

Significant Event Review

EEI Occupational Safety and Health
Committee Meeting

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View of Job Site

**Changing Cutouts to
Rehab Capacitor Bank**

June 2008

**Electrical Contact
hand-to-hand
requiring surgery for
removal of both hands
and arms up to the
shoulders**

WHAT was being done

- Crew of 2 Line Mechanic A's. (LMA-1 injured) & LMA-2 assigned the task of Capacitor Maintenance (Capacitor hardening project).
- The crew was assigned multiple capacitor locations on the 12KV circuit for the day.
- The accident occurred at third location of the day at approx. 11 am
- A general job briefing took place at the service center before work began for the day, conducted by the Line Crew Supervisor.
- Discussed at this briefing was merely the fact of having enough work to last for the day.
- The crew had filled out a job briefing form to cover multiple locations for the day.
- Listed on the briefing form was PIPE & PPE needed to complete this job.
- All boxes were checked.
- Special Precautions noted were:

Follow Safety Procedures for Capacitors.

WHAT was being done continued

- Crew set up their bucket truck in a field, off of the roadway and discussed who was going to perform the work in the air.
- Crew installed barricade around the vehicle.
- LMA-1 was wearing hard hat, leather gloves, safety glasses and FR shirt.
- An actual structured **job briefing at the site did not occur.**
- LMA-1 ascended in the bucket and proceeded to isolate the fixed capacitor bank by opening the 3 cutouts utilizing a load break tool fastened to an 8 foot hot stick.
- After opening the 3 cutouts LMA-1 lowered the bucket to the ground and exchanged hot stick with load break for a standard 8 foot shotgun type hot stick.

WHAT was being done concluded

- LMA-1 ascended once again and used a hot stick with a grounding jumper attached to discharge the voltage from each cap unit (3)
- LMA-1 then hung the hot stick on the primary neutral.
- At this point, LMA-2 was busy fitting up material (cutouts and arresters) at the rear of the bucket truck, when he heard the electrical contact, looked up and could not see LMA-1 standing any longer in the bucket.
- LMA-2 shouted a few times but received no response. LMA-2 then called for emergency assistance via the radio to the dispatch center. After making the emergency call, LMA-2 lowered bucket to the ground utilizing the lower controls.
- LMA-2 removed LMA-1 from the bucket and attempted to calm him until emergency assistance arrived.
- LMA-1 was air lifted via emergency helicopter to a hospital (burn unit).

HOW it happened

- LMA-1 had previously opened the doors of the 3 energized cutouts protecting the fixed capacitor bank.
- He failed to realize the top of each cutout was still energized & remained connected to the corresponding energized primary phase.
- LMA-1 then proceeded to loosen the load side cutout riser nut using a combination speed wrench.
- To steady his work, the accident committee feels that he placed his other hand on top of the cutout (energized portion) completing the circuit path for electricity to flow from arm to arm.

WHY it occurred

Failure to follow proper safety procedures & requirements while working in an energized area, AEP Safety & Health Manual)

including violations of AEP Safety & Health Manual, below:

- 1. Failure to perform a detailed job briefing @ site.***
- 2. Failure to Observe while in primary zone.***
- 3. Failure to maintain minimum approach
Failure to follow PIPE rules and requirements. Failure to follow proper rules & procedures while working with capacitors.***



Right Hand Contact Point (Still energized)...

Left Hand Contact Point.



Riser was still attached to the stirrup at time of contact.

Human Performance Error Review

Crew: Capacitor Bank Rehab, 2-LMAs

Performance Mode:

(Check one that best represents individual's competence level for the work)

Skill Based

Rule Based

Knowledge Based

Performance Mode Comments:

- LMA lost focus, resulting in failure to recognize and comply with established safety guidance, because he inadvertently missed a critical step for safe work performance when he overlooked that the top of each cutout was still connected and energized at primary voltage, as reflected in:
 - Mind not on task.
 - Eyes not on task.

