The ODP
Core Lab Cookbook

Version November, 03

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I. INTRODUCTION

The ODP Core Lab Cookbook is intended to guide Marine Laboratory Specialists (Techs) sailing onboard the *R/V JOIDES Resolution* in basic core lab procedures. All Techs assigned to the core lab share the responsibility of processing core and maintaining the lab. Below is a drawing of the core lab to help illustrate the procedures described in this Cookbook (see Figure 1).

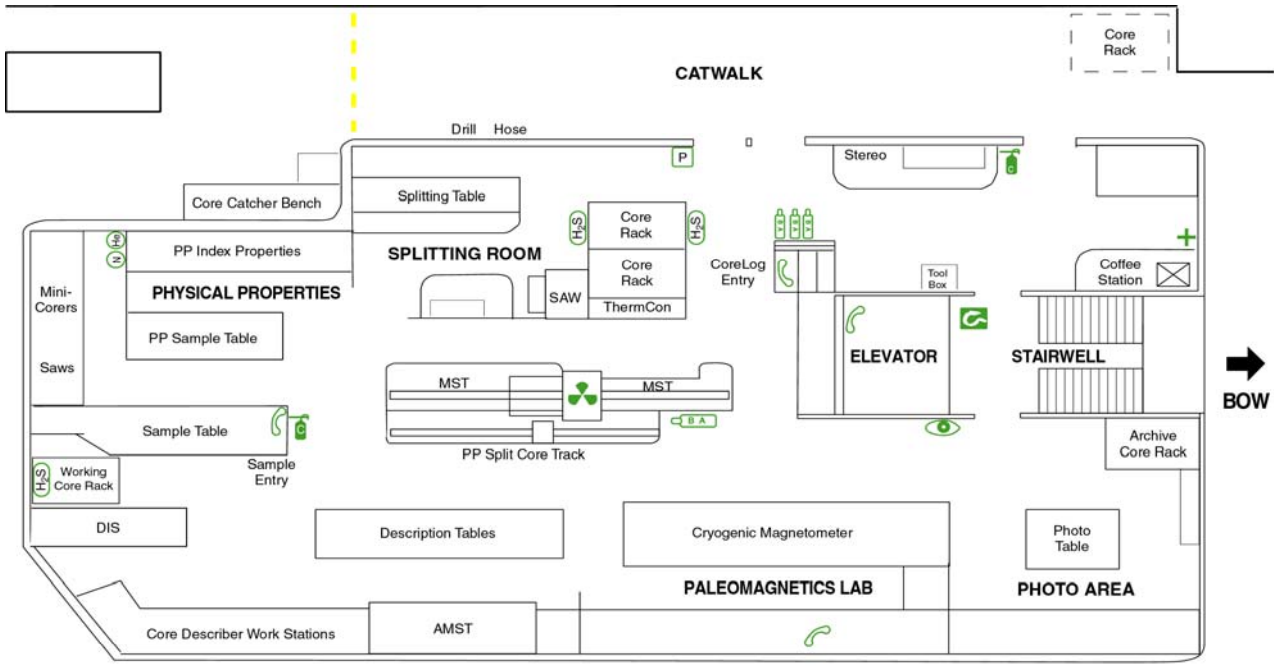


Figure 1 – Core Lab (Bridge) Deck

II. SUPPLYING THE LAB

At the beginning of a leg the lab should be fully stocked and stock levels maintained during the leg. Supplies can be obtained from Upper Tween, Lower Tween and Hold stores, Hold reefer, and Casing Hold. Please remember to check out all supplies on the check-out sheets located in each storage area. In the core entry area there is a list of supplies for the core lab and where they are stored. Following is a detailed list of the supplies needed for the each area:

Catwalk Supplies

- clear, blue, and yellow end caps
- acetone in red squirt bottles (with "acetone" label), with siphon tube removed.
- clean, absorbent rags

- wooden meter sticks (~149cm)

- 4" stainless steel spatulas
- permanent red and black markers
- chisel and mallet for harder sediment and hard rock
- liner puncture tool or drill for gassy sediments
- hammer, hacksaw, plunger, core catcher tools
- china markers for hard rock and marking liners on wet days
- cutters (for core liners) with good blades
- nitrile gloves, various sizes (bin by catwalk entry door)
- safety glasses (bin by catwalk entry door)
- hearing protection (bin by catwalk entry door)

These supplies must be clean. Meter sticks should be trimmed slightly short to yield 150 cm core sections. Rusty tools should be cleaned or replaced -- a small amount of rust can ruin core material for paleomagnetics. Also, non-magnetic drill bits must be kept available for releasing pressure from gassy cores.
The chem techs provide their own supplies for taking headspace and vacutainer samples. IW samples require no special supplies. You should work with the Curator to maintain the supply of equipment for any special catwalk sampling.

