

# Magnetism Reflectometer Alarm Response for Users

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Magnetism Reflectometer  
Alarm Response for Users

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# Magnetism Reflectometer Alarm Response for Users

Approved By

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# Magnetism Reflectometer Alarm Response for Users

## Objective

To familiarize users with alarms and response procedures associated with activities at the SNS and the Magnetism Reflectometer.

## Description

This document provides a general overview of the potential alarms which a user may experience, and the appropriate response procedures, at Magnetism Reflectometer (MR) beam line and the SNS target building.

## Precautions

Failure to follow the policies, procedures and work practices described in this document may expose users or personnel to unsafe conditions.

## References

OPM document 05-U-4A-01 BL4A *Alarm Response Procedure*

SNS document *Beam Line 4A IPPS Operating Procedure for Users*

## How to Request Assistance

Your primary point of contact should be the Instrument **Call Coordinator (IHC)**, who can be reached at **865-241-4432**. Some display screens still refer to calling the central control room (CCR), or the protective systems team (PST), and will display different numbers. We recommend you always call the IHC. The IHC will respond to your request for assistance and make a determination whether any other person or group need to be contacted. If you are unable to reach the IHC, **contact the CCR at 865-576-1502**. In the event that it is necessary to call for assistance in response to an alarm or a concern please provide the following information to the person whom you are calling.

- Your name.
- The phone number from which you are calling (in case you are disconnected).
- Your current location.
- The beam line on which the alarm or concern occurred.
- The nature of the alarm or concern.
- Any action you have already taken.

## IPPS Fault Detection Sequence

**Upon detection of an IPPS fault condition, the IPPS will initiate the following sequence to place the instrument in a safe condition:**

- Attempt to close the secondary shutter
- If the secondary shutter does not close within the specified time, then the PPS will close the primary shutter
- If the primary shutter does not close within the specified time, the PPS will terminate the proton beam to the target building.

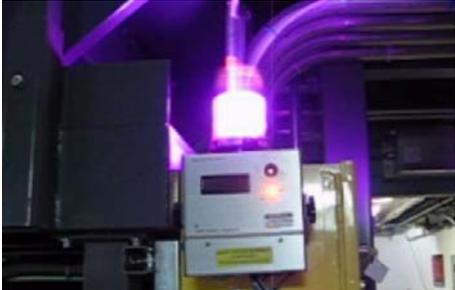
## Magnetism Reflectometer Alarm Response for Users

The safety of users and personnel is of the utmost importance to everyone at the SNS. To ensure the highest level of safety there are many layers of warnings and alarms on beam line 4A, in the target building and throughout the SNS complex. Potential alarms, and the appropriate response actions to take, are detailed in this document. Users should familiarize themselves with these alarms and responses, take time each day to review this information and have a copy of this document readily available so that it can be referenced immediately in the event of an alarm. Questions concerning alarm conditions should be directed to a member of the beam line 4A staff, or to an Instrument Hall Coordinator (241-4432).

Please note that PPS system faults may be caused by several different conditions, which result in different illumination states on the stack light. Each is a system fault, though not the same system fault. Each has its own indication on the stack light, though not necessarily a unique indication. It is not practical for the yellow sign displayed at each instrument to list all possible stack light indications associated with all possible fault conditions. Only the most common indications are posted. Regardless of the stack lights displayed, if the message board displays the PPS Fault message follow the instructions in this document and those on the message board. **Exit the instrument cave immediately if a red stack light is ever displayed.**

### IPPS Message display, alarm indicators and actions to take in response to alarms



<b>Radiation Alarms</b>
<b>Alarm Indication</b>
<p><b>Magenta beacon is flashing</b></p> <div style="text-align: center;">  </div>
<b>Immediate Action</b>
<ul style="list-style-type: none"> <li>• <b>Close Secondary Shutter</b></li> <li>• <b>Exit Area</b></li> <li>• <b>Call Instrument Hall Coordinator (241-4432) and RCT (574-6588) for assistance.</b></li> <li>• <b>Notify Lead Instrument Scientist.</b></li> </ul>
<b>Description</b>
<p>The beacon is illuminated and remains so when the radiation levels at the radiation detector (outside of the shielding enclosure) exceed 5 mrad/hr. This is not a normal mode of operation for the instrument but may be permitted if the area is properly posted and controlled and prior authorization has been granted by the NSSD ESH/Operations staff, and if proper, predetermined procedures are followed. If this alarm point is reached without prior approval, close the secondary shutter, exit the area and call the Instrument Hall Coordinator (241-4432) and an RCT (574-6588). Do not attempt to open the secondary shutter without correcting the cause <b>and first</b> notifying the Lead Instrument Scientist (or designee) or the Instrument Hall Coordinator. Note that once radiation levels drop below 5 mrad/hr it will take approximately thirty seconds for the beacon to stop flashing.</p>

