OAK RIDGE National Laboratory

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BL014B | HYSPEC Quick Reference Guide for Users

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SAMPLE MANAGEMENT

- Samples MUST be shipped or checked in upon arrival with Sample Management Staff prior to beam exposure. (Outside of normal business hours, arrange for sample check-in with Instrument Staff).
- Samples and/or equipment CANNOT be removed from ORNL without approval.
  - "Hand Carry" and "Authorized Limits Evaluation for Clearance" forms are required for all samples entered into ITEMS.
  - Check with Local Contact, other Instrument Staff, or an Instrument Hall Coordinator (IHC) to ensure requirements for removal are met.

INSTRUMENT AREA ORIENTATION

Work in the HySpec Instrument Bay

- Instrument Staff on call and/or the Laboratory Space Manager are to be notified when the User is working in the HySpec Instrument Bay.
- The HySpec instrument is not a space for wet work or sample preparation. There are no eyewash stations or sinks for clean-up.
- The space is for simple mounting and assembling of samples and sample equipment.
- For any special handling or sample preparation, arrange with Sample Management Staff or Instrument Staff for access to the General Chemistry Lab in Building 8600 or the basement laboratory if the sample is activated.

Radiological Controls

- HySpec has one user-accessible Radioactive Materials Area/Radiological Buffer Area—the HySpec Instrument Cave.
  - Unescorted access to this area requires successful completion of Radiological Worker Training and is controlled by the HySpec IPPS system (described below).
  - Access to this area is prohibited when the shutter is open.

Magnetic Field Hazards

- HySpec uses polarization and non-compensated magnetic fields in experiments. There are permanent and electromagnetic field sources in the HySpec instrument bay. A 5 G field or higher can disrupt the function of electronic medical devices. Permanent magnets in various locations in the HySpec instrument bay easily exceed this limit.
- **Users with electronic medical devices or pacemakers are prohibited from entering the HySpec Instrument Bay.**

Mechanical Hazards

- The HySpec instrument is composed of many HEAVY moving parts.
- The detector vessel has proximity alarms. Collision potential wall and equipment lift regions have light curtains to prevent damage to the HySpec instrument, Users, and staff when in motion.
- Instrument motion requires trained staff to clear the instrument's path of collision hazards.
- Only trained Instrument Staff are allowed to move the HySpec instrument unaided.
- Users must work with Instrument Staff to establish safe motor clearance ranges before scripting move-oriented operations.
- Many sample environment changes require use of the HySpec 10-Ton DeShazo crane.
  - Only trained ORNL personnel equipped with appropriate personal protective equipment are allowed to use the facility crane.

Cadmium

- HySpec utilizes cadmium metal in many different neutron shielding capacities.
- Cadmium metal is toxic when inhaled or consumed.
  - Only handle cadmium with gloves and wash hands after handling.
  - Store any stray pieces of cadmium in the labeled containers at the instrument.

Cryogen Hazards

- HySpec uses cryogen-filled sample environments to support low temperature experiment needs.
  - All operations involving these sample environments require 22-48 hour liquid Helium refills to meet low temperature experimental needs.
- Cryogenic liquids can cause burns and ODH hazards.
- Only trained cryogen operations ORNL personnel can assist in cryogenic operations.
- In the case of a spill or system quench, leave the area immediately and notify the IHC Office and Instrument Staff immediately.

INSTRUMENT OPERATIONS

Instrument Personnel Protection System (IPPS)

- The HySpec IPPS is engineered to prevent personnel exposure to ionizing radiation.
- Detailed procedures are executed to ensure that Controlled Areas are clear of all personnel prior to sealing the Instrument Bay to place the system into beam permit and open the shutters.
- There are three sample area IPPS Panels for HySpec.
- Users may *only* be trained by Instrument Staff to use the main HYSPEC IPPS Instrument Bay Access Panel located outside of the instrument bay to sweep/unsweep the HySpec instrument bay area.
  - Users completing training are provided a job aid and may reference the “Procedure for User Operation of the HYSPEC IPPS System” posted near the IPPS Instrument Bay Access Panel.
- The HySpec mezzanine sweep/unsweep procedure is performed by trained ORNL Staff only.
  - The Instrument Bay cannot be put into beam permit unless the mezzanine sweep has been performed.

