

## RSS Report - Detailed

### Report Criteria:

- Project ID(s): 5820

**\*\*\* WARNING \*\*\***

**This RSS is not currently valid, only "Authorized" RSSs are considered to be complete/valid.**

**RSS Title: NPDGamma @ FNPB13 @ SNS**  
**Principal Investigator: [Paul Mueller](#) (35792)**  
**RSS Status: [Awaiting GL Approval](#) RSS Number: 5820.0**

|                                 |  |
|---------------------------------|--|
| <b>Created By:</b>              | <a href="#">Paul Mueller</a> (35792) on Tuesday Aug 14, 2007 at 12:47 PM |
| <b>Last Revised By:</b>         | <a href="#">YZG</a> on Monday Mar 17, 2008 at 4:08 PM                    |
| <b>Start Date:</b>              | August 14, 2007  |
| <b>End Date:</b>                | December 31, 9999  |
| <b>RSS Division:</b>            | <a href="#">X013</a> : Physics Division                                  |
| <b>Division Work Authority:</b> | <a href="#">Glenn Young</a> (20535)                                      |
| <b>Division POC:</b>            | <a href="#">Stephen Withrow</a> (19314)                                  |

| <b>Group Leader(s):</b>                                       | <a href="#">Vince Cianciolo</a> (36339)<br><a href="#">Ian Evans</a> (916301)<br><a href="#">David Freeman</a> (900067)<br><a href="#">Kenneth Herwig</a> (36436)<br><a href="#">Sandra Kennedy</a> (26837)   |                           |                 |           |      |      |                         |                           |                 |                          |                            |                 |
|---|---|---------------------------|-----------------|-----------|------|------|-------------------------|---------------------------|-----------------|--------------------------|----------------------------|-----------------|
| <b>Lab Space Manager(s):</b>                                  |   |                           |                 |           |      |      |                         |                           |                 |                          |                            |                 |
| <b>Approvals/<br/>Authorizations:</b>                         | <table border="1"> <thead> <tr> <th>Date/Time</th> <th>Name</th> <th>Role</th> </tr> </thead> <tbody> <tr> <td>Mar 18, 2008<br/>3:58 PM</td> <td>Sandra Kennedy<br/>(26837)</td> <td>Group<br/>Leader</td> </tr> <tr> <td>Mar 20, 2008<br/>12:19 PM</td> <td>Vince Cianciolo<br/>(36339)</td> <td>Group<br/>Leader</td> </tr> </tbody> </table>  |                           |                 | Date/Time | Name | Role | Mar 18, 2008<br>3:58 PM | Sandra Kennedy<br>(26837) | Group<br>Leader | Mar 20, 2008<br>12:19 PM | Vince Cianciolo<br>(36339) | Group<br>Leader |
|   | Date/Time   | Name                      | Role            |           |      |      |                         |                           |                 |                          |                            |                 |
|   | Mar 18, 2008<br>3:58 PM   | Sandra Kennedy<br>(26837) | Group<br>Leader |           |      |      |                         |                           |                 |                          |                            |                 |
| Mar 20, 2008<br>12:19 PM                                      | Vince Cianciolo<br>(36339)  | Group<br>Leader           |                 |           |      |      |                         |                           |                 |                          |                            |                 |
| <b>Currently awaiting additional Group Leader approval(s)</b> |   |                           |                 |           |      |      |                         |                           |                 |                          |                            |                 |
|   | <p>This work is subject to an Instrument Safety Review as directed by the SNS ISSC (Instrument System Safety Committee); this review will be done in accordance with the requirements of the SNS Final Safety Assessment Document (FSAD) - Neutron Facilities and applicable ORNL SBMS procedures. The ISSC will assure that an acceptable hazard analysis has been completed before a recommendation from the ISSC is made to allow this instrument to run. A Job Hazard Analysis is expected to be completed for this work, per SNS procedures.</p> <p>Required training for anyone performing hands-on experimental work in the SNS Target Building is: ORNL Site Access Training, SNS Target Building Access Training, and ORNL/SNS site specific safety training, which is dependant on the task defined in the RSS and Job Hazards Analysis. Physics Division staff and guests must complete all Physics Division training required for hands-on work unless a specific training exception is granted from the Physics Division Training Manager, Sandra Kennedy. IN ADDITION, Physics Division staff and guests must complete training identified by the SNS. Required Physics Division training for this RSS includes Physics Division Experiment Safety Training, Physics Division Electrical Safety Training, Physics Division Hazard Communication Training, including site-specific hazard communication training, and ORNL Radiological Worker Training.</p> <p>Visitors and guests shall be escorted by trained personnel at all times, must comply with PPE requirements, and are not allowed to perform hands-on experimental work.</p> |                           |                 |           |      |      |                         |                           |                 |                          |                            |                 |

**General Comments:**

A list of SNS-required training will be prepared for each Physics Division participant and tracked locally at the SNS.

Changes in access requirements for SNS facilities will be reflected in badge control and/or communicated directly to Physics Division contact personnel.

Contact the LSS, SNS CCR (576-1502), and SNS Instrument Hall Coordinator (387-4012) in case of an emergency.

David Freeman (382-4863) is the Neutron Scattering Science Division (NSSD) Area Manager for the Target Building and for this experiment.

Ian Evans (574-8224) is the Neutron Scattering Science Division (NSS) ES&H/Operations Manager for the Target Building and this experiment.

Participants must read this RSS after its approval (to access the RSS reading tool enter your badge number at the RSS Participants Report, click on Generate Report, then look in the Required Reading column).

Observe access requirements for SNS buildings, including PPE requirements (presently hard hat, safety glasses, and safety shoes).

**No files have been attached to this section**

**RSS Description:**

This Research Safety Summary (5820) covers the commissioning and operation of the NPDGamma apparatus on beam line 13.

Construction of beam line 13 and installation of the NPDGamma apparatus is covered by Research Safety Summary (2766).

"The NPDGamma experiment aims to measure the directional asymmetry  $A_{\gamma}$  of the gamma ray direction  $k_{\gamma}$  and the neutron spin  $S_n$  in the reaction  $n + p \rightarrow d + \gamma$ ... The first phase of the experiment has been successfully completed at the Los Alamos Neutron Science Center... All components of the experiment like beam monitors,  $^3\text{He}$  spin-filter neutron polarizer, guide field, radio-frequency spin rotator, liquid para-hydrogen target, and cesium iodide gamma detector were tested and commissioned. The analysis of the first phase data is underway. The experiment is now moved to [Oak Ridge National Laboratory] where it has been approved to be the first experiment at the Fundamental Neutron

Physics Beam-line [13] at the [Spallation Neutron Source] and will measure the gamma asymmetry [A\_gamma] with a combined statistical and systematic uncertainty of  $1.0 \times 10^{-8}$ ." [SANTRA et al. 2007]

Safety analysis documentation for both the LANL and the ORNL phases of the NPDGamma experiment is available at the [NPDGamma Experiment Safety Page](#).

**Participants:**

[Rick Allen](#) (32476) , [James Bowman](#) (900245) ,  
[Vince Cianciolo](#) (36339) , [Mostafa Dadras](#) (937670) ,  
[Nadia Fomin](#) (952332) , [Geoffrey Greene](#) (900908) ,  
[Robert Mahurin](#) (747037) , [Paul Mueller](#) (35792) ,  
[Seppo Penttila](#) (936344)

**Work Locations:**

[8700: F-3-1](#)

**Hazards:**

Accelerators , Air Emissions , Chemical: Carcinogens , Chemical: Flammable/Combustibles , Chemical: Reproductive , Chemical: Toxic , Chemical: Toxic/Skin Absorption , Compressed Gases , Cryogenics , Electrical: => 50 volts , Elevated Work , Fissile Material , Hazardous Energy , Hazardous Material: On-site P&T , Hazardous Wastes/Used Oil , Hazcom Standard , Hoisting/Rigging , Hotwork , Intellectual Property , Lasers: 3a or below , Lasers: 3b or 4 Lasers , Lockout/Tagout , NEPA Documentation , Odd Work Hours , Other , Procurement , Quality (QA Plan) , Radioactive Material , Radioactive Wastes , Radioactive: Sealed Sources , Recyclable Material , Security Considerations , Unattended Work , Unguarded Equipment , Wastewater

**Question: 1.1 Does this operation involve the use of a particle [accelerator](#)?**

**Response: YES**

**Hazard Category: Accelerators**

**Work Location(s):**

8700: F-3-1

**PI Hazard Notes:**

While the Spallation Neutron Source is an accelerator facility, operation of NPDGAMMA does not involve direct use of the accelerator. The only direct interaction the instrument has with the accelerator is via the Instrument Personnel Protection System (IPPS) designed to protect operators of the instrument from prompt radiation. The IPPS can initiate a sequence of events that halts operation of the accelerator.

