

# ESH Coordinators Meeting

## Stanford Linear Accelerator Center (SLAC) Contractor Hospitalized After Arc Flash

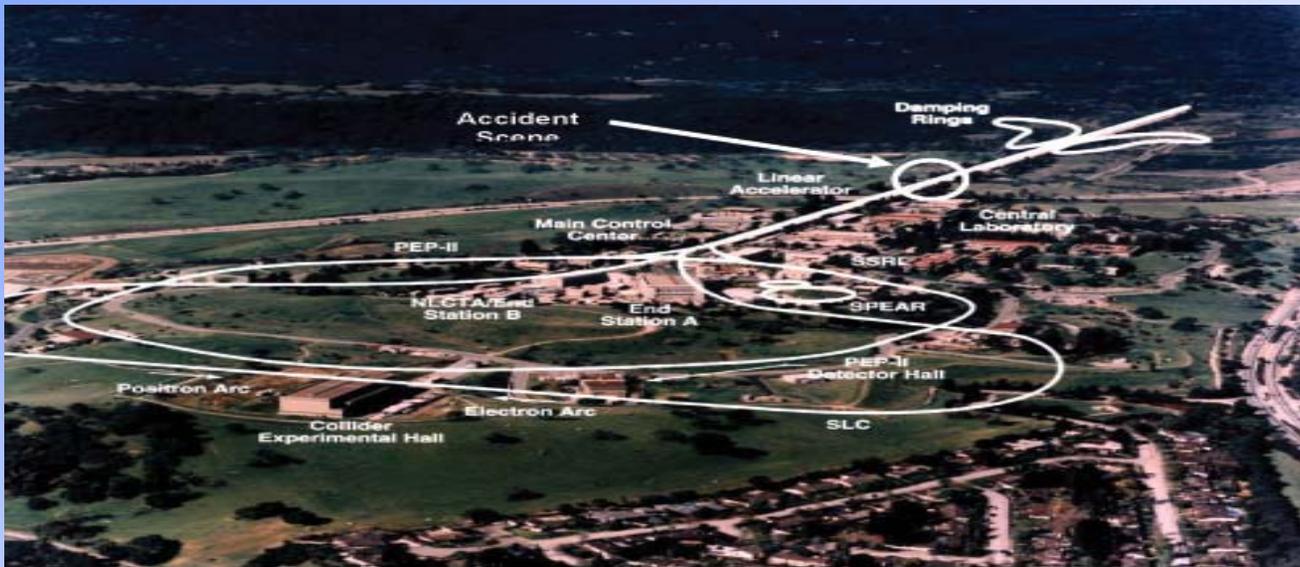
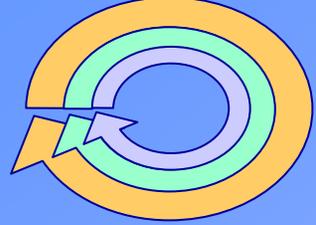


Figure 1-1. Stanford Linear Accelerator Center with Accident Scene Marked

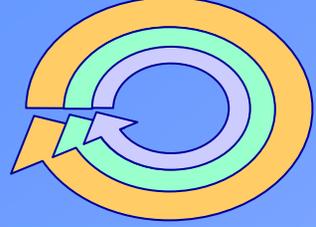
Presented by Ed Sierra  
Laboratory Lessons Learned Coordinator  
Quality Management Office  
January 26, 2005



# Overview

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- Accident Description
- Accident Analysis
- Identified Deficiencies/Lessons Learned
- DOE Investigation Board Concludes ...



# Accident Description

## October 11, 2004

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- Unqualified SLAC Supervisor directs subcontractor electrician to install breaker in live 480-volt dist. panel
- Supervisor did not obtained required working “Hot” permit
- The electrician wore a short-sleeved cotton/polyester shirt, leather gloves over Voltage (V)-rated gloves, safety glasses, and a hardhat
- Unqualified laborer assigned as safety backup
- When the accident occurred, the electrician had connected phases B and C and was in the process of connecting phase A



