

SAFETY



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PSC All-Hands and Priority Meeting
October 18, 2017

SAFETY

- Recent Incidents
- Common Causes
- Reminder of current requirements
- Areas of Focus

CAPACITOR DISRUPTIVE DISCHARGE EVENT

July 18, 2017

- Capacitor being tested at ~9 kV
- Engineer assumes capacitor is discharged
- To prevent recharging, engineer grasps jumper wire hanging from high voltage cable to attach it to the other terminal creating a short
- As alligator clip on jumper approaches terminal disruptive discharge of energy occurs with flash, heat, light and sound
 - Engineer is stunned, receives second degree burns to hand, ringing in ears
 - Technician has ringing in ears
- Event was near miss fatality event

CAPACITOR DISRUPTIVE DISCHARGE EVENT

Fundamental cause

- Did not follow ISM practices, did not follow basic tenets of Work Planning and Control
 - Failure to develop scope of work
 - Failure to analyze hazards that were identified
 - No controls developed for the hazards
 - No work control document or procedure
 - No authorization to begin work
 - Incomplete understanding of means and methods to accomplish work
 - Line management unaware work was being performed



CAPACITOR DISRUPTIVE DISCHARGE EVENT

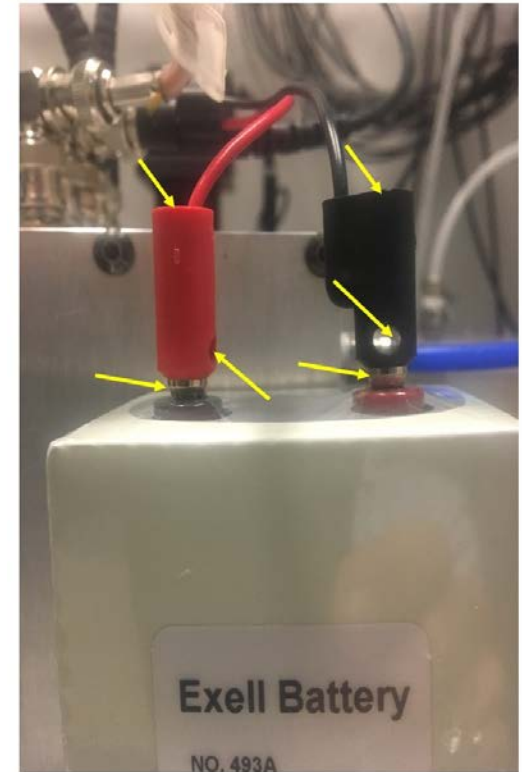
Contributing Causes

- **Communications failures**
 - Division to division
 - Within the workgroup
 - Within the division
- **Process deficiencies**
 - Failure to perform zero energy verification

BATTERY SHOCK EVENT

July 25, 2017

- Team was troubleshooting an ionization chamber detector
- Undergraduate student measured voltage on a 300 VDC battery
- After measurement, student tries to remove the banana plugs from the battery
 - Grasps both plugs at the same time, pulls up and battery lifts, but plugs do not release
 - Moves fingers down the plugs to get better grip, comes into contact with conductive surface
- Student receives shock felt to the elbows, calculated to be equivalent energy to 120VAC outlet plug being grasped



Arrows indicate energized surfaces

BATTERY SHOCK

Fundamental Cause

- **Did not fully identify the scope of work**
 - Electrical equipment not identified/specified
 - Hazards and controls for 300 VDC battery not identified
 - Hazard of unshielded banana plug was not recognized, analyzed, nor mitigated
 - Staff and users were not familiar with requirements for 300 VDC battery use

COMMON CAUSES

- ISM principles were not followed
 - Failure to define scope of work
 - Failure to analyze the hazards
 - Failure to develop/implement controls
- Both activities considered *ancillary* to the work that needed to be done under work planning and control



REMINDER - CURRENT REQUIREMENTS TO PERFORM MODE 0 AND 1 ELECTRICAL WORK

- In order to place a piece of equipment or wiring into the electrically safe work condition including zero voltage verification (Mode 1) the following actions must be completed:
 - Create a work control document
 - Designate a Qualified Electrical Worker (QEW) to perform the work
 - Complete and obtain approvals – Mode 1 Electrical Work Job Briefing
 - Enlist an independent QEW Observer to be present for all Mode 1 work
 - Perform a Pre-Job briefing and record into in the PSC database
 - Obtain Work Authorization from line management prior to starting work
 - Perform the work within the controls established
 - Perform a Post-Job Briefing and record into the PSC pre-job briefing database
- Additional information is available on the APS Electrical Safety Web Page Or from your ES&H Coordinator or Floor Coordinator

FAILURE TO PERFORM COMPENSATORY ACTION FOR MODE 1 ELECTRICAL WORK

October 5, 2017

- Engineering Specialist recognized work being performed on a chiller was not in compliance with the current compensatory measures put in place on August 16
- De-energization and LOTO were performed
- But ANL Electrical Pre-Work Brief was not done, and there was no ANL Electrical Work Observer
- Work was paused and placed in a known safe state until following day, when appropriate documentation and qualified personal could be present
- This event was reportable to DOE

AREAS OF FOCUS

- Investigations identified a few areas to help drive a culture of safety
 - Approval versus authorization
 - Work planning and control requirements
 - Housekeeping
 - Using Stop Work Authority

APPROVAL VS AUTHORIZATION

Approval

Retrospective acknowledgement that the planning has been done appropriately, including use of:

- Scope of Work
- Analysis of the hazards
- Development of necessary controls

Authorization

Forwards-looking verification by line manager that work is ready to be performed

- Follows a pre-job briefing and walk-down to assure that everything is ready to go
- Takes into account the time, date and location of the work



WORK PLANNING & CONTROL

- Work planning and control exist to ensure safe operations
- Components of WPC include:
 - Defining the Scope of Work
 - Walking down the work area
 - Identifying potential hazards
 - Implementing controls for hazards
 - Pre-job briefing
 - Opportunity for worker and supervisor to meet to discuss the work
 - Confirm that everything is as expected
 - Confirm that everyone is ready to perform the work

HOUSEKEEPING

- Housekeeping is an accurate indicator of everyone's attitude about safety
- Poor housekeeping is one of the major causes of accidents
- Minimize legacy equipment accumulation
- A well-maintained area set a standard for others to follow
- A clean work area is vital not only for a safe working environment, but also to do great science



STOP WORK AUTHORITY

- YOU have an OBLIGATION to **STOP WORK** when a perceived unsafe condition or behavior creates a safety concern
- Everyone has an obligation to respond to a **STOP WORK** request and engage in an honest, open discussion
- Everyone has the right to be treated professionally and for their concerns to be considered with an open mind
- If a resolution cannot be found, take the issue to a line manager
- *Nothing that we do here is worth getting hurt for*

