

**1. Work requester fills out this section.**

Standing Work Permit

Requester: Don Lynch	Date: 9/25/2009	Ext.: 2253	Dept/Div/Group: PO/PHENIX
Other Contact person (if different from requester): Carter Biggs			Ext.: 7515
Work Control Coordinator: Don Lynch		Start Date: 09/28/2009	Est. End Date: 12/31/2009
Brief Description of Work: Troubleshoot, Repair/Replace Faulty electronics components and wire chamber repairs on Drift Chamber, PHENIX East & West Carriage			
Building: 1008	Room: AH & IR	Equipment: DC East&West	Service Provider: PHENIX

**. WCC, Requester/Designee, Service Provider, and ES&H (as necessary) fill out this section or attach analysis**

<b>ES&amp;H ANALYSIS</b>					
<b>Radiation Concerns</b>	<input checked="" type="checkbox"/> None	<input type="checkbox"/> Activation	<input type="checkbox"/> Airborne	<input type="checkbox"/> Contamination	<input type="checkbox"/> Radiation
Radiation Generating Devices:	<input type="checkbox"/> Radiography	<input type="checkbox"/> Moisture Density Gauges	<input type="checkbox"/> Soil Density Gauges	<input type="checkbox"/> X-ray Equipment	
<input type="checkbox"/> Special nuclear materials involved, notify Isotope Special Materials Group			<input type="checkbox"/> Fissionable materials involved, notify Laboratory Criticality Officer		
<b>Safety Concerns</b>	<input type="checkbox"/> None	<input type="checkbox"/> Ergonomics	<input type="checkbox"/> Transport of Haz/Rad Material		
<input type="checkbox"/> Adding/Removing Walls or Roofs	<input type="checkbox"/> Confined Space*	<input type="checkbox"/> Explosives	<input type="checkbox"/> Lead*	<input type="checkbox"/> Penetrating Fire Walls	
<input type="checkbox"/> Asbestos*	<input type="checkbox"/> Corrosive	<input type="checkbox"/> Flammable	<input type="checkbox"/> Magnetic Field*	<input type="checkbox"/> Pressurized Systems	
<input type="checkbox"/> Beryllium*	<input type="checkbox"/> Cryogenic	<input type="checkbox"/> Fumes/Mist/Dust*	<input type="checkbox"/> Material Handling	<input type="checkbox"/> Rigging/Critical Lift	
<input type="checkbox"/> Biohazard*	<input type="checkbox"/> Electrical	<input type="checkbox"/> Heat/Cold Stress	<input type="checkbox"/> Noise*	<input type="checkbox"/> Toxic Materials*	
<input type="checkbox"/> Chemicals*	<input checked="" type="checkbox"/> Elevated Work*	<input type="checkbox"/> Hydraulic	<input type="checkbox"/> Non-ionizing Radiation*	<input type="checkbox"/> Vacuum	
	<input type="checkbox"/> Excavation	<input type="checkbox"/> Lasers*	<input type="checkbox"/> Oxygen Deficiency*	<input type="checkbox"/> Other	
* Does this work require medical clearance or surveillance from the Occupational Medicine Clinic? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No					
<b>Environmental Concerns</b>	<input checked="" type="checkbox"/> None	<input type="checkbox"/> Work impacts Environmental Permit No.			
<input type="checkbox"/> Atmospheric Discharges (rad/non-rad)	<input type="checkbox"/> Land Use	<input type="checkbox"/> Soil Activation/contamination	<input type="checkbox"/> Waste-Mixed		
<input type="checkbox"/> Chemical or Rad Material Storage or Use	<input type="checkbox"/> Liquid Discharges	<input type="checkbox"/> Waste-Clean	<input type="checkbox"/> Waste-Radioactive		
<input type="checkbox"/> Cesspools (UIC)	<input type="checkbox"/> Oil/PCB Management	<input type="checkbox"/> Waste-Hazardous	<input type="checkbox"/> Waste-Regulated Medical		
<input type="checkbox"/> High water/power consumption	<input type="checkbox"/> Spill potential	<input type="checkbox"/> Waste-Industrial	<input type="checkbox"/> Underground Duct/Piping		
Waste disposition by: <input type="checkbox"/> Other					
<b>Pollution Prevention (P2)/Waste Minimization Opportunity:</b>	<input checked="" type="checkbox"/> None	<input type="checkbox"/> Yes			
<b>FACILITY CONCERNS</b>	<input checked="" type="checkbox"/> None				
