples in wax as soon as possible.
- To produce a wax with the right consistency for sealing physical properties whole rounds, mix five parts beeswax with one part paraffin in a large crock pot and then add a small amount of Vaseline to the mixture until it reaches a tarlike consistency.
- When dipping the sample in the wax, ensure that the wax does not obliterate the sample identification (secure the label with polyethylene tape before immersing it in wax). Watch your fingers!
- Record the sample via Janus Corelog and print labels and new tracking sheets. After the sample is waxed, take it to the core refrigerator and store it upright in a saltwater-filled Igloo cooler.

Splitting Core

After whole-round measurements have been made, the sections are transferred to the splitting room. They are split longitudinally from the bottom of the section to the top on the core splitter with either the wire (for soft sediments) or the supersaw (for lithified material) along an axis halfway between the double line and the opposing single line scribed on the liner (**Fig. 8**).

You may need to drag the wire through a second time for extra soft or sticky cores—or use the cheese cutter that is stored in the drawer beneath the splitting table.

Soft and lithified sediment core splitting is done from stratigraphic bottom to stratigraphic top to prevent downward contamination. Biostratigraphic ages are based on the youngest fossils present in a sample. If the core is split from top to bottom, younger fossils could move downward to contaminate older age material.

Note that the lithified cores split with the supersaw have melted plastic that accumulates on the edges of the section. Cut the sharp plastic off for safe handling and for good quality photographs and digital images.

Gently rinse supersawed sections to remove the cutting slurry before leaving the splitting room.

Archive Half

Description

The archive half is placed on the description table in the Core Laboratory.

- The sedimentologists describe the core in detail, making smear slides to examine under the microscope.
- The sedimentologists also run the sections through the DIS (**Fig. 35**) and AMST (**Fig. 36**).
- The paleomagnetists pick up archive halves one at a time to run through the cryogenic magnetometer (Cryomag).

Imaging

After the cores have been described and run through the Cryomag, the archive half is placed on the photo table (**Fig. 37**).

- The MLS(s) photograph the whole core with color film and black-and-white film, with the help of the Curatorial Specialist if the laboratory is very busy.

- Consult the Core Tracking Report before taking core photos to double-check section lengths and cored interval.
- Place whole-round spacers of the proper length with identifying codes (e.g., PAL, IW, PPWR, and VOID) in all of the core photos.

After whole-core photography, the archive halves are placed in d-tubes and put in the archive core rack.

- The MLS(s) will check the close-up photo request sheet to see if a close-up has been requested for that core.
- Sections with close-up requests will be marked with a yellow dot on the end cap.
- The section stays in the laboratory until the photographer completes all close-ups.

Boxing

When the scientists are finished with all descriptions (including structural descriptions, which often lag behind lithology descriptions) and with viewing the images from the DIS, the Curatorial Specialist gives the approval to box the cores (see **"Core Storage System"** in "On Site").

Finally, it's always a good idea to check with the Staff Scientist before boxing

Working Half

The working-half sections are taken one by one to the auxiliary sample table

- Physical properties measurements are made (**Fig. 38**).
- Physical properties scientists take samples (**Fig. 39, Fig. 40**).

Once physical properties measurements are completed the sections are transferred to the sampling table where a rotating team of scientists takes samples for the shipboard party.

Once the core is sampled, the scientists will put the cores in d-tubes in the working-half rack. It's a good idea to stay ahead of the scientists by preparing a few cores worth of d-tubes in advance. The Curatorial Specialist supervises sampling activities during his/her shift, but during off-hours it's very helpful to have one or two experienced MLS(s) (preferably the ALO) check on things at the sample table.

SEDIMENT CORE HANDLING AND SAMPLING

Sample Volume and Sampling Tools

Typical sample volumes are shown in **Table 6.** A few new types have been added to the sample volumes as outlined in the Sample Distribution Policy. **Table 7** shows the tools and procedures that help the Curatorial Specialist sample efficiently.

Laboratory Codes and Sample Codes

When a split core is placed on the sample table it is just about ready for sampling. Before sampling can occur, all approved sample requests must have Janus sample codes assigned or must have a corresponding shipboard analysis laboratory code in the database. The sample code is linked to the Janus request number/request name. Sample code naming is often derived from the first three letters of the primary investigator's last name. Each sample request should have at least one sample code associated with it. When an investigator has more than one sample request for the cruise or a variety of sample types for one request, separate codes should be assigned. Often a sample request is submitted jointly by more than one investigator; choose only one sample code to be associated with that request. Finally, assign a sample code for samples taken for all approved shore-based requests.

Laboratory codes are permanent fixtures in the Janus Sample tables. If you need a new laboratory code created, the shipboard developer can do so. Document the laboratory code addition in your Curatorial Report. **Table 8** provides a list of standard laboratory codes for shipboard analyses or routine archiving.

Sampling Guidelines

Once the whiteboard plan is posted, the sample codes are entered into Janus Curation, and the core is split, it's time to take samples. Use the following list as a general guide for sampling sedimentary cores. Improvise as needed to get the best quality samples for scientific study.

Note: During the initial training period (i.e., the first few days of coring) the Curatorial Specialist (or his/her representative) should be present as much as possible to guide the sampling process.

Physical Properties

After splitting, the core is placed on the auxiliary sampling table. The physical properties scientist measures shear strength (shear vane) and sonic velocity on each section, then one or two 10-cm^3 samples per section are removed from the core for index properties measurements (**Fig. 38, Fig. 39, Fig. 40**).

Paleomagnetism

Next, the paleomagnetist takes samples. Shipboard paleomagnetists normally deal with two categories of discrete samples: shipboard samples and personal samples. At this stage, most if not all the PMAG samples taken are for shipboard analysis.

After preliminary measurements are done on the discrete samples and half-core archive, the paleomagnetist may request higher-resolution sampling at interesting paleomagnetic transitions. Orienting and removing the samples properly requires care and time.

Shipboard paleomagnetists (rather than the paleomagnetic MLS) are responsible for taking all paleomagnetic samples or for training other shipboard scientists in the proper techniques. In softer sediment, 2" × 2" × 2" paleomagnetism cubes are taken.

When the material becomes more indurated, minicores may be required. When the paleomagnetic sampling is complete, the cores are moved to the main sample table where the remaining samples are taken.

Shipboard Analysis and Personal Studies Using Flags

Scientists working their 2-hr sampling shift should make announcements over the PA as they work, stating something like "Core A is on the sample table. Please flag your samples."

Guided by the whiteboard plan, the requesting scientist or his/her representative takes a sample flag attached to a toothpick (see **"Core Laboratory and Sampling Area Setup/**

Supply" in "Underway/Presite") and places it in the foam backer rod strip adjacent to the steel meter sticks and next to the interval of interest (**Fig. 41**).

Flagging for shipboard analyses (e.g., XRD, CARB, TSB, etc.) also needs to be done. Often the responsibility for flagging these samples falls by the wayside. It is the Curatorial Specialist's job to see to it that these samples are flagged. If you notice that not all of the requested shipboard analysis samples are being taken, ask the Staff Scientist to assign the task to someone. Often a good choice is one of the sedimentologists on watch.

Routine Assigned Intervals Using Colored Dots

Again, guided by the whiteboard plan, the routine assigned intervals need to be sampled. It's a great help to everyone if the Curatorial Specialist puts colored dots with sample codes and volumes at the assigned intervals on the steel meter sticks on the sample tray. This is useful for both high- and low-resolution sampling for assigned intervals.

Cut Samples

With the samples flagged or dotted, the sampling team inserts sample tubes or cuts samples (with a spatula or chisel or rock saw) at the designated intervals. Samples should stay in place or be put back into place from where they were first taken after cutting.

Data Entry into Janus

After all of the samples have been cut, sample codes and intervals are entered into Janus Sample. In most cases this will be a two-person job; one calls out the sampling information (usually going down the length of one section at a time) while the other enters the data at the sample station computer.

Print Labels and Tracking

Check to see that the bar-coded labels print properly. If there are mistakes in data entry, ask the scientists to re-enter the correct information and reprint a label. Without crossing anything out on the bad label have the scientists write "delete" on the label and post it on the monitor at the sample station for you to correct when you have time.

Apply Labels to Bags

Peel and stick all labels to sample bags, keeping things in order by section.

Remove Samples from Core/First Crosscheck

This is a two-person job. By checking each sample removed against the corresponding labeled bag the sampler may be certain that he or she is taking the exact interval recorded in Janus. This check is the single most important step in sampling because at this point the exact identity of the sample is known with complete certainty. After confirming that the sample location matches the sample ID on the bag, the bagger hands the sample to his/her partner to seal and drop into the properly marked sample bin.

Note: It is important to double-bag any samples to be frozen because the labels do not always stick to the plastic bags when stored in freezing conditions.

Second Crosscheck

A second check should be performed after all of the samples have been taken. If there are any flags still standing, a sample may have been mistakenly omitted from the database. If there are labeled bags left over, a sample was not taken (an investigator may decide he doesn't want some material already entered into Janus and forget to tell the samplers on watch that he withdrew his flag).

Plugging Holes

After all sampling is completed, fill the holes and voids left behind with Ethafoam sample plugs, available in 5-cm^3 (1/2-in) and 10-cm^3 (1-in) diameters. Cut quarters or slices of ODP standard 2.5-in diameter Ethafoam rod to fill odd-shaped holes. Where more than half the working half has been taken (in the dedicated interval or with prior approval from the ODP Curator) mark the spacer "depleted" with permanent marker directly on the Ethafoam spacer or with a label written on tape applied to the top of the Ethafoam spacer.

Interstitial Water Subsamples

Some recovered materials (usually pore water) are assigned codes based on their origin. These are not always samples per se; sometimes they include material that is archived outside of the core. Nevertheless, they are entered in the Janus Sample database and thus require a sample code. Following are some standard IW subsamples from sediment whole rounds:

IWG(#)	=	interstitial water stored in glass
IWGA	=	acidified interstitial water stored in glass
IWP(#)	=	interstitial water stored in plastic
IWPA	=	acidified interstitial water stored in plastic
IWS	=	sediment squeeze cakes

# Denotes container/squeeze number if excess is squeezed and/or indicates which investigator received the sample

Scientists request personal samples from the routine IW samples as well as material recovered by special tools. Assign these personal samples a hybrid code that consists of the first two letters "IW" plus the third letter indicating the type of sample (S = squeeze cake, P = water stored in plastic, etc.), and the fourth letter indicating the request name in some way. For example, Miriam Kastner might take 10-mL splits of the IW water stored in a glass ampoule. The sample code would then be IWGK.

Logging Tool Runs

For detailed descriptions of special tools, refer to ODP *Technical Note*, 31, "Overview of Ocean Drilling Program Engineering Tools and Hardware." Listed below are the naming conventions for water derived from logging tool runs.

Kuster tool

KG##	=	Kuster water stored in glass
KGA#	=	acidified Kuster water stored in glass
KP##	=	Kuster water stored in plastic
KPA#	=	acidified Kuster water stored in plastic

Packer subsamples

PG##	=	packer water stored in glass
PGA#	=	acidified packer water stored in glass
PP##	=	packer water stored in plastic
PPA#	=	acidified packer water stored in plastic

RFT tool

RG##	=	RFT water stored in glass
RGA#	=	acidified RFT water stored in glass
RP##	=	RFT water stored in plastic
RPA#	=	acidified RFT water stored in plastic

WSTP Tool

W#G	=	Water stored in glass
W#GA	=	Acidified Water stored in glass
W#P	=	Water stored in Plastic
W#PA	=	Acidified Water stored in Plastic
WT	=	Water stored titanium tubing
WC	=	Water stored in copper tubing
WO	=	Water stored as overflow split
WS	=	Water stored in stainless steel tubing

On WSTP Tool runs the # in the code should indicate run number.

Fissler Tool Runs

FSG#	=	Water stored in glass
FSGA	=	Acidified Water stored in glass
FSP#	=	Water stored in Plastic
FSPA	=	Acidified Water stored in Plastic
FST#	=	Water stored titanium tubing
FSC#	=	Water stored in copper tubing
FSO#	=	Water stored as overflow split

When tools are run only once in the hole the samples can be uniquely identified by their corresponding core number, so a run number is not necessary. If multiple runs of the tool occur in the same cored interval (revisiting Hole 504B, for example), then a run number must be designated in the record to prevent samples from receiving the same ID. Note the run number in the comment field in Janus Sample. By using the above codes there are still plenty of characters available for both investigator and multiple splits. In the few cases where there is only one character field left, enter both the split and the run number in the comment field.

A depth interval must also be assigned. The WSTP penetrates from 0 to 50 cm into the first section of the next core. The Fissler Tool penetrates from 0 to 100 cm. A comment in Janus Core should also be made to indicate which sections were disturbed by the tool’s probe.

Los Alamos Water Sampler

The Los Alamos Water Sampler is an unusual logging tool that samples water from different locations in the borehole. Because there are no core numbers to coincide with the actual sample depth, the following convention has been devised to enter the sample data into Janus Sample so it will make sense.

Core: Run #
Type: M for miscellaneous
Section: 01
Interval: MBSF/10 or /100
Volume: in milliliters
Sample Codes:

B for “borehole sample,” plus
T for “titanium tool” or
S for “stainless tool,” plus

HS	Headspace gas sample stored in stainless steel
DG	Dissolved gas samples stored in copper tubing
PS	Slush, water with solids, stored in plastic
FS	Solids from slush on filter paper
SS	Suspended solid samples
GT	Tritium, stored in glass
PA	Acidified, in plastic for archival purposes
G	Stored in glass for archival purposes
SA	For sulfur isotopes, CD added, stored in glass
GD	Deuterium studies, stored in glass
GH	Hydrogen, carbon, and oxygen isotope studies, in glass
GB	For anions, Br, I, F, stored in glass
P	Stored in polytube, for archival purposes
GF	Organic fluorescence samples, in dark glass, HCl added
PL	For isotopes, Sr, B, U-series, Br, I, Rb
PB	HNO_3 added
PM	Residual water

Pressure Core Sampler

The pressure core sampler (PCS) recovers gas, liquid, and solid samples (**Fig. 42**). Gas samples are ephemeral and are not easily archived in a condition that will be useful for further studies. As such, gas samples (and clathrates) will probably be consumed by scientists who have an approved sample request. The liquid samples that are recovered by the PCS fall into the same category as the IW sampling program. Any solids recovered in the PCS may be sampled under the ODP sampling policy.

Solid samples that are squeezed as IW samples are treated as ordinary IWs. PCS samples are labeled as follows:

PWG#	=	PCS water stored in glass
PWP#	=	PCS water stored in plastic
PW##	=	PCS water for an investigator

To Archive   5 cm^3 in glass
  5 cm^3 in plastic

Gas Hydrates

Gas hydrates are icelike solids in which water molecules trap gas molecules in a cagelike structure known as a clathrate (**Fig. 43, Fig. 44**). The location of a clathrate sample in a whole core can often be detected with the use of an infrared camera (**Fig. 45**).

Use the following sample codes for gas hydrate samples:

CW	=	whole-round sample taken on catwalk
CW##	=	subsample to investigator

Smear Slides

Smear slides are used for core description and biostratigraphic age dating. Smear slides made for core description are typically archived at the repository where the cores are stored. Smear slide data are recorded in Janus by core describers. They appear in the sample database as laboratory code SS.

Smear slides are currently considered residues, and as such they can be distributed to requesting scientists at the end of a cruise. Send any remaining slides along with an inventory to the repository where the cores are stored. When packing smear slides for shipment to a scientist or a repository, be sure they are stored sideways in plastic slide boxes. The plastic boxes should then be secured with filament tape and bubble wrap.

Residues

Residues are any residual material derived from the processing and/or analysis of a sample. If a sample is returned unprocessed and not analyzed, it is considered a "pristine residue."

All ODP residues are identified with the standard "Leg-Site-Hole-Core-Core Type-Section-Interval" identifier. If a residue's parent sample was taken using the Janus Sample database program, the sample code used to identify the parent sample is usually used to identify its daughter residue(s). Samples are taken from ODP cores in order to support studies identified in investigator-submitted sample requests and/or for standard ODP shipboard analyses. Samples taken on the ship for routine ODP shipboard analysis and the sample codes that have traditionally been assigned to them are listed in the Observer/Sample Code section of the curatorial notebook.

Distribution of Residues

With Co-Chief Scientist approval, residues that are generated on the ship from standard ODP shipboard analyses may be redistributed to investigators on the ship. They may also be transferred from one investigator to another. Volumetric and quantitative sampling restrictions apply to these residues in the same manner as all ODP samples.

- If the residues are to be processed/analyzed as part of the same study described in an investigator's presubmitted and approved shipboard sample request, residues are then included as part of that request.
- If the residues are to be used for a new and different study, the investigator must submit a new sample request.

Procedure for Residue Handling on Board Ship

Compile inventory lists of all end-product residues generated from standard ODP shipboard analyses that are to be shipped back to an ODP repository, and include these in the RESIDUE section of the Curatorial Notebook. Residues that are consumed during shipboard analyses or that are used for additional shipboard analyses should also be noted in the Comments field of Janus Sample and included in these lists.

HARD ROCK CORE HANDLING AND SAMPLING

Core Handling

Catwalk

When a hard rock (igneous or metamorphic) core arrives on deck, the MLS places the liner on the catwalk core holders.

- If hard rock pieces are scattered along the length of the liner, raise the upper end slightly to shunt the pieces to the lower end to provide a more accurate recovery measurement.
- Measure sections starting at the bottom of the recovered material and working backward (i.e., toward the top of the core).
- Label sections in the correct order and measure until reaching the last section (i.e., Section 1). Section 1 may be a very full section or it may only contain small amount.
- Estimate whether additional empty liners will be needed for extra space to "curate" the core.
  - To curate a hard rock core, add dividers between noncontiguous rock pieces.
  - Curation usually expands the length of a core.
- Once all the sections are numbered measure the recovered rock inside the liner to get the total recovery.

Unlike sediment cores, hard rock cores do not always break at 1.5 m. They are sectioned at fractures or other natural breaks as close to 1.5-m intervals as possible. Sometimes pieces longer than 1.5 m are recovered; then it is necessary to break the core with a hammer and chisel at as homogeneous a spot as possible.

