



SNS-OPM 2.H-7.7

SNS Procedure for Removal or Modification of
Radiation Shielding and Beam Line Components

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For SNS Operations Manager Date

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[SNS-OPM Editor](#)

SNS-OPM 2.H-7.7
SNS Procedure for Removal or Modification of
Radiation Shielding and Beam Line Components

1. Purpose

- 1.1 To provide instructions for the safe and deliberate removal or modification of commissioned radiation shielding and/or radiation protection barriers, and of the movement of activated beam line components out of beam areas.

NOTE:

Task specific shielding that is installed on a temporary basis for work, and is controlled as reviewed as a part of an ALARA review or a Radiation Work Permit (RWP) process, is **not** under the scope of this procedure.

1.2 Definitions:

1.2.1 **Shielding:** A bulk material used to attenuate radiation.

- **Permanent Shielding:** Shielding installed to be a permanent part of the facility.
- **Moveable Shielding:** Permanent shielding designed to be moved to allow access.
- **Temporary Shielding:** Shielding that is not intended to be a permanent part of the facility.

1.2.1.1 Examples:

- **Permanent Shielding** includes poured-in-place concrete shielding as well as concrete blocks, lead, steel, and stacked block that are used in the construction of a beam cave or beam stop that are intended to be a permanent part of the facility.
- **Moveable Shielding** includes lintels over the RTBT T-Section, shielding plugs for the Front End, Chopper shielding, etc. that is designed to be removed.
- **Temporary Shielding** includes polyethylene, paraffin, borax, lead bags, and sandbags that are **not** intended to be a permanent part of the facility.

1.2.2 **Radiation Barrier:** Any material or device that prevents access to a radiation field.

1.2.2.1 Examples:

- **Yellow and Magenta rope/tape with appropriate postings.**
- **Access gates or doors to a beam cave.**

- **Fenced** areas that delineate a beam line and has a gate or door that is part of the **SNS Personnel Protection System (PPS)**.
- Fenced areas with gates padlock-controlled by the **SNS RSO**.
- A beam line transport vacuum pipe.
- Mesh netting or other material, which surround a beam line trajectory.
- Any component in the beam line which effectively serves as an access barrier, when removed, would allow access to the beam line trajectory. (Magnets, counters, instrumentation, etc.).

1.2.3 **Potentially Activated Beam Line Components:** All components have the potential to become activated to a measurable extent (as determined by conventional survey meters) as a result of exposure to beam or secondary particles (mostly neutrons and gammas created due to beam interaction with beam line components).

- 1.2.3.1 Examples of potentially activated beam line components are:
- Magnets, cables, cable tray, and piping, in proton and neutron beam areas.
 - Collimators and targets in proton beam areas.
 - Instrumentation in proton and neutron beam areas.
 - Choppers and secondary shutters in neutron beam areas.

2. **Responsibilities**

- 2.1 The **Responsible Scientist/Engineer** is responsible for assuring that this procedure is implemented whenever shielding or a barrier is removed and whenever a beam line component is removed.
- 2.2 The **SNS Radiation Safety Officer (RSO)** shall review and approve any modifications to a radiation shield or barrier, including its temporary removal and replacement.
- 2.3 The **SNS RSO** shall supervise shielding removal or reinstallation and will ascertain and certify the proper shielding configuration prior to restart.
- 2.4 The **SNS RSO** shall keep, in the CCR, a log of Temporary Shielding locations and signs, and their status.

3. Prerequisites

- 3.1 Temporary or Moveable Shielding shall have identification signs designating it as being under the configuration control of the **SNS RSO**.
- 3.2 Physical barriers, tethers, or banding should be erected, where practical, to control the location of Temporary or Moveable Shielding and to prohibit its modification or removal.
- 3.3 Temporary or Moveable Shielding should, where practical, be painted yellow for easy identification

4. Precautions

- 4.1 If the removal affects more than one accelerator area or experimental beam line, or the removal is in proximity of another running beam line, or the intended work results in an unintended modification, the **SNS RSO** must ensure that the affected area is continuously manned until the shielding or barrier is replaced or a temporary barrier is installed and posted by a **Radiological Control Technician (RCT)**.

5. Procedure

- 5.1 If a modification is to be made to Permanent or Temporary Shielding, the **Responsible Engineer/Scientist** (e.g. System Engineer, Instrument Scientist, Lead Engineer, Liaison Physicist, Commissioning Area Manager, etc) shall inform the **SNS RSO** of the proposed change.

NOTE:

For commissioned instruments and their associated beam lines, the Lead Instrument Scientist or designee shall approve all proposed shielding modifications.