Description Table Supplies

- glass slides
- toothpicks
- mounting media (Norland Optical Adhesive (for ultraviolet curing)
- coverslips
- smear slide cases, smear slide labels
- glass sample vials with snap lids
- miscellaneous glassware
- desk supplies, including pens, pencils, Liquid Paper, rulers, etc.
- gloves for those who do not remove their jewelry
- Plastic Wrap

Photo Table Supplies

- red d-tube endcaps
- d-tubes
- Box of sponges, bucket of sponges
- red permanent markers
- core boxes
- polyethylene tape

- staples
- filament tape

Sample Table Supplies

The bins under the sample table should be stocked with:

- 5 and 10 cc sample tubes and scoops
- 5 and10cc foam plugs
- pop top vials
- sample bags
- foam rods
- other supplies as labeled

The core rack area and adjacent cabinet should be stocked with:

- core boxes
- d-tubes
- a bucket to hold foam sponges (under core rack)
- polyethylene tape
- filament tape
- black permanent markers
- black d-tube endcaps (in bins)
- foam sponges
- "Kapak" bags
- Utility knives
- Shrink Wrap

Splitting Room

- Hook, utility and core cutter blades
- Cleaning sponges
- Acetone in the large metal container
- Hard rock dividers, halved endcaps
- Foam rods
- Permanent red and black markers, china markers
- Spatulas, various sizes
- WD-40 in spray bottles

III. ODP CORE NAMING

ODP has a specific naming convention for identifying cores, data and samples. All are named with the leg number, site number, hole letter, core number, core type, section number, which half (working or archive). Samples and data will also include the sample interval. Here is an example for a sample:
203-1243B-6R-5, 25-30 cm W

Core Types

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

A	RAB-C
B	Bit Sample
C	Center Bit Recovery
D	Positive Displacement Coring Motor (PDCM)
E	HYACE Rotary
G	Ghost cores, re-drilled intervals
H	**Advanced Piston Core (APC)**
I	In-Situ Water Sample
M	Miscellaneous
N	Navi-Drill Core Barrel (NCB)
P	Pressure Core Barrel (PCB)
R	**Rotary Core Barrel (RCB)**
S	Side Wall Sample
V	Vibra Percussive Corer (VPC)
W	**Wash Core Sample**
X	**Extended Core Barrel (XCB)**
Y	HYACE Pressure
Z	Diamond Coring System (DCS) also ADBC

IV. CORE RECOVERY - CATWALK

After the liner is removed from the core barrel, 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 meters long, and they yield six 150 cm sections, a shorter seventh section, and a core catcher. Recovery of material in length to 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, 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 meters. For sediments, the core catcher sample is extruded into a short piece of plastic liner and is treated as a separate section below the last core section. For hard rock, material recovered in the core catcher is included at the bottom of the last section.

When sediment recovery is less than 100%, whether or not the recovered material is contiguous, the recovered sediment is placed at the top of the cored interval and then 1.5 meter 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 meter length.

The Curator and techs measure and mark the ends of each section, labeling each with core, core type and section number and an arrow pointing 'up'. At the section breaks, they cut the liner with a circular cutting tool and part the contained sediment with a spatula. If the material is well lithified a hacksaw or hammer and chisel is used to section the core. After separating into sections, whole round (AKA catwalk samples, see next section) samples are taken. After the whole round and head space samples are removed from the catwalk, the rest of the core may be capped, and the caps glued with acetone. Blue endcaps are placed at the top of each section, clear endcaps at the bottom, and yellow endcaps 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 Lab for processing.

V. CATWALK SAMPLING

In addition to the usual hard rock/soft rock sample requests taken from the split core at the sample table, shipboard scientists will most likely take 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 and chem techs have finished taking their samples. All samples taken on the catwalk should be recorded in JANUS Corelog.

Paleo Samples (PAL)

(PAL=paleontology) - Paleontologists receive material from the core catcher for biostratigraphic dating the core. Generally, 5 cm is sufficient, but in unfossiliferous material a greater volume may be required. This sample typically comes from the bottom of the core catcher.

After the PAL sample is taken, the core catcher is placed in plastic liner, capped, and the caps glued with acetone, and labeled with black marker. The location of the sample should be marked on the outside of the liner with permanent marker. This sample should be recorded as a sample code PAL in JANUS Corelog.

Head Space/Gas Analyses (HS, VAC)

The Shipboard Chemist or Chemistry Technician will take at least one 5cc sample for analysis of hydrocarbon composition and concentration. These include a sediment sample for headspace gas analysis (HS) and, if present, free gas samples (VAC or Vacutainer Samples). These samples are immediately analyzed to determine if it is safe to continue drilling.

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 (interstitial water whole round sample). The pencil-size cylinder used for headspace sampling removes material from the working side of the core. In the case of lithified sediments, scrapings or chips are taken. These samples are entered in JANUS Corelog as sample code HS.