Core Entry Area

Hard rock sections are carried into the core entry area where recovery (recovery = liner length in Janus Corelog) is recorded on paper forms and in Janus Corelog and the record is saved. The true curated length will not be correct until the core is fully spaced out (i.e., curated). It's a good idea to label and engrave an extra liner or two in case material needs to be transferred to the next section above.

Note that when working with hard rock it is always helpful to have a plentiful supply of precleaned and presplit core liners on hand.

Splitting Room

The core is brought to the splitting room where the liner of the first uncurated section of core is split on the core splitter with the wire removed.

- Starting from the top of the section and using a red wax china marker **mark the bottom** of every piece that is long enough not to have rolled in the liner.
- The physical properties MLS may then select intervals to be sampled for sonic velocity and gamma ray attenuation (GRA) measurements.
    - Take the sonic velocity sample, also used for wet bulk density and water content measurements, before the cores begin to dry out.
    - Store this sample in seawater for 1 hr to stabilize the temperature.
    - Mark pieces of whole core chosen for physical properties sampling on opposite sides with orientation arrows that point to the top of the section.
    - Replace removed pieces with Ethafoam placeholders of the same length.
    - Assign temporary labels to both the removed pieces and the placeholders denoting their position in the section.
- With the help of the igneous petrologist or structural geologist (or both), align from piece to piece and fit together broken or beveled rock pieces that have recognizable features (e.g., foliation directions, connecting veins) (**Fig. 46**).
- Have the inspecting scientist(s) mark a splitting line on the rock pieces (**Fig. 47**).
- Draw hatch marks on subpieces that fit together to help maintain connections between subpieces when cutting on the rock saw (**Fig. 48**).
- Use ODP dividers to separate hard rock pieces that do not fit together in the core liner, and then acetone (or sonic weld) the dividers in the split and label liners to match the spacing in the original liner.

Once the pieces in each section are spaced out and the dividers attached, measure the curated length and enter in Janus Corelog.

Rebuild depths and print and distribute the Core Tracking Sheets and d-tube labels.

Cutting

Hard rock core pieces are split on the Felker saw in the splitting room along the splitting line marked by the petrologists (**Fig. 49, Fig. 50**). Sometimes the Supersaw is used to cut long, solid pieces that do not fit on the Felker saw. Similarly, a series of long pieces may be more conveniently cut on the Supersaw.

- Before making any cuts, check again to be sure that the bottoms of all orientable pieces are marked with red wax pencil.
- Ideally, pieces are split symmetrically with regard to any contacts, veins, or other special features to preserve part of the feature in each core half; however, this may not always be possible because cores should also be aligned based on structural trends.
- Pieces that fit together or that have contiguous features are split along a single line drawn on all the pieces when they are fitted together.

- Shattered rock that can be pieced together by hand may be held together with masking tape or shrink tubing and cut as one unit.

Once split, hard rock core pieces are returned to their respective liners and set flat side down, and are air dried, dried with a heat gun (the heating element in the "off" position), or dried with compressed air. Applying direct heat to the core can affect alteration products and demagnetize the rocks, so always get approval from the science party before turning on a heat gun even with the heating element in the off position.

Labeling

Label all hard rock pieces with the ODP standard identifier "Leg-Site-Hole-Core-Core type-Section-Piece (and Subpiece number)," an "up" arrow if the piece is oriented, and a W or an A to indicate whether the piece is from the working or archive half (**Fig. 51**).

- Make labels using the handheld Brady labeling machine (**Fig. 52**).
- Affix labels with epoxy resin parallel to the cut face midway between the bottom and the cut edge of the left side of the core so that they read parallel to the lines of writing and with the orientation arrow pointing toward the top of the core (**Fig. 53**).
- Cover label with more epoxy so it is completely sealed. Apply the epoxy carefully because too much epoxy may cause drips and contaminate the surface of the core.
- Once the epoxy has set, rotate the pieces in the liner so that the split side faces up. All oriented pieces should have arrows pointing "up" core.
- If there is any question of whether a piece is long enough to be oriented, do not put an arrow on the label. As a general guideline, any unattached piece that is smaller than 6 cm is probably not orientable.
- Number each piece consecutively from the top of the section down. Every section should begin with piece number 1 even if a piece is continuous between sections.
- Subpieces (i.e., the pieces that fit together between liner dividers to collectively form a piece) should be consecutively alphabetized from the top of the piece to the bottom of the piece. When the CUT FACE of the WORKING HALF is facing up, the subpiece to the right relative to the stratigraphic top of the section is Subpiece A.
- When it is not possible or desirable to glue labels to the actual pieces, affix the label to the right side of the core liner. Pieces in this category include the following:
    - Pieces that are too small to label (**Fig. 54**)
    - Rollers and rubble that for convenience sake are curated as one "piece" between two liner dividers.
    - Pieces that if removed for labeling would disturb the core (e.g., sediment basement contacts that have been shrink-wrapped together, volcaniclastics interbedded with basalts).
    - Pieces that are so porous and contain so much water that an epoxied label will not stick.

Divide sections between pieces whenever possible. Remember that curated section lengths may be shorter than the average 150-cm length; however, the cut-liner should remain 150 cm with "EMPTY" written in the blank space at the bottom.

Hard rock cores are curated so the assigned piece and subpiece numbers are the same in both the archive and working halves. Should there be one piece in the archive half that has broken into two pieces in the working half, then assign a single piece number to each unit in the working half (i.e., do not assign subpiece numbers) (**Fig. 55, Fig. 56**).

Hard rocks are sampled all at one time at a "sampling party," so do not box the working halves as usual.

- After enough cores accumulate, lay them out in the laboratory.
- MLS(s) will assist in drilling, sawing, labeling, and bagging the samples.
- Shrink-wrap both working and archive sections prior to the final trip down to the refrigerator to ensure that the pieces do not roll around or become damaged in transit.

Core Sampling

Once the archive halves of a core are described, samples can be selected and taken from the working halves for the following shipboard analyses:

- Paleomagnetism (minicores and cubes)
- Physical properties (chips and cubes)
- Geochemistry (X-ray diffraction [XRD] and inductively coupled plasma–atomic emission spectrometry [ICP] quarter core)
- Petrography (TSB; see **"Thin Section Management"** below for specific instructions).

Depending on the preferences, core recovery rate, and experience of the Co-Chief Scientists and Staff Scientist, the Curatorial Specialist may be asked to cut all shipboard samples while on shift or perhaps once a day. During other cruises, sampling-shift scientists may be assigned the task of cutting hard rock shipboard samples as the cores are split and described. The key is flexibility on hard rock cruises in particular, but in any case, the Curatorial Specialist should always keep close tabs on the process. Note that personal sampling should not be done at this point.

Pieces and subpieces in the working halves are frequently broken or cut into smaller pieces during sampling. It is of primary importance for shipping and long-term repository preservation to insert properly fitting Ethafoam spacers in sampling voids. If there is sufficient time, pieces larger than 15 cm^3 (about the size of a minicore) can be relabeled. If time is limited, it is highly desirable to relabel oriented pieces so they do not get turned upside down after sampling.

After the cores have been described and sampled for shipboard analysis, the working halves are stored in d-tubes and racked in the Core Laboratory to await a sampling party for personal studies.

Thin Section Management

Requests

This procedure results in a complete collection of sections ready for microprobe analysis on shore.

- Scientists wanting thin sections made fill out a Thin Section Request form. Special instructions for orientation, impregnation, or other procedures are written on the form.
- The Curatorial Specialist then cuts the billet and places it in the sample bin labeled TSB (laboratory code for thin section billet) along with a completed and signed request form.

- The thin section MLS usually comes by once a day to pick up any freshly cut TSBs for processing in the Thin Section Laboratory (**Fig. 57**).
- Unless otherwise requested, thin sections are polished and coverslips are not applied.

Thin sections are returned to the Curatorial Specialist at the end of the cruise, but are available postcruise by shipboard scientists from ODP/TAMU if requested.

Cutting Billets

Well-cut billets result in faster and higher-quality work by the thin section MLS; less material is lost in lapping to a bonding surface, and even distribution of pressure during bonding is possible. Obviously, it is not always possible to cut a perfect billet, but keep this goal in mind.

Oversized slides may be made from large-faced samples in special circumstances (e.g., when crystal size is very large).

A few points to check when cutting thin section billets and recording data in Janus:

- Keep a supply of blank Thin Section Request forms available at the sample table.
- Billets should be properly labeled and marked with an orientation arrow if an oriented slide is requested.
- Standard TSBs should be no larger than 1.5 cm × 3.5 cm in order to fit on a standard slide without being trimmed. Keep a plastic demonstration block attached to the rock saw for the scientists to use as a reference when cutting billets.
- Cut TSBs thick enough for two thin sections to be made from the same billet, either for a second shipboard copy if the first slide is messed up, to request as a personal sample by a shipboard scientist at the end of the cruise, or to archive at the repository.
- Make the saw cuts as clean as possible with the two faces parallel to each other.
- The interval in the database (i.e., the label) and the interval on the handwritten request form should match exactly.
- Record piece and subpiece should in Janus for all hard rock TSBs.
- All billets for shipboard description should have the laboratory code TSB, never the requester’s personal sample code.

Production

The average capacity of the Thin Section Laboratory is 12 slides or 6 oversized slides per 12-hr shift. Typically, only one MLS will be available to make thin sections, and it is possible that he or she will be responsible for other laboratory functions (e.g., Core Laboratory and Downhole) as well.

Please be especially aware of backlogs and time constraints toward the end of the leg.

The turnaround time between receiving the requests and finishing the slides is generally 1–3 days or longer if the billet requires special preparation like impregnation or if other duties intervene.

When the thin section is complete, the thin section MLS will put it in a slide case that remains in the Petrology Laboratory accessible to the scientists until the end of the leg. The thin section MLS maintains a labeling system inside the case.

End-of-Cruise Thin Section Requests

All thin sections are the property of ODP. Shipboard scientists may request to borrow thin sections at the end of the leg as a part of a new or preexisting sample request; however, all slides must first be sent to the ODP Curator for cataloging. The Curator will then send the thin sections to the investigator once the approval process has been completed.

It is useful to send an end-of-leg e-mail to the scientists with an attached up-to-date Thin Section Inventory asking them which thin sections they would like to request postcruise. Include the final updated Thin Section Distribution list in the "Action Items" in the Curatorial Notebook so the thin sections get sent to scientists as soon as they are cataloged at the receiving repository.

Entering Thin Section Slides into the Sample Database via JRS

This procedure (as of Leg 205) allows batch entry of thin section slides (laboratory code TSS) into the sample database and creates a permanently archived, searchable thin section database for use on shore. It is best performed after the last TSB is made into a TSS.

Before starting, crosscheck the TSB data against the information written in the thin section MLS's logbook and on the TSSs. All TSB records should match the thin section MLS's slides and vice versa.

- From Netscape Communicator, go to the Sample Report Data Query (**www-odp.tamu.edu/janusweb/sample/sample.shtml**) (**Fig. 58**).
- Select all TSBs taken for the leg and submit.
- Save Sample Query Results (e.g., *sample.cgi*) to a desired location.
- Open the file in Excel.
    - Remove the header and footer lines.
    - Select the entire spreadsheet.
    - Go to Data>Text to Columns.
    - Delete all columns but the following: Leg, Site, Hole, Core, Section, Top Interval, Bottom Interval, Volume, Piece, SubP, and Lab Id.
    - Be sure to delete the "Core Type" column, too.
    - Save as *tss.xls*.
    - Select all rows and columns with data and click copy.
- Open S*amples.xlt* from the C:\ODP\JRS directory (**Fig. 59**).
- Paste the copied cells from *tss.xls* into S*amples.xlt*, then do the following:
    - Check that the data is in the correct column.
    - Fill in the Loc and Obs columns by using the "fill down" option. Use SHIP as Loc and CUR as Obs.
    - Make sure the column labeled "H" (half) is filled down with a capital "W" (working half).
    - Piece and Subpiece should be in separate columns.
    - Change the Laboratory Id from TSB to TSS.
    - It's also very useful at the repository to have a record of the thin section MLS's slide number. Enter this information into the comments section of the spreadsheet. **Note:**

Do NOT add any columns after the "comments" column or JRS will not import the template.
    - Save the file as a comma-delimited file (e.g., *tss.csv*) (**Fig. 60**). Create a new folder to save these templates (e.g., "xltemplt"). DO NOT save the files to the Template folder in the JRS program.
- Close the Excel file. JRS will not import the file if it is open in Excel.
- Open JRS. Select Import from the Template menu. An "Import From" window will appear (**Fig. 61**).
- Select *tss.csv* and click OK. *Tss.csv* will be loaded into JRS.
    - To save the records, click F4, Accept.
    - Verify that all new TSS records actually made it into the database by going to the Open (F3) screen and recalling all TSS. This data will now be permanently archived in a searchable form on shore (**Fig. 62**).

SHIPBOARD SAMPLING PARTIES

Sample Selection

Materials available for personal samples include both working halves and residues of shipboard samples that have already been analyzed. During the sampling party scientists mark off their desired sample interval with wax pencil (sometimes masking tape if necessary) and apply a round Avery dot label marked with their sample code (**Fig. 63, Fig. 64**).

If sampling intensity is great in one specific area as a result of low recovery or the presence of a critical interval (such as a glass) the scientists should make a drawing on a "Post-It note" showing the exact location of the proposed samples and where they want the cuts made. This drawing should be placed next to the piece they wish to sample (**Fig. 65**). Then as other scientists add their choices, conflicts are quickly seen and can be resolved more easily without marking up the core.

Sampling

- The SAC goes over the proposed samples, sorting out any conflicts.
- Cut the samples with the help of MLS(s) using the two rock saws and two drill presses. It is acceptable to ask the shipboard paleomagnetist(s) to assist with cutting minicores, especially if the number of samples is great and time is short.
- Cut pieces containing glass or other rare materials using a thin blade on the rock saw or the tabletop Varicut saw.
- Store any glass fragments or other materials that break off in a labeled bag or pop-top vial in the working half or with the sample.
- Mark an "up" arrow (with a red china marker or a scribe) on oriented samples.
- Enter sample information into Janus Sample (including piece and subpiece).
- Bag and carefully seal the sample.
- Return the unused portion of the core to the liner in its proper place and orientation.

Handling Small Pieces

Again, pieces and subpieces in the working halves that are broken or cut into smaller pieces during sampling require special curatorial attention.

- It is of primary importance for shipping and long-term repository preservation to insert properly fitting Ethafoam spacers in sampling voids.
- If there is sufficient time, relabel pieces larger than 15 cm^3 in volume (about the size of a minicore plug).
- If time is limited, it is highly desirable to relabel oriented pieces so they do not get turned upside down after sampling.

Both working and archive sections must be shrink-wrapped before their final trip to the core storage refrigerator. This ensures the pieces do not roll around or become damaged in transit.

CORE STORAGE SYSTEM

Split cores are stored permanently in white plastic d-tubes. Archive and working halves are distinguished by color coding.

- Working halves have black end caps and archive halves have red end caps.
- Working and archive halves are stored in separate boxes on opposite sides of the core refrigerator on the ship.

Always check to make sure that the physical storage is consistent with the Core Tracking Report and that the working and archive halves are stored in exactly the same manner. If you discover inconsistencies with Janus (or between archive and working halves after cores are boxed and you are not able to fix them) make a note for the repository superintendent at the repository where the cores will be unpacked.

Placing Samples in D-Tubes

- After sampling or describing a core, slide each section bottom-end-first into a tube.
- Follow with a moist sponge and close with an end cap.
  - The sponge should not be too moist or water will drip out and destroy the waxed cardboard core boxes.
  - Do not put a wet sponge in a section that consists entirely of igneous or metamorphic rock.
  - Expanding clays may expand further with the absorption of water from a sponge, so do not use a sponge in “shaley” cores.
  - Sometimes extra sponges behind and in front of a section may help to preserve a core that is deteriorating as it dries out on the ship.
  - The Curatorial Specialist determines the appropriate use of sponges in unusual circumstances and communicates it to everyone working in the Core Laboratory.
- With the exception of the last section and the CC, only one section goes inside of a d-tube.
  - Follow this rule even when multiple short sections would fit in one d-tube.
  - When storing the CC and last section together, put the CC into the d-tube first so that it is behind the numbered section. Janus Corelog also does a summation of the length of the last section and the CC. If sum is less than 150 cm, the Core Tracking Report will indicate storage in one d-tube.

Labeling D-Tubes

Hand-label the top of each d-tube with a permanent marker (black for working halves, red for archive halves).

- The label runs the length of the tube, reading “Leg-Site-Hole-Core-Core type-Section,” an “up” arrow pointing to the top of the section toward the end cap, and a W or an A to indicate whether the piece is from the working or archive half (**Fig. 66**).
- Put one bar-coded core label on the top of the d-tube at the open end and a second bar-coded core label on the end cap.
- Use colored dots on d-tubes to indicate the following situations:
  - Blue = entirely igneous or metamorphic section; blue color signifies no sponge
  - Red glow = critical intervals
  - Yellow = temporary dot used on ship to let photographer know that a close-up is being requested
- Other dots that are used on shore at the repositories include the following:
  - Purple = permanent archive sections
  - Green =APC (referred to as Hydraulic Piston Corer [HPC]) sections recovered during last years of the Deep Sea Drilling Project (DSDP)
  - Green glow = “geriatric cores” used in a core aging study
  - White = no sponge—expanding core

Yellow preprinted ODP “caution” stickers are applied to end caps of sections that have had something unusual happen. In addition to the caution label, it’s always helpful to write a brief handwritten message on the top of the d-tube explaining what happened. The message must be easily understood by the repository staff or scientists visiting a repository. For example, if a section was dropped but not conspicuously damaged, write “section dropped.” If parts of a dropped section fell onto the floor and piecing together was not possible, write “section dropped; 0–28 cm out of order and not oriented.” Be sure to make a note of the event in Janus Corelog Core Comments.

General Guide to Core Boxing

Try to keep cores in the laboratory as long as possible before boxing to allow each crew of scientists the chance to view and/or sample material that came up while off shift.

When there is no more space for core storage in the lab, sections are boxed and moved to the core refrigerator. The Curatorial Specialist monitors core flow out of the laboratory. Talk to the Staff Scientist and science party about when they will be finished working with specific cores. Let the other MLS(s) know what cores should and shouldn’t be boxed. Develop a workable system to minimize conflict and maximize useful work.