### Alarm Indication

**Magenta beacon is flashing, audible alarm is sounding**



**Message Display Reads “Beam Off, High Rad Call CCR 576-1502”**



### Immediate Action

- **Exit Area**
- **Call Instrument Hall Coordinator (241-4432) and RCT (574-6588) for assistance.**
- **Notify Lead Instrument Scientist.**

### Description

This condition is reached if the radiation level as measured at the radiation detector (outside of the shielding enclosure) exceeds 20 mrad/hr. The IPSS will initiate the **IPSS Fault Detection Sequence** to remove the hazard. If the magenta beacon remains illuminated, exit the area. Call the Instrument Hall Coordinator (241-4432) and an RCT (574-6588) and ask them to come to the instrument. Do not attempt to open the secondary shutter until the condition causing the elevated radiation field is corrected. Continued operation will require an “Enable” of the IPSS.

### Alarm Indication

Message Display Reads “Beam Off, Rad Fail Call PST 241-2727”



### Immediate Action

Call the indicated number and report the problem.

### Description

The **IPPS** will initiate the **IPPS Fault Detection Sequence** removing any possible hazard due to elevated radiation fields. The radiation detector has failed and requires maintenance by a member of the **Protection Systems Team** – call the indicated number and report the problem. Do not attempt to operate the secondary shutter.

## Alarm Indication

Cave Mode status lights display two different colors



Message Display Reads "PPS Fault Call PST 241-2727"



Stack light may display steady green, or steady green and blinking red light



<b>Immediate Action</b>
<ul style="list-style-type: none"> <li>• <b>Exit Area</b></li> <li>• <b>Call Instrument Hall Coordinator (241-4432) and RCT (574-6588) for assistance.</b></li> <li>• <b>Notify Lead Instrument Scientist.</b></li> </ul>
<b>Description</b>
<p>A hardware failure has occurred in the IPPS and requires maintenance by a member of the <b>Protection Systems Team</b> – call the indicated number and report the problem. Do not attempt to operate the secondary shutter. If this condition occurs when the <b>secondary shutter</b> is <b>open</b> the stack lights will display a <b>flashing red light</b> in addition to a <b>steady green light</b>. If this condition occurs when the <b>secondary shutter</b> is <b>closed</b> the stack lights will display <b>only a steady green light</b>. The <b>IPPS</b> will initiate the <b>IPPS Fault Detection Sequence</b> if this error occurs when the secondary shutter is open.</p>

### Alarm Indication

Message Display Reads “PPS Fault Call PST 241-2727”



No stack lights are illuminated



### Immediate Action

- **Exit Area**
- **Call Instrument Hall Coordinator (241-4432) and RCT (574-6588) for assistance.**
- **Notify Lead Instrument Scientist.**

### Description

A hardware failure has occurred in the IPSS and requires maintenance by a member of the **Protection Systems Team** – call the indicated number and report the problem. Do not attempt to operate the secondary shutter. The **IPSS** will initiate the **IPSS Fault Detection Sequence** if this error occurs when the secondary shutter is open.

## Oxygen Deficiency Hazard Alarms

### Alarm Indication

#### Blue strobes flashing



**Audible alarm sounding in cave and Message Display Reads “Low O<sub>2</sub>, Do Not Enter Call CCR 576-1502”**



### Immediate Action

- **Leave the cave immediately if inside or do not attempt to enter cave if outside.**
- Call the **Instrument Hall Coordinator** (241-4432) and ask them to come to the instrument. Inform the Instrument Hall Coordinator of an ODH event, and request the Instrument Hall Coordinator close the GN<sub>2</sub> feed valve, located above the BL4B hutch if an uncontrolled GN<sub>2</sub> release potentially could be responsible for the ODH event.
- Horn may be silenced by depressing **alarm acknowledge** button on ODH display.

