



## 7.U-2.8.1

### Procedure for Sample Removal on the Backscattering Spectrometer

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**SNS-OPM 7.U-2.8.1**  
**Procedure for Sample Removal on the Backscattering Spectrometer**

**1. Purpose**

1.1 This procedure provides instructions on how to remove a sample that has been exposed to the neutron beam on the Backscattering Spectrometer. It assumes that the user has been trained on the use of the IPPS “User Panel”([SNS-OPM 3.A-1.5.2.2](#)) and the procedure to enter the Restricted Sample Area (RSA) ([SNS-OPM 3.A-3.5.2.1](#)). Additional instructions may be needed specific to the current sample environment equipment containing the sample.

**2. Responsibilities**

2.1 The **Backscattering Spectrometer Lead Instrument Scientist** or designee is responsible for ensuring that personnel and users performing sample changes on the Backscattering Spectrometer read, understand, and follow this procedure.

**3. Prerequisites**

- 3.1 Staff and users should read [SNS-OPM 3.A-1.5.2.2](#), Procedure for Operation of the Backscattering Spectrometer User IPPS Panel.
- 3.2 Staff and users should read [SNS-OPM 3.A-3.5.2.1](#), Procedure for Entry to the Backscattering Spectrometer Restricted Sample Area.
- 3.3 Staff must meet the qualification of Radiological Worker I; users must successfully complete the training “Radiological Worker Training for Neutron Scattering Users at the High Flux Isotope Reactor (HFIR) and Spallation Neutron Source (SNS)”.

**4. Precautions**

**4.1 Assess the Activation**

The level of residual activation in the sample and sample environment equipment must be assessed and appropriate safeguards must be followed. Failure to follow or complete this procedure may result in the unintentional release of activated samples to non-designated areas. This could lead up to the termination of your experiment and/or loss of beam time. The activation level of the sample at the time of removal can be reduced by closing the secondary shutter (as required by the procedure to enter the RSA) some time before the sample removal. *This procedure does not qualify a User or a Staff member to open the sample container.*

Note that an aluminum sample holder typically requires 15 minutes to deactivate below the level that requires assistance by an RCT.

**4.2 Complete training on Sample Environment Equipment**

Before removing a sample, training appropriate to the sample environment equipment present in the RSA is required. Check the area for signage associated with the equipment; read and obey all signage.

**4.3 Check and Obey Signage**

In normal operation, the RSA may have specific sample hazards such as chemical hazards. Signage associated with these hazards is variable and subject to frequent change. Staff and users entering this area must read and obey all signage.

**5. Procedure**




<b>Step Number</b>	<b>Procedure/Actions to be performed</b>
<b>5.1</b>	<b>If not yet completed, follow procedures to enter RSA:</b> <ul style="list-style-type: none"><li>• Assess</li><li>• Close Shutter</li><li>• Release Ia Key</li><li>• Exchange Key</li><li>• Open Door</li></ul>
<b>5.2</b>	<b>Acquire Geiger-Muller Detector</b> <p>If the predicted dose from the activated sample is below 2 mrem/hr, the portable G-M detector can be used to verify the activation and allow staff and users to remove the sample. The detectors are located in the beamline 2 corridor (See Figure 1).</p> 

Figure 1. G-M detector table in the beamline 2 corridor

<p><b>5.3</b></p>	<p><b>Inspect</b></p> <ul style="list-style-type: none"> <li>• Visually check the detector for obvious problems, valid calibration date, and initials for the source check on the current date.</li> <li>• With the knobs set so that the range is “x100”, the response is “Slow”, and audio is “On” (See Figure 2), verify that a background ticking sound can be heard. If no sound can be heard, contact an RCT (574-6588 or 574-6590) for a replacement.</li> </ul>  <p>Figure 2. Portable G-M detector properly prepared for use</p>
<p><b>5.4</b></p>	<p><b>Remove Sample</b></p> <ul style="list-style-type: none"> <li>• Follow the appropriate JHA(s) to remove the sample stick from the beam.</li> <li>• Wear protective gloves when handling the sample.</li> </ul>

<p><b>5.5</b></p>	<p><b>Measure Sample</b>          Hold the G-M detector head as close as possible to the sample without touching:</p>  <p>Figure 3. Proper use of G-M detector</p> <p><b>If the needle stays within the scale</b>, the sample may be removed from the sample environment equipment.  <b>If the needle exceeds the scale</b>, leave the sample in the RSA, exit the RSA, and immediately contact an RCT to survey and handle the sample.</p> <p><b>NOTE:</b> Radiological Control Technicians are the only staff at SNS who can release potentially radioactive or radioactive samples from posted areas.</p>
<p><b>5.6</b></p>	<p><b>Label Sample</b>          If you remove the sample container, attach a label to the sample container (See Figure 4). If an RCT is called to measure the sample, provide a filled out label and ask the RCT to attach it.</p> <div style="border: 1px solid black; padding: 10px; margin: 10px auto; width: fit-content;"> <p style="text-align: center;"><b>BL-2 Sample Tag</b></p> <p style="text-align: center;">Exposed to neutron beam. Do not open at ORNL, unless by an RCT.</p> <p><b>Proposal ID:</b> _____</p> <p><b>Owner:</b> _____</p> <p><b>Formula:</b> _____</p> <p><b>Sample can ID:</b> _____</p> <p><b>Mass:</b> _____</p> <p><b>Time in beam:</b> _____ <b>hours</b></p> <p><b>Out of beam on:</b> ___/___/___</p> <p><b>Special instruction:</b> _____</p> <p>_____</p> <p>_____</p> </div> <p>Figure 4. Label for exposed samples</p>
<p><b>5.7</b></p>	<p><b>Handle Removed Sample</b></p>

**Attention! This procedure does not qualify a User or a Staff member to open the sample container.**

**If a sample is surveyed and measured within the scale in step 5.5**, it may be removed from the sample environment equipment, but it must remain in the area posted as 'Radioactive Material' until it is tagged by an RCT. There are two Radioactive Material areas on beam line 2: the RSA and the red cabinet next to the RSA (See Figure 5). Any item inside a Radioactive Material area cannot be carried out across the boundary unless it either

- has an RCT applied tag (green or yellow – See Figures 6, 8) or
- was carried into the area after the shutters were last open.



Figure 5. Radioactive Material areas

**If a sample is surveyed, measured and given a yellow Radioactive Material tag by an RCT** (See Figure 6), it may be removed from the sample environment equipment and the Radioactive Material area, but it must remain within the posting of 'Controlled Area' (on the target building entrances - See Figure 7).





Figure 6. Yellow Tag



Figure 7. Controlled Area Posting

**If a sample is surveyed and given a green Clearance tag by an RCT (See Figure 8), it may be removed from Controlled Areas.**



Figure 8. Green Tag

**6. Documentation**

- NONE

**7. References**

- SNS-OPM 3.A-1.5.2.2, Procedure for Operation of the Backscattering Spectrometer User IPPS Panel.  
<https://neutrons.ornl.gov/x/operations/SNS-OPM/03-A-01-05-02-02.pdf>
- SNS-OPM 3.A-3.5.2.1, Procedure for Entry to the Backscattering Spectrometer Restricted Sample Area.  
<https://neutrons.ornl.gov/x/operations/SNS-OPM/03-A-01-05-02-01.pdf>
- *Backscattering Spectrometer BL2 Hazard Identification and Analysis*, SNS document number 107040100-ES0001-R00.  
(in ProjectWise at <https://shawnee.ornl.gov/WEL/index.html>)

**8. Attachments**

- NONE