Core Box Inventory Forms

- Use these to keep track of boxed cores.
- Keep one clipboard of blank forms for working halves and one for archive halves in the Core Laboratory.
- Update these forms whenever cores are boxed. Always use a black pen for working-half forms and a red pen for archive-half forms so that none gets mixed up. It is important to carefully label the boxes and fill out the Core Box Inventory forms to find needed sections later in the leg and to simplify core unboxing at the repository (**Fig. 67**).
- Whenever possible, transfer the handwritten information to an Excel spreadsheet stored on the personal computer (PC) in the curatorial office. Having a computer-generated Core

Box Inventory form makes life easier for the repository folk unloading the cores. Form versions of these spreadsheets are kept on the hard drive on the curatorial PC.

- At the end of the expedition provide copies of the Core Box Inventory to the following:
  - LO
  - ALO
  - Oncoming Curatorial Specialist
  - Curator's copy of the Curatorial Notebook (original handwritten inventory)
  - Repository copy of the Curatorial Notebook
  - Taped to a core box in the core shipment

D-Tube Transport

- Since d-tubes in the laboratory are reopened frequently to have second look at cores, tape the end caps just before the cores are ready to be boxed.
- When it is time to box the cores, seal the d-tubes with archival quality polyethylene tape (3M brand is preferred) extending from the top to the bottom surface of the d-tube and covering both computer labels.
- Get a four-wheeled cart to stack the core boxes on as they are packed and to transport the full core boxes to the core refrigerator.
- D-tubes are placed in wax core boxes that hold 10 sections (**Fig. 68**).
- When 4–8 full core boxes are stacked on the cart, take them to the core refrigerator for storage until the end of the cruise.

Core Boxing Instructions

Instructions for properly assembling, packing, marking, and closing core boxes follow. Copies of these instructions should remain posted at both ends of the Core Laboratory.

- Fold rear of box and insert cores so that the lowest core/section number is in the upper left and the highest core/section number is in the lower right (**Fig. 69**). It is easiest to fill the box by starting in the lower right with the highest core/section number and working backward to the upper left.
  Note: Other times it may be easier to fold the front of the box and insert the cores top-first into the open rear end of the box so that the top of the section goes in first. The lowest core/section number should still be in the upper left and the highest core/section number should still be in the lower right. It is easiest to fill the box by starting in the lower left of the open rear of the box with the highest core/section number and working backwards to the upper left.
- Record the pertinent data on the Core Box Inventory form.
- Mark boxes containing working halves with a black permanent marker; mark boxes containing archive halves with a red permanent marker.
- Write BOT at the rear of the box, both on the flap and top surface, and TOP on the front flap and top surface.
- At both ends of the box, on the top and flap, write the leg number and the box number (as listed on the Core Box Inventory) followed by a W or A for working or archive. Circle the core box number and letter (**Fig. 70**).

Core Storage in the Refrigerator

Segregate cores in the Core Refrigerator so that working halves are on the port side and archive halves are on the starboard side of the refrigerator. Push core boxes as far back into the racks as they will go. On a high recovery leg, core boxes will be stacked four across on the floor in the center of the refrigerator. There are only a couple of inches of extra space to work with, and when the cores aren't pushed all the way back into the side racks you can't stack a full set of core boxes in the aisle.

On extremely busy legs when the core refrigerator is nearly full, talk with the LO about clearing out space in the Hold Refrigerator or the gym for the overflow cores.

RESAMPLING AND REDESCRIBING CORES

Try as you may to minimize resampling (by keeping the cores accessible in the Core Laboratory racks) the scientists will still need to look at some intervals again. Scientists wishing to redescribe or resample boxed cores must get approval from the Staff Scientist and then contact the Curatorial Specialist, who determines when, where, and how the activity is to be undertaken.

The more core boxes are opened and restapled, the more they begin to resemble soggy graham crackers. This weakens the boxes and obscures their labels. Therefore, it's best if the Curatorial Specialist coordinates requests for resampling or redescribing.

Investigators wishing to access boxed cores may be asked to do the legwork themselves after consulting with the Curatorial Specialist. Either the investigators can retrieve the desired material and then pack, staple, and shelve the boxes just as they found them or this can be done by the Curatorial Specialist and a few MLS(s), whatever method works best.

Depending on how many samples, sections, boxes, and so on are involved, the actual resampling and redescribing may be done in the Second Look Laboratory or in the refrigerator itself. The Second Look Laboratory sometimes is not available and, as with the refrigerator, it does not have a sampling station to enter samples; sample IDs are therefore recorded by hand on the sample bags and the data are entered later at the Janus sampling station upstairs. Sometimes, especially during drilling breaks, it's just as easy to take the cores up to the laboratory for scientists to resample or redescribe.

For safety reasons as well as increased strength of the restapling job, remove the old staples prior to restapling. Old staples have caused many nasty scrapes and cuts. Keep a pair of needle-nosed pliers in the refrigerator for this purpose. Toward the end of the cruise, it generally is not possible to access boxed cores. The final date for any resampling and redescribing will be included in the "end-of-the-cruise" schedule devised and distributed by the LO. The Curatorial Specialist should inform the Co-Chief Scientists and scientists that after this final date resampling and redescribing must be performed at the repository.

BETWEEN SITES

Between site tasks for the Curatorial Specialist include:

- Clean up laboratory (especially around the sampling tables) and restock.
- Update Excel Core Box Inventory.

- Make corrections to the sample database using JRS.
- Box and bag all the previous site's samples and take them to the refrigerator. On busy cruises, it's a good idea to keep samples in the Hold Refrigerator so they don't get in the way of people trying to load core boxes.
- Prepare the sampling plan for the next site.
- Crosscheck the core photos with Janus curated lengths to make sure they match. Make updates to Janus Corelog as necessary and rerun the depths for those particular holes.
- Check for voids greater than 5 cm that have not been entered into the Subsection Log.
- Check for placement and length of whole-round samples. Make updates to Janus Corelog as necessary and rerun the depths for those particular holes.
- Update the Sample Request Detail in Janus Curation for all the requestors who took samples from the previous site (i.e., insert the site numbers into the appropriate columns next to the presite name so that they will show up correctly in the Netscape version of the FCSP).

END-OF-LEG ACTIVITIES

CURATORIAL NOTEBOOK

The purpose of the Curatorial Notebook is to provide the ODP Curator with a compilation of primary documents reflecting the events, problems, and activities of a cruise. It is used postcruise by the Curator and repository staff. It is crucial that the Notebook be carefully prepared with the awareness that it will be used long after the details of any particular leg have been forgotten. Problems and questions will inevitably arise about cores, samples, requests, and procedures that will require a clear written record of the cruise.

You may need several binders to hold all the information. One copy of the Curatorial Notebook must be returned to the Curator, and the other should be sent with the cores to the repository. The Curator has the notebook microfilmed for posterity. The original Curatorial Notebook must shipped via express-mail service directly from the ship to ODP/TAMU at the end of the leg. An express box will be set up in the LO's office at the end of the cruise.

The contents of the Curatorial Notebook will vary according to the cruise. Nevertheless, certain documentation is nearly always required. Add any other information you think may be useful.

Include the following sections in your notebook:

- Participant list: Obtain a copy from the Yeoperson.
- Curatorial Report: (see **"Curatorial Report"** below for further details).
- Action items: This section is for the Curator or Repository Superintendent. Include
  - All new requests
  - Instructions for redistribution of shipboard residues or thin sections
  - Requests for postcruise samples
  - Any last-minute items the Curator will need to take care of on shore
- Final Cruise Sampling Plan (FCSP)
- Presite to Site Conversion: List presite numbers with their corresponding ODP site numbers.

- Request#/Sample Code/Approval Status List/Sample Totals: There is no Web report that combines all of this information. Prepare this in Excel by combining several of the available Web reports.
- Core Box Inventory Forms: Put one Excel copy in each notebook. The original handwritten copies go in the Curatorial Notebook.
- Thin Sections: TSB inventory and TSS inventory with Curatorial Specialist's updates (e.g., slide #). Prepare both in Excel (see **"Entering Thin Section Slides into the Sample Database via JRS"** in "Thin Section Management" in "Hard Rock Core Handling and Sampling" in "On Site").
- Smear Slide Inventory: Prepare in Excel.
- Residues and Redistributed Samples: Memo describing distribution information of all shipboard samples, smear slides, and samples being returned to the Gulf Coast Repository (GCR).
- Site Sampling Plans.
- Memos/e-mails: Any information of interest relating to curation and requests from the leg.
- Correspondence with the shore-based scientists.
- Curatorial diskettes: Prepare a CD containing the Curatorial Report, the FCSP, and the newest Curatorial Cookbook (if changes were made).
  - If the Curatorial Specialist is ASPP, hand-carry a copy of the same diskette home in case the shore-based Curator or Repository Superintendent needs to contact the Curatorial Specialist.
  - Send diskettes with the digital composite core images to the core-receiving repository.
  - Tape all CDs in the inside pocket of the Curatorial Notebooks.
- Curatorial Cookbook changes/updates: Ensure that changes are incorporated both on board the ship and on shore. Provide hard copies of these changes in the Curatorial Notebook as well as an electronic copy on diskette. The changes should be italicized and bold to reflect the additions or deletes.
- Sample Requests: These may need to be put in a separate notebook. Group them by request number in the following categories:
  - New Requests
  - Accepted Requests
  - Modified requests: Clearly mark the request and document all changes on the request and in the action items list if anything more is required on shore.
  - Deferred/Partially Deferred Requests: List the samples which are to be sampled onshore on a Sample Request Inventory form, or alternatively, specify the site, hole, section, and interval where sampling should begin and end. For deferred decision, explain what Co-Chief Scientists intend to do with the request postcruise.
  - Rejected/Withdrawn Requests: Include the Co-Chief Scientists' statement of why a request was rejected.

CURATORIAL REPORT

The Curatorial report is read by the following people at the end of each leg:

- LO: to prepare the end-of-leg Technical Report.

- Curator and repository staff: to alert them to any postcruise sample request action that needs to be taken.
- Oncoming Curatorial Specialist: to learn about new procedures and equipment changes.

Provide Curatorial reports as follows:

- Hard copies in both the Curator's and the repository copy of the Curatorial Notebook
- Electronic copy to the LO and/or Yeoperson in the format they request
- Hard copy in the Curatorial Report notebook in the Curatorial Office
- Electronic copy on the hard drive of the computer in the Curatorial Office (there should be a / report directory)
- Provide a copy for the oncoming Curatorial Specialist to read at crossover

Include the topics below in your Curatorial Report. Within each area, be sure to discuss any exceptional differences from standard procedures. Adjust the contents as appropriate.

- Summary: This might include a very brief statement on the locality and general cruise objectives.
- Sample Totals: The LO will need this number.
- Shipments–Core: The LO will need this number.
- Shipments–Sample:
  - Express
  - Hand carried
  - Frozen
  - Refrigerated
- E-mailed Files: List e-mailed files sent to the Curator and to the superintendent of the receiving repository at the end of the cruise.
- Action Items
- Thin Sections
- Smear Slides
- Residue Distribution
- Special Projects, which might include the following:
  - Unusual sample requests
  - Curatorial Policies/Procedures: Include information about cores, including any oddities important in core racking
  - Computing Hardware and Software
  - Curatorial Cookbook: Copies and explanations of all changes made during the leg
  - Action Items
  - Any special projects you attempted/completed during the cruise
- Problems Encountered: Note any problems with equipment, supplies, or anything else.

END-OF-LEG PAPERWORK

Final Cruise Sampling Plan

As soon as the last samples are taken

- Finalize the PCSP, which then becomes the FCSP.
- Complete updates to the Janus Curation database, including the Sampling Detail screen.
- Produce the FCSP via the Web query.
- Export the document to Microsoft Word and make final updates. Since the document is included in the ODP postcruise publication "Hole Summaries," it is important to make the document as accurate and complete as possible.
- Print five copies on the laser printer and give three copies (or as many copies as requested) to the Yeoperson for the Hole Summaries and include one copy in each of the Curatorial Notebooks.

See **"Final Cruise Sampling Plan"** in "Sampling Plans" in "Under Way/Presite" for step-by-step instructions on how to create a FCSP.

End-of-Leg E-mail Files

The Curator requests that essential end-of-leg curatorial files be e-mailed as attachments to him and to the superintendent of the repository that is receiving the cores. **Table 9** provides a summary of all curatorial materials (samples, cores, files, etc.) and their delivery method.

CLEAN-UP

After all the cores have been boxed and stored, begin cleaning up the curatorial work areas.

- First ensure that all sample material has been removed from the Core Laboratory and packed in the appropriate boxes.
- Gather smear slides, place in labeled cardboard trays, and pack securely for shipping.
- Likewise, gather all thin sections and take an inventory to make sure none are missing.
- Empty and clean sample bins. Check behind bins on the floor for stray samples.
- Make sure that all samples have been removed from the labs on the foc'sle deck, where residues and other samples may linger.

Packing Samples

Sample Bins

The investigators' sample bins hold about 100 samples.

- As the bins fill, pack the sample bags into personal boxes labeled with the appropriate sample code.
- Before transferring the samples from the bins, check that each bag is sealed securely and labeled properly. Because present bag sealers are not reliable (the bag appears to be sealed but can easily be opened by running fingers through the alleged seal), check each bag carefully before storing them in boxes.
- Samples occasionally get tossed into the wrong bins in the flurry of sampling activity.
- Inspecting sample bin contents also allows a chance to check that sufficient volume is being taken.

Frozen Samples

The small freezer in the Core Laboratory also needs to be emptied regularly.

- Frozen samples should be transferred to the Hold Freezer for long-term storage.
- Frozen samples may be transferred to a garbage bag and packed in an insulated carton labeled with the appropriate sample code.
- Work closely with the ALO to arrange a time to wrap foreign air freight, get shipping labels, correct addresses for shore-based scientists, and arrange for dry ice in port call.

Core Laboratory Cleanup

After all sample material has been safely packed for shipment, it is time to clean up the Core Laboratory. The LO will probably assign specific end-of-leg clean up duties. Pay particular attention to the sampling area. Even if you are not assigned to Core Laboratory cleanup duty, it’s a good idea to do a preliminary clean-up of tools and equipment so your stuff won’t be in the way when the final clean-up is done.

- Try to restock the curatorial area for the oncoming Curatorial Specialist.
- Make sure the Curatorial Specialist’s office on the Main Deck looks neat and clean.
- Clear the bulletin board, remove personal items from drawers, and straighten bookshelves.
- Clean up the PC hard disk and the Curatorial e-mail account.
- Pack your personal box and give it to the ALO.

ONBOARD PREPARATION FOR POSTCRUISE SAMPLING PARTY

If the cruise is busy as far as core recovery and sampling, the science party may consider having a postcruise sampling party at the remote repository where the cores will be stored. There are many things that can be done to prepare for this.

- Try to obtain as many postcruise sample requests as possible before the end of the leg.
- Make Sample Request Inventory sheets available to the scientists (either electronic or hard copies) and instruct them on how to fill them out.
- Let the scientists know the deadline for submitting postcruise sample requests for the party if they need more time to think about it after the cruise.
- Get copies of the composite section for each site from the stratigraphic correlator.
- Make sure there is sufficient overlap from one hole/core to another to ensure that there are no gaps. This will allow the repository staff to know beforehand which sections need to be pulled from which holes and in what order they will be sampled.

Hints for Conducting a Successful Sampling Party in a Repository

Timing

Scientists should be given sufficient time after receiving core descriptions (Hole Summaries) to formulate detailed sample requests before the party. Experience from previous successful sampling parties suggests that sampling parties should be held no sooner than 3–4 months postcruise.

Dedicated Holes

Dedicated intervals should be specifically determined by the time the scientists receive the core descriptions. The scientists and repository personnel should be made aware of where those intervals are. Any late modifications to the composite depths should be cleared up at least 1 week before the sampling party so the repository superintendent will have time to compose the sampling plans.

Deadline

The scientists should be given a realistic but firm deadline by which time the detailed requests must be completed and turned in. In general, about 2 weeks prior to the sampling party allows sufficient time to review the requests from a curatorial viewpoint. Late-arriving requests will be handled as quickly as possible. If there is an on-site Curatorial Specialist assigned to the sampling party, then late arriving requests can be handled during the party. If necessary, late-arriving requests can be faxed to ODP/TAMU to expedite the review process. Scientists should keep in mind that the Bremen Core Repository (BCR) is 7 hr ahead of ODP/TAMU, and it can take as long as 24 hr to get the required approvals.

The Role of the Co-Chief Scientists

The Co-Chief Scientists are responsible for the science that will be conducted on the samples. The final decision on the fate of each sample request, to the extent that it remains within the Sample Distribution Policy guidelines, rests in their hands. The Co-Chief Scientists coordinate with the party attendees and the repository superintendent to select the sampling party dates.

The Role of the Repository Staff

The repository staff assists the scientists, guiding their sampling needs so that they stay within curatorial policy but still get what they require for their research. The repository staff designs sampling plans based on the approved sample requests. These plans serve as a guide to the samplers during the party. Students are available to rack and unrack the cores. If the scientists stay at the same hotel, repository staff may provide transportation to and from the hotel at the beginning and end of each sampling shift.

Note: In rare and unusual situations, it may be necessary to take cores on the ship with a plan to have them split on shore. If the cores will be sent to a repository unsplit, it is strongly recommended that the cores be run through the MST on the ship. Local facilities may not be available for use or compatible with shipboard data.

If cores are sent back unsplit, then the sampling party must be held early enough so that the cores can be described and photographed for the *Initial Reports* volume. This means that the sampling party must be held prior to the first postcruise meeting.

How to Request Samples

Sample requests must be reviewed prior to the sampling party to ensure that all the high-resolution samples (those that exceed sampling policy) are taken from the dedicated intervals. If a request is made to move back and forth between several holes using the composite depth, then reviewing the requests becomes complicated; therefore, sample lists should be provided at least 2 weeks prior to the scheduled party. The lists are used to generate a sampling plan similar to the whiteboard plan on the ship but much more detailed.

Intervals (cm levels) are assigned within each section, and repository staff try to plot out each sample location taking into consideration samples that were taken on the ship and attempting to provide intervals that are a continuation of the shipboard intervals. Assistance from the scientists is graciously accepted.

How Detailed do the Sample Lists Need to Be?

To request samples from a single hole, then it is sufficient to say “I want samples (15 cm^3 in size) at 10-cm intervals from Hole 976A from Cores 1 through 20 ending in Section 2” (for example).

