Lessons Learned from SLAC Type A Accident Investigation Electrical Arc Injury

Task Hazard Analysis/Hazard Control

Butch Meier
What Happened?

— Breaker installation in energized panel

— Two 480 volt phase busbars came in close contact during install

“...the work being done violated every ISM Core Function and every ISM Guiding Principle”

SLAC Type A Investigation Report
Arc Flash Hazards

- Temperatures up to 35000 F
- Brilliant flash
- Loud noise
- Spreading hot gases
- Molten metal
- Flying objects
What Happened (cont.)

ISM Functions and Principles violated

— Define the work
— Analyze hazards
— Develop/implement hazard controls
— Line Management responsible for safety
— Competence commensurate with responsibilities
Key Findings

— No need or justification to work energized

— OSHA/NFPA 70E requirements not followed or known
  • Qualification
  • Hazards/PPE
  • Permits
  • Boundaries

— Field Supervisor knew worker PPE was improper
SLAC Accident Lessons Learned

• JLab managers and supervisors are responsible to:
  — Determine if hazards are present or likely
  — Perform hazard analysis
  — Select proper PPE based on analysis
  — Communicate selection to employee, making sure it fits properly

• Supervisors and workers must stop when work steps do not go as expected

• Subcontractors are to comply with our safety requirements
Final Thoughts on SLAC Accident

“ISM Core Functions and Guiding Principles have no impact because operations are placed above safety concerns”
“Rigorous safety oversight … is frowned upon and given very low priority”
- SLAC Type A Electrical Arc Injury Investigation Report

Keys to remember so this analysis doesn’t apply here

- Complacency in hazard analysis leads to injuries
- Supervisors must communicate PPE requirements
- Don’t accept unsafe conditions or practices
- Even simple jobs have hazards - follow EH&S Manual procedures for hazard analysis
• EH&S Manual 3210 requires task hazard analysis
  — Implement OSHA/ISM requirements
  — New and in progress tasks
  — Reevaluate periodically and when things change
• Supervisors tasked with responsibility
• Safety professionals available – use them
<table>
<thead>
<tr>
<th>Severity of outcome</th>
<th>Personal injury</th>
<th>Property loss or environmental impact</th>
<th>Likelihood of accident</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Death or permanent disability</td>
<td>&gt; $100,000</td>
<td>&gt; 500 yrs</td>
</tr>
<tr>
<td>IV</td>
<td>Hospitalization required or ≥ 5 lost workdays</td>
<td>&gt; $10,000</td>
<td>≤ 500 yrs</td>
</tr>
<tr>
<td>III</td>
<td>First aid or medical treatment required and &lt; 5 lost workdays</td>
<td>&gt; $500</td>
<td>≤ 500 yrs &gt; 10 yrs</td>
</tr>
<tr>
<td>II</td>
<td>First aid not required</td>
<td>&lt; $500</td>
<td>≤ 10 yrs &gt; 10 days</td>
</tr>
<tr>
<td>I</td>
<td></td>
<td>&lt; $500</td>
<td>≤ 10 days</td>
</tr>
</tbody>
</table>

(Estimated likelihood per full-time active person)
Table 4: Risk Codes and Task Review Requirements

<table>
<thead>
<tr>
<th>Risk Code</th>
<th>Level of Task Review required before new work can begin</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>High</td>
</tr>
<tr>
<td>3</td>
<td>Medium</td>
</tr>
<tr>
<td>2</td>
<td>Low</td>
</tr>
<tr>
<td>1</td>
<td>Minor</td>
</tr>
<tr>
<td>0</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

- **Risk Code 3 & 4 jobs** get much supervisory planning and attention
- **Risk Code 2 jobs** require worker and supervisor to “explicitly review hazards and mitigating measures”

Risk Code 2 is our area of focus for the shutdown – four reportable injuries in 2004 occurred in Risk Code 2 tasks
Final Safety Thoughts

• Within DOE complex, electrical safety and hoisting and rigging are the two tasks of current high level interest

• At JLab, slips/trips/sprains and hand injuries are our most common injuries

• Injuries are preventable – zero is our goal!

• Open every meeting with a short discussion of a recent safety item of interest – gets everyone thinking of safety!