*Figure 3-4. An electrical arc flash test*

# Scene Immediately After the Accident



Figure 2-1. Scene immediately after the accident

# Insulating Mat With Outline of Knee in Arc Flash Shadow

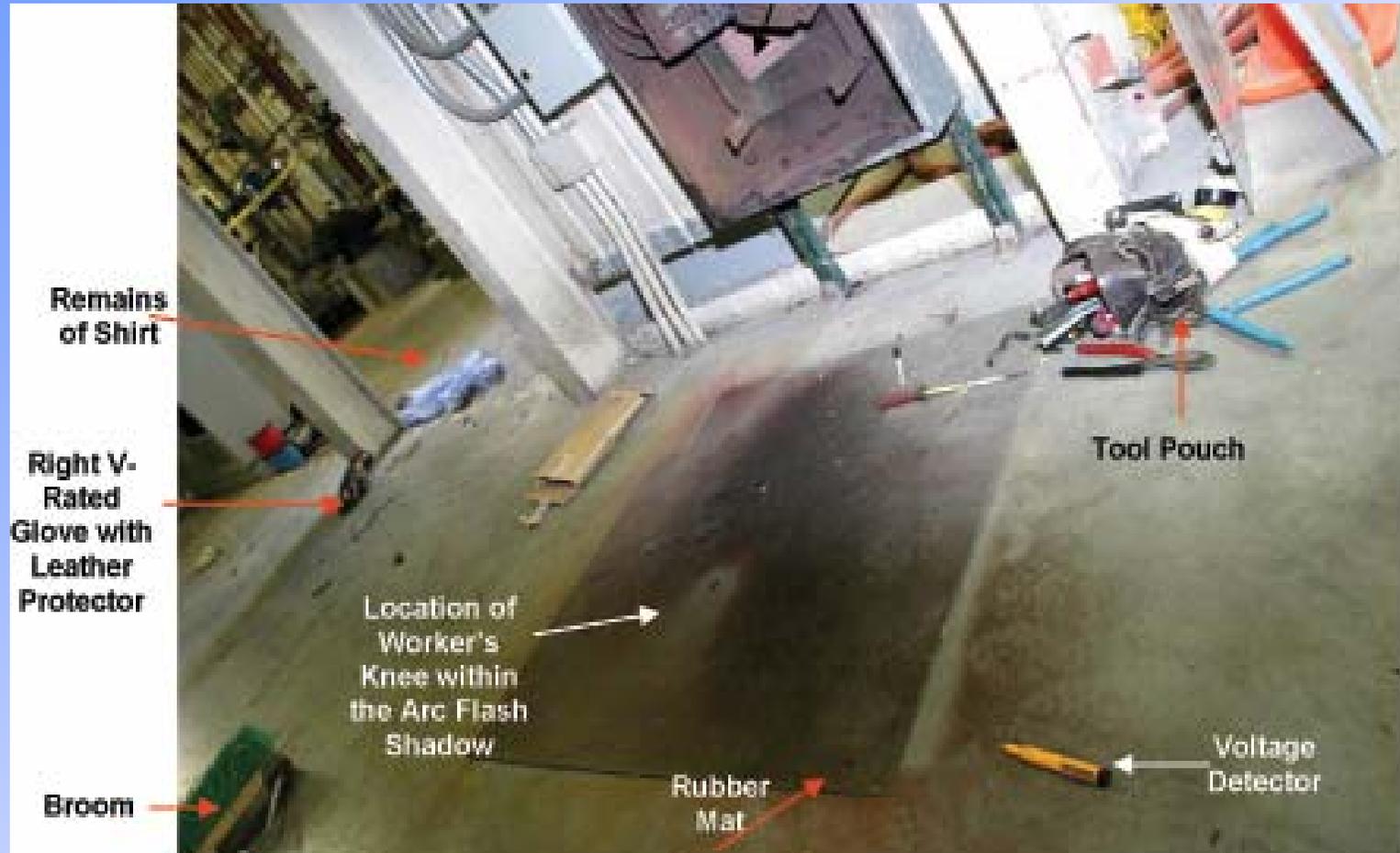


Figure 2-3. The insulating mat with the outline of BSE-1's knee in the arc flash shadow

# Screwdriver Used When Arc Flash Occurred



Figure 2-9. Closeup of the screwdriver the Board believes BSE-1 was using when the arc flash occurred