HOWEVER, if a request moves back and forth between Hole A and Hole B, the request becomes more complicated because the sampling has to move back and forth across the composite depth. In order for the repository staff to make up the sampling plan, each scientist will have to word their request in the following terms: “I want samples at 10-cm intervals (15 cm^3 in size) from the Pleistocene through the Miocene at Site 976.” A sample list should be attached that states where they want the samples taken within the composite depth. An example of an appropriate sample list follows:

976A-1-1, 10 cm, through 976A-2-3, 50 cm

976A-5-3, 60 cm, through 976A-7-1, 70 cm

976B-2-4, 40 cm, through 976B-5-1, 20 cm

976B-7-4, 30 cm, through 976B-9-5, 40 cm

Samples will be shipped via United Parcel Service (UPS) brown (4–5 day service) within the continent where the receiving repository resides. All other shipments will be sent via Airborne Express.

Travel Arrangements

Scientists need to notify Joint Oceanographic Institutions, Inc. (JOI) of their plans. There are some limitations on reimbursable expenses and JOI must approve any travel arrangements or funds advance. For reference, these requirements are specified in the “Explanatory Notes, Co-Chief Scientist Supplement” that each Co-Chief Scientist receives from JOI prior to the cruise.

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Paula Weiss, June 2004

A partial list of curators who have contributed directly or indirectly to this volume include the following:

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Jim Harrington	Bob Hayman	Bruce Horan
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Erinn McCarty	Russell Merrill	John Miller
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Drew Patrick	Steve Prinz	Dan Quoidbach
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Diana Stockdale	Paula Weiss	Bob Wilcox
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APPENDIXES

CURATORIAL STANDARD OPERATING PROCEDURE

(Draft June 2002)

Precruise

The Curatorial Specialist should perform the following tasks in preparation for an upcoming cruise:

- Familiarize yourself with the upcoming cruise objectives, try to attend the precruise meeting and read the Scientific Prospectus for the leg.
- For new hires, become acquainted with ODP Sample Distribution Policy (**http://ship2.tamu.edu/publications/policy.html**) and this Curatorial Cookbook.
- Review sample requests as electronic copies are received. The shore-based Curator (or Staff Scientist) will contact the Curatorial Specialist either by telephone or in person to do a general review of requests and to discuss potential overlaps.
- Flag requests that require special equipment or handling and notify the LO.
- Read over the PCSP spreadsheet sent to the Curatorial Specialist by the Staff Scientist and/or shore-based Curator. Use this document as the basis for future shipboard sampling plans.

Port Call—Oncoming

- Cross over with off-going Curatorial Specialist. Review the Curatorial Report from the previous cruise together and address any significant changes to the Core Lab/Sampling Area, computer changes, database changes, and the Curatorial Cookbook. Be sure the off-going Curatorial Specialist provides sufficient information about off-going frozen samples, ambient samples, core shipments, and the status of any display/PR cores.
- Attend introductory meeting or any other safety or training meetings.
- Finish the shipment of frozen samples prepared by the off-going Curatorial Specialist. Fill the insulated shipping container with dry ice or blue ice. Activate the temperature monitors before closing the container.
- Guide and participate in the loading/unloading of cores and frozen shipment. Place temperature monitors on individual core boxes in the back, middle and front of the refrigerated shipping container. Tape a Core Box Inventory list to one of the boxes.). Give the other copy of the Core Box Inventory to the MLC or ALO to include with the shipping papers.
- Assist with loading/unloading other freight and perform other tasks as directed by the LO or ALO.

Site Preparation

There are many beginning-of-the-cruise curatorial tasks that may be tackled during port call. If the “to do” list below is too long and the port call too short, these tasks should be done while under way to the first site.

- Obtain from the Staff Scientist any last-minute sample requests that have been submitted by oncoming scientists and/or provide the Staff Scientist and Co-Chief Scientists with the last-minute requests they do not have. Remind those scientists who have yet to submit requests that they must do so before arriving at the first site.

- Arrange a meeting with the Staff Scientist and Co-Chief Scientists to discuss sample requests and conflicts and to address the status of requests submitted by shore-based participants. Also, discuss the operational plan for the upcoming sites.
- Compile two notebooks of sample requests. Keep one available for use by the scientific party during the first few science meetings when sample strategy is discussed. Make another copy for your use. Attend as many of the sample discussions as possible, realizing that you won't be able to attend all of them because they may overlap.
- Continually update the Staff Scientist/Curator's PCSP spreadsheet (in Excel) as the sample requests are clarified and as conflicts are resolved.
- For sediment legs, prepare a Site Sampling Plan in addition to the PCSP. Divide the plan into "routine intervals" and "special picks." See the Curatorial Cookbook for details. Circulate the PCSP and Site Sample Plan to the Co-Chief Scientists and Staff Scientist for comments. Once approved, circulate the plans among the scientific party. Discuss any pertinent issues with the technical staff (e.g., IW whole rounds and other chemistry samples, Physical Properties samples, XRD samples, TSB samples, etc.).
- Meet with the chemistry MLS(s) and scientists before reaching the first site to discuss the chemistry sampling plan for the leg. Provide them with copies of each request associated with the Chemistry Laboratory and with a list of sample codes to be used in the Janus Sample application during the leg.
- Enter sample codes into Janus Curation.
- Assign Leg/Roles for all scientists and technical staff in Janus Curation.
- Before arriving on site, post the Site Sampling Plan on the whiteboard near the sample table.
- Set up the sampling area before arriving at the first site. This set-up includes stocking sampling supplies (see Curatorial Cookbook for list of supplies needed), gathering sampling tools, and preparing the whiteboard (as described above) and sample flags for each sample code.
- Hold Core Laboratory orientation sessions for new MLS(s) and all scientists. Begin each session with a catwalk/Core Laboratory tour in which core handling and flow are discussed. At the core entry area, explain the coring summary table on the whiteboard and the Janus Core application. Make sure the scientists are aware of the numbering and labeling scheme of the cores. If you are on a hard rock leg be sure that you or a senior MLS discusses the orientation and labeling of pieces within the core.
- Hold sampling classes for scientists. Introduce the scientists to the Janus Sample application using Ship Test. Test print labels. Discuss sampling tools, techniques, and volumes and the whiteboard. Review the ODP Sample Distribution Policy. Remind the scientists that no gold, platinum, or other precious-metal jewelry may be worn at either the sampling tables or anywhere else in the laboratory. Provide scientists with Nitrile gloves if they are unable to remove jewelry.
- Assist the Staff Scientist with devising the scientist's sampling watch schedule (generally teams of two scientists working 2-hr shifts). Strive for 24-hr a day coverage. This is particularly important for cruises with heavy sampling plans.

- Along with other Senior MLS(s), train new MLS(s) in the operation of Core Laboratory equipment or instruments.
- Stand up to Underway watches in the Geophysical Laboratory as assigned by the LO.

For more details in these preparatory tasks, refer to the Curatorial Cookbook.

On-Site Activities

In consultation with the LO and ALO, the Curatorial Specialist oversees and monitors the handling of all cores on the catwalk, in the laboratory, and in the storage areas. He or she assures smooth core-handling operations by interfacing with scientists and fellow MLS(s) as well as overseeing all sampling activities in the Core Laboratory. The Curatorial Specialist stays in close contact with the chemistry MLS(s) to assure that the Chemistry Laboratory sampling needs are being met. The Curatorial Specialist performs all the Core Laboratory tasks described in the *Core Laboratory Standard Operating Procedures* and many other tasks, including the following:

- Take the responsibility for proper handling of special cores including soupy cores, expanding cores, cores with split liners, H_2S cores, and cores with critical intervals (e.g., K/T boundary, volcanic glass, sulfides, sapropel, etc.). Refer to the Curatorial Cookbook for specific instructions on how to handle these cores.
- Oversee the sampling process, ensuring that all scientists are well trained in sampling techniques and understand the posted whiteboard plan. The Curatorial Specialist fills in at the sample table whenever there is a gap in the scientists’ sampling schedule or the sampling regime backs up the core flow in the laboratory.
- Correct sample data entry errors in Janus Sample.
- Cut TSBs. Ensure that the Thin Section Request Form is properly filled out.
- Organize and oversee hard rock sampling parties. This includes assisting the Staff Scientist and Co-Chief Scientists in sorting out conflicts over requested samples and, with the help of the fellow MLS(s), cutting the samples with the drill press or Felker Saw. If conflicts cannot be fully worked out by the investigators, then the SAC must decide.
- Working with the Staff Scientist, send e-mail to the shore-based Curator listing approval status of all requests.
- Organize and oversee the resampling of cores.
- Pack all samples.
- Compile a cruise Curatorial Notebook which should include the following:
    - Action items (for the shore-based Curator or repository superintendent)
    - Curatorial Report
    - Request Status List
    - Request #/Sample Code List
    - Presite-to-Site Conversion
    - Core Box Inventory
    - Any unusual information relating to curation or requests (e.g., e-mails, memos)
    - Thin Section Inventory
    - Smear Slide Inventory
    - Final Cruise Sampling Plan (FCSP)

  - Diskette with electronic versions of all of the above (except the Core Box Inventory). If the Curatorial Specialist is ASPP, it's also a good idea to hand carry a copy of the same diskette home in case the shore-based Curator or repository superintendent needs to contact the Curatorial Specialist.
- Update Curatorial Cookbook as needed.

For more details, refer to the Curatorial Cookbook.

End-of-Leg Activities

- Complete updates to the Janus Curation database, including the Sampling Detail screen. Produce a FCSP via the web query. If necessary, make final updates to the FCSP in Microsoft Word. Print out the FCSP and give copies to the Yeoperson for inclusion in the Hole Summaries. Put a copy in the Curatorial Notebook.
- If needed, do preliminary preparations (i.e., a spreadsheet) for the postcruise sampling party. Include this in the Curatorial Notebook.
- Compile inventory lists of thin sections and smear slides for the Curatorial Notebook.
- Make sure all data are in Janus before the MCSs cut off database access. All nonessential files should be erased from the hard disk of the PC in the Curatorial Office and the curation folder in the Curatorial Specialist's office to cover the entire shipment transit time on the server.
- Write the end-of-leg Curatorial Report, give a copy to the LO and the Yeoperson. Put a copy in the Curatorial Notebook.
- Put the completed Curatorial Notebook in the LO's *express* shipment box in the Curatorial Specialist's office.
- Pack all remaining samples in personal boxes labeled with the appropriate sample code. Seal personal boxes and let the Marine Logistics Specialist and ALO know when you are finished.
- Prepare the frozen sample shipment. Refer to the Curatorial Cookbook for procedures.
- Resupply the curatorial area in the Core Laboratory for oncoming Curatorial Specialist.
- Give the LO a list for port purchases if any.

At the end of the leg it is the responsibility of the Curatorial Specialist to clean the Curatorial Office and to help in the final clean-up of the Core Laboratory as described in the *Core Laboratory Standard Operating Procedures*.

Port Call—Off Going

- Find the oncoming MLS(s) for your laboratory and cross over.
- Attend port call meeting.
- Unload off-going air freight and frozen shipments, or any freight as required. Load oncoming freight if time permits.

MLC SHIPPING GUIDELINES

(excerpts from the MLC Handbook, June 2002)

SCOPE: These guidelines are intended to help the user put together a shipment from the ship and to inform the user of the different details required to achieve a successful shipment.

PURPOSE: The purpose of shipping paperwork is to identify every item that is being shipped off the ship. It is very important that every item in a box or container is listed on the paperwork. Heavy fines and penalties can be assessed if the shipping paperwork is not accurate.

Definitions

Shipper: The person or entity sending the shipment. In the majority of the cases this will be ODP.

Consignee: The person or entity to whom you are sending the item, or the final entity receiving the shipment.

Shipment: All items that are being shipped to a location. Please note that you cannot split a shipment between locations, but multiple shipments can be shipped to the same location. For example, you cannot ship items in a 40-ft shipping container to different locations, but you can have different shipments going to the same location in the same 40-ft shipping container.

USA Shipments: Shipments that are addressed to the USA need to be shipped to ODP, c/o Panalpina Inc. All items will then be forwarded to their final location in the USA, usually via UPS. This method allows ODP to deal with U.S. Customs and clearing all items into the USA. There are exceptions to this guideline. They will be mentioned when they apply.

Foreign Shipments: Foreign shipments are defined as any shipment that is not being shipped to the USA.

Freight Code: This is a short code that ODP uses to identify shipments. These are specific codes identifying the shipping vehicle (SURF, FLAT, CORE) or an airport code that identifies the closest international airport to the final destination. (NRT = Narita Airport Japan, LHR = London Heathrow airport). There is a list of the airport codes in the S2S program.

General Information

Addresses: All addresses must be complete and include phone number, fax number, and e-mail address. The address cannot contain a Post Office Box as part of the address. Courier services such as DHL, Federal Express, United Parcel Service, etc. will **not** ship to a Post Office Box.

Labeling: All items must be labeled with the "Ship To" address. This can be done with the shipping paperwork in a "packing list" envelope or spray painted on the item with a stencil. Please take care to securely attach the label so it will arrive at its destination.

Parcels Number: Every item should be assigned a parcel number. This number should be written on the item to match it to the paperwork.

Required Item Information: Any piece of equipment given to you for shipment must have the following information: ODP No., Description, Value, Serial Number, Country of Manufacture, Date Exported, and Model Number.

What Items Need Paperwork?

Any item that comes off the ship must be manifested with shipping paperwork. “Any item” is defined as anything that will be shipped by land, ocean, or air either locally or internationally for ODP or anyone affiliated with ODP. This does not include *Transocean Sedco Forex*, *Catermar*, or *Supply Oilfield Services*. The only exception to this is hand-carry items. Hand-carry items do not require shipping paperwork as they are considered part of personal luggage; however, if any person requests shipping paperwork for any hand-carry item please create the paperwork for them.

Surface Freight

Surface freight is defined as any item that is being shipped in a container, refrigerator, or flat rack, or shipped Break Bulk. Containers, refrigerators, and flat racks are devices that are used to ship items long distances usually via ocean. Surface freight will be transported by truck when the ship docks on the continental US.

Bill of Lading (BOL): This is a legal document that the shipping company uses to ship a container, refrigerator, or flat rack aboard a vessel. This document contains information such as container numbers, seal numbers and weight, vessels shipped upon and port of discharge.

Be aware that load limit **cannot** exceed **40,000 pounds** per container, refrigerator, or flat rack.

ODP surface shipments (**SURF, FLAT**) are made up of items being returned to owner for repair. These items are generally shipped to the below address.

Ocean Drilling Program (TAMU)
c/o Panalpina
1000 Discovery Drive
College Station TX 77845
USA
ATTN: Robert Mitchell
Phone: 979-845-5780
Fax: 979-845-2374

You can put more than one freight code into a container but you cannot split a freight code between containers. If you need to use more than one container then you should split the items between freight codes (Example SURF1, SURF2). Use the same practice for FLATS. Flats must have the items strapped down using 2-in banding, not chain boomers. Railroads will not accept flats that use chain boomers, so this delays the shipment. Containers must be properly blocked and braced before sealing. It is good practice to record the container, refrigerator or flat rack number, and seal number.

Core Shipments

Core shipments are split into two types: sedimentary and hard rock. All sedimentary cores must be shipped in a refrigerator container that will be set at 40ºF (~4ºC). Hard rock cores may be shipped in a dry container. This must be confirmed with the Staff Scientist. If there are both sedimentary and hard rock cores then all of the cores must be put into a refrigerator. All effort to keep a leg's cores together must be attempted. Sediment core shipments should have the freezer strips put on them by the oncoming Curatorial Specialist. There should also be a temperature recorder put into a sediment core shipment if one is available.

Core shipments will be shipped to the appropriate repository depending upon the drilling location. Consult the Staff Scientist, LO, Curatorial Specialist, or MLC if you are unsure. Below are the shipping addresses for the different repositories:

Gulf Coast Repository (GCR)
Ocean Drilling Program (TAMU)
c/o Panalpina
1000 Discovery Drive
College Station TX 77845
USA
ATTN: Robert Mitchell
Phone: 979-845-5780
Fax: 979-845-2374

Bremen Core Repository (BCR)
Ocean Drilling Program (BCR)
Universitat Bremen
Konsull-Smidtstrasse 30, Schuppen 3
D-28217 Bremen
Germany
ATTN: Walter Hale
Phone: 49-421-396-6336
Fax: 49-421-396-6684

East Coast Repository (ECR)
East Coast Repository
Ocean Drilling Program
LDGO
Palisades NY 10964
USA
Phone: 845-365-8446
Fax: 845-365-8178

West Coast Repository (WCR)
West Coast Repository
Scripps Institute of Oceanography
La Jolla CA 92093
USA
ATTN: Jerry Bode
Phone: 858-534-1657
Fax: 858-534-4555

Air Freight

Air freight items are those that will be shipped via air cargo or courier service. Air cargo shipments utilize Air Waybills and courier services utilize tracking numbers.

Air Waybill (AWB): A legal document issued by the airline that is transporting items tendered for shipment. This document is used by the airline to track the item to its destination.

Courier Service: Courier services are companies that specialize in shipping small packages quickly around the world. These are companies such as Federal Express, DHL, UPS, TNT and Airborne Express. Courier services utilize tracking numbers to track these packages. The tracking numbers can be accessed via the World Wide Web to locate where a package is in the shipping stream.

Regular Air Freight

Regular Air Freight (RAF) is defined as air freight shipments being sent to ODP/TAMU and should be addressed as below.

Ocean Drilling Program (TAMU)
c/o Panalpina
1000 Discovery Drive
College Station TX 77845

USA
ATTN: Robert Mitchell
Phone: 979-845-5780
Fax: 979-845-2374

RAF is composed of scientific data, samples, and equipment for repair. This also includes equipment belonging to scientists that reside in the US. If any equipment is to be shipped back to the US it should be shipped through ODP/TAMU. No personal effects should EVER be in RAF. RAF is usually shipped in yellow boxes and cardboard K-boxes.

Please only use the gray plastic K-boxes as a last resort. The empty weight of a gray plastic box is 150 lb and, at a cost of $2 per lb of air freight, it would cost $300 just to ship the empty crate.

Any equipment that is shipped back should have the **Additional Customs Information** filled out on the paperwork. Please remember that the country of manufacture is important information. **NOTE:** There is no country named “other”—therefore, “other” is not acceptable for the country of manufacture. If you cannot find a country of manufacture on an item please default to “Made in USA.”