### Description

This condition is caused by an oxygen deficiency hazard inside the sample enclosure “cave” (ODH cutoff set point is 19.5% O<sub>2</sub>; a normal O<sub>2</sub> level is about 21%). **Leave the cave immediately if inside or do not attempt to enter cave if outside.** The actual O<sub>2</sub> concentration will be displayed on the O<sub>2</sub> display.

Call the **Instrument Hall Coordinator** (241-4432) and ask them to come to the instrument. Inform the Instrument Hall Coordinator of an ODH event, and request the Instrument Hall Coordinator close the GN<sub>2</sub> feed valve, located above the BL4B hutch if an uncontrolled GN<sub>2</sub> release potentially could be responsible for the ODH event. Do not attempt to open the cave door until the condition causing the oxygen deficiency is corrected. Continued operation will require an “Enable” of the IPSS.

*Note: Horn may be silenced by depressing alarm acknowledge button on ODH display.*

## Alarm Indication

**Blue strobes flashing**



**Audible alarm sounding in cave and no Stack Lights are illuminated**



**Message Display Reads “O<sub>2</sub> Detector Fail Call PST 241-2727”**



## Immediate Action

- **Leave the cave immediately if inside or do not attempt to enter cave if outside.**
- Call the **Protection Systems Team** and report the “O<sub>2</sub> detector fail” message.
- Horn may be silenced by depressing **alarm acknowledge** button on ODH display.

## Description

This condition will occur when a failure occurs within the O<sub>2</sub> monitoring system. **Leave the cave immediately if inside or do not attempt to enter cave if outside.** Call the **Protection Systems Team** and report the “O<sub>2</sub> detector fail” message.

*Note: Horn may be silenced by depressing alarm acknowledge button on ODH display.*

## Other Alarm Messages

### Alarm Indication

**Cave Mode remains in Beam Permit, even though Mode Selector key is in the Access position**



**Message Display Reads “Detector not in safe position”**



### Immediate Action

- **Restore all keys to their Beam Permit Positions**
- **Drive detector table to “home” (zero degree) position**
- **Repeat procedure to change cave mode to Access**

### Description

The detector table must always be in the zero degree, or “home” position before access to the cave is granted. If the detector table is in any other position the cave mode will remain in beam permit, and access to the cave is denied. To correct this condition, restore all key positions to their beam permit positions (mode selector key to sweep complete, **Ig** key to **Beam permit**...don't forget to push the **Press to Secure** button before trying to turn the **Ig** key) and drive the detector table angle to zero degrees. Then repeat the process of returning the cave mode to **Access**: Rotate the **Ig** key clockwise ninety degrees to its trapped, **Cave Access/Sweep Required**, position. Rotate the **Mode Selector** key to the **Access** position. If the conditions inside the cave allow, the cave

mode will revert to **Access**, and the green Access status lights will illuminate, and the door will be unlocked, and may be opened with the door control **Open** button. If the status continues to remain in **Beam Permit**, contact a member of the BL4A staff or an **Instrument Hall Coordinator (241-4432)** for assistance.