When gassy voids are present, the chemist may need to take free gas samples using a puncture tool and a vacutainer. 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.

Interstitial Water Samples (IW)

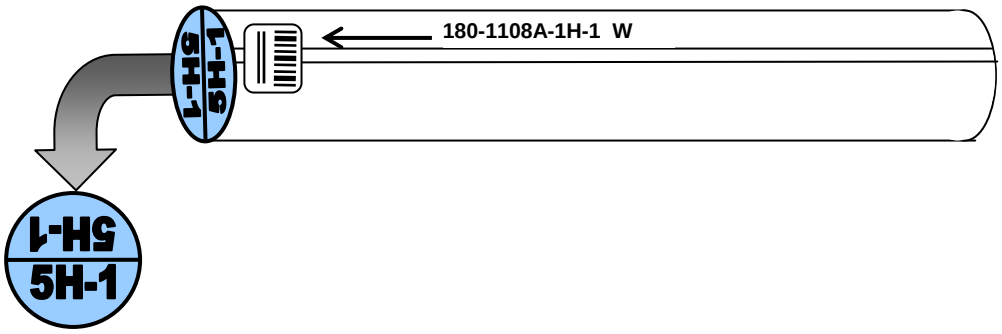
Interstitial waters for geochemical analysis samples are generated from the whole round samples removed on the catwalk. In less consolidated sediments at the top of a borehole, IW samples are generally 5cm long (176cc). The size of the sample may be increased as the sediment becomes more lithified with depth. The Curator and the Chem Techs work together to come up with an IW sampling plan that best meets the needs of the shipboard party. Depending on the preference of the Curator and Chem Techs, the IW sample may be recorded at the core

entry computer via JANUS Corelog or in the chemistry lab by the Chem Tech 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-chiefs, staff scientist, and the Curator define appropriate limits on whole round sampling to safeguard the scientific interests of the cruise. Always get the Curator's (or his/her representative's) OK to cut IW samples.

VI. IN THE LAB

Inside the Core Lab, the marine technicians engrave the working (double line) and archive (single line) side of the liners with the standard ODP identifier, "LEG-SITE-HOLE-CORE-CORETYPE-SECTION" (e.g. 180-1108A-1H-1, W) along with an 'up' arrow. This ensures that each section is permanently and uniquely distinguished. The engraving should be as clear as possible. The blue endcaps of each section should be marked with the core, coretype and section number like so:



The Curator or techs then enter the pertinent data into JANUS Corelog. Corelog generates the bar coded labels for each section. Use Netscape or Internet Explorer to print four hardcopy print-outs of the Core Tracking Report.

One copy of the report is left in the Yeoperson's box next to the left of the JANUS Corelog entry station computer. Other copies of the Core Tracking Report, a useful reference while sampling and boxing cores, are brought to the sampling station, the photo table and the core description table. Three sets of labels (archive and working) are printed, one for the core liner, one for the d-tube and one for d-tube cap. A fourth set of archive labels is printed for use with the Digital Imaging System (DIS).

Once properly marked and recorded, the sections are left in the rack to equilibrate to room temperature before they are measured on the Multi-Sensor Track (MST) and measured for thermal conductivity.

Physical Properties Whole Rounds

Sometimes physical properties whole round samples are chosen after the core has been run through the MST. The Curator or phys prop tech will cut the whole round on the catwalk and then seal the samples in wax as soon as possible. Once the sample has been sealed in wax, it should be stored upright in a salt water bath in the reefer. The sample will then be entered into JANUS Corelog by the Curator or Physical Properties Tech.

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. The wire may need to be dragged a second time through extra soft or sticky cores--or use the cheese cutter which is stored in the drawer beneath the splitting table. Lithified cores split with the supersaw should have the melted plastic that accumulates on the edges of the section due to sawing cut away for safe handling (the plastic is sharp) and for better quality photographs and digital images. The sections should be gently rinsed to remove the cutting slurry before leaving the splitting room. The bottom to top direction that must be used when splitting a core is 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, we would cause younger fossils to move downward into older age material.

The splitting table, the wire cutter, and the supersaw should be cleaned thoroughly between each core. All plastic cuttings need to be removed from the end sink to prevent them from flowing down into the drain and backing up the sink. When finished splitting a core, the cutter or supersaw should be placed in the upper position, away from the sink, and the nylon rope all the way out of the bottom of the track or the floor. This is to allow the rope to dry out.

Archive Half

The archive half is placed on the description table in the Core Lab. The sedimentologists describe the core in detail, making smear slides to examine under the microscope. The sedimentologists also run the sections through the Digital Imaging System (DIS) and Archive Multi-sensor Track (AMST). The Paleomagnetists will pick up archive halves, one at a time, to run through the Cryogenic Magnetometer. After the cores have been described and run through the Cryomag the archive half is placed on the photo table.