**Potential Controls:**

1. Contact your [Operations Manager](#) for information and requirements.

|                               |  |
|-------------------------------|--|
| <b>Requirements:</b>          | 1. <a href="#">Accelerator Safety</a>  |
| <b>PI Control/Rqmt Notes:</b> | <p>All individual experiments will be subject to a Safety Review as directed by the SNS Experiment Safety Review Committee. The review examines the overall safety plan, hazards, and proposed controls, including combustibility associated with individual sample materials; this review will be done in accordance with the requirements of the Spallation Neutron Source, Final Safety Assessment Document - Neutron Facilities and applicable ORNL SBMS procedures. Observe SNS access and training requirements.</p> <p>Contact either Ian EVANS (574-8224) or David FREEMAN (382-4863) for information and requirements regarding potential controls.</p> |

**No files have been attached to this question**

**Question: 1.2 Does this operation involve the use of a particle [accelerator](#) capable of generating a [radiation area](#)?**

**Response: YES**

**Hazard Category: Accelerators**

|                            |   |
|----------------------------|---|
| <b>Work Location(s):</b>   | 8700: F-3-1   |
| <b>PI Hazard Notes:</b>    | <p>NPDGAMMA includes an incident flight path that directs a neutron beam generated in the (mercury) Target Facility to a liquid hydrogen target (or test target of other composition). Direct exposure to this beam at the target location could result in a dose rate as high as 1,000,000 mrem/hr. The dose rate inside the physically accessible restricted access area could be as high as 200 mrem/hr.</p> |
| <b>Potential Controls:</b> | <ol style="list-style-type: none"> <li>Contact your Radiation Control Officer (RCO) for procedures/guidance related to the control of radiological hazards.</li> <li>Contact your <a href="#">Operations Manager</a> for information and requirements.</li> </ol>   |
| <b>Requirements:</b>       | 1. <a href="#">Accelerator Safety</a>   |

|                               |   |
|-------------------------------|---|
| <b>PI Control/Rqmt Notes:</b> | <p>1) Shielding - The incident neutron beam is heavily shielded so as to achieve a calculated dose on contact of less than 0.25 mrem/hr. The shielding is under configuration management.</p> <p>2) Instrument Personnel Protection System (IPPS) - The IPPS is a credited engineered control which restricts access to areas where personnel can receive a radiation dose.</p> <p>3) Training of instrument personnel and users will identify proper operation of the IPPS and the procedures for accessing these areas.</p> |
|-------------------------------|---|

**No files have been attached to this question**

**Question: 2.1 Does this operation involve the generation, handling, processing, use, or storage of [radioactive materials](#) (including sealed sources and waste)?**

**Response: YES**

**Hazard Category: Radioactive Material**

|                            |   |
|----------------------------|---|
| <b>Work Location(s):</b>   | 8700: F-3-1   |
| <b>PI Hazard Notes:</b>    | <p>Components of the NPDGAMMA apparatus exposed to the neutron beam will become activated.</p> <p>Standard neutron and gamma ray sources will be used for detector calibration.</p>   |
| <b>Potential Controls:</b> | <ol style="list-style-type: none"> <li>1. PPE and monitoring requirements included in the RWP.</li> <li>2. Contact your Radiation Control Officer (RCO) for assistance in designing projects and conducting ALARA reviews.</li> <li>3. Proposed additions and relocation of radiological materials must be reviewed relative to building inventory limits prior to receipt or relocation of the material. Facility Specific Radioactive Material Inventory Limits can be found in Section 4.1 of the applicable <a href="#">Facility Use Agreement</a> and as related information in the <a href="#">Facility Hazard Categorization Subject Area</a>.</li> <li>4. <a href="#">Facility Hazard Categorization Training</a> is available (not required) for personnel wishing to gain a better understanding of the process.</li> </ol> |

**Requirements:**

1. [Facility Hazard Categorization](#)
2. [Facility Use Agreements](#)
3. [Price Anderson Amendments Act \(PAAA\)](#)
4. [Radiological Design Requirements](#)
5. [Radiological Work: Performing Work](#)
6. [Radiological Work: Preparing for Work](#)
7. [Sealed Radioactive Source Control](#)

**PI Control/Rqmt Notes:**

This RSS is the technical work document authorizing radiological work. The maximum individual total effective dose equivalent (TEDE) is expected to be less than 20 mrem/yr, and the collective TEDE is expected to be less than 100 mrem/yr, "based on doses received in previous years for similar work". As a result, this constitutes a Level 1 Radiological Work Review (per SBMS Subject Area "Radiological Work: Preparing for Work").

Contact David Freeman (382-4863) or Ian Evans (574-8224) for assistance. General access to 8700: Target Hall does not require radiological worker training at the present time; however, ORNL Radiological Worker Training is required for Physics Division staff and guests accessing radiological areas at the SNS as Physics Division Radiological Worker Training is only good in Physics Division facilities. Obey ALL radiological postings.

ORNL Radiological Worker Training is required for all participants handling sealed sources. If any Physics Division sources are needed, SNS and Physics Division line management approval is required prior to transporting, using, or storing such sources at the SNS.

**The Target Building does not have a Facility Use Agreement.**

**Potential Training:**

1. Source users shall receive source-specific training provided by the Source Custodian.
2. [\(50022807\)](#) 17711 RADIOLOGICAL II TRAINING FOR ORNL
3. [\(50022921\)](#) 90184 Radiological Worker I Trng - ORNL
4. [\(50022367\)](#) SOURCE CONTROL CUSTODIAN - RADIOACTIVE

**No files have been attached to this question**

**Question: 2.2 Does this operation involve any [accountable radioactive sealed sources](#)?**

**Response: YES**

**Hazard Category: Radioactive: Sealed Sources**

**Work Location(s):**

8700: F-3-1

**PI Hazard Notes:**

137Cs gamma ray sources may be borrowed from the radiological control technicians. The 252Cf Neutron Check Source may be borrowed from the 252Cf Neutron Check Source Custodian, Lowell CROW.

The 0.498 ug 252Cf Neutron Check Source is sealed inside a shielded container and the dose rate at the surface of the container is less than 5 mrem/h.

**Potential Controls:**

1. Approval is needed for all accountable sources brought on-site. All sources (procured or made on-site) must be registered with the RP Source Control. See [Sealed Radioactive Source Control](#).
2. Sealed sources must be appropriately accounted for in the facility radioactive material inventory.

**Requirements:**

1. [Price Anderson Amendments Act \(PAAA\)](#)
2. [Radiation Generating Devices](#)
3. [Sealed Radioactive Source Control](#)

**PI Control/Rqmt Notes:**

The radiological control technicians will determine if they need to be present while their sources are being used.

252Cf Neutron Check Source training, provided by the 252Cf Neutron Check Source Custodian Lowell CROW, is required for its use.

The 252Cf Neutron Check Source is DOE accountable special nuclear material. Any movement from its present control area to another control area must be approved by the SNS Material Balance Representative (Greg Rowland 576-6445) prior to movement.

Radiological worker training and source user training are required for anyone handling check sources. Source user training is provided by the source custodian. Sources must be logged out when borrowed and logged back in when returned.