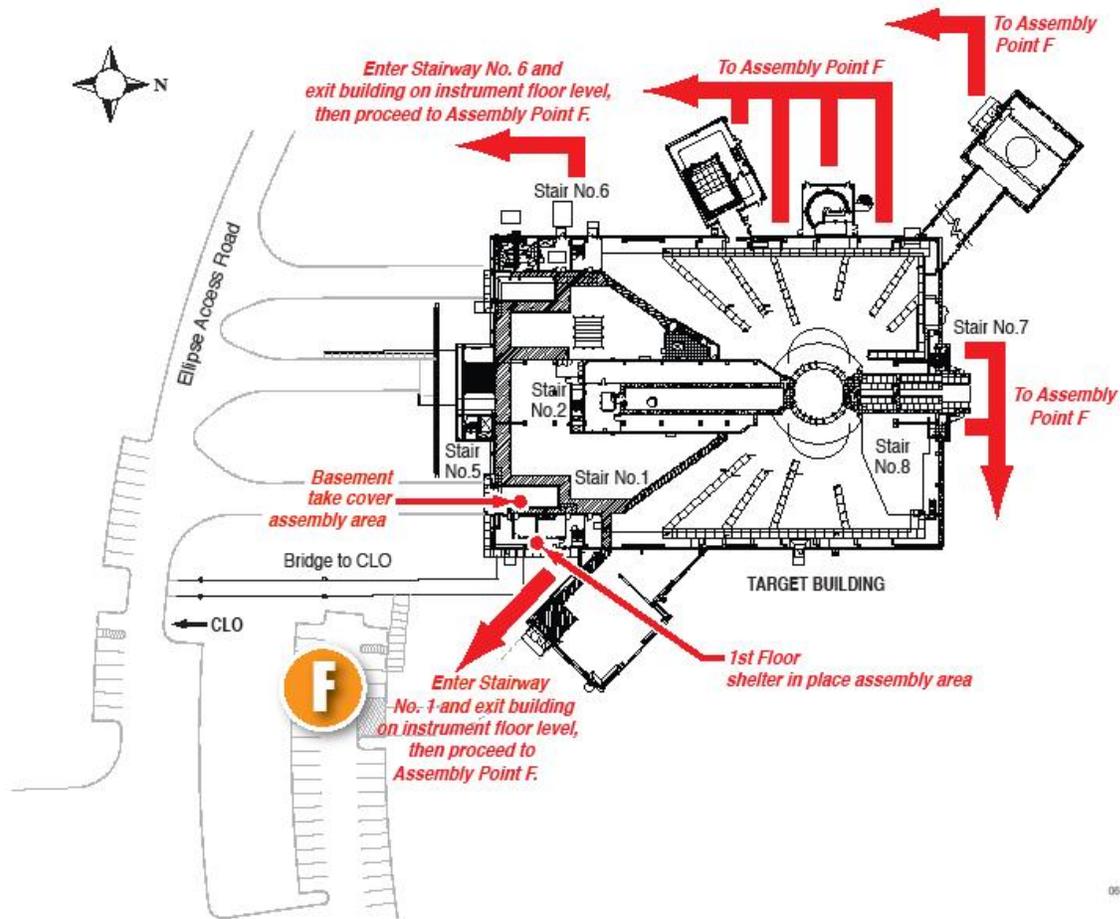
<b>Site/Facility Wide Indications</b>
<b>Alarm Indication</b>
Announcement “Tornado Warning has been issued for this area. Building 8700 occupants proceed to Target Control Room in Target Facility Basement immediately.”
<b>Immediate Action</b>
Proceed to, and remain at the Assembly Point until the “All Clear” announcement is given (refer to the emergency map and directions at the end of this document for the location of the target building assembly points).
<b>Description</b>
A tornado has been spotted in the immediate area and the laboratory issues a tornado warning. Proceed to, and remain at the Assembly Point until the “All Clear” announcement is given (refer to the emergency map and directions at the end of this document for the location of the target building assembly points).

<b>Alarm Indication</b>
Announce “Target Facility Shelter-in-Place. Building 8700 occupants proceed to Conference Room TA-103 on Instrument Floor immediately.”
<b>Immediate Action</b>
Proceed to, and remain at the Assembly Point (Conference Room TA-103 on Instrument Floor) until the “All Clear” announcement is given (refer to the emergency map and directions at the end of this document for the location of the target building assembly points).
<b>Description</b>
An abnormal condition exists in the target building or surrounding area which requires all personnel to proceed to and remain in an area which is equipped with an air handling system which is separate from the air handling system for the rest of the target building. Proceed to, and remain at the Assembly Point (Conference Room TA-103 on Instrument Floor) until the “All Clear” announcement is given (refer to the emergency map and directions at the end of this document for the location of the target building assembly points).

<b>Alarm Indication</b>
Announce “Target Facility Evacuation. Building 8700 occupants proceed to the nearest Assembly Point immediately.”
<b>Immediate Action</b>
<ul style="list-style-type: none"> <li>• Exit target building immediately.</li> <li>• Proceed to, and remain at the Assembly Point until the “All Clear” announcement is given (refer to the emergency map and directions at the end of this document for the location of the target building assembly points).</li> </ul>
<b>Description</b>
<p><b><u>Target Facility Evacuation</u></b></p> <ol style="list-style-type: none"> <li>a. Announce “Target Facility Evacuation. Building 8700 occupants proceed to the nearest Assembly Point immediately.”</li> <li>b. Repeat announcement.</li> <li>c. Target Facility ERT members conduct area sweeps while proceeding to designated Assembly Point.</li> <li>d. Remain at the Assembly Point until the “All Clear” announcement is given.</li> <li>e. In the event of an Emergency evacuation of MBA 060, the following actions shall be taken to ensure the integrity of the nuclear materials inventory: <ul style="list-style-type: none"> <li>• The MBA 060 Representative/ Alternate shall be responsible to see that no loss of nuclear materials has occurred.</li> <li>• The MBA 060 Representative/ Alternate shall be responsible to immediately report to the NMC&amp;A Department any discrepancies or unusual situations which could indicate a loss of control of nuclear materials.</li> </ul> </li> </ol>