Foreign Air Freight

Foreign Air Freight (FAF) is defined as any equipment, samples, or personal effects of scientists or MLS(s) that are not living in the USA.

Please consolidate the FAF to as few packages as possible to be sent to the final address. We generally wrap the packages in plastic wrap to provide additional protection while in transit. Address labels are placed directly on the package and also on the plastic wrap.

The freight code used is the closest international **airport code** to the scientists’ or MLS’ **work** address. ODP will pay for the shipping of FAF but cannot help the individual scientist or MLS with Customs service in the different member countries. It is the scientist’s or MLS’s responsibility to clear their shipments through their country’s Customs Service. In addition, check with the scientist about whether there are some specific words in the description that could hinder their shipment from entering their country. Some countries are more restrictive than others.

Since scientists are responsible for clearing their shipments it is good practice to keep the value of samples low because the scientists must pay any duties. A value of $50 per box is good. Do not go lower than $50; otherwise if the package is lost there is little incentive for the shipping company to look for the lost shipment.

Express Shipments

Express Shipments (EXP) are defined as shipments sent via courier services to ODP/TAMU. These shipments mostly consist of prime data and last-minute paperwork. These are items that are shipped according to the **Data Distribution List** compiled by the LO.

Any equipment that needs to be shipped by courier back to ODP/TAMU should be sent separately from other data and should use a different freight code from other express shipments (EXP2). This is to allow for the fastest transit time for prime data. Equipment and electronics can be held up in U.S. Customs.

The address for Prime Data Express Shipments is:

Ocean Drilling Program
1000 Discovery Drive
College Station TX 77845
USA
Phone: 979-845-5780
Fax: 979-845-2374

We have started to send the different types of prime data in different boxes. For example, all photographic items are sent in one box to the attention of John Beck. Also, the Curatorial Notebook is sent in a separate box to the attention of Mimi Bowman, and the prime data is sent to the attention of the Data Librarian (Paula Clark). It is recommended that this practice continue.

Other Shipments

Cold Shipments (Blue Ice)

The Curatorial Specialist is responsible for the packing of samples. The frozen or cold shipments should be completed as much as possible by the off-going crew. The oncoming crew should at most have to add the samples and blue ice and seal the boxes. The sample boxes should be prepared, in place, and ready to receive the samples and blue ice.

The ALO Storekeeper is responsible for the correct addressing and labeling of the shipment. Cold shipments are no different from an FAF shipment except that they are usually in igloos or insulated boxes. You can put the samples and the blue ice into the box ahead of time and weigh it and then remove the samples and blue ice for storage until the port call. This allows you to produce the “Pallet Packing List” ahead of time and affix it to the correct package. These shipments should be shipped directly to scientists in the US. They will be responsible for clearing U.S. Customs. There are labels that say “Keep Cool” and “Do Not Freeze” that should be applied to these packages.

Frozen Shipments (Dry Ice)

Please notify the LO and the MLC as soon as possible if you are going to be shipping samples in dry ice. The Curatorial Specialist can help you determine if there are going to be any dry-ice shipments.

The insulated cardboard shipping boxes are the first choice for any dry ice shipment. If you run out of the cardboard boxes it is okay to substitute the plastic igloos. If the frozen shipment is unusually heavy then please use the plastic igloos for the dry ice shipment.

As a general guideline we use 25 kg (50 lb) of dry ice per insulated shipping box. Dry ice shipments are hazardous shipments and require specific instructions. The boxes should be properly labeled and ready to go. If the samples are in the –80°C freezer then the insulated box should be outside the freezer ready to go. The oncoming crew should only have to add the dry ice and samples and seal the box. The Curatorial Specialist is responsible for making up the insulated boxes and putting the samples in the boxes. The ALO Storekeeper is responsible for labeling, marking, and the paperwork for the dry ice shipment.

The ALO Storekeeper should also place “KEEP FROZEN” stickers on the frozen shipment.

Insulated Box Instructions

The following information is required on the insulated box:

Ship To: Scientist's Address
From: ODP

Print on one side of the insulated box in the upper left corner the following:

Dry Ice (25 kg)
UN1845

Also place a **Class 9 Miscellaneous** sticker on the same side of the box. This is a square label that has black and white stripes on the top half and a "9" on the bottom half of the label.

Paperwork Instructions

The "Pallet Packing List" should have the following information in the Item description area:

Dangerous Goods—Shipper's Declaration not required
Frozen Deep Sea Sediment Samples
Carbon Dioxide, solid
9 UN1845
1 × 25 kg

Hazardous Shipments

Hazardous Shipments are defined as articles or substances which are capable of posing a significant risk to health, safety, or property when transported by land, air, or ocean and are classified according to IATA, IMDG, and 49 CFR regulations. In simple language these are items that are composed of chemicals or are in pressurized containers or are considered dangerous.

If you come upon any item you are asked to ship that you think might be hazardous immediately notify the LO and the MLC. Please **do not** hesitate to ask. Hazardous shipments require training and certification. The MLC will need your help with the shipment but defer the shipment to them.

Hazardous shipments require special packaging, labeling, and additional paperwork. Due to the nature of Dangerous Goods there can be delays in shipping because of special considerations in packaging, labeling, and shipping.

SUGGESTED READING

Guide to Janus Curation, Corelog and Sample for Curators. (McCarty and Weiss, 2004).

H_2S Drilling Contingency Plan, ODP *Technical Note,* 19 (Foss and Julson, 1993). A revision of this document is in press. A web version of this technical note is not available at present, but you may request a hard copy from ODP Publications at **distribution@odpemail.tamu.edu.**

Handbook for Shipboard Sedimentologists, ODP *Technical Note,* 8 (Mazzullo and Graham, 1988). A web version is not available at present. Request a copy from ODP Publications at **distribution@odpemail.tamu.edu.**

Introduction to Shipboard Organic Geochemistry on the JOIDES Resolution, ODP *Technical Note,* 30 (Pimmel and Claypool, 2001). Available from the World Wide Web: <**http://www-odp.tamu.edu/publications/tnotes/tn30/INDEX.HTM**>.

Methods for Quantifying Potential Microbial Contamination during Deep Ocean Coring, ODP *Technical Note,* 28 (Smith et al., 2000). Available from the World Wide Web: <**http://www-odp.tamu.edu/publications/tnotes/tn28/INDEX.HTM**>

ODP Core Lab Cookbook, an in-house manual for new MLS(s). Curatorial Specialist should ask the LO or the ALO to give this to all new MLS(s).

ODP Dictionary, a glossary of scientific and drilling terms. Available from the World Wide Web: <**http://www-odp.tamu.edu/publications/resource.htm**>.

Overview of Ocean Drilling Program Engineering Tools and Hardware, ODP *Technical Note,* 31 (Graber et al., 2002). Available from the World Wide Web: <**http://www-odp.tamu.edu/publications/tnotes/tn31/INDEX.HTM**>.

Physical Properties Handbook: A Guide to the Shipboard Measurement of Physical Properties of Deep-Sea Cores, ODP *Technical Note*, 26 (Blum, 1997). Available from the World Wide Web: <**http://www-odp.tamu.edu/publications/tnotes/tn26/INDEX.HTM**>.

Sample Distribution, Data Distribution, and Publications Policy (Adopted March 1999; revised 1 June 2001, 15 April 2002, 19 August 2002). Available from the World Wide Web: <**http://www-odp.tamu.edu/publications/policy.html**>.

Shipboard Scientist's Handbook, ODP *Technical Note,* 3 (1990). A revised version of this document is in press. A web version of this technical note is not available at present, but you may request a hard copy from ODP Publications via **distribution@odpemail.tamu.edu.**

Table 1. List of Core Laboratory supplies with their ship locations.

DESCRIPTION TABLE SUPPLIES	LOCATION
10% HCl	CHEMISTRY LABORATORY
Desk supplies: pens, rulers, etc.	HS
Glad Wrap cut into thirds (for AMST)	HRS
Glass sample vials with snap lids (16 mL and 8 mL)	LTS
Gloves (for those with jewelry)	LTS
Miscellaneous glassware	LTS
Mounting media (Norland Optical Adhesive)	HRS
Nalgene bottles	LTS
Smear slides, coverslips, and labels	LTS
Toothpicks	LTS
GENERAL CORE LABORATORY SUPPLIES	**LOCATION**
Kimwipes	GYM
Kleenex tissues	GYM
Paper towels	GYM
PHOTO AREA SUPPLIES	**LOCATION**
Bucket (for foam sponges)	HS
Core box staples	HS
Core boxes	CASE
d-tubes	GYM
Filament tape	HRS
Foam sponges	HRS
Polyethylene tape	HRS
d-tube end caps (red)	HRS
Permanent markers (red)	HS
Shrink wrap	HRS
Utility knives	HS
CORE RACK SUPPLIES AT SAMPLE TABLE	**LOCATION**
Bucket (for foam sponges)	HS
d-tube end caps (black)	HRS
Permanent markers (black)	HS
Core box staples	HS
Core boxes	CASE
d-tubes	GYM
Filament tape	HRS
Foam sponges	HRS
Polyethylene tape	HRS
Utility knives	HS
SAMPLING TABLE SUPPLIES	**LOCATION**
10-cm^3 scoops	UTS
5- and 10-cm^3 sample tubes	UTS
5- and 10-cm^3 Ethafoam sample plugs	UTS
Ethafoam rods	HRS
Kapak bags	LTS
Pop-top vials	UTS
Sample bags	UTS

Notes: HS = Hold Stores, HRS = Hold Refrigerator Stores, LTS = Lower Tween Stores, GYM = Cage in Gym (Lower Tween), CASE = Casing Hold, UTS = Upper Tween Stores. Please remember to check out all supplies on the checkout sheets located in each storage area.

Table 2. Example of Precruise Sampling Plan (PCSP).

Specialty	Req #	Request Name	Pre-cruise Site	Hole(s)	Frequency	Age	Depth Range	Lithology	Vol	Shape/Tool	Data Types	Proposed research	Comments	Stuff to resolve (for SAC only)
MBIO	12345A	Smith/Jones/ Johnson	DR-3C, DR-5B, DR-2	B or C	1/core in OAE; 1/2 cores background	OAEs w/low density in background sed.		organic carbon		each "sample" is 1-10 cm wrc, 1-5 cm wrc;		With our multi-proxy approach, we will test whether OAE sediments are strongly enriched in intact polar lipids (Sturt/Hinrichs), markers of living prokaryotes, and sediment-bound gases (Sturt/Hinrichs). Functional genes (Teske) will provide information on the major biogeochemical processes mediated by these prokaryotes	can't tell scheme for special headspace analyses, WRC frozen at -80C; coordinated with Schippers et al;	OAE; need someone on opposite shift, lots of work; #of wrc not clear--verify; freezer space-verify, sterile bags and labels, contam testing?
BIOSTRAT	12346A	Peter/Paul/Mary	Any			Aptian/ Albian, C/T black shales			4		biostrati-graphy, ecology, stable isotopes	Our studies aim at analysing the samples at a high resolution with respect to their content in calcareous nannofossils. The ultimate goal is to understand the fluctuations of calc. nannos during these two intervals with respect to oceanographic changes causing the deposition of black shales. This will be achieved by i. a detailed quantitative analyses of the calcareous nannofossils, ii. measurements of stable isotopes (13C, 18O).	high resolution samples???	OAE

Table 3. Example of Site Sampling Plan.

REQ #	CODE	NAME	DR-8B	DR-3C (DEEP)	DR-5B	DR-2 (SHALLOW)	FREQ	SECS	INTERVAL	VOL	COMMENTS/HANDLING
18308A	SCHIP	Schippers/Neretin		X	X	X	one 10-cm whole round every other core	adj. to IW and STURT WR	5cm PCR, 5cm FISH	353	microbiology: polar lipids, sediment-bound gases, sequences of functional genes
18310A	STURT	Sturt/Hinrichs/Teske		X	X	X	one 15-cm-long whole round at OAE	adj. to IW and SCHIPPER WR	10cm lipids, 5cm Genes,	529	microbiology, biogeochemistry
18318A	MATWR	O'Regan	X	X	X	X	1/lithology, all sites		10cm whole round	353cc	permeablity, consolidation; cap with elec. tape, wax and chill
18301A	NISH	Nishi/Kawahata/Nomura	X	X	X	X	1/section	all		20cc	biostratigraphy (plank/benth forams), paleoceanography. Can use the PAL sample + BIO?
18314A	NOR3	Norris/Nishi/Roehl	X	X	X	X	1-3 cm		P/E	toothpick	biostratigraphy (plank/benth forams), paleoceanography: also using BIO samples
18384A	WISE	Wise	X	X	X	X	2/sec	all		2cc	biostratigraphy (nannos)
18328A	BICE2	Bice/Norris/Hinrichs	X	X	X	X	1/core		late Eocene-Albian	40cc (quarter core)	paleoceanography, geochemistry; FREEZE ENTIRE SAMPLE (-20C freezer)
18334A	EPHIL	Sexton	X	X	X	X	every 2 cm		mid Eocene	toothpicks	paleoceanography, geochemistry Staff Scientist to talk to Paul/Phil
18339A	WILE	Wilson/Erbacher/Norris	X	X	X	X	1 every 2 cm		OAE-2, OAE-1d	toothpick	paleoceanography, geochemistry; also using BIO samples; no trace elements- overlap with Brumsack.
18357A	HATH	Hathorne					10 samples total		LPTM, E/O	10cc	geochemistry
18316A	BOE	Brumsack/Boettcher	X	X	X	X	all pyrites and barite concretions			10 cc	major and minor elemental comp of 34S of sulfate
18320A	FORS	Forster/Damste/Brumsack		X		X	1/section		Aptian- Campanian	5cc	geochemistry; FREEZE (-20C) IN KPAKS; discussion to take place in OAE meeting;
18294A	MEY	Meyers	X	X	X	X	5 samples (3 above, 3 below, 3 within black shale)		OAE-2	20cc	geochemistry; SAC will ask Meyers to clarify his request
18294A	MEY	Meyers	X	X			5 samples (3 above, 3 below, 3 within black shale)		OAE-3	20cc	geochemistry; SAC will ask Meyers to clarify his request
18321A	HEN	Henderiks		X	X	X	1 to 2 per core		carbonates to TD	10cc	sedimentology; MUST DISCUSS WITH MUTTERLOSE.
18336A	OGG	Ogg	X	X	X	X	1 to 2 per sec + oriented thin sec blank		Cenomanian and older	10cc (billets) + 20cc	sedimentology, geochemistry
18297A		Grevemeyer/Villinger	X	X	X	X					data only (temperature)

4. Whiteboard spreadsheet.

Sample Code	Frequency	Sec	Interval	Volume	Comments
PMAG	1/SECT		85-87-cm	6cc	PMAG to sample & enter data; oriented PMAG cube
PP	1/SECT		75-77cm	10cc	PP to sample & enter sample data
BIO	1/SECT		65-67cm	10cc	GROUP SAMPLE; no unusual lithologies
BIO	1/SECT		67-68cm	2cc	GROUP SAMPLE; no unusual lithologies
CARB	1/CORE	5	77-78cm	2cc	ADJACENT to PP
TSB	as needed			4-6cc	SED TO FLAG; use correct TS Billet size
XRD	as needed			5cc	SED TO FLAG as needed
ROUTINE					
OGG	2-3/CORE		30-32cm	10cc	PMAG. 10cc tube MUST BE ORIENTED TO TOP OF CORE!
LEON	2-3/CORE		120-122cm	10cc	PMAG. 10cc tube MUST BE ORIENTED TO TOP OF CORE!
PAUL	1/CORE	3	140-145cm	10cc	ADJACENT to IW in IW cores
BARK	1/CORE	3	135-140cm	10cc	KPAK bag; put in FREEZER immediately
PLE	1/CORE	5	55-60cm	20cc	Avoid unusual lithogies; NO cherts, sands, turbs etc.
BLO	2/CORE	3,5	40-42cm	10cc	Rads; from 0 mbsf to T.D. Will flag chert intrvls as needed
BIOSTRAT/ ISOTOPE					**NOTE: AVOID UNUSUAL LITHOLOGIES FOR ALL BIOSTRAT**
KATZ	1/SECT		25-30cmm	20cc	Forams; Top down to upper Paleocene (p5); STOP CORE#______
PAK	1/SECT		100-105cm	20cc	Forams; Top down to upper Paleocene (p5); STOP CORE#______
GUE	1/CORE	3	50-55cm	20cc	OSTRACODS; Top down to just above K/T STOP CORE#____
BRINK	3/CORE	1,3,5	15-20cm	20cc	DINOS; Eocene to top of Maastr. START CORE#_____STOP CORE#
NOR	1/10CM			.25cc	Paleocene/Eocene boundary core (s) Dick to flag
WID	1/SECT		110-115cm	20cc	FORAMS; Maastr - Campanian. START CORE#______
ERB	3/CORE	2,4,6	35-40cm	20cc	FORAMS; Upper Campanian to T.D. START CORE#________
PAUL	3/CORE	2,4,6	90-92	10cc	Aptian/Albian; START CORE#_______
SELECTIONS					
HOL	as flagged			10cc	CLAY poor intrvls; MaryAnn to flag; Thomas opposite
HOL	as flagged			20cc	CLAY rich intrvls; MaryAnn to flag; Thomas opposite
PLE	as flagged			10-20cc	clay rich intrvls; Thomas to flag; MaryAnn opposite
WAT	as flagged				Hardgrounds; David to flag and sample
BARK	as flagged			10ccc	Organic intrvls; Kpak bag/double bag w/label inside/Freezer

Table 5. Example of Chemistry Sampling Plan.