Sources should not be left unattended unless secured in an approved configuration.

**Potential Training:**

1. ORNL Installation, Registration, Operation and Maintenance of Radiation-Generating Devices, for Radiographers
2. ([50022807](#)) 17711 RADIOLOGICAL II TRAINING FOR ORNL
3. ([50022921](#)) 90184 Radiological Worker I Trng - ORNL
4. ([50022367](#)) SOURCE CONTROL CUSTODIAN - RADIOACTIVE

**No files have been attached to this question**

**Question: 2.3 Will this operation include the use of enriched uranium, uranium-233, plutonium, neptunium, americium, curium or californium as part of the radiological material?**

**Response: YES**

**Hazard Category: Fissile Material**

**Work Location(s):**

8700: F-3-1

**PI Hazard Notes:**

The 252Cf Neutron Check Source may be borrowed from the 252Cf Neutron Check Source Custodian, Lowell CROW.

The 0.498 ug 252Cf Neutron Check Source is sealed inside a shielded container and the dose rate at the surface of the container is less than 5 mrem/h.

**Requirements:**

1. [Screening for Nuclear Criticality Accident Hazards](#)
2. [Facility Hazard Categorization](#)
3. [Nuclear Criticality Safety](#)
4. [Price Anderson Amendments Act \(PAAA\)](#)

**PI Control/Rqmt Notes:**

252Cf Neutron Check Source training, provided by the 252Cf Neutron Check Source Custodian Lowell CROW, is required for its use.

Any use of 6Li or any other nuclear material (or special nuclear material) must be approved by the SNS Material Balance Representative (Greg Rowland 576-6445) prior to use.

|                            |  |
|----------------------------|--|
| <b>Potential Training:</b> | <ol style="list-style-type: none"> <li>1. See <a href="#">Meeting NCS Training Requirements</a>.</li> <li>2. (<a href="#">50022933</a>) NCS Level 0 Fission Control Area Access</li> </ol> |
|----------------------------|--|

No files have been attached to this question

**Question: 4.1 Does this operation involve the use of [lasers](#) of Class 3a and below?**

**Response: YES**

**Hazard Category: Lasers: 3a or below**

|                               |   |
|-------------------------------|---|
| <b>Work Location(s):</b>      | 8700: F-3-1   |
| <b>PI Hazard Notes:</b>       | A Class 3a laser will be used for beam line alignment.  |
| <b>PI Control/Rqmt Notes:</b> | All personnel with access to the instrument when the laser is in use must have completed LOW POWER LASER HAZARD AWARENESS TRAINING. |
| <b>Potential Training:</b>    | <ol style="list-style-type: none"> <li>1. (<a href="#">50022883</a>) LOW POWER LASER HAZARD AWARENESS TRAININ</li> </ol>            |

No files have been attached to this question

**Question: 4.2 Does this operation involve the use of [lasers](#) of [Class 3b](#) and above?**

**Response: YES**

**Hazard Category: Lasers: 3b or 4 Lasers**

|                            |  |
|----------------------------|--|
| <b>Work Location(s):</b>   | 8700: F-3-1  |
| <b>PI Hazard Notes:</b>    | A Class 3b laser will be used for beam line alignment.   |
| <b>Potential Controls:</b> | <ol style="list-style-type: none"> <li>1. All class 3B and 4 lasers require authorization by the Division Laser Safety Officer.</li> <li>2. Division/Facility-specific safety documentation, as required.</li> <li>3. Users must receive a medical laser eye exam and laser safety training prior to use.</li> </ol> |
| <b>Requirements:</b>       | <ol style="list-style-type: none"> <li>1. <a href="#">Lasers</a></li> </ol>  |

|                                      |  |
|--------------------------------------|--|
| <p><b>PI Control/Rqmt Notes:</b></p> | <p>All personnel with access to the instrument when the laser is in use must have completed HIGH POWER LASER HAZARD AWARENESS TRAINING.</p> <p>The Class 3b laser will be operated in accordance with the PHYSICS DIVISION LASER SAFETY PROCEDURE.</p> |
| <p><b>Potential Training:</b></p>    | <p>1. (<a href="#">50023141</a>) High Power Laser Hazard Awareness Trng</p>  |

**No files have been attached to this question**

**Question: 5. Does this operation involve the potential for electrical shock or the release of other hazardous energy (mechanical, pressure, steam, etc.)?**

**Response: YES**

**Hazard Category: Hazardous Energy**

|                                      |  |
|--------------------------------------|--|
| <p><b>Work Location(s):</b></p>      | <p>8700: F-3-1</p>   |
| <p><b>PI Hazard Notes:</b></p>       | <p>Routine maintenance will be performed on electrical equipment.</p> <p>Vacuum photo-diodes for the CsI(Tl) crystal scintillator gamma-ray detectors are biased at 90 Vdc by two batteries.</p>   |
| <p><b>PI Control/Rqmt Notes:</b></p> | <p>Reference SNS ES&amp;H Procedures for electrical work and lockout/tagout (contact Ian Evans 574-8224 for a hard copy or for online access).</p> <p>No energized work (including testing and verification) can be done without a variance approved by the SNS Director.</p> <p>The SNS Go Train Modules "Electrical Safety Awareness", "Lockout/Tagout", and "SNS Lockout/Tagout of Hazardous Energy Sources" are required. Physics Division staff and guests must also take Physics Division Electrical Safety training.</p> <p>ORNL "Electrical Worker Safety Training for R&amp;D" is required for persons performing work on-or-near electrical equipment.</p> |

**No files have been attached to this question**

**Question: 5.1 Does this operation involve any work on or near equipment with unguarded, [energized](#) electrical components operating at 50 volts or greater?**

**Response: YES**

**Hazard Category: Electrical: => 50 volts**

|                               |   |
|-------------------------------|---|
| <b>Work Location(s):</b>      | 8700: F-3-1   |
| <b>PI Hazard Notes:</b>       | Each vacuum photo-diode for the CsI(Tl) crystal scintillator gamma-ray detectors is biased at 90 Vdc by two batteries.  |
| <b>Potential Controls:</b>    | <ol style="list-style-type: none"> <li>1. Work must be performed by a <a href="#">Qualified Person</a>.</li> <li>2. Ensure Restricted Approach Boundary is identified.</li> <li>3. Proper PPE (e.g., voltage rated and tested gloves and blankets), insulated tools available and in use, protective clothing and eye/face protection, etc.</li> <li>4. Ensure administrative controls are in place (e.g., work performed under SOP).</li> <li>5. Acquire co-worker to assist as needed.</li> </ol> |
| <b>Requirements:</b>          | <ol style="list-style-type: none"> <li>1. <a href="#">Electrical Work</a></li> <li>2. <a href="#">Lockout/Tagout</a></li> </ol>   |
| <b>PI Control/Rqmt Notes:</b> | As a routine matter, work on energized electrical equipment (Voltages > 50 V) is prohibited. Electrical work will be performed by qualified personnel and testing and verification will require specially trained personnel who are familiar with the proper use of special precautionary techniques, personnel protective equipment, shielding and insulating materials, and insulated tools, and follow all applicable SBMS procedures.   |
| <b>Potential Training:</b>    | <ol style="list-style-type: none"> <li>1. (<a href="#">50157208</a>) High Voltage Safety Awareness Training</li> </ol>  |

**No files have been attached to this question**

**Question: 5.2 Does this operation involve work on equipment that requires [Lockout/Tagout](#) control procedures (equipment has the potential to release hazardous energy, e.g. electrical, mechanical, pressure, steam)?**

