

Operational Safety Procedure Form
 (See [ES&H Manual Chapter 3310 Appendix T1](#)
[Operational Safety Procedure \(OSP\)](#) and
[Temporary OSP Procedure](#) for instructions.)

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DEFINE THE SCOPE OF WORK

Title:	Operation of PRad Target		
Location:	Experimental Hall B	Type:	<input checked="" type="checkbox"/> OSP <input type="checkbox"/> TOSP
Risk Classification (per Task Hazard Analysis attached) (See ESH&Q Manual Chapter 3210 Appendix T3 Risk Code Assignment.)	Highest Risk Code Before Mitigation (3 or 4):		3
	Highest Risk Code after Mitigation (N, 1, or 2):		1
Owning Organization:	Experimental Nuclear Physics	Date:	Feb. 19, 2016
Document Owner(s):	Chris Keith		
Document History (Optional)			
Revision:	Reason for revision or update:	Serial number of superseded document	

ANALYZE THE HAZARDS

1. Purpose of the Procedure – Describe in detail the reason for the procedure (what is being done and why).

This document describes the procedures for operating the hydrogen gas flow target for the PRad experiment in Hall B.

2. Scope – include all operations, people, and/or areas that the procedure will affect.

The operations are:

1. Evacuating the target vacuum chamber;
2. Pumping and purging the hydrogen gas panel and supply piping;
3. Cooling the target;
4. Changing the hydrogen gas cylinder;
5. Shutting the target off and securing it at the end of the PRad experiment.

The operations are limited to those individuals listed in the attached document, *Operation of the PRad Target*. All operations are performed either at the target site, or at the Hall B gas pad behind the counting house. The target site is in the Hall B beam alcove, above the Hall B tagger magnet.

Other routine operations associated with the target, such as changing the flow rate of the H2 gas, and moving the target into and out of the beam, can be performed remotely and do not present any hazards to personnel or equipment. They are not described in this OSP.

3. Description of the Facility – include floor plans and layout of a typical experiment or operation.

A detailed description of the target can be found in the attached document, *PRad Target: Detailed Hazard Analysis*. The target is located in the Hall B beam alcove, above the tagger magnet. Hydrogen gas for the target is supplied by standard hydrogen gas cylinders located at the Hall B beam alcove, directly behind the counting house.

4. Authority and Responsibility:

4.1 Who has authority to implement/terminate

Target Group leader or designee.

4.2 Who is responsible for key tasks

Target Group leader or designee. The individuals approved for these operations are listed in the attached document, *Operation of the PRad Target*.

4.3 Who analyzes the special or unusual hazards (See [ES&H Manual Chapter 3210 Appendix T1 Work Planning, Control, and Authorization Procedure](#))

The Target Group leader has analyzed the hazards, which can be found in the associated Task Hazard Analysis. A more detailed discussion of the target, the hazards associated with it, and the steps taken to mitigate these hazards may be found in the attached document, *PRad Target: Detailed Hazard Analysis*.

David Meekins serves as the Design Authority for the pressure systems associated the target.

4.4 What are the Training Requirements (See http://www.jlab.org/div_dept/train/poc.pdf)

- Read the OSP
- EH&S orientation (SAF100)
- Oxygen deficiency hazard training (SAF103)
- Hall B safety awareness training (SAF111)
- Fire safety training (SAF108)

5. Personal and Environmental Hazard Controls Including:

5.1 Shielding

N/A

5.2 Interlocks

1 torr pressure interlock on target chamber limits total quantity of H₂ gas inside the chamber to less than 30 milligrams.

5.3 Monitoring systems

Hall B flammable gas monitor.

5.4 Ventilation

N/A

5.5 Other (Electrical, ODH, Trip, Ladder) (Attach related Temporary Work Permits or Safety Reviews as appropriate.)

N/A

6. List of Safety Equipment:

6.1 List of Safety Equipment:

N/A

6.2 Special Tools:

Nonsparking wrench for removal and attachment of H2 pressure regulator.

DEVELOP THE PROCEDURE

1. Associated Administrative Controls

- Appropriate training, as described in 4.4
- Detailed written procedures, included in the attached document *Operation of the PRad Target*
- Task hazard analysis
- Pre-job walk down

2. Operating Guidelines

The Target Group leader, in concert with the PRad run coordinator, shall determine the appropriate time to begin or terminate operation of the PRad target. The Target Group leader shall assign the task(s) to a designated target expert.

3. Notification of Affected Personnel (who, how, and when)

The Target Group leader or designee shall inform the PRad run coordinator, PRad shift leader, and Hall B work coordinator prior to the target's operation.

4. List the Steps Required to Execute the Procedure: from start to finish.

1. Evacuate the target vacuum chamber;
 2. Pump/purge the hydrogen gas panel and supply piping;
 3. Cool the target;
 4. Change the hydrogen gas cylinder, as needed;
 5. Shut the target off and secure it at the end of the PRad experiment;
- See the attached document, *Operation of the PRad Target*, for more details.

5. Back Out Procedure(s) i.e. steps necessary to restore the equipment/area to a safe level.

1. During target evacuation: turn off pumps. Bleed chamber up to atmospheric pressure, preferably with a dry, inert gas such as nitrogen or argon.
2. During pump/purge procedure: pump H2 from system piping. Bleed system up to atmospheric pressure using a dry, inert gas such as nitrogen, argon, or helium.
3. During cooling: turn off the pulse tube refrigerator.
4. During cylinder change: secure any loose cylinders, confirm cylinder valves are CLOSED.
5. During shut down: N/A. This procedure is intended to secure the system in a safe state.

6. Special environmental control requirements:

6.1 Environmental impacts (See [EMP-04 Project/Activity/Experiment Environmental Review](#))

N/A

6.2 Abatement steps (secondary containment or special packaging requirements)

N/A

7. Unusual/Emergency Procedures (e.g., loss of power, spills, fire, etc.)

See attached documents.8

8. Instrument Calibration Requirements (e.g., safety system/device recertification, RF probe calibration)

Pressure gauges on the PRad gas panel shall be calibrated on a yearly basis.

9. Inspection Schedules

The Target Group shall inspect the system prior to each use.

10. References/Associated Documentation

- Attachment A: Task Hazard Analysis
- Attachment B: *PRad Target: Detailed Hazard Analysis*
- Attachment C: *Operation of the PRad Target*

11. List of Records Generated (Include Location / Review and Approved procedure)

[Click](#)
 To Submit OSP
 for Electronic Signatures

Distribution: Copies to: affected area, authors, Division Safety Officer

Expiration: Forward to ESH&Q Document Control

Form Revision Summary

- Qualifying Periodic Review – 02/19/14** – No substantive changes required.
- Revision 1.3 – 11/27/13** – Added “Owning Organization” to more accurately reflect laboratory operations.
- Revision 1.2 – 09/15/12** – Update form to conform to electronic review.
- Revision 1.1 – 04/03/12** – Risk Code 0 switched to N to be consistent with [3210 T3 Risk Code Assignment](#).
- Revision 1.0 – 12/01/11** – Added reasoning for OSP to aid in appropriate review determination.
- Revision 0 – 10/05/09** – Updated to reflect current laboratory operations

ISSUING AUTHORITY	FORM TECHNICAL POINT-OF-CONTACT	APPROVAL DATE	REVIEW DATE	REV.
ESH&Q Division	Harry Fanning	02/19/14	02/19/17	1.3

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