<input type="checkbox"/> Access/Egress Limitations	<input type="checkbox"/> Electrical Noise	<input type="checkbox"/> Potential to Cause a False Alarm	<input type="checkbox"/> Vibrations		
	<input type="checkbox"/> Impacts Facility Use Agreement	<input type="checkbox"/> Temperature Change	<input type="checkbox"/> Other		
<input type="checkbox"/> Configuration Control	<input type="checkbox"/> Maintenance Work on Ventilation Systems	<input type="checkbox"/> Utility Interruptions			
<b>WORK CONTROLS</b>					
<b>Work Practices</b>					
<input type="checkbox"/> None	<input type="checkbox"/> Exhaust Ventilation	<input checked="" type="checkbox"/> Lockout/Tagout	<input type="checkbox"/> Spill Containment	<input type="checkbox"/> Security (see Instruction Sheet)	
<input checked="" type="checkbox"/> Back-up Person/Watch	<input type="checkbox"/> HP Coverage	<input type="checkbox"/> Posting/Warning Signs	<input type="checkbox"/> Time Limitation	<input type="checkbox"/> Other	
<input type="checkbox"/> Barricades	<input type="checkbox"/> IH Survey	<input type="checkbox"/> Scaffolding-requires inspection	<input type="checkbox"/> Warning Alarm (i.e. "high level")		
<b>Protective Equipment</b>					
<input type="checkbox"/> None	<input type="checkbox"/> Ear Plugs	<input type="checkbox"/> Gloves	<input type="checkbox"/> Lab Coat	<input type="checkbox"/> Safety Glasses	
<input type="checkbox"/> Coveralls	<input type="checkbox"/> Ear Muffs	<input type="checkbox"/> Goggles	<input type="checkbox"/> Respirator	<input checked="" type="checkbox"/> Safety Harness	
<input type="checkbox"/> Disposable Clothing	<input type="checkbox"/> Face Shield	<input type="checkbox"/> Hard Hat	<input type="checkbox"/> Shoe Covers	<input checked="" type="checkbox"/> Safety Shoes	<input type="checkbox"/> Other
<b>Permits Required (Permits must be valid when job is scheduled.)</b>					
<input checked="" type="checkbox"/> None	<input type="checkbox"/> Cutting/Welding	<input type="checkbox"/> Impair Fire Protection Systems			
<input type="checkbox"/> Concrete/Masonry Penetration	<input type="checkbox"/> Digging/Core Drilling	<input type="checkbox"/> Rad Work Permit-RWP No			
<input type="checkbox"/> Confined Space Entry	<input type="checkbox"/> Electrical Working Hot	<input type="checkbox"/> Other			
<b>Dosimetry/Monitoring</b>					
<input checked="" type="checkbox"/> None	<input type="checkbox"/> Heat Stress Monitor	<input type="checkbox"/> Real Time Monitor	<input type="checkbox"/> TLD		
<input type="checkbox"/> Air Effluent	<input type="checkbox"/> Noise Survey/Dosimeter	<input type="checkbox"/> Self-reading Pencil Dosimeter	<input type="checkbox"/> Waste Characterization		
<input type="checkbox"/> Ground Water	<input type="checkbox"/> O <sub>2</sub> /Combustible Gas	<input type="checkbox"/> Self-reading Digital Dosimeter	<input type="checkbox"/> Other		
<input type="checkbox"/> Liquid Effluent	<input type="checkbox"/> Passive Vapor Monitor	<input type="checkbox"/> Sorbent Tube/Filter Pump			
<b>Training Requirements (List below specific training requirements)</b>					
PHENIX Awareness, LockOut/TagOut affected, Collider Accelerator worker, working at heights					
<b>Based on analysis above, the Walkdown Team determines the risk, complexity, and coordination ratings below:</b>			<b>If using the permit when all hazard ratings are low, only the following need to sign: ( Although allowed, there is no need to use back of form)</b>		
<b>ES&amp;H Risk Level:</b>	<input checked="" type="checkbox"/> Low	<input type="checkbox"/> Moderate	<input type="checkbox"/> High	WCC:	Date:
<b>Complexity Level:</b>	<input checked="" type="checkbox"/> Low	<input type="checkbox"/> Moderate	<input type="checkbox"/> High	Service Provider:	Date:
<b>Work Coordination:</b>	<input checked="" type="checkbox"/> Low	<input type="checkbox"/> Moderate	<input type="checkbox"/> High	Authorization to start	Date:
(Departmental Sup/WCC/Designee)					

