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Org: PHALLD

Status: WAPPR
Saved: 6/19/2018 11:31:06 AM
Submitted: 6/19/2018 11:31:06 AM



Operational Safety Procedure Review and Approval Form # 76940
(See [ES&H Manual Chapter 3310 Appendix T1 Operational Safety Procedure \(OSP\) and Temporary OSP Procedure](#) for Instructions)

Type:	OSP Click for OSP/TOSP Procedure Form Click for LOSP Procedure Form
Serial Number:	(Assigned after final approval)
Issue Date:	(Assigned after final approval)
Expiration Date:	< <i>Approximately 6/19/2021</i> >
Title:	GlueX DIRC System
Location: (where work is being performed) Building Floor Plans	203 - Experimental Hall D <div style="border: 1px solid black; padding: 2px; display: inline-block;">Location Detail: (specifics about where in the selected location(s) the work is being performed)</div> Between the FCAL carriage and the Solenoid

Risk Classification: (See ES&H Manual Chapter 3210 Appendix T3 Risk Code Assignment)	Without mitigation measures (3 or 4):	3
	With mitigation measures in place (N, 1, or 2):	1

Reason: This document is written to mitigate hazard issues that are :
Determined to have an unmitigated Risk code of 3 or 4

Owning Organization: **PHALLD**

Document Owner(s): **Stevens, Justin (jrsteven@jlab.org) Primary**
Whitlatch, Timothy (whitey@jlab.org)

Supplemental Technical Validations

- Air Contaminants - Hazardous (*Imani Burton, Jennifer Williams*)
- [Area Temperature](#) (*Bert Manzlak*)
- Asbestos (*Jennifer Williams, Scott Conley*)
- Bloodorne Pathogens (*Bob May, Smitty Chandler*)
- [Chemicals](#) (*Imani Burton, Jennifer Williams*)
- Confined Space (*Imani Burton, Jennifer Williams*)
- Cryogenic Material - Gas or Liquid (*Jonathan Creel, Kelly Dixon*)
- [Electricity](#) (*Paul Powers, Todd Kujawa*)
- [Environmental](#) (*Bill Rainey*)

- Ergonomics - Lifting, Carrying, Repetitive Motion (*Bob May, Smitty Chandler*)
- Gas Cylinders (*Tim Minga, Tina Menefee*)
- Hazardous Material Transport - On or Off Site (*Christian Whalen, Jennifer Williams*)
- [Hazardous Metals](#) (*Imani Burton, Jennifer Williams*)
- High Noise (*Imani Burton, Jennifer Williams*)
- [Hot Work](#) (*Bruce Lenzer, Mike Martin*)
- Lasers Class 3B or 4 (Ultraviolet, Infrared, and Visible Light) (*Bert Manzlak, Jennifer Williams*)
- Lock, Tag, Try (*Paul Powers, Todd Kujawa*)
- Machine Tools (*Bert Manzlak, Paul Collins*)
- [Material Handling Equipment](#) (*Bob Sperlazza, Mark Loewus*)
- Nanotechnology - Engineered (*Bob May, Jennifer Williams*)
- [Oxygen Deficiency Hazards \(ODH\)](#) (*Imani Burton, Jennifer Williams*)
- Pinch Points (*Bert Manzlak, Paul Collins*)
- Portable Hand Tools (*Bert Manzlak, Paul Collins*)
- [Pressure Systems](#) (*Will Oren*)
- [Radiation - Ionizing](#) (*David Hamlette, Keith Welch*)
- Radio Frequency (*Imani Burton, Jennifer Williams*)
- Sharp Edges (*Bert Manzlak, Paul Collins*)
- Silica (*Imani Burton, Jennifer Williams*)
- Static Magnetic Fields >5G: Fringe, High, & Quench Effect (*Imani Burton, Jennifer Williams*)
- Stored Energy: Mechanical, Hydraulic, Pneumatic (*Bert Manzlak, Paul Collins*)
- [Subcontracts](#) (*Bob Sperlazza, Rusty Sprouse*)
- [Waste Generation](#) (*Jennifer Williams, Scott Conley*)
- [Working at Elevations](#) (*George Perry*)

Other Issues:

- Emergency Preparedness (*Tina Menefee*)
- Fire Protection (*Tim Minga*)

Document History

Revision <input type="checkbox"/>	Reason for revision or update <input type="checkbox"/>	Serial number of superseded document <input type="checkbox"/>
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Comments for reviewers/approvers:

The DIRC is an addition to the baseline GlueX equipment and is installed between the FCAL carriage and the solenoid.