- 5.2 The **SNS RSO** shall assure that the proposed change is properly reviewed in accordance with the requirements of [SNS-OPM 2.H-7.4 “Review of SNS Radiation Shielding”](#) before continuing with any shielding modifications.
- 5.3 The **Responsible Engineer/Scientist**, the **SNS RSO**, the **SNS Operations Manager** and one of the following where appropriate, either the **RAD Accelerator Operations Manager** or the **SNS Instrument Operations Manager** shall consult and determine what beam restrictions are required to safely remove or modify a shielding barrier.
- 5.4 The proposed change should be evaluated to determine if it may potentially affect more than one accelerator area or experimental beam line and if additional restrictions are warranted (e.g. Radiation Safety Hold Tags, fault studies, notifications, etc.).

- 5.5 The **Responsible Engineer/Scientist** shall clearly indicate on a work order the required beam restrictions identified by facility staffing Section 5.3.
- 5.6 The **Responsible Engineer/Scientist**, or designee, shall assure implementation of all safe beam requirements.
- 5.7 The **Responsible Engineer/Scientist**, or designee, shall ensure that the **Control Room Shift Supervisor, Target Operations Shift Technician (for Target Shielding), Instrument Hall Coordinators (for Instrument Shielding) and other affected experimenters or individuals** are notified of the changing status of the shielding.
- 5.8 The **Responsible Engineer/Scientist**, or designee, shall notify the person responsible for accomplishing the barrier or shielding removal/modification that a safe beam condition exists and work may begin under the general supervision of the **RSO**.
- 5.9 All beam line components and other potentially activated materials removed from beam areas shall be surveyed by a qualified **RCT** and shall comply with the ORNL Standards Based Management System (SBMS) policies for radioactive material control, especially:
- [ORNL SBMS Subject Area: Radiological Labeling and Control of Materials](#).
 - [ORNL SBMS Subject Area: Radiological Labeling and Control of Materials Procedure: General Release of Material](#).
- 5.10 Upon completion of the work order, the **Lead Engineer**, or designee
- Shall sign off the completed work order, and
 - Shall notify the **RSO**.
- 5.11 The **RSO** shall:
- Determine that the shielding or barrier has been placed into an appropriate configuration.
 - Notify the **on-duty Control Room Shift Supervisor or Control Room Accelerator Specialist** of the removal of any previous requirements for a safe beam condition.
 - Make appropriate entries in the CCR Logbook.
- 5.12 The **on-duty Control Room Shift Supervisor or Control Room Accelerator Specialist** shall:
- Work with the appropriate staff in the removal of the previously required, and now relinquished, requirements for a safe beam condition (e.g. Radiation Safety Hold tags and locks or PPS bypasses, etc.).
 - Make appropriate entries in the CCR Logbook.
 - Notify the **Responsible Engineer/Scientist** that the work is completed.

5.13 The RSO (or designee) shall assure that surveys are conducted as required to verify shielding effectiveness.

6. Documentation

6.1 Signed off and completed work order.

6.2 Appropriate entries in the CCR Temporary Shielding Logbook and E-Log.

7. References

7.1 ORNL SBMS Subject Area: Radiological Labeling, and Control of Materials
<https://sbms.ornl.gov/sbms/sbmsearch/subjarea/plcrm/sa.cfm>

7.2 ORNL SBMS Subject Area: Radiological Labeling, and Control of Materials
Procedure: General Release of Material
<https://sbms.ornl.gov/sbms/sbmsearch/subjarea/plcrm/pro9.cfm>

7.3 SNS-OPM 2.H-7.4. "Review of SNS Radiation Shielding"
<http://ns-staff.ornl.gov/operations/SNS-OPM/02-H-07-04.pdf>

8. Attachments

8.1 SNS-OPM 2.H-7.7.a "SNS Shielding Under Configuration Control"
<http://ns-staff.ornl.gov/operations/SNS-OPM/02-H-07-07-a.pdf>

9. Revision History

- Rev. 4 February 10, 2015 - **Signatory Page** updated signature page to reflect current organization. Minor formatting changes throughout the document. Updated the links. Removed references to the DRCO throughout the document. **Section 5.3** Clarified appropriate personnel to contact. **Sections 5.11 and 5.12** added in the CRAS as they now can remove RS Holds and the CRAS is on duty during shutdown periods. **Section 9** Added Revision History section.
- Rev. 2 SNS-OPM –ATTACHMENT 2.H-7.7.a – configuration controlled items at instruments that have been commissioned since the last revision has been added. Also, items necessary for the various PPS operating modes are now indicated by notes and downward-pointing arrows. A few items changed status (e.g., were removed from configuration control for some reason).