**3. Both work requester and service provider contribute to work plan (use attachments for detailed plans)**

<b>Work Plan</b> (procedures, timing, equipment, and personnel availability need to be addressed): See Attached				
Special Working Conditions Required: No				
Operational Limits Imposed: No				
Post Work Testing Required: No				
Job Safety Analysis Required: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			Walkdown Required: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
<b>Reviewed by:</b> Primary Reviewer will determine the size of the review team and the other signatures required based on hazards and job complexity. Primary Reviewer signature means that the hazards and risks that could impact ES&H have been identified and will be controlled according to BNL requirements.				
Title	Name (print)	Signature	Life #	Date
Primary Reviewer				
ES&H Professional				
Other				
Other				
Work Control Coordinator	Don Lynch		20146	
Service Provider				
	Review Done: <input type="checkbox"/> in series <input type="checkbox"/> team			

**4. Job site personnel fill out this section.**

Note: Signature indicates personnel performing work have read and understand the hazards and permit requirements (including any attachments).			
Job Supervisor:		Contractor Supervisor:	
Workers:	Life#:	Workers :	Life#:
Workers are encouraged to provide feedback on ES&H concerns or on ideas for improved job work flow. Use feedback form or space below.			

**5. Departmental Job Supervisor, Work Control Coordinator/Designee**

Conditions are appropriate to start work: (Permit has been reviewed, work controls are in place and site is ready for job.)			
Name:	Signature:	Life#:	Date:

**6. Departmental Job Supervisor, Work Requester/Designee determines if Post Job Review is required.**  Yes  No

Post Job Review (Fill in names of reviewers)			
Name:	Signature:	Life#:	Date:
Name:	Signature:	Life#:	Date:

**7. Worker provides feedback.**

Worker Feedback (use attached sheets as necessary)
a) WCM/WCC: Is any feedback required? <input type="checkbox"/> Yes <input type="checkbox"/> No
b) Workers: Are there better methods or safer ways to perform this job in the future? <input type="checkbox"/> Yes <input type="checkbox"/> No

**8. Closeout: Work Control Coordinator (authorizing dept.) checks quality of completed permit and ensures the work site is left in an acceptable condition. (WCC can delegate clean up of work area to work supervisor)**

Name:	Signature:	Life#:	Date:
Comments:			

**Drift Chamber repair in the PHENIX Experimental Hall (bldg. 1008).**

**Problem**

A number of faults have been detected in the PHENIX east and west Drift Chambers and associated electronics. Some of these faults can be addressed by exchanging FEM boards easily accessible from ground level or by software fixes. Other problems require FEM modifications at elevated locations accessible by ladder (FEM's) or Detector wire repairs from the extended CM lift table or from a vertical manlift in the PHENIX Assembly Hall (AH).

Access to the elevated locations inside the PHENIX Interaction Region (IR) is difficult, as they are located 10 to 20 feet above track level, tucked inside the arc formed by the RICH detector, with the Central Magnet in front of the west carriage. Access to the elevated locations on the DC East when it is in the AH is readily accomplished with a vertical manlift. The procedures described below were used successfully in the past to trouble shoot and repair failed modules and chamber wires.