# Burned Glove

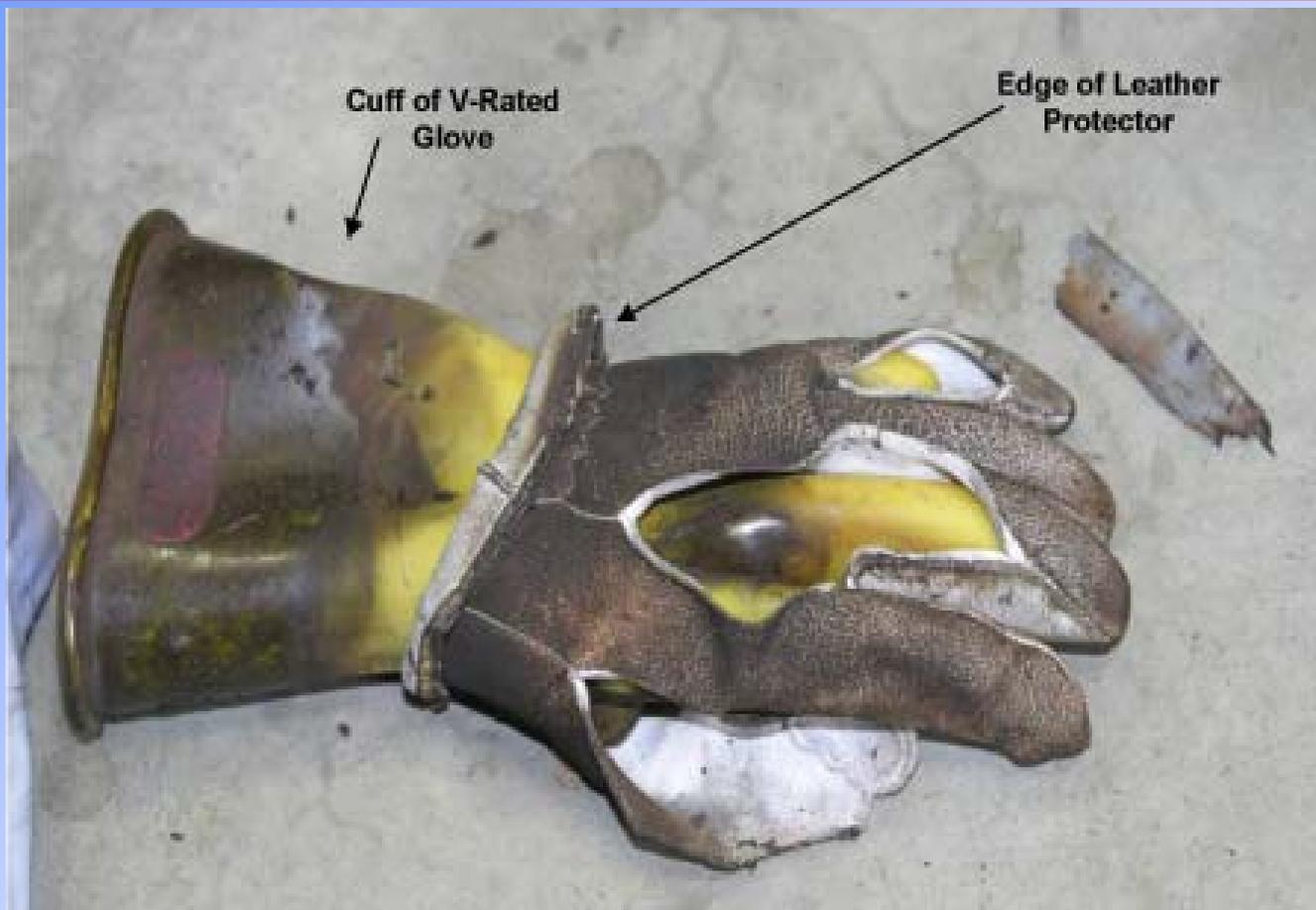


Figure 2-8. Closeup of one of BSE-1's burned gloves

# Burned Shirt & Flash-damaged PPE & Tools



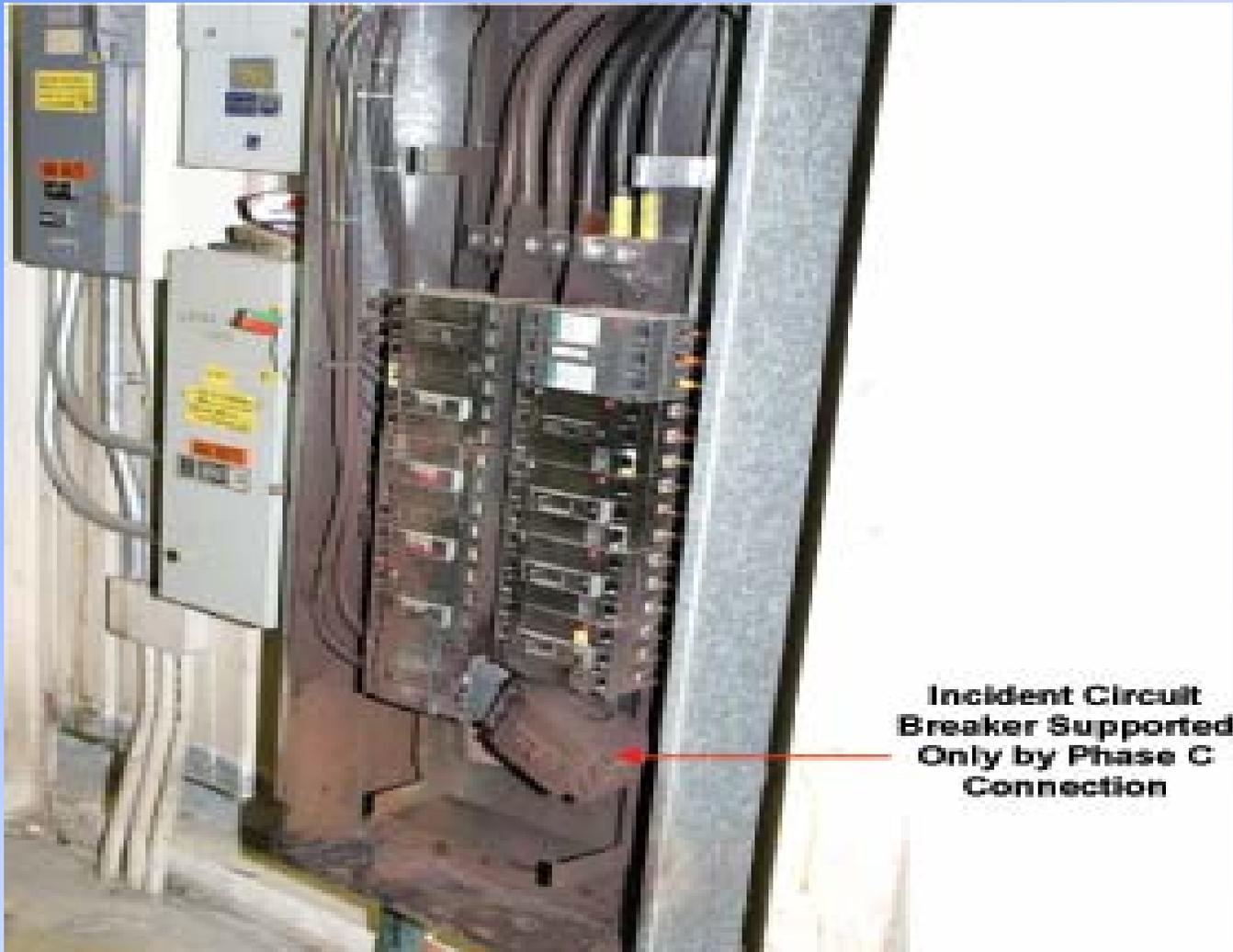
Figure 2-6. BSE-1's burned shirt and his flash-damaged PPE and tools