**Response: YES**

**Hazard Category: Lockout/Tagout**

|                          |                                    |
|--------------------------|------------------------------------|
| <b>Work Location(s):</b> | 8700: F-3-1                        |
| <b>PI Hazard Notes:</b>  | see PI Hazard Notes for question 5 |

|                               |   |
|-------------------------------|---|
| <b>Potential Controls:</b>    | <ol style="list-style-type: none"> <li>1. Work must be performed by a <a href="#">Qualified Person</a>.</li> <li>2. Ensure Restricted Approach Boundary is identified.</li> <li>3. Proper PPE (e.g., voltage rated and tested gloves and blankets), insulated tools available and in use, protective clothing and eye/face protection, etc.</li> <li>4. Ensure administrative controls are in place (e.g., work performed under SOP).</li> <li>5. Acquire co-worker to assist as needed.</li> </ol> |
| <b>Requirements:</b>          | <ol style="list-style-type: none"> <li>1. <a href="#">Electrical Work</a></li> <li>2. <a href="#">Lockout/Tagout</a></li> </ol>   |
| <b>PI Control/Rqmt Notes:</b> | <p>see <a href="#">PI Control/Rqmt Notes for question 5</a></p> <p>Physics Division requires Lockout/Tagout retraining whenever ORNL changes such training.</p>   |
| <b>Potential Training:</b>    | <ol style="list-style-type: none"> <li>1. <a href="#">(50157208)</a> High Voltage Safety Awareness Training</li> <li>2. <a href="#">(50197490)</a> Lockout/Tagout of Hazardous Energy 2003</li> </ol>   |

**No files have been attached to this question**

**Question: 7.2 Does this operation involve work conducted under the [OSHA Hazard Communication Program \(HAZCOM\)](#)?**

**Response: YES**

**Hazard Category: Hazcom Standard**

|                          |  |
|--------------------------|--|
| <b>Work Location(s):</b> | 8700: F-3-1  |
| <b>PI Hazard Notes:</b>  | <p>Liquid carbon tetrachloride (CCl<sub>4</sub>) and liquid hydrogen (LH<sub>2</sub>) will be used as target materials.</p> <p>Liquid nitrogen (LN<sub>2</sub>) and cold helium gas (He) will be used as cryogenes.</p> <p>Lead (Pb) will be used for gamma-ray detector shielding.</p> <p>Inert and flammable gases will be used.</p> <p>Oils, greases, and solvents for cleaning parts will be used.</p> |

|                               |  |
|-------------------------------|--|
| <b>Requirements:</b>          | 1. <a href="#">Conducting Qualitative Exposure Assessments - Interim Procedure</a>   |
| <b>PI Control/Rqmt Notes:</b> | <p>SNS hazardous materials operations are conducted under the <a href="#">OSHA HazCom Program (29CFR 1910.1200)</a>. SBMS <a href="#">Hazard Communication Program</a> applies. Requirements include training, referencing Material Safety Data Sheets (<a href="#">MSDS</a>), using warning labels, and maintaining inventories.</p> <p>Physics Division <a href="#">Hazard Communication and HazCom Site Specific Training #1309</a> is required for Physics Division personnel.</p> <p>A Job Hazards Analysis developed by the Experimental Group (i.e. those involved with this activity) will identify the specific chemical safety and PPE required.</p> <p>Reference the Physics Division ESH Bulletin <a href="#">Hazardous Material Inventories</a> for information on how to check inventories.</p> <p>Follow SNS requirements with regard to PPE, including safety glasses.</p> <p>Check availability of free chemicals at the <a href="#">Chemical Management Center (Materials Exchange List)</a> before purchasing.</p> <p>All chemicals will be stored in a HMIS controlled area in the Target Building in the vicinity of beam line 13 when not being used.</p> <p>Lead shielding will be encapsulated to prevent oxidation.</p> |
| <b>Potential Training:</b>    | 1. ( <a href="#">50022929</a> ) General Hazard Communication   |

**No files have been attached to this question**

**Question: 7.3 Does this operation involve any chemicals or wastes that are known or suspected human [carcinogens](#)?**

**Response: YES**

**Hazard Category: Chemical: Carcinogens**

|                               |   |
|-------------------------------|---|
| <b>Work Location(s):</b>      | 8700: F-3-1   |
| <b>PI Hazard Notes:</b>       | Liquid carbon tetrachloride (CCl <sub>4</sub> ) will be used as a target material and lead (Pb) will be used for gamma-ray detector shielding.  |
| <b>Potential Controls:</b>    | <ol style="list-style-type: none"> <li>1. Must be evaluated by your <a href="#">ESH POC</a>.</li> <li>2. <a href="#">ORNL Chemical Hygiene Plan</a></li> </ol>  |
| <b>Requirements:</b>          | <ol style="list-style-type: none"> <li>1. <a href="#">Chemical Safety</a></li> <li>2. <a href="#">Conducting Qualitative Exposure Assessments - Interim Procedure</a></li> <li>3. <a href="#">Personal Protective Equipment</a></li> </ol>  |
| <b>PI Control/Rqmt Notes:</b> | <p>Carcinogens must be labeled.</p> <p>Use gloves when handling Pb.</p> <p>The generation of wastes that are known or suspected to be human carcinogens requires review by the SNS Environmental Protection Officer.</p> <p>Reference Physics Division ESH Bulletins <a href="#">Lead Shielding</a> and <a href="#">Lead Safety Awareness</a></p> <p>Reference <a href="#">Guidance on Lead Soldering Operations</a>.</p> |
| <b>Potential Training:</b>    | <ol style="list-style-type: none"> <li>1. (<a href="#">50023039</a>) No-Rad Added - Performance-based Trainin</li> <li>2. (<a href="#">50022825</a>) WASTE CERTIFICATION PROGRAM/GEN AW</li> </ol>  |

No files have been attached to this question

**Question: 7.4 Does this operation involve any chemicals or wastes that are chemical reproductive hazards?**

**Response: YES**

**Hazard Category: Chemical: Reproductive**

|                          |  |
|--------------------------|--|
| <b>Work Location(s):</b> | 8700: F-3-1  |
| <b>PI Hazard Notes:</b>  | Liquid carbon tetrachloride (CCl <sub>4</sub> ) will be used as a target material and lead (Pb) will be used for gamma-ray detector shielding. |

|                               |   |
|-------------------------------|---|
| <b>Potential Controls:</b>    | 1. Reproductive hazards should be evaluated by your <a href="#">ESH POC</a> for individuals (male and female) who are considering having children, are pregnant, or are breast feeding.   |
| <b>Requirements:</b>          | <ol style="list-style-type: none"> <li>1. <a href="#">Chemical Safety</a></li> <li>2. <a href="#">Conducting Qualitative Exposure Assessments - Interim Procedure</a></li> <li>3. <a href="#">Fetal Protection</a></li> <li>4. <a href="#">Personal Protective Equipment</a></li> </ol> |
| <b>PI Control/Rqmt Notes:</b> | <p>Use gloves when handling lead.</p> <p>The generation of wastes that are known or suspected to be reproductive hazards requires review by the SNS Environmental Protection Officer.</p>   |

**No files have been attached to this question**

**Question: 7.7 Does this operation involve any chemicals or wastes that are [flammable](#) or [combustible](#)?**

**Response: YES**

**Hazard Category: Chemical: Flammable/Combustibles**

|                          |  |
|--------------------------|--|
| <b>Work Location(s):</b> | 8700: F-3-1  |
| <b>PI Hazard Notes:</b>  | <p>"...hydrogen gas from a cylinder passes through a H<sub>2</sub>-purifier and a liquid nitrogen trap of the [Gas Handling System] to clean itself. A partial conversion from [the] ortho to para state of hydrogen occurs while passing through [an] ortho-para converter... placed inside the liquid nitrogen [at 77 deg K]. The partially converted and cooled gas then enters into the cryostat where it gets cooled down to 17 deg K and liquefied near the upper [cryo-cooler] and then again passes through another ortho-para converter cooled by the lower cryo-cooler before entering into the target vessel. Partly evaporated hydrogen gas coming out through the exhaust line gets recooled near the upper cryo-cooler and gets [recirculated] into the target vessel." [SANTRA et al. 2007]</p> |

|                                      |   |
|--------------------------------------|---|
| <p><b>Potential Controls:</b></p>    | <ol style="list-style-type: none"> <li>1. For all flammable gases and liquids, a safe volume must not be exceeded.</li> <li>2. Provide appropriate flammable storage.</li> </ol>  |
| <p><b>Requirements:</b></p>          | <ol style="list-style-type: none"> <li>1. <a href="#">Storing and Handling Flammable and Combustible Liquids</a></li> <li>2. <a href="#">Chemical Safety</a></li> <li>3. <a href="#">Conducting Qualitative Exposure Assessments - Interim Procedure</a></li> <li>4. <a href="#">Personal Protective Equipment</a></li> </ol>   |
| <p><b>PI Control/Rqmt Notes:</b></p> | <p>The Spallation Neutron Source follows a combustible materials and ignition controls program as described in the Final Safety Analysis Document for Neutron Facilities. Identification of all flammable materials needs to be made during the review by the SNS ISSC.</p> <p>A Job Hazards Analysis developed by the Experimental Group (i.e. those performing the activity) will identify the specific chemical safety and PPE required.</p> <p>An increase in the amount of flammable materials to be used in the Target Building over that previously reviewed requires SNS approval.</p> <p>Use appropriate PPE when working with flammable or combustible materials.</p> <p>Flammable chemicals must be labeled FLAMMABLE.</p> |