The marine techs photograph the core with color and black and white film. The Core Tracking Report should be looked at before taking any core photo to double check section lengths and cored interval. Remember to place the whole round spacers of the proper length in all of the core photos. If you photograph a core incorrectly, you'll have to retake the photo. This can be a real pain if the core has already been brought to the reefer below. Take your time and be careful! Ask the Curator if you are unsure about which whole rounds have been taken. After photography, the archive half can be placed in d-tubes and packed into a core box (see section on Storing Core below).

Close-up Photos: After the core photo has been taken, check the close-up photo request sheet to see if a close-up has been requested for that core. If so, place the sections in the d-tube but do not tape it closed. Place a yellow dot on the endcap. Depending on the photographer, they will either want you to place the d-tube on the close-up table or leave it in the rack.

Working Half

The working half sections are taken one by one to the auxiliary sample table (next to Phys Props) where physical properties measurements are made and samples are taken by the Phys Props scientists. Once Phys Props is done, 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 pre-labeled (prepared by techs) 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 Curator will keep an eye on sampling activities during his/her shift, but during off-hours, it is very helpful (and greatly appreciated) if you check on things at the sample table.

Note on Core Flow

All techs assigned to the Core Lab watch over core flow by staying touch with fellow techs and scientists in the lab. Ask if another core needs splitting or if supplies are low. Let them know you are available to assist with all core flow activities. If you need to work in another lab, check back frequently to see if you need to lend a hand to split, photo, box core, etc..

VII. HARD ROCK CORES

Core Handling

The liner is placed on the catwalk core holders. If hard rock pieces are scattered along the length of the liner, the upper end is raised slightly to shunt the pieces to the lower end to provide a more accurate recovery measurement. The sections are then measured starting at the bottom of the recovered material and working backwards (i.e. toward the top of the core). Be sure to label the sections in the correct order. Measure until you get to the last section (i.e. Section 1). You may find when you get to Section 1, that it will be very full of rock or it may only contain small amount. Now it is time to estimate if you will need additional empty liners to give you extra space to "curate" the core. To "curate" a hard rock core is to add dividers between non-contiguous rock pieces. This almost always expands the core. Once all the sections are numbered, measure the recovered rock inside the liner to get your total recovery.

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

Hard rock sections are carried into the core entry area where the recovery (recovery = liner length in JANUS Corelog) is recorded on paper forms. The recovery is then entered into JANUS Corelog and the record saved. The true "curated length" will not be correct until the

core is fully spaced-out (i.e. curated). Label and engrave an extra liner or two in case you need to transfer some of the curated core. Note: when working with hard rock, it is always helpful to have a plentiful supply of pre-cleaned and pre-split core liners on hand. Carry the core to the splitting room. The Curator or senior tech will split the first uncurated section of core on the core splitter with the wire removed. Starting from the top of the section, **mark the bottom** with a red wax china marker of every piece which is long enough not to have rolled in the liner.

The Physical Property Specialist may then select intervals to be sampled for sonic velocity and GRAPE measurements. The sonic velocity sample, also used for wet-bulk density and water content measurements, is taken before the cores begin to dry out. This sample is stored in seawater for an hour to stabilize the temperature. Pieces of whole core chosen for physical properties sampling are marked on opposite sides with orientation arrows that point to the top of the section. Temporary styrofoam place holders of the same length are put in place of any removed pieces. Both the removed pieces and the place holders are given temporary labels denoting their position in the section.

Before the samples are split, the petrologists inspect and mark the cores, looking for foliation directions, connecting veins, or features that can guide them in piecing the rocks into their original orientation. Hard rock pieces that do not fit together are separated from each other in the core liner by dividers. Acetone dividers in the split and labeled liners to match the spacing in the original liner. .Afterwards the curated length can be recorded and entered into JANUS Corelog. Core Tracking Sheets can be printed and distributed.

Hard rock core pieces are split on the Felker saw in the splitting room along the splitting line marked by the petrologists. Sometimes the Supersaw has be 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. Pieces are split symmetrically with regard to any contacts, veins or other special features, so as to preserve part of the feature in each core half. Pieces which fit together or which have contiguous features are split along a single line drawn on all the pieces when they are fitted together. Shattered rock which can be pieced together by hand may be held together with masking tape or shrink tubing and cut as one unit.

Once split, the hard rock core pieces are returned to their respective liners and set flat side down. They can be air dried, dried with a heat gun (the heating element in the 'off' position), or with compressed air. Applying direct heat to the core can affect alteration products and demagnetize the rocks so be careful.

