

Laboratory Handbook

This document provides summary of the rules and guidelines for safe and efficient use of the laboratory facilities on board D/V *Chikyu*. Details should be referred from the original documents available on this web and also from Expedition Project Manager for assigned expeditions.

I. General Information to work in the Laboratory Area

- Basic lab consumables for onboard measurements and sample processing (e.g. sample bag, Styrofoam, slide glass, Kimwipe...) and stationary (pen, notes, media for data backup) are provided through lab staff and publication assistant. However, plan to use special kinds of and/or extremely large amount of consumables need consultation with Expedition Project Manager well in advance of the boarding.
- Smoking is prohibited in the whole lab and most areas of the ship and allowed only at few designed locations.
- Personal Protection Equipments (PPEs: hardhat, safety shoes, safety goggles and coverall) are also prepared onboard Chikyu for each science party member during their expedition. Notify your shoe size at the submission of the boarding documents. Safety shoes and dirty coveralls are not allowed to enter/work in the lab area.
- You must attend the lab instruction lecture before use. The lecture is given by LO or other Lab Staffs usually in the first few days after boarding. There are some restricted areas to enter and equipments to use in the lab. Follow the instructions all the time while your stay onboard.
- In case of emergency, call extension 123 and report to on-duty Lab Officer.

II. Introduction of Laboratory Decks

The Chikyu laboratory is composed of four decks in 2300 m² total space, starting **Lab Roof Deck** at the top which is same level of rigfloor level, **Core Processing Deck**, **Lab Street Deck**, and **Lab Management Deck** at the bottom. Each deck has characteristic functions to efficiently conduct scientific research activity on the ship.

Lab Roof Deck

Function:

- Core cutting area, core registration room, core container space, downhole measurement laboratory, data acquisition and processing rooms located on this floor.
- In the Core Cutting Area, 9.5 m length cores transported from the Rig Floor are cut into 1.5 m length sections. Some samples for measurement of ephemeral properties are taken at this area in the states of whole-round core and syringe samples, such as those

of hydrate, microbiology or headspace gas, according to needs.

- The primary curation information is registered and sample labels are issued in the Core Registration Room.
- Refrigerated core containers are placed to store processed core until those are transported to the core repository.

Cautions:

- Full PPE is necessary to wear to work in the Core Cutting Area, and additionally safety visor to handle core. Working outside this area to the rig floor needs prior approval of Permit-To-Work. To go to the Core Storage Containers, let the Curator/ EPM/ LO know, and wear full PPE.
- Organic geochemist (or his/her substitute) has responsibility to take a headspace gas sample for safety gas monitoring immediately after core cutting during riserless coring operations, and report the results to EPM on daily basis.

Core Processing Deck

Function:

- The Core Processing Deck has 6 laboratories: X-ray CT Scanner Lab, QA/QC Sampling Room, Microbiological Lab, Core Lab, Paleomagnetism Lab with Magnetic Shield Room, and Core Viewing Room, and has Core Splitting Room, Core Sampling Room, two refrigerated core storages (Whole-core Reefer and Cold Core Storage) and Frozen Sample Room.
- Core sections are first processed by X-ray CT scanner to get internal structure images in the X-ray CT Scanner Lab. Whole-round core samples for interstitial water chemical analysis and/or for microbiological studies are taken from the core sections in the QA/QC Sampling Room after X-ray CT scanning, and squeezing interstitial water and some measurement (e.g. titration) are conducted in this room.
- In the Core Lab., non-destructive physical property measurement for core sections, digital image scanning of split-core surface, visual core description, sampling discrete samples for onboard analyses and for personal requests, and physical property measurement on discrete samples are carried out.
- Measurement of palaeomagnetism and other magnetic properties are performed in the Paleomagnetism Lab., by means of the SQUID magnetometer and other apparatuses for magnetic property measurement.
- X-ray analyses using XRF, XRD and XRF Core Logger are carried out in the Core Viewing Room and a space in front of the room; sample preparation is performed also here, except making glass beads.
- Microbiological research works are performed in the Microbiology Lab., where e.g. incubators, anaerobic glove box, clean bench, fluorescence microscopes, etc. are equipped.
- Splitting core sections into halves is performed in the Core Splitting Room. Mini-core and discrete cube samples are taken in the Core Sampling Room.

Cautions:

- RI/X-ray instruments are not allowed to operate by onboard scientists based on the JAMSTEC RI/X-ray regulation, and hence, advance request to EPM is important and necessary to arrange for the core flow with available lab technicians.
- Microbiological experiments are allowed to be performed in the Microbiological Lab. under the biosafety regulation on Chikyu stipulated in JAMSTEC (see details in section

IV).