**No files have been attached to this question**

**Question: 7.9 Does this operation involve any chemicals or wastes that are [toxic](#)?**

**Response: YES**

**Hazard Category: Chemical: Toxic**

**Work Location(s):** 8700: F-3-1

**PI Hazard Notes:** Liquid carbon tetrachloride (CCl<sub>4</sub>) will be used as a target material and lead (Pb) will be used for gamma-ray detector shielding.

|                               |  |
|-------------------------------|--|
| <b>Potential Controls:</b>    | <ol style="list-style-type: none"> <li>1. If <a href="#">toxic gases</a> are stored inside, storage in a locally ventilated cabinet or hood should be considered. Contact your <a href="#">ESH POC</a> for guidance.</li> </ol>  |
| <b>Requirements:</b>          | <ol style="list-style-type: none"> <li>1. <a href="#">Chemical Safety</a></li> <li>2. <a href="#">Conducting Qualitative Exposure Assessments - Interim Procedure</a></li> <li>3. <a href="#">Personal Protective Equipment</a></li> </ol>   |
| <b>PI Control/Rqmt Notes:</b> | <p>Use of toxic gases in SNS spaces requires evaluation and approval by SNS line management. Contact David Freeman or Ian Evans.</p> <p>If there is the potential for routine exposure to toxic materials, a review by the NSSD ES&amp;H/Operations Manager and/or Industrial Hygiene is required.</p> |

**No files have been attached to this question**

**Question: 7.12 Does this operation involve [toxic](#) chemicals or wastes with a significant potential for skin absorption?**

**Response: YES**

**Hazard Category: Chemical: Toxic/Skin Absorption**

|                               |   |
|-------------------------------|---|
| <b>Work Location(s):</b>      | 8700: F-3-1   |
| <b>PI Hazard Notes:</b>       | <p>Liquid carbon tetrachloride (CCl4) will be used as a target material. Alcohol and other organic solvents may be used to clean vacuum components.</p>   |
| <b>Potential Controls:</b>    | <ol style="list-style-type: none"> <li>1. Ensuring proper gloves for chemicals that have the potential for skin absorption is critical to safety. <b>Because gloves can be chemical specific, contact your <a href="#">ESH POC</a> for further guidance.</b></li> </ol> |
| <b>Requirements:</b>          | <ol style="list-style-type: none"> <li>1. <a href="#">Conducting Qualitative Exposure Assessments - Interim Procedure</a></li> <li>2. <a href="#">Personal Protective Equipment</a></li> </ol>  |
| <b>PI Control/Rqmt Notes:</b> | <p>A Job Hazards Analysis developed by the Experimental Group (i.e. those involved with this activity) will identify the specific chemical safety precautions and PPE required.</p>   |

No files have been attached to this question

**Question: 8.1 What NEPA (National Environmental Policy Act) documentation grants approval for this project or activity (e.g., CX-1234X, title, etc.)?**

**Response: YES**

**Hazard Category: NEPA Documentation**

|                               |  |
|-------------------------------|--|
| <b>Work Location(s):</b>      | 8700: F-3-1  |
| <b>Potential Controls:</b>    | 1. Contact your <a href="#">EPO/ECR</a> for assistance.  |
| <b>Requirements:</b>          | 1. <a href="#">National Environmental Policy Act (NEPA) and Cultural Resources Evaluations</a>   |
| <b>PI Control/Rqmt Notes:</b> | Approval for this project and/or activity is granted by the Record of Decision (ROD) for the Construction and Operation of the Spallation Neutron Source, issued June 30, 1999. The respective ROD is based on the analysis contained in the "Final Environmental Impact Statement for the Construction and Operation of the Spallation Neutron Source" (SNS FEIS, DOE/ EIS-0247, April 23, 1999). |

No files have been attached to this question

**Question: 8.2 Does this operation generate [hazardous waste](#)?**

**Response: YES**

**Hazard Category: Hazardous Wastes/Used Oil**

|                            |  |
|----------------------------|--|
| <b>Work Location(s):</b>   | 8700: F-3-1  |
| <b>PI Hazard Notes:</b>    | <b>Hazardous waste may be generated.</b>   |
| <b>Potential Controls:</b> | <ol style="list-style-type: none"> <li>1. Hazardous wastes must be accumulated by appropriately trained personnel in satellite accumulation areas or 90-day accumulation areas.</li> <li>2. Accumulation areas must be registered and treatment options identified prior to generation.</li> <li>3. Contact your <a href="#">EPO/ECR</a> or <a href="#">WSR</a> for guidance.</li> </ol> |
| <b>Requirements:</b>       | 1. <a href="#">Hazardous and Mixed Waste Management</a>  |

|                                      |   |
|--------------------------------------|---|
| <p><b>PI Control/Rqmt Notes:</b></p> | <p>Waste activities at the SNS are overseen by Steve Trotter. Contact Steve (241-9420) with questions about waste management.</p> <p>Hazardous waste will be managed in accordance with federal and state regulations.</p> <p>A RCRA Satellite Accumulation Area (SAA) will be established as needed.</p>   |
| <p><b>Potential Training:</b></p>    | <ol style="list-style-type: none"> <li>1. (<a href="#">50022819</a>) RCRA 90 Day or 180 Day Accumulation Area</li> <li>2. (<a href="#">50022811</a>) RCRA HAZARDOUS WASTE AWARENESS TRAINING</li> <li>3. (<a href="#">50022817</a>) RCRA LAND DISPOSAL RESTRICTIONS FOR GENE</li> <li>4. (<a href="#">50022818</a>) RCRA SATELLITE ACCUMULATION AREA AT ORNL</li> <li>5. (<a href="#">50022825</a>) WASTE CERTIFICATION PROGRAM/GEN AW</li> </ol> |

**No files have been attached to this question**

**Question: 8.3 Does this operation generate [radioactive waste](#) (including mixed hazardous, solid low level, liquid low level, or transuranic)?**