Human Performance Error Review

Error Traps:

(Select all that apply from fact finding)

Time Pressure

- Distractions** or Interruptions
- Multiple Tasks** or **Repetitive Actions**
- Overconfidence** or **Complacency**
- Vague Guidance (Written or Verbal)**
- Assumptions**, lack of or unclear standards
- Unfamiliarity with task, first time or lack of proficiency, inexperienced
- Imprecise communication habits**

Error Traps:

Peer or Self-Induced or Perceived Pressure

Off-normal work time or Infrequent Conditions

Challenging or changing Physical Environment

Fitness for Duty: fatigue or mental stress

Reliance on Memory, limited short term memory

- Inaccurate risk perception or **shortcut choice**

Departure from routine or new technique

Confusing displays or controls or indications

Other

Judgment Statement on Contributions of Error Traps to this incident:

- A Friday, great summer weather, and employee was scheduled to leave for vacation with family.
- Repetitive task, multiple locations, and rotating positions without rebriefing on changed tasks
- Complacency, failure to follow safety rules and procedures, 1st day scheduled on this project.
- Sub-standard job briefing(s) [Job briefing at site was limited, hazards involved were not discussed, work procedures were not discussed; no rebrief at third site]
- Communications between crew members were inconsistent, such that assumptions occurred.
- Mentally disengaged employee took shortcut, failing to follow minimum approach requirements.
- Inadequate safety rule adherence and job briefings indicate possibly deficient safety culture.

Human Performance Error Review

<p>Process Issue(s): Training X Written Guidance (Rules, Policies, Practices, and Procedures) X ES&H Expectations / PJB</p>	<p>Goals & Priorities X Values & Norms X Roles & Responsibilities Work Planning & Scheduling X Communications</p>	<p>X Pre-Assessment & Recognition of Risks versus Job Hazards Task Structure Other</p>
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Process Issue Influences on the Error and Error-Proofing Opportunities Identified:

- Opportunities exist to re-enforce company expectations for following rules, not taking shortcuts.
- Changing the culture of employees to: 1) internalize the need to recognize and stop & review risks with co-workers before independently deciding to deviate from standard safe work practices; 2) valuing the benefit of thorough job briefings. so that expected sequence for safe work practices are reviewed and known, which will promote effective communication; and 3) recognizing that we communicate constantly to keep each other in the proper position to look out for each other before a mistake/slip/or lapse can result in harm.
- Opportunities exist to discuss values, norms, roles and responsibilities.
- Hazard recognition, risk factor, and job briefing requirements need to be reinforced and reintroduced, but even more important it to establish a sequence of events for performing safe work
- Suspect that **Safe Start** principles not being well applied and worth noting that the similar **Human Performance Error Reduction Techniques**.

Human Performance Error Review

Human Performance Tools:	Used - Effective	Used - Not Effective	Not Used - Needed	N/A
▪ Self Checking	<input type="checkbox"/>	X	<input type="checkbox"/>	<input type="checkbox"/>
▪ Peer Checking	<input type="checkbox"/>	X	<input type="checkbox"/>	<input type="checkbox"/>
▪ Knowledge/Training	<input type="checkbox"/>	X	<input type="checkbox"/>	<input type="checkbox"/>
▪ Procedure Usage	<input type="checkbox"/>	<input type="checkbox"/>	X	<input type="checkbox"/>
▪ STAR or Take Two	<input type="checkbox"/>	<input type="checkbox"/>	X	<input type="checkbox"/>
▪ Place-keeping	<input type="checkbox"/>	<input type="checkbox"/>	X	<input type="checkbox"/>
▪ Effective Comm unications	<input type="checkbox"/>	X	<input type="checkbox"/>	<input type="checkbox"/>
▪ Job Briefing	<input type="checkbox"/>	X	<input type="checkbox"/>	<input type="checkbox"/>
▪ Coaching	<input type="checkbox"/>	<input type="checkbox"/>	X	<input type="checkbox"/>
▪ Turnovers	<input type="checkbox"/>		<input type="checkbox"/>	X

Human Performance Error Review

Lesson Learned Statement on Human Performance Tools Use or Failure to Use:

When work tasks are rotated and the crew doesn't rebrief, they miss establishing a "success path" to accomplishing the work safely and can thereby easily lapse into assumptions, sub-standard communications, and miss critical peer checking opportunities; particularly, when engaged in work tasks involving high electrical energy levels that always pose potential life-threatening consequences.

A possible human performance tool to consider is creating a ***work task checklist of the sequence of actions*** involved to do the work safely, which would give the qualified observer something to use to track the progress and serve as the basis for continuous communications so that any lapses or deviations are caught before they result in harm. Finally, getting everything prepared first, together before starting, would enable the qualified observer to remain focused on that role's primary responsibility.

Questions?