All hard rock pieces are labeled with the ODP standard identifier Leg, Site, Hole, Core, Coretype, Section, Piece (and Sub-piece number), an “Up” arrow if the piece is oriented, and a "W" or an "A", indicating

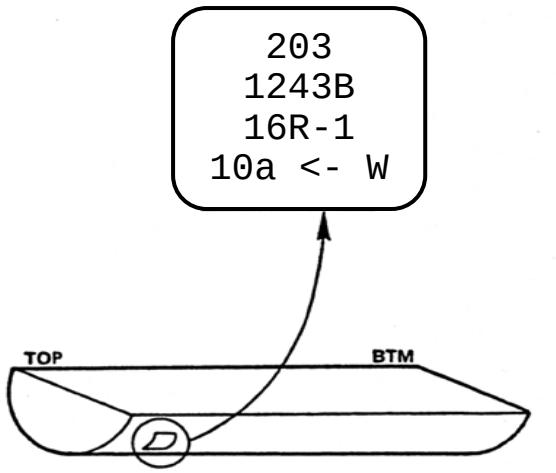


Figure 2 - Location of hard rock label.

whether the piece is from the working or the archive half. The labels are written using the hand held Brady labeling machine. Labels are affixed parallel to the cut face midway between the bottom and the cut edge of the left side of the core with epoxy resin so that they read parallel to the lines of writing and with the orientation arrow pointing towards the top of the core (see Figure 2). The label is then covered with more epoxy so it is completely sealed. The use of too much epoxy may cause drips and contaminate the surface of the core. Once the epoxy has set, the pieces are rotated in the liner so that the split side faces up. Make sure that all oriented pieces have arrows pointing "UP" core. If there is any question if a piece is long enough to be oriented, do not put an arrow.

Each piece should be numbered consecutively from the top of the section down. Every section should begin with piece number 1 even if a piece is continuous between sections. Sub-pieces (i.e., the pieces which 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 sub-piece to the right, relative to the stratigraphic top of the section, is sub-piece A (see Figures 3 and 4).

When it is not possible or desirable to affix labels to the actual pieces, the label should be affixed to the right side of the core liner: These include:

- Pieces which are too small to label
- Rollers and rubble that, for convenience sake, are curated as one "piece", between two liner dividers.
- Pieces which, if removed for labeling, would disturb the core (e.g., sediment basement contact which have been shrink-wrapped together, volcaniclastics interbedded with basalts).

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

Please ensure that hard rock cores are curated so the assigned piece and sub-piece 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 each unit in the working half would be assigned a single piece number (No sub-piece numbers would be assigned, see Figure 4).

Hard rocks are sampled one fell swoop at a "sample party", so don't box the working halves like you normally would. After enough cores accumulate, the techs and the Curator lay them out in the lab. You will assist the Curator in drilling, sawing and labeling and bagging the samples. Both working and archive sections must be shrink wrapped prior to the final trip down to the reefer. This ensures the pieces do not roll around or become damaged in transit.

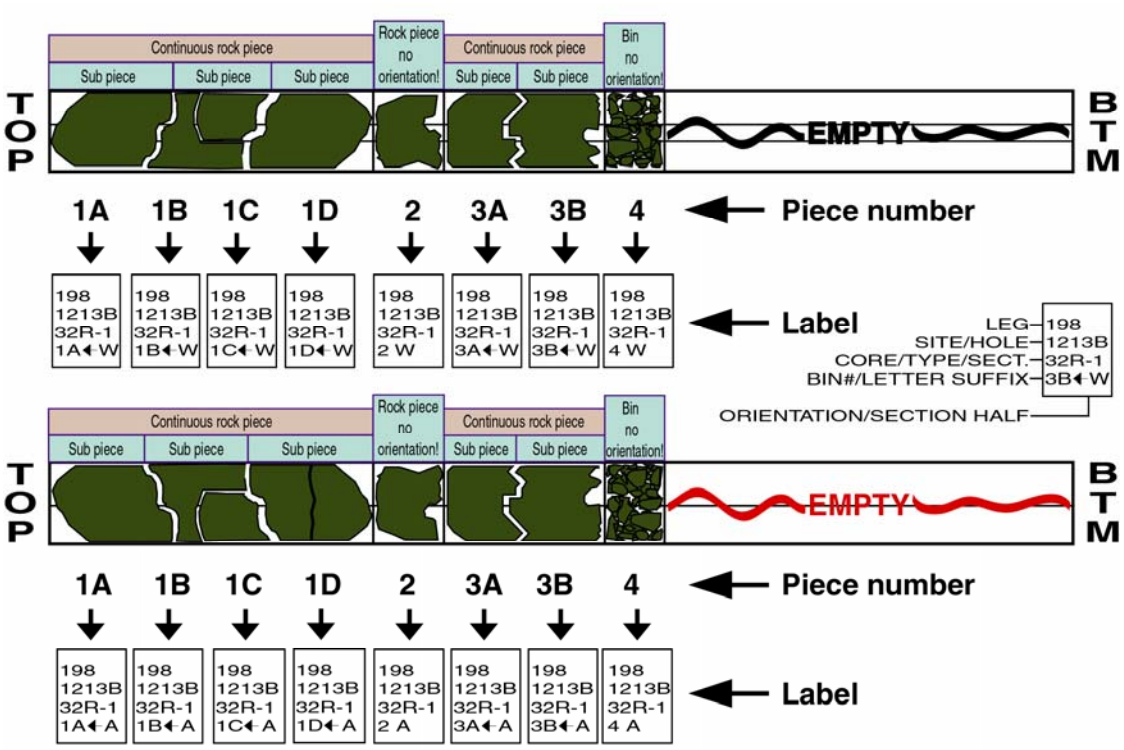
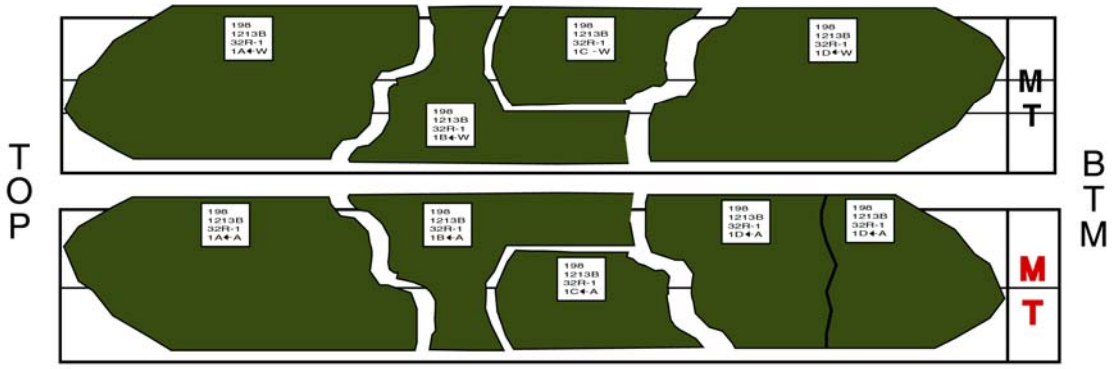