**Response: YES**

**Hazard Category: Radioactive Wastes**

|                                   |  |
|-----------------------------------|--|
| <p><b>Work Location(s):</b></p>   | <p>8700: F-3-1</p>   |
| <p><b>PI Hazard Notes:</b></p>    | <p>Radioactive waste may be generated.</p>   |
| <p><b>Potential Controls:</b></p> | <ol style="list-style-type: none"> <li>1. The generation of <a href="#">radioactive wastes</a> must be conducted within both radiation protection and environmental protection procedures.</li> <li>2. Contact your <a href="#">EPO/ECR</a> or <a href="#">WSR</a> for guidance.</li> <li>3. Staging areas must be registered and treatment options identified prior to generation.</li> </ol> |
| <p><b>Requirements:</b></p>       | <ol style="list-style-type: none"> <li>1. <a href="#">Hazardous and Mixed Waste Management</a></li> <li>2. <a href="#">Hold-for-Decay Requirements</a></li> <li>3. <a href="#">Radioactive Waste (Nonwastewaters) Management</a></li> <li>4. <a href="#">Wastewater, Managing</a></li> </ol>   |

|                               |   |
|-------------------------------|---|
| <b>PI Control/Rqmt Notes:</b> | <p>Waste activities at the SNS are overseen by Steve Trotter. Contact Steve (241-9420) with questions about waste management.</p> <p>Radioactive waste will be managed in accordance with federal and state regulations.</p>  |
| <b>Potential Training:</b>    | <ol style="list-style-type: none"> <li>1. (<a href="#">50022807</a>) 17711 RADIOLOGICAL II TRAINING FOR ORNL</li> <li>2. (<a href="#">50022921</a>) 90184 Radiological Worker I Trng - ORNL</li> <li>3. (<a href="#">50087281</a>) Liquid Waste Generator at ORNL</li> <li>4. (<a href="#">50022819</a>) RCRA 90 Day or 180 Day Accumulation Area</li> <li>5. (<a href="#">50022811</a>) RCRA HAZARDOUS WASTE AWARENESS TRAINING</li> <li>6. (<a href="#">50022817</a>) RCRA LAND DISPOSAL RESTRICTIONS FOR GENE</li> <li>7. (<a href="#">50022825</a>) WASTE CERTIFICATION PROGRAM/GEN AW</li> </ol> |

**No files have been attached to this question**

**Question: 8.7 Does this operation generate recyclable material (used oil, scrap metal, universal waste, photographic waste)?**

**Response: YES**

**Hazard Category: Recyclable Material**

|                            |  |
|----------------------------|--|
| <b>Work Location(s):</b>   | 8700: F-3-1  |
| <b>PI Hazard Notes:</b>    | <p>Recyclable materials are generated in this work. Examples include paper, lightbulbs, batteries, scrap metal, and used oil.</p>  |
| <b>Potential Controls:</b> | <ol style="list-style-type: none"> <li>1. Contact your <a href="#">EPO/ECR</a> for assistance.</li> <li>2. Used oil must be accumulated in used oil accumulation areas.</li> </ol>                             |
| <b>Requirements:</b>       | <ol style="list-style-type: none"> <li>1. <a href="#">Pollution Prevention</a></li> <li>2. <a href="#">Scrap Metal, Off-Site Recycling of Clean</a></li> <li>3. <a href="#">Used Oil Management</a></li> </ol> |

**PI Control/Rqmt Notes:**

Waste activities at the SNS are overseen by Steve Trotter. Contact Steve (241-9420) with questions about waste management.

Scrap metal from Radiological Material Management Areas (RMMAs) or Radiation Areas is not eligible for recycle per the moratorium and suspension on recycling scrap metal. However, lightbulbs exposed to particles capable of causing activation (e.g., in RMMAs) are eligible for recycle per the updated F&O procedure on lightbulb recycling.

Training Module 90910 "Overview of Used Oil Regulations" is required for Used Oil Collection Area custodians.

**No files have been attached to this question**

**Question: 8.8 Does this operation generate air emissions or use Class I or II ozone depleting substances?**

**Response: YES**

**Hazard Category: Air Emissions**

**Work Location(s):**

8700: F-3-1

**PI Hazard Notes:**

A hydrogen vent stack will penetrate the Target Building roof.

**Potential Controls:**

1. Proposed air emissions and wastewater streams must be evaluated for permitting implications. Contact your [EPO/ECR](#) for assistance.

**Requirements:**

1. [Clean Air Compliance](#)

**PI Control/Rqmt Notes:**

All air emission sources are documented in the ORNL Stack and Vent database.

Contact Steve Trotter (241-9420) if a new air emission source is planned.

**No files have been attached to this question**

**Question: 8.9 Does this operation generate wastewater?****Response: YES****Hazard Category: Wastewater**

|                               |  |
|-------------------------------|--|
| <b>Work Location(s):</b>      | 8700: F-3-1  |
| <b>PI Hazard Notes:</b>       | Single-pass process cooling water may be used.   |
| <b>Potential Controls:</b>    | 1. Contact your <a href="#">EPO/ECR</a> for assistance.  |
| <b>Requirements:</b>          | 1. <a href="#">Wastewater, Managing</a>  |
| <b>PI Control/Rqmt Notes:</b> | All discharges are documented in the ORNL Sink and Drain database.<br><br>Contact Steve Trotter (241-9420) if a new discharge source is planned. |
| <b>Potential Training:</b>    | 1. ( <a href="#">50087281</a> ) Liquid Waste Generator at ORNL   |

**No files have been attached to this question**

**Question: 9.1 Does this operation involve any activities requiring the use of mechanically-assisted lifting, rigging or hoisting?****Response: YES****Hazard Category: Hoisting/Rigging**

|                               |   |
|-------------------------------|---|
| <b>Work Location(s):</b>      | 8700: F-3-1   |
| <b>PI Hazard Notes:</b>       | Hoisting and rigging operations at SNS are performed using the SNS Hoisting and Rigging program, which specifies that review and approval of lifts is performed by SNS staff.               |
| <b>Potential Controls:</b>    | 1. The hazards and associated control measures for the specific activities shall be evaluated against the applicable requirements in the SBMS Document <a href="#">Hoisting and Rigging</a> |
| <b>Requirements:</b>          | 1. <a href="#">Hoisting and Rigging</a>   |
| <b>PI Control/Rqmt Notes:</b> | All hoisting, rigging, and securing will be performed by SNS staff under SNS work control.  |

|                            |  |
|----------------------------|--|
| <b>Potential Training:</b> | 1. ( <a href="#">50022323</a> ) RIGGING SAFETY FOR INCIDENTAL OVERHEAD C |
|----------------------------|--|

**No files have been attached to this question**

**Question: 9.2 Does this operation involve any exposure to moving or rotating parts, such as motors, shafts, pulleys, belts, or any other potential mechanical energy?**

**Response: YES**

**Hazard Category: Unguarded Equipment**

|                          |             |
|--------------------------|-------------|
| <b>Work Location(s):</b> | 8700: F-3-1 |
|--------------------------|-------------|

|                         |   |
|-------------------------|---|
| <b>PI Hazard Notes:</b> | Slow moving worm drive mechanisms allow adjustment of the position of the CsI(Tl) crystal scintillator gamma-ray detector array by one centimeter both horizontally and vertically. |
|-------------------------|---|

|                            |                     |
|----------------------------|---------------------|
| <b>Potential Controls:</b> | 1. Machine Guarding |
|----------------------------|---------------------|

|                      |   |
|----------------------|---|
| <b>Requirements:</b> | 1. <a href="#">Occupational Hazard Controls</a> |
|----------------------|---|

|                               |  |
|-------------------------------|--|
| <b>PI Control/Rqmt Notes:</b> | <p>Post appropriate warning signs prior to movement of the array.</p> <p>Utilize machine guarding whenever possible to restrict access to moving parts.</p> <p>Operate equipment in accordance with manufacturers' instructions.</p> |
|-------------------------------|--|

**No files have been attached to this question**

**Question: 11.5 Does this operation involve compressed gases at greater than 100 psi?**

**Response: YES**

**Hazard Category: Compressed Gases**

|                          |             |
|--------------------------|-------------|
| <b>Work Location(s):</b> | 8700: F-3-1 |
|--------------------------|-------------|

|                         |   |
|-------------------------|---|
| <b>PI Hazard Notes:</b> | >2000 psig bottles of argon, helium, and hydrogen along with their associated manifolds will be used. |
|-------------------------|---|

|   |   |
|---|---|
| <b>Requirements:</b>                                | 1. <a href="#">Compressed Gas Cylinders and Related Systems</a>   |
| <b>PI Control/Rqmt Notes:</b>                       | The use of compressed gases at the SNS requires a review by the NSSD ES&H/Operations Manager to ensure adequate controls are in place for asphyxiants and for toxic, flammable, or corrosive gases. |
| <b>No files have been attached to this question</b> |   |