**Work Plan**

This work is to be done by fully trained and experienced personnel during the 2009 summer shutdown.

1. FEM troubleshooting and repair

Access to the power supply modules is by extension ladders set up between the central magnet (CM) outrigger and the RICH vessel on the west carriage. For the higher modules, two ladders will be secured side-by-side, tied together, to allow climbing by the CM pole piece. As flammable gas is not flowing anywhere in the IR during summer shutdown periods, there is no danger of a flammable gas mishap, and the location of the repairs is far enough removed from the DC, PC, or TEC gas windows that there is no chance of damage to the gas volume from their installation. The Drift Chamber high and low voltage will be turned off and locked out. The 12-ton building crane will be positioned such to place the eye of a sling directly above the work area, then locked out. A harness will be worn and clipped to the sling while the work is being performed. A watch must be present at all times when someone is up on the ladders. All work in the IR will be supervised by Carter Biggs.

Work will involve trouble shooting of the modules and cables, and repair or replacement as appropriate.

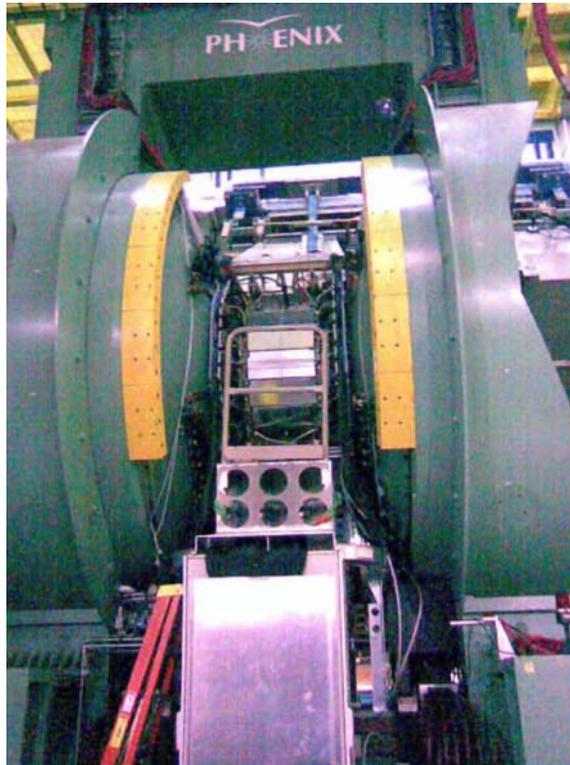
- Ensure that power to the DC electronics is secured and that the CM power key is locked out of use.

- Erect and secure 1 (or 2 side by side if necessary) extension ladders between the top of the central magnet outrigger and the rich detector.
- Set up a tie off point just above the working position using the building crane and an adequately rated sling.
- The position of the tie off point is to be set for each working level and the crane must be locked out before the worker ascends the ladder.
- The worker is to use a body harness with a short clip-on lanyard and tie off before starting work.
- A watch person must be present at all times when a person is on the ladders
- Remove or reinstall power supply modules as necessary.

## 2. DC Chamber wire troubleshooting and repair

Access will be from the CM lift table with extension wings and elevation step attachment (DC West or East when in IR) or from a vertical manlift (DC east in AH).

For CM lift table, safety rail on elevation step must be attached as shown in the attached photo.



***Before commencing any repair efforts, ensure that the Drift Chamber high and low voltage are turned off and locked out.***

Experienced DC group technicians will troubleshoot shorted Chamber wires by carefully slicing into the DC chamber at a known short location, then locating and removing the failed wire. This eliminates the short, then the chamber is resealed using adhesive, followed by testing and verifying the repair. As in all cases for work at PHENIX, all workers must be appropriately trained for using access equipment and all other training as indicated on the green sheet. All work described herein requires adherence to the 2-man rule.

This procedure requires that the east/west carriage be in its run position. For repairs on the DC East in the AH the procedure is similar, but access is provided using a stable vertical manlift (scissor lift).