Submit

Attachments

Procedure: [OSP_DIRC_operations.pdf](#)

THA: [THA_DIRC_Operations.pdf](#)

Additional Files:

Review Signatures

Additional Authorization : Physics ES&H Liaison

Authorized Signers

- Bert Manzlak
(manzlak@jlab.org)

Subject Matter Expert : Electricity->Mode 1: Class 1-> 2-> and 3
Electrical Equipment

Authorized Signers

- Todd Kujawa (kujawa@jlab.org)
- Paul Powers (powersp@jlab.org)

Subject Matter Expert : Oxygen Deficiency Hazards (ODH)->ODH
0 and 1

Authorized Signers

- Imani Burton (iburton@jlab.org)
- Jennifer Williams
(jennifer@jlab.org)

Approval Signatures

NOT APPROVED

Operational Safety Procedure Form

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

Click
For Word Doc

Title:	GlueX DIRC System		
Location:	Hall D	Type:	<input checked="" type="checkbox"/> OSP <input type="checkbox"/> TOSP
Risk Classification (per Task Hazard Analysis attached) (See ESH&O Manual Chapter 3210 Appendix T3 Risk Code Assignment.)	Highest Risk Code Before Mitigation		
	Highest Risk Code after Mitigation (N, 1, or 2):		
Owning Organization:	Jefferson Laboratory	Date:	June 18, 2018
Document Owner(s):	Justin Stevens (jrsteven@jlab.org)		

DEFINE THE SCOPE OF WORK

- 1. Purpose of the Procedure** – Describe in detail the reason for the procedure (what is being done and why).
The DIRC system in Hall D is designed to provide particle identification for charged particles in the forward region of the GlueX spectrometer from 1 – 11 degrees in polar angle. The DIRC is a subsystem of the GlueX detector to run in the high-intensity GlueX program, and is operated continuously with rest of the spectrometer during beam operations.
- 2. Scope** – include all operations, people, and/or areas that the procedure will affect.
The DIRC system consists of a plane of 4 independent boxes each containing 12 fused silica radiator bars with a size of 4.9 m x 35 mm x 17.25 mm, which are housed in an honeycomb shell with a thin aluminum skin. Each pair of bar boxes is optically coupled to a water-filled expansion volume, known as the Optical Box (OB). The Cherenkov photons from the radiators propagate through the water-filled OB and are detected by an array of Hamamatsu H12700 multi-anode photomultiplier tubes (PMT) in each OB. The PMTs are arranged in modules, each of which receives a low voltage, high voltage, and signal fiber cable. The DIRC group is responsible for ensuring the system is fully operational for each run period where it is required. Only sub-system experts as defined in the DIRC Operations Manual are authorized to work on the hardware, service components, etc.
https://halldweb.jlab.org/hdops/wiki/index.php/DIRC_Shift
- 3. Description of the Facility** – include building, floor plans and layout of the experiment or operation.
The detector is located in Hall D between the FCAL carriage and the Solenoid. The DIRC system consists of two optical boxes, positioned on the outer frame of the support structure on either side of the beamline, and are each instrument 2 bar boxes containing fused silica radiators. Access to the PMT and electronics modules is provided by a removeable dark box, which is removed during times of maintenance, when the HV is off. Low voltage, high voltage and fiber optic signal cables pass over the top of the support structure, to the electronics racks on the downstream portion of the FCAL carriage.

ANALYZE THE HAZARDS and IMPLEMENT CONTROLS

- 4. Hazards identified on written Task Hazard Analysis**
There are four hazards identified with the operation of the DIRC system. 1) Electrical hazard when the HV power supply is energized 2) Fall hazards from using manlifts or ladders to access the system elements during maintenance periods. 3) Pressurized fluids and 4) ODH
- 5. Authority and Responsibility:**

5.1 Who has authority to implement/terminate	Justin Stevens, Tim Whitlatch
5.2 Who is responsible for key tasks	Justin Stevens, authorized DIRC experts, Hall D technicians and Hall D Work Coordinator

5.3 Who analyzes the special or unusual hazards including elevated work, chemicals, gases, fire or sparks (See [ES&H Manual Chapter 3210 Appendix T1 Work Planning, Control, and Authorization Procedure](#))

Ed Folts

6. Personal and Environmental Hazard Controls Including:

6.1 Shielding

None

6.2 Barriers (magnetic, hearing, elevated or crane work, etc.)

None

6.3 Interlocks

Interlock of HV with proximity sensor on Optical Box darkbox to protect light-sensitive PMTs

6.4 Monitoring systems

None

6.5 Ventilation

None

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

For servicing, ladder training, manlift training, harness training, electrical worker (see 9.1)

7. List of Safety Equipment:

7.1 List of Safety Equipment:

No personnel protective equipment is needed for testing or operating the DIRC system from the Counting House. When accessing the detectors using a manlift a harness is required.

7.2 Special Tools:

None

8. Associated Administrative Controls

Consult with the Hall D Work Coordinator before starting on any servicing work related to the detector hardware

9. Training

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

SAF113, fall protection training (if using a ladder or manlift), ladder training (if using a ladder), harness training (only if going up in a manlift), manlift training (only for manlift operators), electrical worker required (only for HV system service work). System specific training for the water and nitrogen systems.