**Question: 12.2 Does this operation involve [cryogenics](#) in quantities greater than 1 gallon?**

**Response: YES**

**Hazard Category: Cryogenics**

|                               |   |
|-------------------------------|---|
| <b>Work Location(s):</b>      | 8700: F-3-1   |
| <b>PI Hazard Notes:</b>       | The target vessel will contain 16 liters of liquid hydrogen. See PI Hazard Notes for Question 7.7.  |
| <b>Potential Controls:</b>    | <ol style="list-style-type: none"> <li>Gloves, Safety Glasses, Face Shield</li> <li>See "Cryogenic Materials" in <a href="#">Recognized Industrial Practices Involving the Storage, Handling and Use of Hazardous Chemicals</a>.</li> </ol> |
| <b>Requirements:</b>          | <ol style="list-style-type: none"> <li><a href="#">Working with Cryogenics</a></li> <li><a href="#">Personal Protective Equipment</a></li> </ol>  |
| <b>PI Control/Rqmt Notes:</b> | <ol style="list-style-type: none"> <li>1) Follow the SNS cryogenic safety policy.</li> <li>2) Use appropriate PPE.</li> </ol>   |

**No files have been attached to this question**

**Question: 13.4 Does this operation involve any welding, burning, or hotwork?**

**Response: YES**

**Hazard Category: Hotwork**

|                          |  |
|--------------------------|--|
| <b>Work Location(s):</b> | 8700: F-3-1  |
| <b>PI Hazard Notes:</b>  | Commercially available hand-held heat guns will be used to melt ice. |

|                               |   |
|-------------------------------|---|
| <b>Potential Controls:</b>    | <ol style="list-style-type: none"> <li>1. Complete a <a href="#">Welding/Burning/Hotwork permit</a></li> <li>2. If Welding/Burning/Hotwork is to be performed in a radiological area, complete a <a href="#">Radiation Work Permit</a></li> </ol> |
| <b>Requirements:</b>          | <ol style="list-style-type: none"> <li>1. <a href="#">Welding, Burning, and Hot Work</a></li> </ol>   |
| <b>PI Control/Rqmt Notes:</b> | Observe manufacturer's instructions.  |
| <b>Potential Training:</b>    | <ol style="list-style-type: none"> <li>1. (<a href="#">50022227</a>) Fire Watch Training</li> </ol>   |

No files have been attached to this question

**Question: 13.7 Does this operation involve [elevated work areas or platforms](#)?**

**Response: YES**

**Hazard Category: Elevated Work**

|                               |   |
|-------------------------------|---|
| <b>Work Location(s):</b>      | 8700: F-3-1   |
| <b>PI Hazard Notes:</b>       | Access to the top of the shielded enclosure will be required.   |
| <b>Potential Controls:</b>    | <ol style="list-style-type: none"> <li>1. Requirements relating to fall protection for employees varies depending on the walking/working surface.</li> <li>2. Contact <a href="#">Division Safety Officer/OSSD Division Support Representative</a> for guidance.</li> </ol> |
| <b>Requirements:</b>          | <ol style="list-style-type: none"> <li>1. <a href="#">Ladders</a></li> <li>2. <a href="#">Occupational Hazard Controls</a></li> </ol>   |
| <b>PI Control/Rqmt Notes:</b> | A barrier railing will be installed around the top of the shielded enclosure.   |

No files have been attached to this question

**Question: 14.1 Does this operation requires special attention if left unattended?**

**Response: YES**

**Hazard Category: Unattended Work**

|                          |  |
|--------------------------|--|
| <b>Work Location(s):</b> | 8700: F-3-1  |
| <b>PI Hazard Notes:</b>  | The liquid hydrogen target requires continuous monitoring. |

|                               |   |
|-------------------------------|---|
| <b>Potential Controls:</b>    | <ol style="list-style-type: none"> <li>1. For unattended operations, post the area with name and phone number of the contact, associated hazards, and instructions for safe shutdown.</li> <li>2. Posting contact, hazard, and safe shutdown information</li> </ol>             |
| <b>PI Control/Rqmt Notes:</b> | <p>The NPDGAMMA apparatus must be continuously manned by a trained and certified Target Operator ANYTIME liquid hydrogen is present. Only after the target vessel has been warmed to room temperature and purged with helium may the NPDGAMMA apparatus be left unattended.</p> |

**No files have been attached to this question**

**Question: 14.2 Does this operation involve work performed outside normal working hours (6am to 7pm)?**  
**Response: YES**  
**Hazard Category: Odd Work Hours**

|                               |  |
|-------------------------------|--|
| <b>Work Location(s):</b>      | 8700: F-3-1  |
| <b>PI Hazard Notes:</b>       | <p>The NPDGAMMA apparatus must be continuously manned by a trained and certified Target Operator ANYTIME liquid hydrogen is present. Only after the target vessel has been warmed to room temperature and purged with helium may the NPDGAMMA apparatus be left unattended.</p>  |
| <b>Potential Controls:</b>    | <ol style="list-style-type: none"> <li>1. When conducting hazardous operations after hours, contact the LSS at 574-6606 and provide the location and nature of the activities.</li> <li>2. Use of the "Buddy System" may be required.</li> </ol>   |
| <b>PI Control/Rqmt Notes:</b> | <p>Potentially hazardous activities identified in either the RSS or JHA shall be reviewed and approved by the NSSD ES&amp;H/Operations staff.</p> <p>If only Physics Division personnel are working after hours at the SNS, they should notify the SNS Central Control Room.</p> <p>Use the buddy system when appropriate.</p> |

**No files have been attached to this question**

**Question: 15.2 Does this operation involve packaging or transporting chemicals, [hazardous materials](#), or [radiological materials](#) on-site?**

**Response: YES**

**Hazard Category: Hazardous Material: On-site P&T**

|                               |   |
|-------------------------------|---|
| <b>Work Location(s):</b>      | 8700: F-3-1   |
| <b>PI Hazard Notes:</b>       | Hazardous chemicals, radiological materials, and hazardous and radiological wastes may be packaged and transported on-site.   |
| <b>Potential Controls:</b>    | <ol style="list-style-type: none"> <li>1. Procedures must be followed by appropriately trained drivers.</li> <li>2. For materials moving across facility or organizational boundaries, hazards must be documented and formally communicated to the receiving organization. For this requirement, organizational boundaries are defined as across different Group Leader responsibilities for work approval and/or different RSS documents defining hazard controls.</li> </ol>  |
| <b>Requirements:</b>          | <ol style="list-style-type: none"> <li>1. <a href="#">Transporting Chemicals</a></li> <li>2. <a href="#">Commercial Motor Vehicle</a></li> <li>3. <a href="#">On-Site Transportation</a></li> </ol>   |
| <b>PI Control/Rqmt Notes:</b> | <p>Do not transport hazardous or radioactive materials in any vehicle without appropriate DOT training.</p> <p>Address questions to the Physics Division <a href="#">Research Support Group Leader</a> or to the Physics Division <a href="#">Procurement Specialist</a>.</p> <p>Reference the ORNL document "<a href="#">ORNL On-Site Transportation Safety</a>" for transportation of hazardous or radioactive materials using a vehicle. For hand carried chemicals, reference the procedure <a href="#">Transporting Chemicals</a>.</p> |
| <b>Potential Training:</b>    | <ol style="list-style-type: none"> <li>1. Contact <a href="#">Division Training Officer</a> for assistance in determining training needs.</li> </ol>  |

**No files have been attached to this question**

**Question: 17. Does this operation involve any safety hazards not previously identified above? Examples might include:**

- Equipment or facility [modifications](#)
- Changes in research that might affect the [Facility Use Agreement](#), e.g. change in chemical inventories, introduction of new hazards, fire safety issues