Figure 3 - Numbering system for hard rock labels.



1. To identify and distinguish between individual sub pieces of a continuous rock piece (Fig 3), they need to be lettered with suffixes. Mark the sub pieces that fit together or have contiguous features at the bottom and draw connecting lines between them with a red wax pencil. This should be done previous to the labeling when receiving the core on the catwalk and/or when the core is reconstructed in the splitting room!
2. In the example from Fig 4 all the individual sub pieces of the continuous rock piece have the same bin number: 1, but to distinguish between them different letter suffixes: 1A, 1B, 1C and 1D.
3. All individual sub pieces within a continuous rock piece having a reasonable size must be separated by letter suffixes with the exception of rules I and II:

I. If a rock or sub piece is broken in only one of the section half's they should be labeled with the same letter suffixes. See the sub pieces labeled 1D.

II If the pieces broke while splitting on the saw.

Figure 4 – Labeling hard rock pieces with letter suffixes.

VIII. STORING CORE

The System

Split cores are stored permanently in white plastic d-tubes. Archive and working halves are distinguished by color coding. Working halves have black endcaps and are labeled with black permanent markers; archive halves have red endcaps and are labeled with red permanent markers. Archive and working halves d-tube endcaps are stored separately, in boxes, on opposite sides of the hold reefer.

The core racks accommodate roughly 100 sections at a time, allowing the most recent 150 meters of core to remain in the Core lab. Keeping cores in the lab as long as possible allows each crew of scientists the chance to view and/or sample material that came up while they were off shift. When there is no more space for temporary core storage in the lab, sections are boxed and moved to the core reefer.

Packing D-Tubes

How many sections can go in a d-tube? Most of the time only one section is put in a single d-tube, regardless of its length. This rule should be followed even when it is possible to fit multiple short sections in one d-tube. The one exception is when a core catcher will fit in a d-tube with the last section of a core. Put the core catcher into the d-tube first so that it is behind the numbered section in the tube. The Core Tracking Report for a given core will say whether the core catcher should be stored in its own d-tube or in the d-tube with the last section. Be sure that the actual storage is consistent with the Core Tracking Report and that the working and archive halves are stored the same way. Accurate mirror image storage is particularly important when the cores are unboxed and racked at the repository.

Put a sponge in each d-tube at the endcap end for all sediment cores. The sponge should be moist with water not dripping. Often water will squeeze out of sponges when cores are being packed into boxes and moved, and the core boxes will get wet.

Do not put a 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. Sometimes extra sponges behind as well as in front of a section may help to preserve a core that is deteriorating as it dries out on the ship. It’s a good idea to shrink wrap such sections.