Sample Handling at the Instrument (Post Irradiation)

- Users may not place any samples in the beam that have not been approved on the Experiment Safety Summary. DO NOT place an unapproved sample in the neutron beam!
- Properly screen all samples removed from beam with the RadEye™G as demonstrated in radiological worker training.
- If the RadEye™G alarms during sample screening,
  - DO NOT move the sample and walk away to a safe distance.
  - Contact Radiological Control Technician (RCT) immediately.
- If the RadEye™G does not alarm,
  - Place the sample in the corresponding container/bag affixed with the ITEMS label.
  - Apply an adhesive “Caution Radioactive Material” label to the sample container/bag.
  - Give the sample to an Instrument Staff member for storage or shipment.
  - Update ITEMS sample disposition comments with experiment and shipping/return information.
- Contact Instrument Hall Coordinator immediately if a sample, cell, or can is suspected to have been compromised (breaks/leaks).
- Following beam exposure, powder and liquid sample containers cannot be opened without additional review. Arrange for review through Local Contact.

RESPONSE TO ABNORMAL CONDITIONS AND ALARMS

- There are three emergency exit doors at HySpec in the following locations:
  - Door on the outside wall of the computer room, leading out to the asphalt path
  - Main double door entrance to the lobby (in the hall outside the control room)
  - Door in the Instrument Bay to the right of the exterior roll up door.
- The nearest fire alarm pull boxes to HySpec are located:
  - On mezzanine overlook, beside the interior IPPS panel box.
  - In the Instrument Bay, (1) at the base of the secondary shielding stairs, (2) beside the rear emergency exit door, and (3) beside the main entrance door
  - Near the control room, beside the lobby double doors and computer room exit door.

	EVACUATION (Fire) – Go outside immediately! Meet at Assembly Point under bridge. Listen for additional instructions to return.
	TAKE COVER (Tornado) – Go to basement! Take the stairs up to the SNS mezzanine access. Turn LEFT and walk to the first facility stairway just before the IHCs office (labeled with TAKE COVER directions). Use this stairway to descend to the basement level.
	SHELTER IN PLACE – Stay inside! If outside, go immediately to the nearest building. Remain indoors until additional instructions are issued.
	RADIATION ALARM (Magenta beacon) – HySpec does not require a radiation alarm. *If a neighboring alarm sounds*, leave instrument area immediately! Go to IHC Office. Do not return until cleared by the IHCs.
	OXYGEN DEFICIENCY ALARM (Blue beacon) – HySpec does not require an O_2 alarm. *If a neighboring alarm sounds*, leave instrument area immediately! Go to IHC Office. Do not return until cleared by the IHCs.

EXPERIMENT REVIEW

- The “Experiment Safety Summary” identifies hazards and defines controls specifically for your experiment.
  - Review this primary tool for hazard communication carefully prior to signing!
  - Discuss any questions or concerns with Instrument Staff.
- HySpec uses many bottom-loading sample environments and mounts top-loading sample environments on its mobile sample table.
  - ALL sample change operations are assisted by Instrument Staff.
    - Discuss and schedule with the instrument Staff any after-hours sample change support required.
  - Users can mount the sample on the-bottom loading CCRs or standard Cryostat Sticks.
  - Instrument staff will assist shielding of the sample with cadmium or boron.
  - Instrument staff will assist with placing samples in the neutron beam.
    - Most sample environment mounting requires crane operation or ladder use to install.
    - Only Instrument Staff or IHCs can assist in crane installation of sample environments.
- Off normal or after-hours presence at the instrument needs to be reported to the IHCs on duty upon arrival and departure.
  - Off normal hours are before 7 am and after 6 pm Monday through Friday.
  - Anytime during the weekend is an Off normal hour activity.

Electrical Safety

- Users are not authorized to work on or near any exposed, energized electrical circuits or parts!
- All User electrical equipment must be NRTL-approved or approved by SNS Electrical Equipment Inspector.

Experiment Monitoring

- For best monitoring of your experiment, Instrument Staff and IHCs must be aware of what your experiment entails.
  - Questions about your experiment should be directed to the HySpec Instrument Staff during and after normal working hours.
  - In the case of a problem, notify the IHCs office and the Instrument Staff member on call.
  - Before leaving the facility, ensure that the Instrument Staff and IHCs are aware you are leaving and the basic experimental parameters the IHCs are required to check on through the night.
    - Temperature, Ei, S2 Range, S1 Range, Expected Run duration, Runs per hour, etc.
- Web sites available for monitoring your experiment and accelerator status from your personal devices are:
  - Data Monitoring for HYSPEC: https://monitor.sns.gov/dasmon/hyspec/runs/
  - SNS operating status: http://status.sns.ornl.gov/index.jsp