REQ #	CODE	REQ NAME	VOL	Container	Additive	Storage	PROPOSAL
	IW TRIMMINGS						
	IWTK		any leftovers				
	IW SQUEEZED CAKES						
Shipboard analysis	IWSG	Organic Geochem	6cc				Shipboard analyses: various org. geochem.: CNS, $CaCO^3$, Rock Eval
18316A	IWSB	Brumsack/Boettcher	30cc	plastic bag			major and minor elements by XRF, ICP-MS 34S on pyrite, AVS, barite; also request any pyrite or barite concretions
	IW SPLITS						
Shipboard analysis	IWPA		3ml	plastic	acidified, HCl		alkalinity
Shipboard analysis	IW		5ml				salinity, chlorinity, ammonium, K, Ca, SO_4, Ba, Fe, Mn, Mg, Cs, PO_4, Sr, Rb, B, Li, Si
18316A	IWBS	Brumsack/Boettcher	5-10ml	glass	Zn acetate		S isotopes (34S of sulfate, 34S of sulfide, 18O of sulfate)
18316A	IWBE	Brumsack/Boettcher	10-15ml	screw-top plastic bottles		refrigerate	elemental analysis (Mn, Fe, Ba, Br, B, I), minor ion concentrations
18354A	IW3	Malone	3ml	glass			H, O, and Cl isotpes
18354A	IW2	Malone	2ml	plastic			strontium, boron
18323A	IWH	Hinrichs/Hayes/Spivack	5-10ml	screw-top plastic bottles		freeze –20ºC	volitile fatty acids, carbon isotopic comp. of acetate and other fatty acids

NOTES:
1. IW Sampling Frequency: ~one 5–10-cm IW per core at all sites but top 70 m of DR-2 (where will take three 5-cm/core for Mitch Malone).
2. ALL IW SAMPLING IN CRITICAL INTERVALS IS SUBJECT TO CO-CHIEF/STAFF SCIENTIST APPROVAL.
3. BRUMSACK/BOETTCHER (18316A) asks for 10-cm half round (instead of standard 5-cm whole round) in critical intervals.
4. HATHORNE (18357A) requested 5 ml for Li isotopes; Mitch suggests that water will not be availabe at resolution or intervals requested, so this request is not listed on spreadsheet.
5. MALONE (18354A) requests IW sampling of 3/core in upper 70 m (Neogene) at DR-2 (shallow/last site).

Table 6. Typical sample volumes.

Sample Type	Volume/Length
Thin section billets	Standard: 10 cm^3
Thin section billets	Oversized: 50 cm^3 (for large-grained plutonic rocks)
Alkenone (Uk37)	5 cm^3
X-ray diffraction (XRD)	5 cm^3
Inductively coupled plasma (ICP)	10 cm^3
Carbonate	2 cm^3
Paleomagnetism–cubes	7 cm^3
Paleomagnetism–minicores	12 cm^3
Paleomagnetism–U-channels	600 cm^3
Moisture and density	10–20 cm^3
Grain size	10–20 cm^3 (depending on coarseness)
Planktonic foraminifers	10 cm^3
Benthic foraminifers	10–20 cm^3
Nannofossils	2 cm^3
Diatoms	5–10 cm^3
Radiolarians	10 cm^3
Palynology	10–15 cm^3
Organic samples	20 cm^3
Interstitial pore waters whole rounds	5–20 cm long (based on water content)
Inorganic geochemistry	10 cm^3
Organic geochemistry	10 cm^3
Sedimentology	10–20 cm^3
Slabs (for laminae studies)	25–50 cm^3 (depending on slab length)
Slabs (large-grained plutonic rocks)	50–100 cm^3 (often shared by scientists for multiple analyses)
Stable isotopes (C, O)	10–20 cm^3

Table 7. Sampling tools and procedures.

Tool	Volume/Size	Comment	Material
sample tubes, small*	2–5 cm^3 tube	A single punch fills the tube halfway, yielding a volume of about 3 cm^3, a second punch fills it to 5 cm^3. It is given a 1- or 2-cm interval, depending on the volume taken and how the second punch was inserted (side by side = 1 cm, adjacent = 2 cm).	soupy or consolidated sediment
sample tubes, large*	10–cm^3 tube	A single punch fills the tube halfway, yielding a volume of about 10 cm^3, a second punch fills it to 20 cm^3. If a 10-cm^3 sample is taken the sample is given a 2-cm interval; if 20 cm^3 is taken, it is given a 5-cm interval (the tube is actually 2.5 cm wide, but we enter only whole intervals; generally, the larger tube is not used side-by-side).	soupy or consolidated sediment
plastic scoops**	5 cm^3 and 10 cm^3**	Small scoops are useful when trying to preserve 2/3 of core for later high-resolution sampling. Note: there is some contamination on the edges of these samples.	soupy or consolidated sediment
stainless steel scoops***	20 cm^3, 40 cm^3, 100 cm^3	The larger metal scoops are sturdy and can be used for organic geochemistry sampling when the use of plastic is not desirable. They can also be gently pushed or hammered into semi-lithified sediment instead of a using a hammer and chisel	soupy or consolidated sediment; semi-lithified sediment
plastic sample cubes, standard	2" × 2" × 2" (same in all dimensions, aka “French” cube)	The bottom of the PMAG cubes are predrilled and premarked with directional arrows. The standard ODP cube volume is somewhere between 6 and 7 cm^3 but is recorded in Janus as 7 cm^3. Place the cube open-side-down with arrow pointing to the top of the core and then press down with both thumbs, applying equal pressure across its surface. Remove the sample from the core with spatula(s), trying not to disturb the material in the cube. Gently scrape or break off the material from the bottom of the cube with a clean spatula. Clean the cube and cap. Always place a handwritten label on the cube itself and not the cover. Putting the label over the hole in the lid will slow evaporation from the sample. Let the paleomag MLS know about how many PMAG cubes will be needed for the cruise and when supplies are running low. PMAG cubes are also used to take fabric study samples (phys props samples) in soft sediment. Hand label fabric study samples as you would PMAG cubes. Place cube in a sealed pop vial. Place the pop vial and a moistened sponge in a 4	paleomagnetic samples and fabric studies
plastic sample cubes, small	1 cm × 1 cm × 1 cm	Generally used for sampling across magnetic transitions and for high-resolution sampling. The paleomag MLS should prepare the plastic cuvettes. The cuvettes must be cut down to a 1-cm cube, the burrs cleaned off, and a tiny hole drilled in the bottom. A slip of parafilm is used to seal the sample inside the cube.	paleomagnetic high-resolution sampling
minicorer	10–12 cm^3	In harder materials, paleomagnetists often prefer to take minicores (cylindrical samples taken with the drill press). It is also not uncommon for scientists to request minicores for geochemical or petrological studies. All drilled PMAG samples should be marked with a directional arrow before drilling. Slice off the bottom of the PMAG minicore using the rock saw. Return the slice to the core. Place all drilled samples in pop vials. Vials should be taped and have a computer-generated label on the outside.	paleomagnetic (and sometimes geochemical/ petrological) samples

vertical minicores	variable	These are generally requested for sonic velocity measurements. It is important that the samples are cut in materials that do not contain fractures or veins. Samples should be oriented with respect to the top of the core. At times, vertical minicores can be requested from whole rounds. In this case, each sample must be preapproved by the SAC in the same way that Physical Properties whole rounds need the SAC approval.	30–50 cm^3
parallel bladed saw	12 cm^3	Make sure the sample is marked with a directional arrow. In lithified sediment and basalt, sonic velocity samples are often cut on the parallel saw.	sonic velocity and paleomagnetic samples
hammer and chisel	variable	Metal hammer and chisels are ok for most samples. Check to be sure. Always use a plastic chisel at the K/T boundary and other geochemically significant locations (as defined by the SAC).	lithified sediment, igneous and metamorphic rock
rock saw	variable		lithified sediment, igneous and metamorphic rock

Note: PMAG = paleomagnetic, PP = physical properties, SAC = Sample Allocation Committee.

Table 8. Standard laboratory codes for shipboard analyses or routine archiving.

Laboratory Code	Description
BIO	biostratigraphy, taken on catwalk from cuts between sections
CARB	carbonate analysis
DML	clay swelling tests for downhole logging
HS	analysis of headspace gases, taken on catwalk
ICP	inductively coupled plasma
IW	whole round for interstitial water, taken on catwalk
MBIO	whole-round microbiology, taken on catwalk
NANNO	Nannofossil biostratigraphy
PAL	from core catcher for biostratigraphic dating, taken on catwalk
PMAG	oriented sample taken for paleomagnetic analysis
PP	whole round taken for physical properties analysis, cut from whole rounds after MSTing
SCRAPE	cut face scrapings from sections; used when material is especially critical (e.g., K/T boundary)
SS	smear slides for descriptions
STRX	oriented samples taken for structural analysis
TOC	total organic carbon
TSB	thin section billet
TSS	thin section slides, entered by Curatorial Specialist after TSB is made into thin section slide
VP	*P* -wave velocity
XRD	X-ray diffraction analysis
XRF	X-ray fluorescence analysis (XRF machine no longer on board *JOIDES Resolution*)

Table 9. Summary of all curatorial materials and their delivery methods.

	METHOD OF DELIVERY				
CURATORIAL MATERIAL	**E-mail to Curator**	**E-mail to Core-Receiving Repository**	**Express Ship to Curator**	**Express Ship to Core-Receiving Repository**	**Regular Air Freight to Core-Receiving Repository**
Sample Shipment	X	X			
Core Box Inventory	X	X			
Thin Section Inventory	X	X			
Curatorial Report with Action Items	X	X			
FCSP	X	X			
Curatorial Notebook			X	X	
CD with Curatorial Notebook files			X	X	
CD with DIS composite images				X	
Black-and-white whole-core photos				X	
Thin sections				X	
All nonrequested smear slides					X
All nonrequested residues					X

Notes: FCSP = Final Cruise Sampling Plan, CD = compact disk, DIS = digital imaging system. See **"MLC Shipping Guidelines"** in "Appendixes" for detailed information on delivery methods.

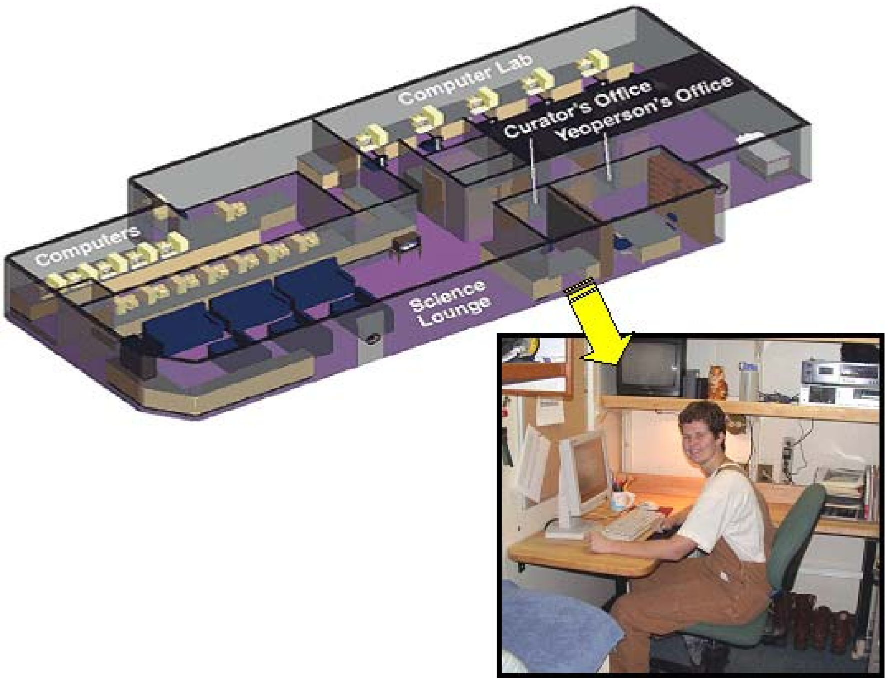

Figure 1. Curatorial office.

Figure 2. Digital datalogger without probe for core shipments.

Figure 3. Digital datalogger with probe for frozen shipments.

Figure 4. Disposable temperature chart recorder for refrigerated shipments.

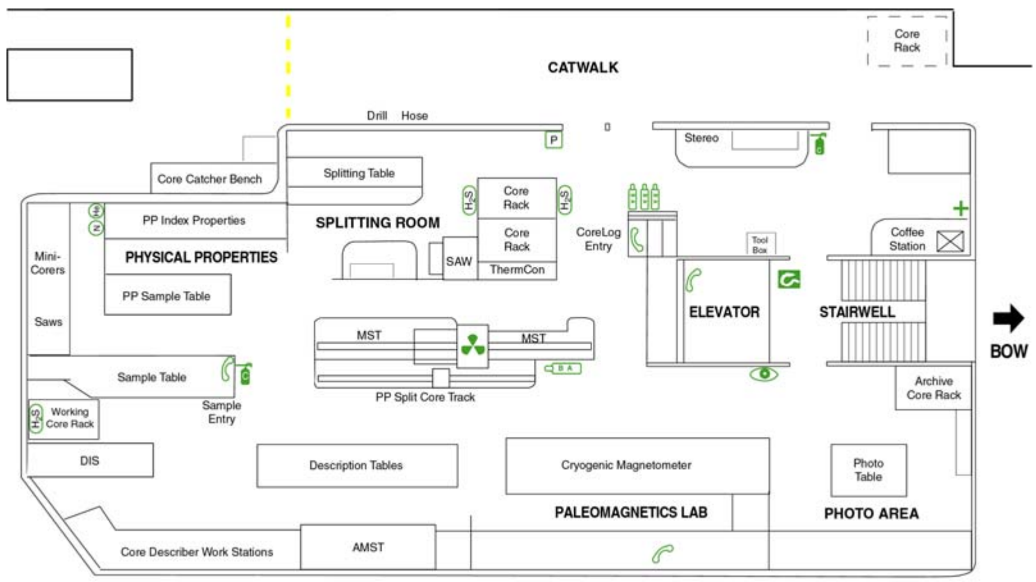

Figure 5. Core Laboratory layout.

Figure 6. Core receiving platform.

Figure 7. Core entry whiteboard.

Figure 8. Splitting room.

Figure 9. Sample table.

Figure 10. Sample table supply area (under table).

Figure 11. Description tables.

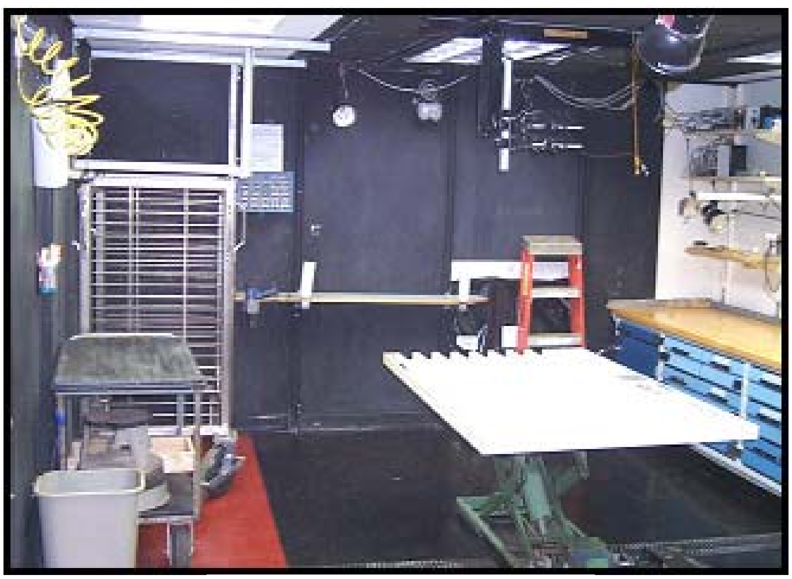

Figure 12. Photo area.

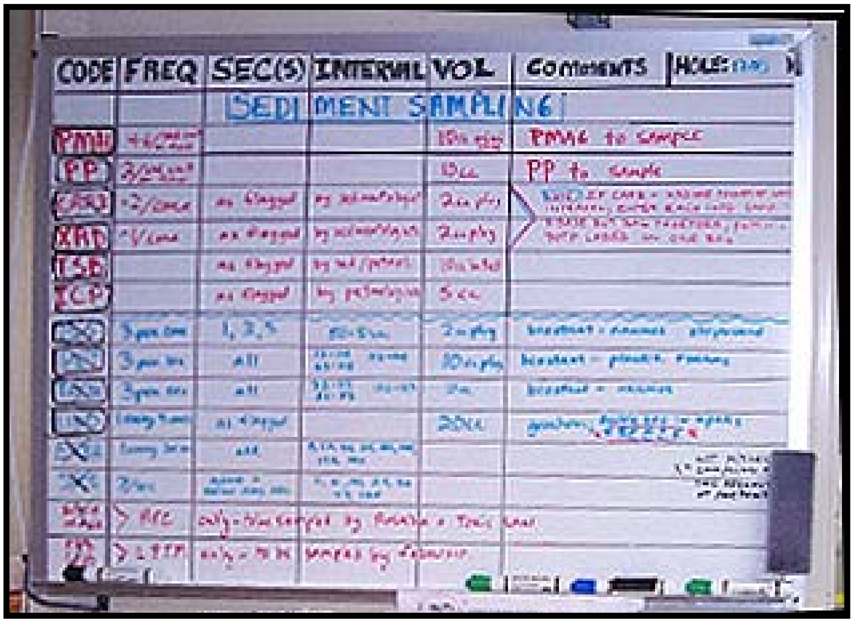

Figure 13. Handwritten sample whiteboard.