Seal every d-tube with polyethylene tape extending from the top to the bottom surface of the d-tube, covering both computer labels. When core sections are frequently reopened, it will save tape and time to wait until it is time to box the cores before taping them. When it comes time to finally box core, pre-tape all sections. The boxing will go much quicker.

Labeling D-tubes

Label d-tubes using either a black or a red permanent marker. The handwritten label runs the length of the tube, reading something like this: "LEG-SITE/HOLE-

CORE/CORETYPE-SECTION <----- W or A with the arrow pointing to the top of the section (towards the endcap). Put one barcoded Corelog label on the top of the d-tube at the open end and a second label on the endcap. After photography (or sampling), slide each section, bottom end first, into a tube. Follow with a moist sponge, and cap with an endcap. Seal the d-tube with polyethylene tape (the stretchy 3M brand kind; accept no subsitute!). KEEP THE SECTIONS IN ORDER in both the archive and working core racks.

Colored Dots and Caution Stickers: Colored dots and caution stickers are used on d-tubes to alert people to some unusual condition of the section inside. When possible use ½" diameter dots, not larger. The colored dots signify specific conditions as follows:

- blue – cores with igneous or metamorphic rock. This allows repository workers to quickly identify "hard rock" cores which do not need wet sponges.

- red glow - critical intervals (e.g. Cretaceous/Tertiary Boundary, Cenomanian/Turonian boundary, tektite layers, Paleocene/Eocene Boundary, any interval of interest designated as "critical" by the Sample Allocation Committee (SAC), etc.)

**Other dots which are used on the beach but not on the ship:

- Purple - cores designated permanent archives by the shorebased Curator; permanent archives are at least one half of one set of cores that span the entire drilled sequence.

- green – Deep Sea Drilling Project HPC cores (HPC, hydraulic piston corer, is the old term for APC)

- yellow – "recurated" sections (recuration is when old dried-out cores are pieced back together again).

- white - no sponge due to expanding clays in old cores; cores in repositories have been known to expand up to 50cm.

- green glow – in the mid-1990s, a so called "geriatric study" was started on the ship and at the repositories to study the process of core aging.

Put yellow caution stickers on the d-tube of any section that has had something unusual happen to it. In addition to the caution label, write a brief, but complete message on the top of the d-tube explaining what happened. The message must be easy to understand by repository workers and visitors in the years to come. For example, if a section was dropped, but not conspicuously damaged, write simply "section dropped." If parts of a dropped section fell onto the floor, but were replaced in order, write "section dropped; top 28 cm fell out and were replaced in order." You get the idea.

Boxing Core

Core Lab

Working halves are temporarily held in the core rack next to the sampling table. When the rack is nearly full, it is time to box core. Ask the Curator before actually boxing, just in case some cores are still being worked on by the scientific party. Be sure that the cores are in order in the racks and that all the endcaps are taped. Get a four-wheeled cart to stack the core boxes on as you are packing them and to transport core boxes to the lower tween reefer (core reefer). D-tubes are placed in wax core boxes which hold 10 sections. Instructions for assembling, packing, marking, and closing core boxes follow. Copies of these instructions are also posted at both ends of the core lab. When you have 4-8 full core boxes stacked on the cart, take them to the core reefer for storage until the end of the shift. More than 8 boxes on the cart make it unwieldy and potentially dangerous, especially if the seas get rough.

Archive halves are often held out for close-up photos. The ODP Photographer will take all close-ups. Afterwards the core can be boxed.

Core Reefer

Segregate cores in the lower tween core reefer so that working halves are on the port side and archive halves are on the starboard side. Be sure to push core boxes as far back into the racks as they will go. On a high recovery leg core boxes will most likely be stacked four across on the floor in the center of the reefer. Once the lower tween reefer is full, core boxes may be brought to the hold reefer.

Moving Core Around

Take care to hold split sections level (parallel to the floor) when moving them in and out of d-tubes, when moving the d-tubes in and out of boxes, and when moving core boxes. Encourage others to do the same.

Core Box Inventory Forms

Core Box Inventory forms keep track of the boxed sections. One clipboard of blank forms is posted on the working half rack and another near the archive halves. 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 no one gets mixed up. It is important to carefully label the boxes and fill out the Core Box Inventory forms so that you can find sections that need to be resampled or redescribed later in the leg. Make a note in the comments section if a section is left out of a box, when a section is placed in a box out of order and any time the sections are not in sequential order. Most importantly, the repository folks rely on these forms for unboxing the core. They greatly appreciate your accuracy and neatness.