**Response: YES**

**Hazard Category: Other**

|                               |  |
|-------------------------------|--|
| <b>Work Location(s):</b>      | 8700: F-3-1  |
| <b>PI Hazard Notes:</b>       | The liquid hydrogen (LH2) target is an UNREVIEWED SAFETY ISSUE (USI).  |
| <b>Potential Controls:</b>    | <ol style="list-style-type: none"> <li>1. <a href="#">Complex/Facility Managers</a> should provide review</li> <li>2. See <a href="#">Facility Use Agreements</a></li> </ol>   |
| <b>PI Control/Rqmt Notes:</b> | <p>Do not commence operations involving the USI until the Department of Energy (DOE) has provided written approval.</p> <p>An addendum to the SNS Final Safety Assessment Document for Neutron Facilities will be produced to document hazard and accident analyses that demonstrate that the risk associated with the LH2 target is acceptable and consistent with the SNS safety basis. The safety and hazard analyses may require certain systems or features of the LH2 target to be designated as Credited Engineered Controls; it may also require the designation of Credited Administrative Controls. After this document (FSAD-NF addendum for the LH2 target) is approved by SNS review committees, it will become the basis for DOE approval to commence operation of the LH2 target.</p> |

**No files have been attached to this question**

**Question: 18.1 Does this operation involve [intellectual property](#) or export controlled information or materials?**

**Response: YES**

**Hazard Category: Intellectual Property**

|                          |   |
|--------------------------|---|
| <b>Work Location(s):</b> | 8700: F-3-1   |
| <b>PI Hazard Notes:</b>  | The operational, technical, and scientific results of the NPDGAMMA experiment will be communicated throughout the greater physics community and published in the open physics literature. |

|                                      |  |
|--------------------------------------|--|
| <p><b>Potential Controls:</b></p>    | <ol style="list-style-type: none"> <li>1. Ensure work does not include research areas that are prohibited. See the <a href="#">Export Control Program Description</a> for further explanation.</li> <li>2. Consult the <a href="#">Export Control Office</a> and/or the <a href="#">Export Control Decision Tool</a> for further information and assistance.</li> <li>3. Ensure restrictions for personnel working on the project (e.g. foreign national involvement, clearances, etc.) are maintained throughout the lifecycle of the project.</li> <li>4. Caution: Do not reveal classified or sensitive information in this Research Safety Summary.</li> </ol> |
| <p><b>Requirements:</b></p>          | <ol style="list-style-type: none"> <li>1. <a href="#">Cooperative Research and Development Agreements (CRADAs)</a></li> <li>2. <a href="#">Export Control</a></li> <li>3. <a href="#">Proprietary Information, Protected CRADA Information, and Business Sensitive Information</a></li> </ol>  |
| <p><b>PI Control/Rqmt Notes:</b></p> | <p>All papers and talks will be reviewed and approved in accordance with the Procedure: <a href="#">Review and Approval of Scientific Communications</a>.</p>  |

**No files have been attached to this question**

**Question: 18.4 Does this operation require safeguards and security considerations or special controls? Review the [ISSM checklist](#).**

***Note: If any of the questions on the ISSM checklist are answered " yes, " question 18.4 must also be answered yes.***

**Response: YES  
Hazard Category: Security Considerations**

|                                 |  |
|---------------------------------|--|
| <p><b>Work Location(s):</b></p> | <p>8700: F-3-1</p>   |
| <p><b>PI Hazard Notes:</b></p>  | <p>Many members of the NPDGAMMA Collaboration are foreign nationals.</p> |

**Potential Controls:**

1. [See Policy Statements](#)
2. See [ISSM Checklist](#).
3. Ensure work does not include research areas that are prohibited. See the [Export Control Program Description](#) for further explanation.
4. Consult the [Export Control Office](#) and/or the [Export Control Decision Tool](#) for further information and assistance.
5. Ensure restrictions for personnel working on the project (e.g. foreign national involvement, clearances, etc.) are maintained throughout the lifecycle of the project.
6. Caution: Do not reveal classified or sensitive information in this Research Safety Summary.

**Requirements:**

1. [Classified Matter Protection and Control Program](#)
2. [Event Reporting and Follow-Up](#)
3. [Export Control](#)

**PI Control/Rqmt Notes:**

Foreign national work at the NPDGAMMA apparatus will be conducted in accordance with the Subject Area: Foreign National Visits and Assignments, Unclassified.

**No files have been attached to this question**

**Question: 18.5 Does this operation require special controls on procurement, such as PAAA or critical item review?**

**Response: YES**

**Hazard Category: Procurement**

**Work Location(s):**

8700: F-3-1

**PI Hazard Notes:**

Any acquisition with ESH implications is considered a critical application item.

Any acquisition with radiological implications may have P-AAA requirements.

|                               |  |
|-------------------------------|--|
| <b>Potential Controls:</b>    | <ol style="list-style-type: none"> <li>1. <a href="#">Exhibit: Determining if Procurement is Subject to Price-Anderson Amendments Act</a></li> <li>2. <a href="#">Exhibit: Determining if Replacement Parts are Technically Equivalent</a></li> <li>3. <a href="#">Exhibit: Environment, Safety, and Health (ES&amp;H) Checklist for Service Subcontracts</a></li> </ol>   |
| <b>Requirements:</b>          | <ol style="list-style-type: none"> <li>1. <a href="#">Price Anderson Amendments Act (PAAA)</a></li> <li>2. <a href="#">Purchasing Supplies and Services</a></li> </ol>   |
| <b>PI Control/Rqmt Notes:</b> | <p>The Physics Division has <a href="#">Procurement Specialists</a> who are the only persons authorized to procure items for the Division.</p> <p>Reference the "<a href="#">Physics Division Procedure on Procurements</a>".</p> <p>All procurements shall be initiated using the on-line Physics Division purchase request form that facilitates screening for P-AAA requirements, critical application items, hazardous materials, etc.</p> |

**No files have been attached to this question**

**Question: 18.6 Is a project-specific QA Plan needed to address:**

- the uniqueness or complexity of the project,
- sponsor requirements, and/or
- data, calibration, training, and assessment management?

**Response: YES**

**Hazard Category: Quality (QA Plan)**

|                               |   |
|-------------------------------|---|
| <b>Work Location(s):</b>      | 8700: F-3-1   |
| <b>PI Hazard Notes:</b>       | <p style="color: red;">The liquid hydrogen target vessel must withstand a catastrophic vacuum failure to air of the surrounding vacuum vessel.</p>  |
| <b>Potential Controls:</b>    | <ol style="list-style-type: none"> <li>1. Contact your <a href="#">Quality Assurance Manager/Specialist/Coordinator</a> for procedures/guidance.</li> <li>2. <a href="#">Quality Assurance Program Description</a></li> </ol> |
| <b>PI Control/Rqmt Notes:</b> | <p style="color: red;">The liquid hydrogen target vessel will be American Society of Mechanical Engineers (ASME) Code stamped.</p>  |

**No files have been attached to this question**

**Project Closeout (Notes/Reminders):**

As projects are closed out, please ensure ....

- any legacy materials or property acquired during project are properly dispositioned
- records are maintained/archived in readily accessible format (in accordance with ORNL procedures)
- hazards associated with the project have been removed or mitigated
- project specific surveillance or protective measures are terminated as necessary
- lessons learned feedback is provided
- waste generated during project is properly disposed of and any waste storage areas are closed out
- facility is returned to standard condition
- reports for sponsors are transmitted in required manner (i.e., CRADA reports, etc.)
- materials and/or documentation associated with project have been verified and properly secured

Unless superseded by another document, this Research Safety Summary, once authorized, serves as the [certification of hazard assessment](#) for the specification of personal protective equipment for research activities at Oak Ridge National Laboratory.

|                            |  |
|----------------------------|--|
| <b>Location:</b>           | Facility(s) and lab/room(s) in which RSS/work will be conducted.   |
| <b>Controls:</b>           | Special instruction on measures to be taken for additional information or evaluations.                                   |
| <b>Requirements:</b>       | Laboratory-level documents/procedures that direct work at ORNL.  |
| <b>Potential Training:</b> | Potential training programs to submit for review to DTO or SME for access control to labs/rooms work is being conducted. |

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