- During core splitting operations, only operators are allowed in the Core Splitting Room.
- To visit Whole Core Reefer or Cold Core Storage, ask curator or LO to accompany and assist. Ventilating fan must be turned on during working inside.

Lab Street Deck

Function:

- Geochemistry Lab. with Semi-clean Room, Sample Preparation Room, Paleontology/Petrology Lab. and Lab Storage, Chemical Storages, Gas Bottle Storage and ET Shop are located in this floor.
- Geochemical analyses for discrete samples and their preparation are performed in the Geochemistry Lab. and Sample Preparation Room. Various analytical apparatuses, e.g. gas chromatographs, ion chromatographs or ICP spectrometers, are placed in these rooms.
- Petrological and micropaleontological observation with microscopes and SEM are performed in the Paleontology/Petrology Lab.
- Thin sections are made in the Thin Section Room.
- Liquid nitrogen and analytical nitrogen gas are produced onboard by the generators placed in the Lab Storage.

Cautions:

- To keep the geochemistry lab clean, change shoes at the entrance.
- Entering Lab, Chemical and Gas Bottle Storages are not allowed.

Lab Management Deck

Function:

- The Lab Management Deck has offices for EPM and Co-chief scientists, LO and Publication Assistant, in addition to Conference Room, Lounge, Library and Server Room, and Office Storage.

Cautions:

- Follow the library/lounge facility use guidelines accordingly.

III. Rules and Guidelines for Chemicals / X-ray and RI / Biosafety

Chemicals:

- CDEX provides chemicals for standard/routine onboard measurements (see Chemical List in the Lab Measurement Catalog), however, plan to use large amount of chemicals need contact with EPM well in advance before boarding.
- For chemicals not in the list, scientist can bring those chemicals unless it is restricted by the JAMSTEC regulations of chemicals. Upon consultation with EPM well before expedition, scientist needs to submit MSDS (Material Safety Data Sheet) for all chemicals in advance, and also to provide detail instructions for handling if a special treatment (refrigerated, frozen...etc) is needed. As helicopter transfer is not allowed for chemicals, bringing with supply boat will take a few days to a week inside mini-container without temperature control. Each scientist is responsible for both bring-in and chemicals. The residual chemicals (including empty containers) must be

- brought back with you or must be sent back to your institute after your disembarkation.
- Ask Lab Staff for any of chemical supply as chemical storage is restricted to the Lab Staff only. To use LN2 (liquid nitrogen), request to Lab Staff at least five days in advance.
 - Chemical waste disposal (including empty containers and paper waste with chemicals) must be separated properly following the instructions posted in the laboratory.

Use of Instruments with Radio Isotope (RI) or X-ray source:

- Operation of RI (MSCL-W, -S, and GC-ECD) and X-ray (X-ray CT scanner, XRF core logger, XRD and XRF) instruments is allowed only to the Lab Staff with appropriate licenses and permissions. However, using those instruments needs advanced discussion with EPM. To access the X-ray CT scanner Lab (including control room) needs permission from EPM/LO.
- The use of an unsealed RI source (tracer, etc) is PROHIBITED on board *D/V Chikyu*.

Biosafety:

- Microbiological experiments of biosafety level (BSL) 2, 3 and 4 are PROHIBITED on board *D/V Chikyu*. Even BSL 1 experiment is allowed to conduct onboard, personnel who is going to conduct such experiments is necessary to notify JAMSTEC with the designated application form at least one month in advance.
- Only recombinant DNA experiments whose appropriate containment measure classification is P1 and which use an approved host-vector system can be conducted aboard *Chikyu*. Scientists who are planning to conduct such experiments are required to submit the designated application form at least 3 months in advance and to be approved by JAMSTEC.

IV. Third Party Equipment

To use third-party equipments during *Chikyu* expeditions, need advance consultation with EPM and preparation to submit request to IODP-MI.

V. Shipboard communication and computer environment

- Multiplatform environment (Windows and Mac PCs) is available for public use in the lab area with common use software installed.
- Bringing own notebook computers with necessary software is encouraged, however each computer and device (hard disk or flash memory) must have anti-virus scanning with latest virus updates.
- Two network systems are onboard *Chikyu*, Science Data Management System (SDMS) is for J-CORES system and shared folders for the science data inside the Lab area, and Information Management System (IMS) throughout ship for browsing of various drilling and marine data.
- Internet access and IP phone services are available through Ku Band VSAT, however access points are limited and located on all four decks. In addition to the limited internet access points, onboard email accounts can be used from own computers throughout Lab Area Networks.