Instructions for Boxing Archive and Working Core

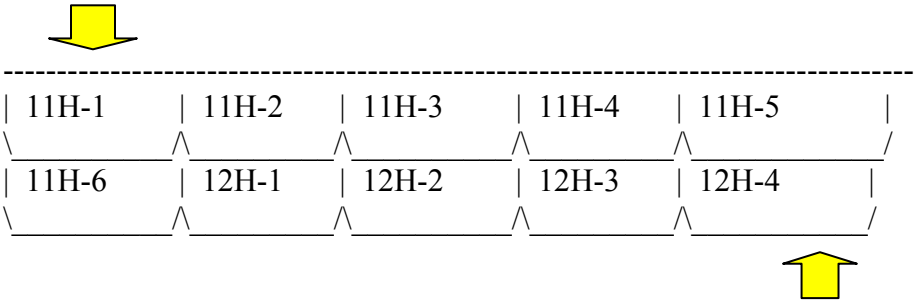
1. Ten core sections fit into one box. Record the box number and the sections that will be placed in the box on the Core Box Inventory form.

2. Mark boxes containing working halves with a black permanent marker; mark boxes containing archive halves with a red marker. Mark bottom (BTM) 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 an A for working or archive. Circle the core box number and letter.

3. With the current lab configuration it is easier to fold and staple the top of box and insert cores so that the top of the section goes in first. The sections should go in so that the lowest core/section number is in the upper left and the highest core/section number is in the lower right when looking at the front of the box (see below). It is easiest to fill the box by starting in the lower left with the highest core/section number and working backwards to the upper left.

Here is how the open front end of a filled box should look:

End here with the
LOWEST CORE/SECTION NUMBER



Start here with the
HIGHEST CORE/SECTION NUMBER

IX. LAB MAINTENANCE

In the Core Lab, the following maintenance takes place during and at the end of the Leg:

- Core Splitter/Super Saw: WD-40 bearings and track of both the saw and the wire splitter. If the track is still difficult after cleaning the bearings, it may be time to replace the bearings. See the ALO or a senior tech for how-to. Changing the bearings is a major operation requiring at least two people. Make a new rope at the end of a cruise.

- Drill presses: Sharpen bit with cutting brick. Check spindle for proper rotation and alignment. Clean thoroughly and lubricate with Marvel Mystery Oil or WD-40 when not in use for long periods and at end of leg.

- Rock saws: Sharpen blade with cutting brick. Check blade for proper rotation and alignment. Clean thoroughly and lubricate with WD-40 when not in use for long periods and at end of leg.

On the catwalk:

- Core cutter: It is time to maintain the cutter when the blade is missing or broken, and when it starts to cut the liner in a spiral pattern.

To replace the blade, one needs to check out X-acto #23 blade. Remove the blade set from the core cutter, clean the cutter. Inspect the blade holder, if it is still in good shape, replace the blade. If the blade holder is damaged, then the whole set need to be replaced. The blade holder is modified from a X-acto-3022 knife. Replace the blade from the 3022 knife with the #23 blade. Cut the stem of the 3022 knife with a hacksaw to leave about an inch above the neck. Then apply adequate Aqua Lube around the neck before inserting the holder into the cutter. Carefully not to over-tighten the screw to prevent damaging the holder.

X. CLEANING AND END OF LEG ACTIVITIES

During the leg the core lab should be cleaned between sites if time permits or any time there is a lot of build up of dust and mud. Clean the floors, wipe down the core trays, photo table and tracks. Depending on the leg, the splitting room and core entry area may need to be thoroughly cleaned during the leg. At the end of the leg the lab must be thoroughly cleaned.

Catwalk Clean-up

After the last core is recovered, the catwalk can be taken down. Remove acetone bottles, core cutters, spatulas, pens, hacksaws and end cap baskets and put everything away. Put all clean endcaps back into the boxes and stow baskets under the splitting table. Take the blade assembly out of the core cutters and clean them. Empty acetone bottles and stow in the cabinet in the splitting room. Wash down the catwalk, core rack and core catcher

bench. Scrub the core rack with a brush. Take the core rack down placing the bolts and washers in the can with the other core rack tools. Completely remove the section closest to the Bridge and secure it further down the catwalk. This section must be removed so that the hatch can be opened during portcall.

General Core Lab Clean-up

Use the list below as a guide for general end of leg clean-up:

- Remove all unnecessary paperwork and tape from walls, bulletin, boards, shelves and drawers.
- Clean thoroughly the splitting room and splitting table, wash the mats on the catwalk with the pressure washer. Make sure the mats are cleaned before the deck crew start washing and painting the deck below.
- Clean the small freezer.
- Clean all equipment & tools, including outside of microscopes.
- Clean the tracks and photo table.
- Clean description and sample table core trays.
- Vacuum all the shelves and drawers.
- Wash counters tops and cabinets thoroughly.
- Clean the desk and the stereo system.
- Clean all monitors, keyboards AND mouse pads.
- Clean the lights and vents.
- Vacuum the chair seats and wash their feet.
- Wash walls, doors, portholes, and base boards.
- Clean deck drains, sediment traps, and sinks
- Vacuum, scrub and then mop the floor.

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Sign Off (Department Supervisor):

Review by: Johanna Suhonen

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