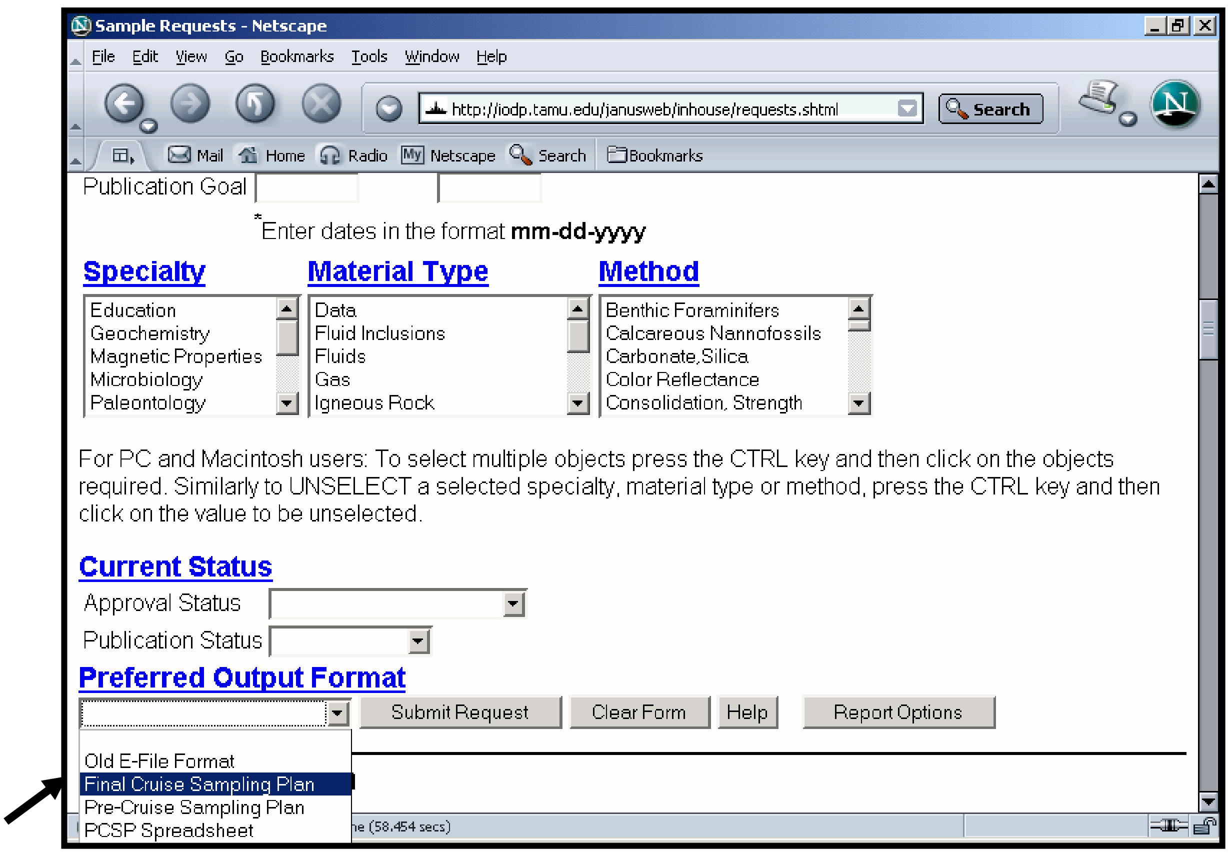

Figure 14. Janus Final Cruise Sampling Plan (FCSP) data request form.

Request Number: 17621A
Request Type: ShipShiSci
Request Status: Approved
Request Name: **FREY/HUANG**

Frederick A. Frey
Department of Earth, Atmospheric and Planetary Sciences
Massachusetts Institute of Technology
77 Massachusetts Ave
Cambridge, Massachusetts 02139
USA
Phone: (617) 253-2818
Fax: (617) 253-7102
e-mail: fafrey@mit.edu

Shichun Huang
Massachusetts Institute of Technology
Cambridge, Massachusetts 02139
USA
e-mail: shuang@mit.edu

Proposed Research
Huang and Frey desire to obtain a comprehensive geochemical data set for all igneous flow units at a subset of the sites. Our data set would include major and trace element abundances by XRF, trace element abundances by ICP-MS and INAA, and isotopic ratios of Sr, Nd and Pb determined by TIMS. We are aware that other shipboard scientists have similar capabilities/objectives; hence, we would propose to study samples from one of the three proposed drilling groups; perhaps group 3 (we anticipate that assignment of specific sites to shipboard scientists will be sorted out by shipboard discussions after drilling is completed.) **10/12/01 UPDATE, (POST-SHIPBOARD PETROLOGY GROUP MEETING): Major and trace elements, Sr-Nd-Pb isotopes for all basement units at one of the volcanoes.**

SAMPLING PROGRAM

Leg	Precruise Sites	Site Num	Hole	Sample Code	Lithology	Depth/Interval	Frequency	Volume
197	Detroit	1203	all	FREY	basement	all	1–3 samp/igneous flow unit	50
197	Detroit	1204	all	FREY	basement	all	1–3 samp/igneous flow unit	50
197	Koko	1206	all	FREY	basement	all	1–3 samp/igneous flow unit	50

SAMPLE CODES AND SAMPLE COUNTS

Sample Code	Description	#Samples:
FREY	geochem (maj & trace elements, Sr-Nd-Pb isotopes)	84

Total Number of Samples: 84

Figure 15. Example of of FCSP document generated from data entered into Janus Curation.

Figure 16. Removing core from core barrel.

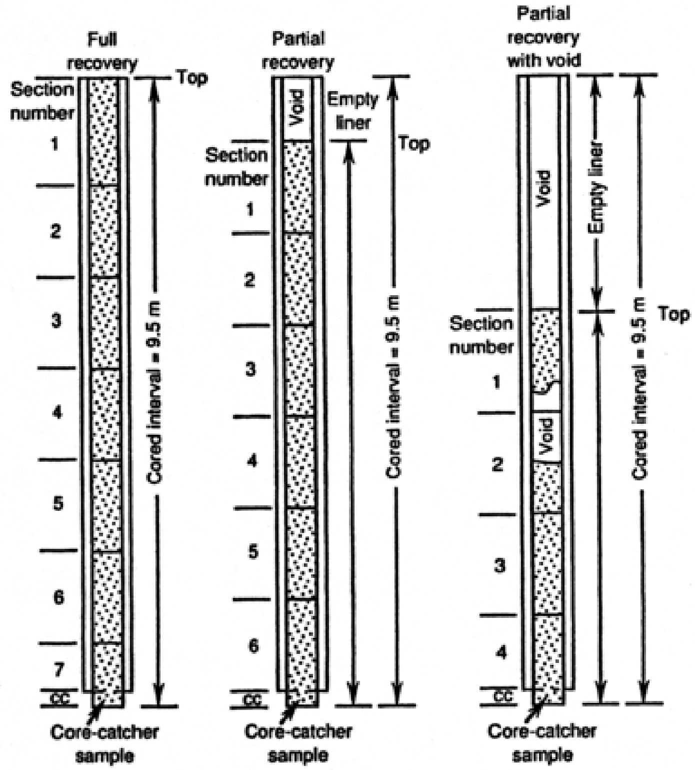

Figure 17. Core recovery.

Figure 18. Drilling holes in liner.

Figure 19. Face mask with mud.

Figure 20. Discarded shattered liners.

Figure 21. "Packrat" hydrogen sulfide (H_2S) monitor.

Figure 22. H_2S core handling.

Figure 23. Drill crew with self-contained breathing apparatus (SCBAs).

Figure 24. H_2S core splitting.

Figure 25. Paleontology spacer in split core.

Figure 26. Headspace gas sampling.

Figure 27. Free gas sampling with vacutainer.

Figure 28. Cutting an interstitial water (IW) sample.

Figure 29. Carver Press for squeezing interstitial water.

Figure 30. Scribing a liner.

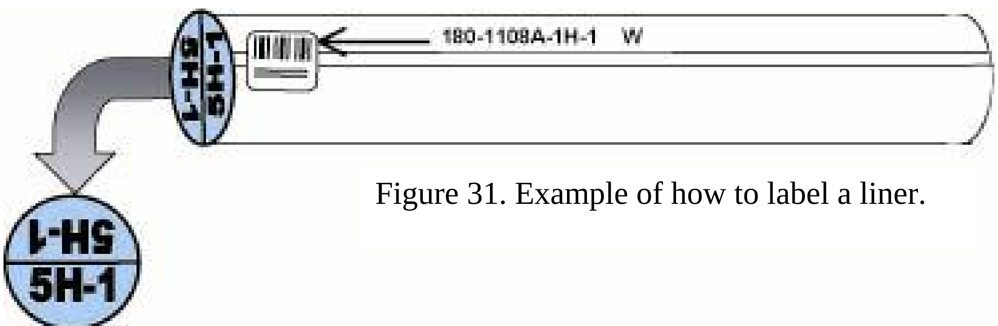

Figure 31. Example of how to label a liner.

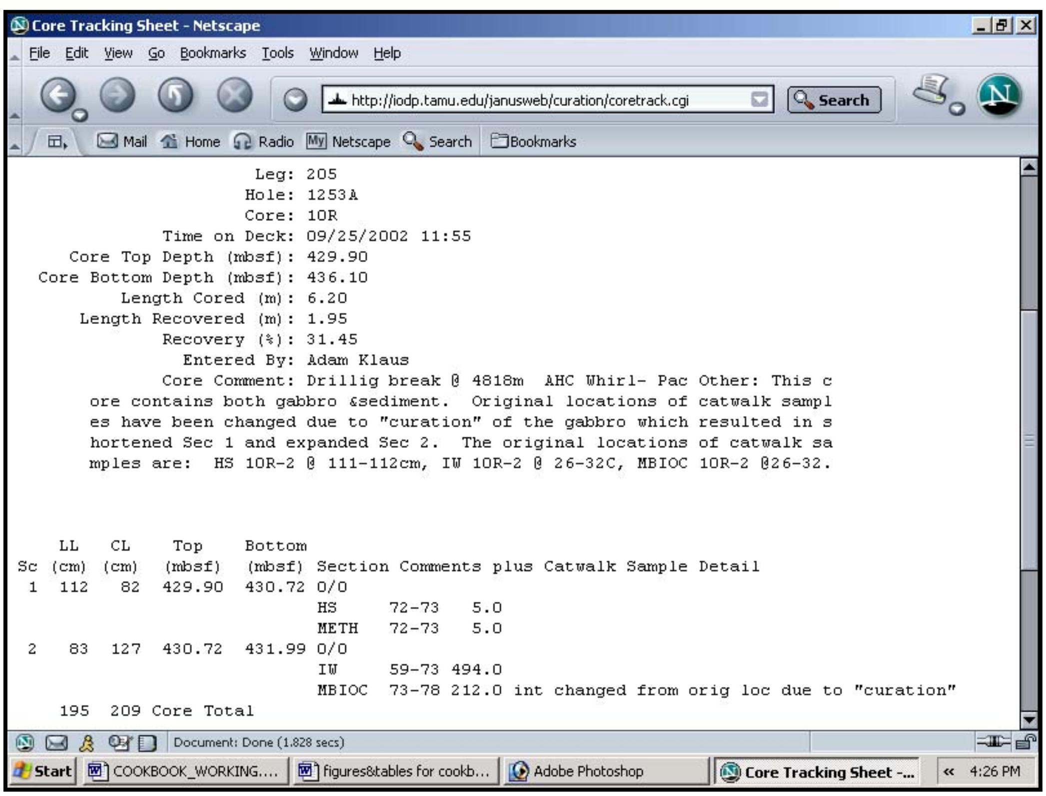

Figure 32. Example of a Core Tracking Report.

Figure 33. Multisensor track.

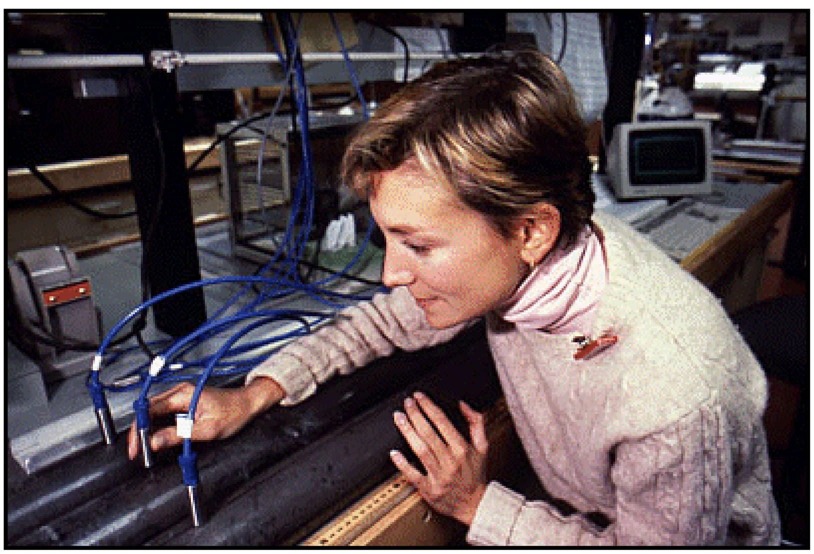

Figure 34. Measuring thermal conductivity.

Figure 35. Digital imaging system.

Figure 36. Archive multisensor track.

Figure 37. Whole core photography.

Figure 38. Measuring sonic velocity and shear strength.

Figure 39. Sampling for index properties.

Figure 40. Index properties beakers.

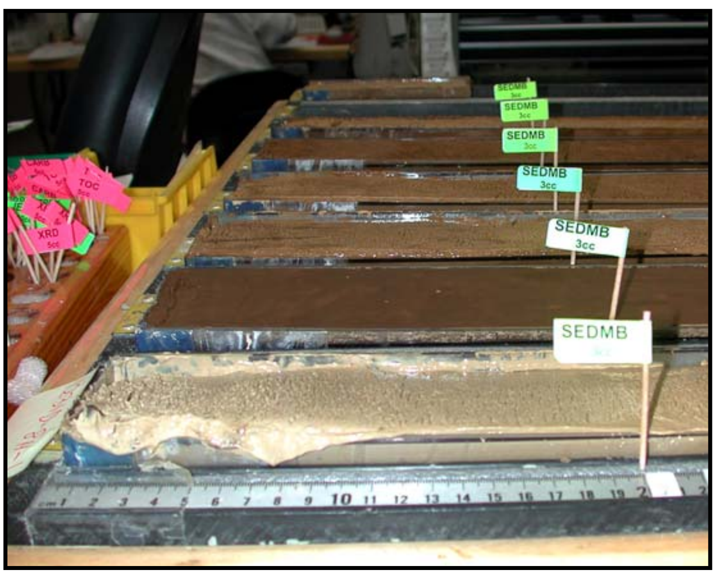

Figure 41. Core flagged core for samples.

Figure 42. Pressure core barrel staying cool in ice container.

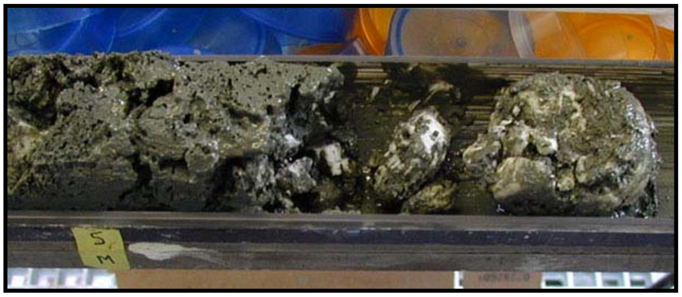

Figure 43. Clathrate example 1.

Figure 44. Clathrate example 2.

Figure 44. Infrared camera for detecting clathrates.

Figure 46. Piecing together hard rock.

Figure 47. Hard rock ready for splitting line.

Figure 48. Hard rock core with hatch marks.

Figure 49. Rock saws.

Figure 50. Hard rock split and ready for labels.

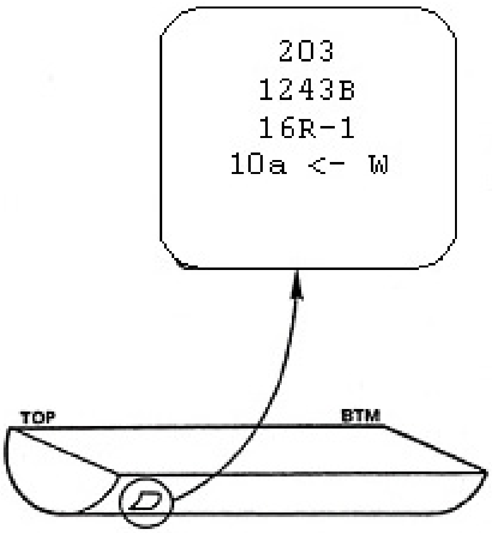

Figure 51. Example of hard rock piece label.

Figure 52. Brady printer for hard rock labeling.

Figure 53. Hard rock label glueing.

Figure 54. Hard rock bin labeling on small pieces.

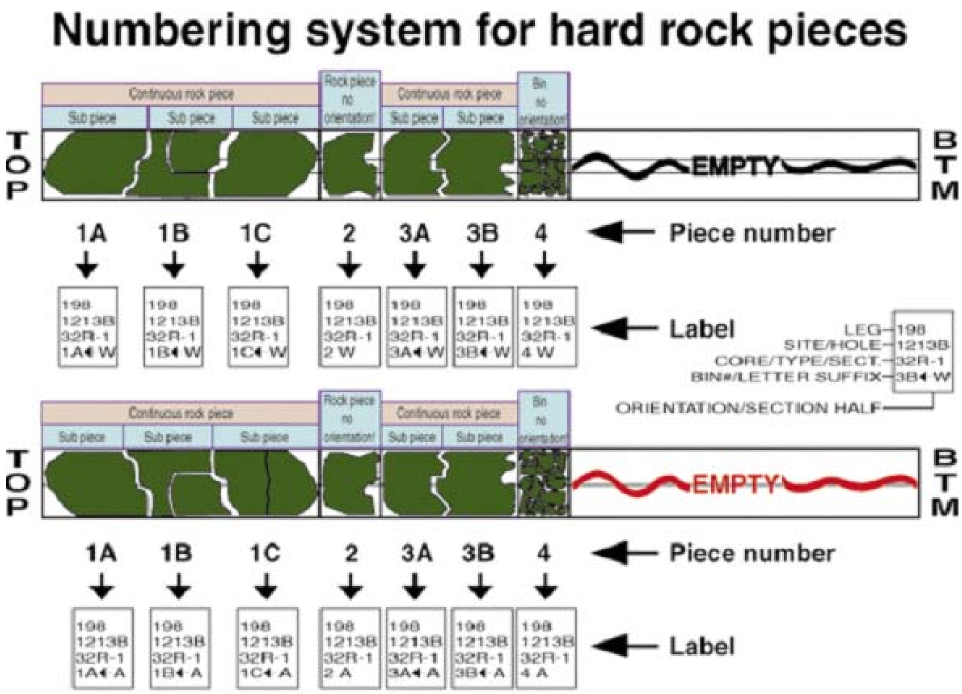

Figure 55. Hard rock labeling: numbering system.