<b>Other Indications</b>
<b>Alarm Indication</b>
Observed water or hydraulic leak. Smell/see smoke, strange smell, strange sound
<b>Immediate Action</b>
<ul style="list-style-type: none"> <li>• <b>Call Instrument Hall Coordinator (241-4432) for assistance.</b></li> <li>• <b>Notify Lead Instrument Scientist.</b></li> </ul>
<b>Description</b>
Beam line 4A uses water cooled equipment (choppers, lasers) which may leak, causing potential hazards and equipment damage, as well as electrical or mechanical hazards. Non-SNS personnel should not attempt to remedy leaks. You smell smoke, or see smoke from a piece of equipment, or detect a strange or unusual smell, or hear an unusual or suspect noise.
<b>Alarm Indication</b>
Unusual/Questionable motor movement
<b>Immediate Action</b>
<ul style="list-style-type: none"> <li>• Press <b>Motor Emergency Stop Button</b>, located on the right door of the motor motion control panel, located inside the beam line 4A cave.</li> <li>• <b>Call Instrument Hall Coordinator (241-4432) for assistance.</b></li> <li>• <b>Notify Lead Instrument Scientist.</b></li> </ul>
<b>Description</b>
You observe or suspect that a motor or piece of motor driven equipment is behaving in an unusual manner, or makes an unusual or suspect noise.

## Emergency Map and Directions to Target Building Assembly Points



### Directions to Take Cover Assembly Point

In the event of a **Take Cover** alarm, proceed from beam line 4A to the **Take Cover assembly point**, located in the Target Building basement. Walk up the stairs located by beam line 4A to the mezzanine. Continue to the stairwell door.



Using the stairwell between the “north” and “south” side of the Target Building proceed to the basement, following the signs indicating the direction to the assembly point.



The door at the basement level of the target building can only be opened by a member of the SNS staff. If you are not accompanied by a member of the SNS staff you will be unable to proceed further. This is not a cause for concern; this is a valid assembly area even though it is not posted as the primary assembly area for take cover emergencies. Remain at this door until the all clear is announced if you are unable to proceed further. If you are able to open the door, proceed all the way to the end of the hall.



Turn left at the end of the hall and proceed to the assembly point, indicated by the assembly point marker sign.





Wait for the all clear announcement to be given before leaving the assembly point.

### **Directions to Shelter in Place Assembly Point**

In the event of a **Shelter in Place** alarm, proceed from beam line 4A to the **Shelter in Place assembly point**, located on the Target Building instrument floor, at conference room TA-103. Walk up the stairs located by beam line 4A to the mezzanine. Continue to the stairwell door.



Follow the signs indicating the route to the “north” side of the mezzanine.



Follow the mezzanine to the stairwell.



Pass through the first set of doors only, and take the stairwell to the instrument floor level.



Do not exit to the instrument floor. Exit the stairwell using the door to the target building offices, and continue to the shelter in place assembly point, indicated by the assembly point marker sign.





Wait for the all clear announcement to be given before leaving the assembly point.

## Directions to Evacuation Assembly Point

In the event of an **Evacuation** alarm, exit the target building and proceed from beam line 4A to the **Evacuation assembly point**, located in the parking lot adjacent to the target building stairway number 1. Exit the target building by means of the nearest exit. If you are in the beam line 4A hutch or cave, the nearest exit is between beam line 4 and beam line 2.



Using the emergency map, follow the marked route to Assembly Point “F”. Exit the building and proceed to the left.



Stay on paved walkways when possible. When this is not possible take special care walking on loose or uneven surfaces, particularly when the ground is damp. Continue to the left, using the target building and its exterior buildings as a guide.



At the end of the target building turn left, and continue along the front of the target building.



Continue to the parking lot nearest the target building, which is posted with the **Assembly Point F** sign.



Wait for the all clear announcement to be given before leaving the assembly point.