DEVELOP THE PROCEDURE

10. Operating Guidelines

The operating guidelines for both general Hall D Collaboration members and DIRC system experts is discussed in the DIRC Operations Manual: https://halldweb.jlab.org/hdops/wiki/index.php/DIRC_Shift

11. Notification of Affected Personnel (who, how, and when include building manager, safety warden, and area coordinator)

The Hall D Work Coordinator is to be consulted before any DIRC servicing work on the detector hardware is performed. Any maintenance of the electronics should be done only by DIRC system experts

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

All system operations are described in the DIRC System Operations Manual

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

When the HV is turned off the DIRC is in its fully safe condition.

14. Special environmental control requirements:

14.1 List materials, chemicals, gasses that could impact the environment (ensure these are considered when choosing Subject Mater Experts) and explore [EMP-04 Project/Activity/Experiment Environmental Review](#) below

None

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

None

14.3 Abatement steps (secondary containment or special packaging requirements)

None

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

None

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

None

17. Inspection Schedules

None

18. References/Associated/Relevant Documentation

For operation instructions see the DIRC Operations Manual

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

None

Distribution: Copies to Affected Area, Authors, Division Safety Officer

Expiration: Forward to ESH&Q Document Control

Form Revision Summary

Revision 1.4 – 06/20/16 – Repositioned “Scope of Work” to clarify processes

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 0.0 – 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	06/20/16	06/20/19	1.4

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Task Hazard Analysis (THA) Worksheet

(See [ES&H Manual Chapter 3210 Appendix T1](#)
[Work Planning, Control, and Authorization Procedure](#))

Click
For Word

Author:	Justin Stevens	Date:	June 18, 2018	Task #: If applicable	
Complete all information. Use as many sheets as necessary					
Task Title:	GlueX DIRC	Task Location:	Hall D		
Division:	Physics	Department:	Hall D	Frequency of use:	Continuously
Lead Worker:					
Mitigation already in place: Standard Protecting Measures Work Control Documents	All workers on the DIRC system must complete SAF113				

Sequence of Task Steps	Task Steps/Potential Hazards	Consequence Level	Probability Level	Risk Code (before mitigation)	Proposed Mitigation (Required for Risk Code >2)	Safety Procedures/ Practices/Controls/Training	Risk Code (after mitigation)
1	Energize DIRC HV power supply (CAEN A1535N +3.5 kV), possible exposure to high voltage	M	L	2		HV cables terminated properly at voltage divider and supply. Supply properly grounded at racks.	0
2	Servicing detector components – manlift or ladder access, potential fall hazards	H	M	3	A harness must be used for manlift operations or on ladders where a fall of more than 4 ft. may occur	Harness training, manlift training, ladder training, fall protection training	1

Task Hazard Analysis (THA) Worksheet

(See [ES&H Manual Chapter 3210 Appendix T1](#)
[Work Planning, Control, and Authorization Procedure](#))

Sequence of Task Steps	Task Steps/Potential Hazards	<u>Consequence Level</u>	<u>Probability Level</u>	<u>Risk Code</u> (before mitigation)	Proposed Mitigation (Required for <u>Risk Code</u> >2)	Safety Procedures/ Practices/Controls/Training	<u>Risk Code</u> (after mitigation)
3	Nitrogen purge system repair/maintenance/ pressure and ODH hazards	L	L	1		Regulator set to 4 inches water column and reliefs set to 1 psi. Very low stored energy (<<1000 ft-lbs) in the system. Mechanical on call techs receive equipment specific training. The flow is very low (< 5 l/hr). There is an ODH analysis for the hall considering the instantaneous dump of all the nitrogen in the solenoid and ODH alarms are installed in the hall.	
4	Clean water system repair/maintenance/pressurized fluid	L	M	2		Maximum pressure (dead head pressure) of pump is 35 psi. Very low stored energy (<<1000 ft-lbs) in the system. Mechanical on call techs receive equipment specific training	
Highest <u>Risk Code</u> before Mitigation:				3	Highest <u>Risk Code</u> after Mitigation:		1

When completed, if the analysis indicates that the Risk Code before mitigation for any steps is “medium” or higher (RC≥3), then a formal [Work Control Document](#) (WCD) is developed for the task. Attach this completed Task Hazard Analysis Worksheet. Have the package reviewed and approved prior to beginning work. (See [ES&H Manual Chapter 3310 Operational Safety Procedure Program](#).)

For questions or comments regarding this form contact the Technical Point-of-Contact [Harry Fanning](#)

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Task Hazard Analysis (THA) Worksheet

(See [ES&H Manual Chapter 3210 Appendix T1](#)

[Work Planning, Control, and Authorization Procedure](#))

Form Revision Summary

Periodic Review – 08/13/15 – No changes per TPOC

Revision 0.1 – 06/19/12 - Triennial Review. Update to format.

Revision 0.0 – 10/05/09 – Written to document current laboratory operational procedure.

ISSUING AUTHORITY	TECHNICAL POINT-OF-CONTACT	APPROVAL DATE	REVIEW DATE	REV.
ESH&Q Division	Harry Fanning	08/13/15	08/13/18	0.1

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