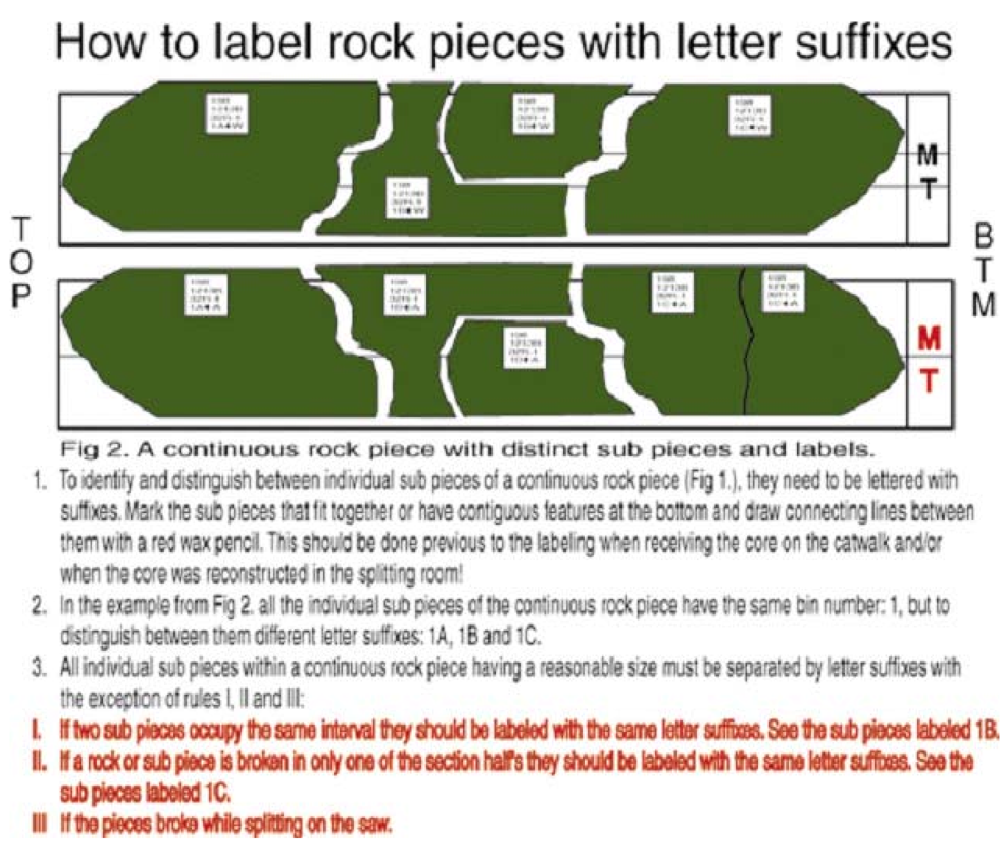

Figure 56. Hard rock labeling: letter suffixes.

Figure 57. Thin section laboratory.

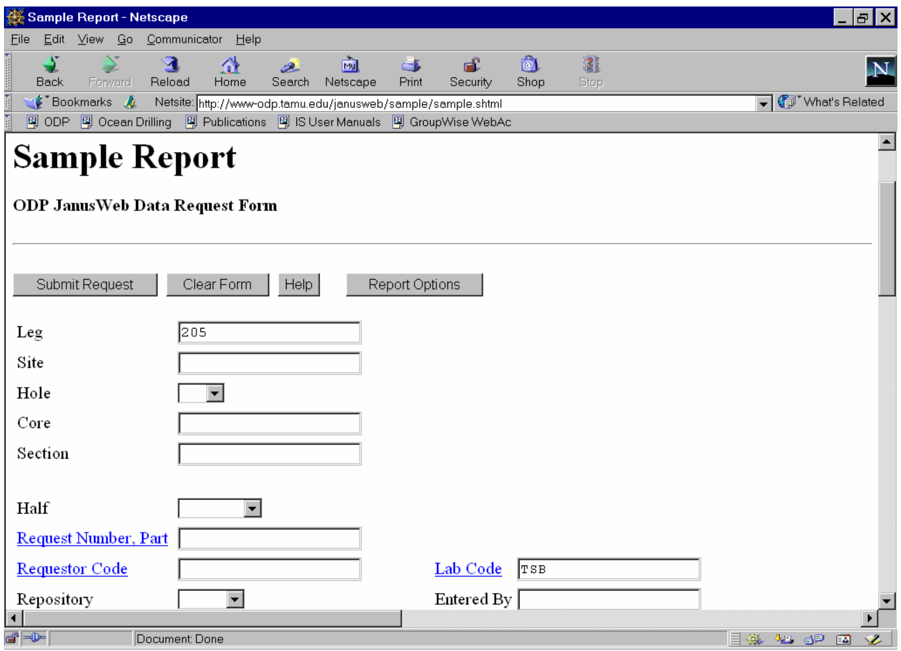

Figure 58. Sample Report data query.

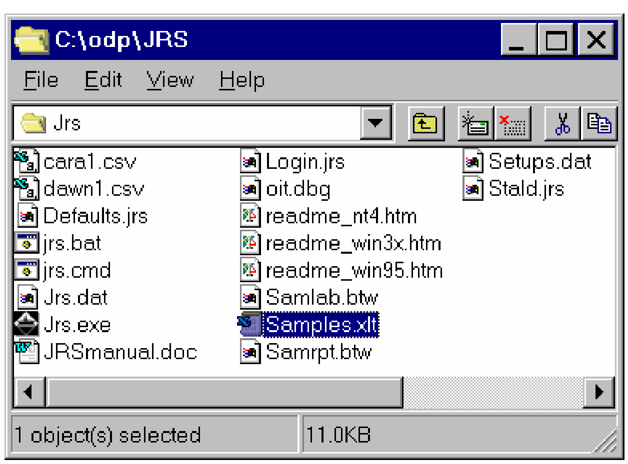

Figure 59. Samples.xlt in JRS directory.

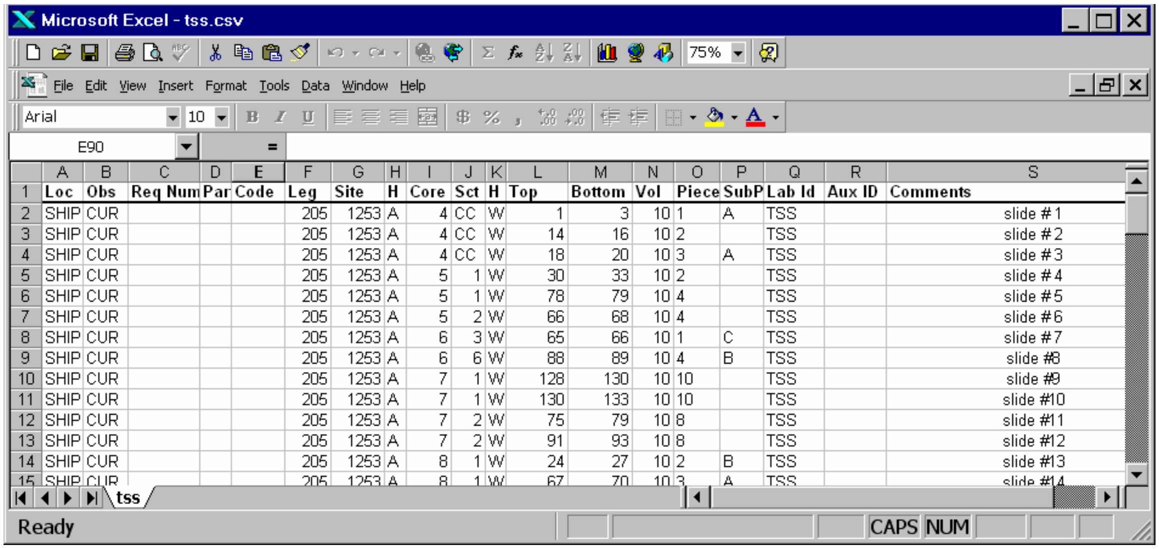

Figure 60. TSS.csv.

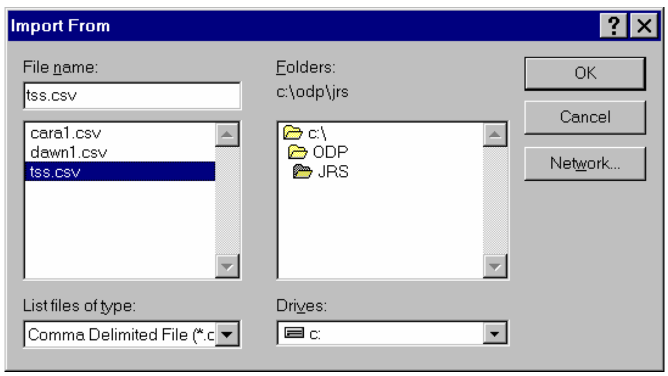

Figure 61. Template menu showing “Import From” window.

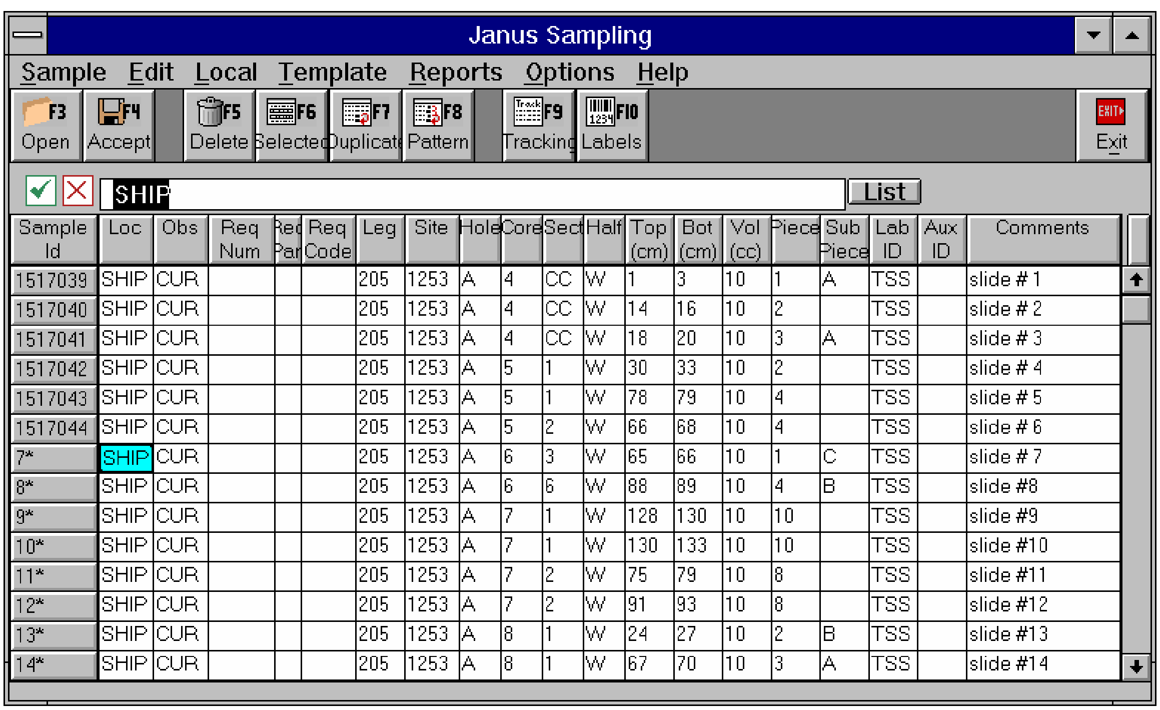

Figure 62. TSS.csv data loaded into JRS template.

Figure 63. Hard rock sampling party.

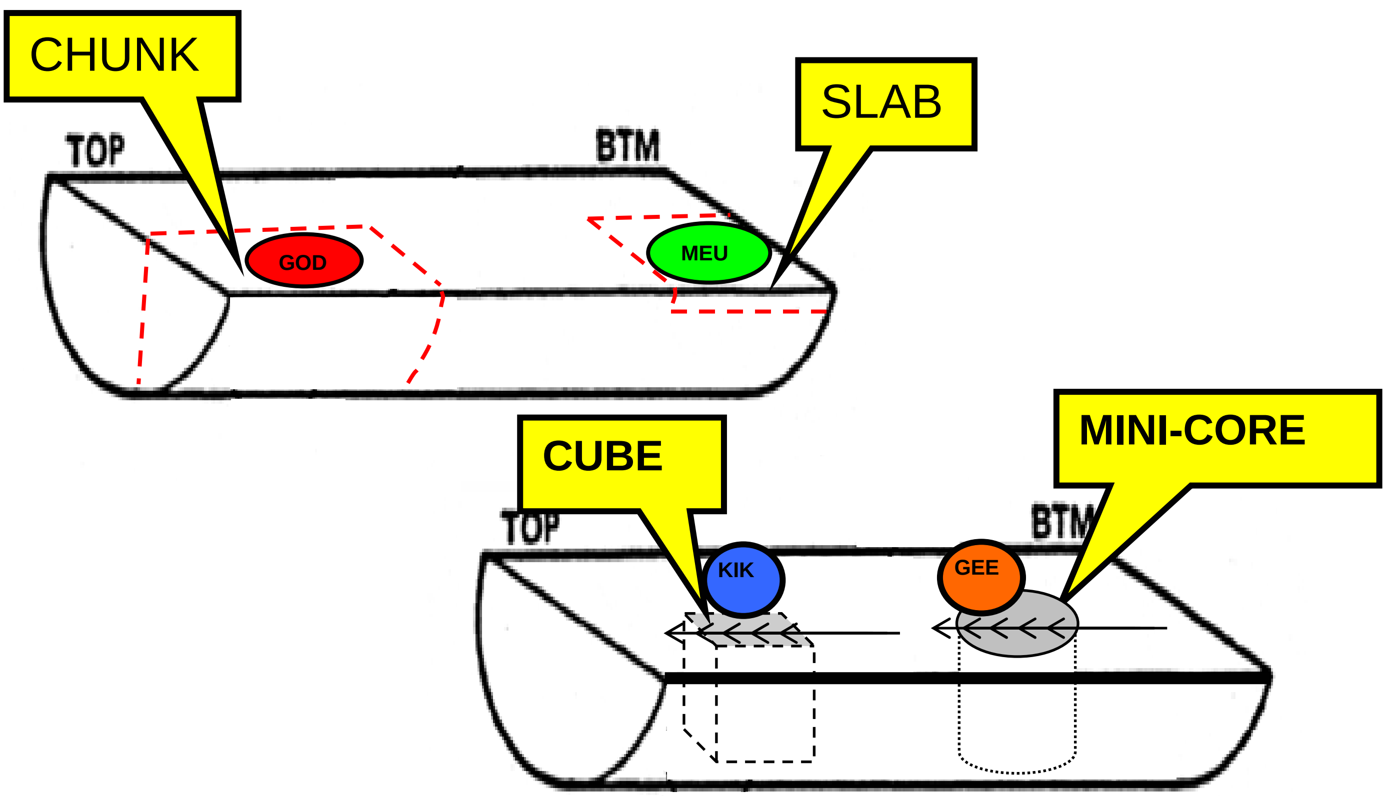

Figure 64. Sampling party labeling diagram.

Figure 65. A heavily requested set of hard rock cores.

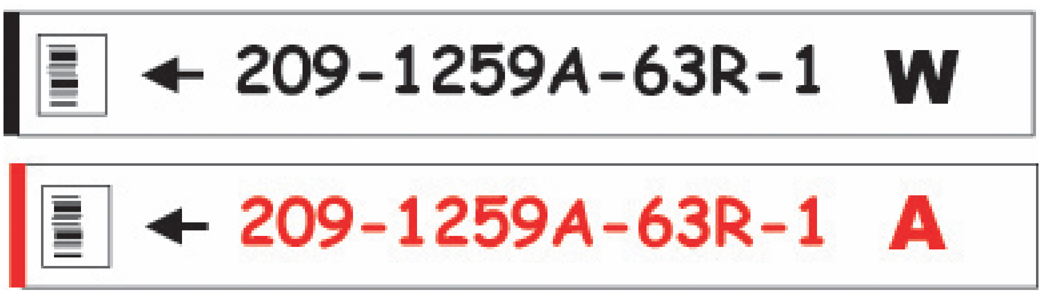

Figure 66. D-tube labeling example.

Figure 67. Back at the core repository.

Figure 68. Marine Laboratory Specialist (MLS) boxing core.

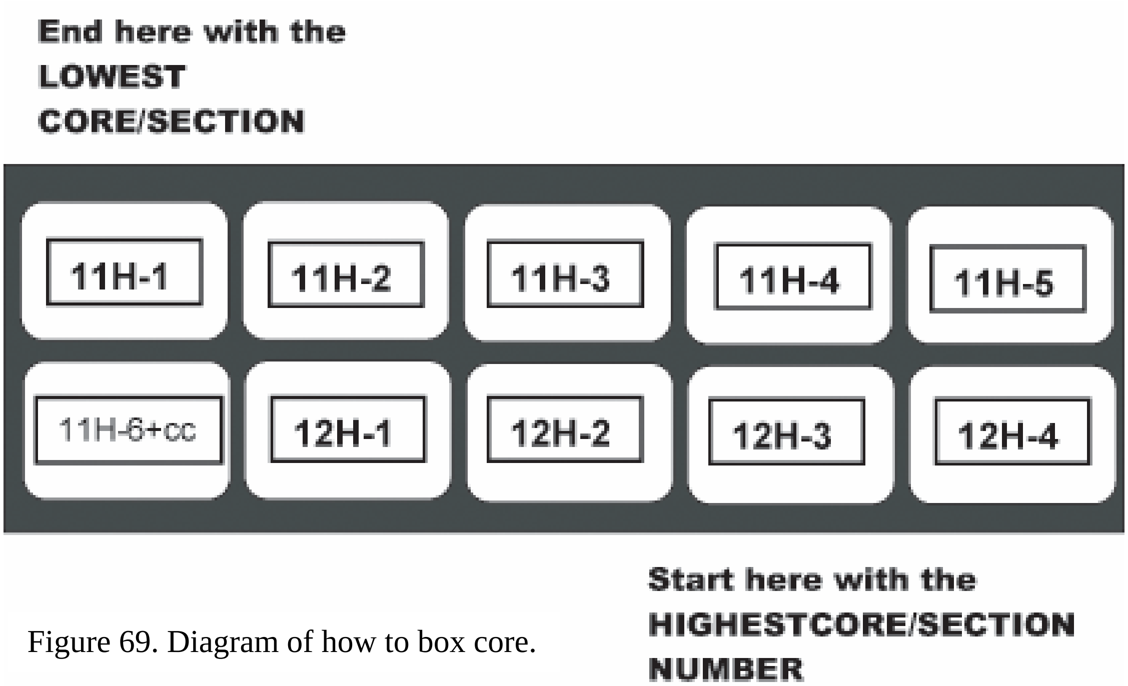

Figure 69. Diagram of how to box core.

Figure 70. Example of core box end labeling.