# Warning Label on Panel



Figure 2-4. Warning label on Panel 4P20R

# Circuit Breaker Panel



**Incident Circuit  
Breaker Supported  
Only by Phase C  
Connection**

# Circuit Breaker Panel



Figure 2-10. Closeup 1 of the damaged circuit breaker panel

# Circuit Breaker Panel

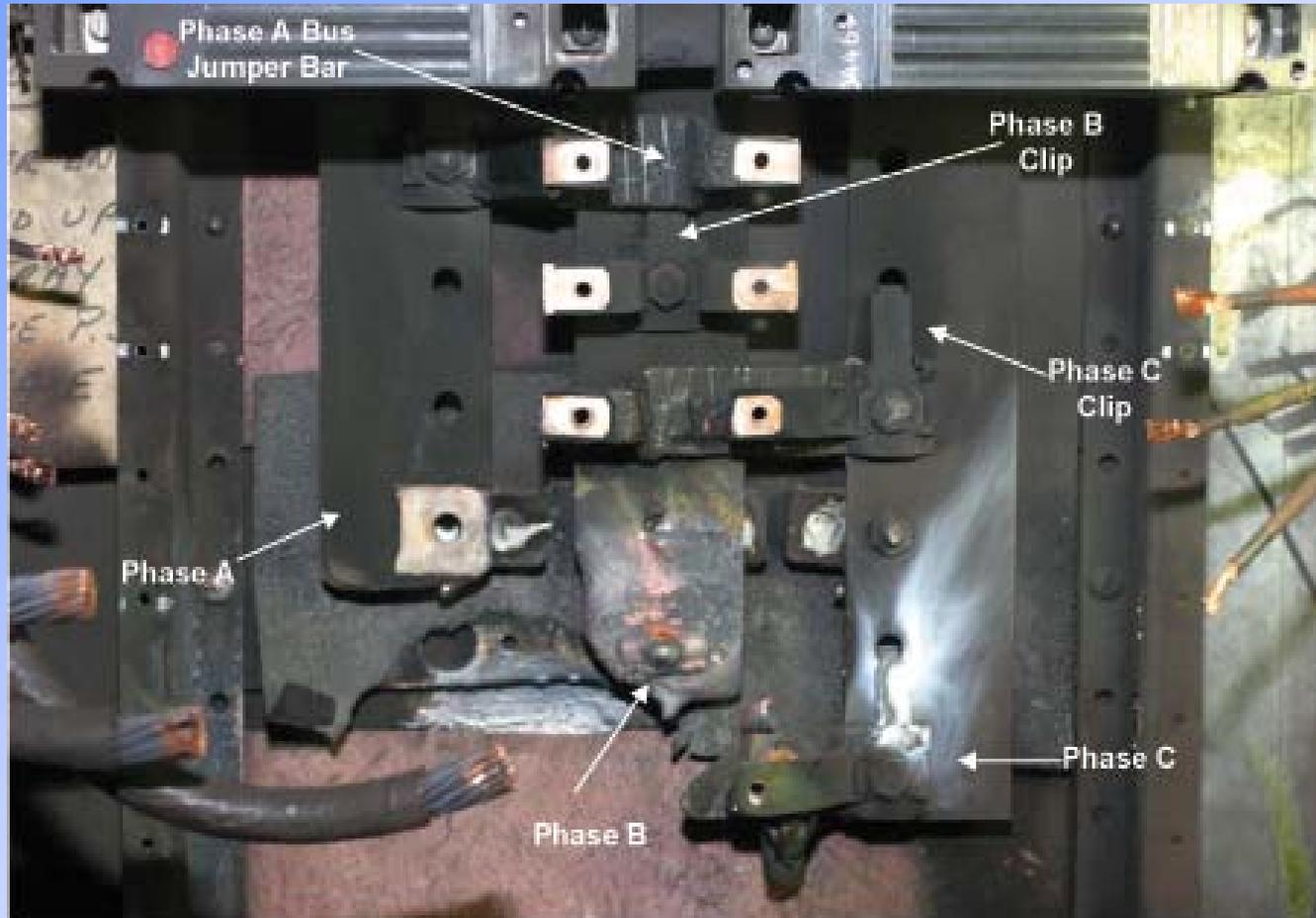


Figure 2-12. Circuit breaker panel after removal of the incident circuit breaker, adjacent circuit breakers, and the two circuit breakers above

# Accident Analysis



Figure 2-10. Closeup 1 of the damaged circuit breaker panel

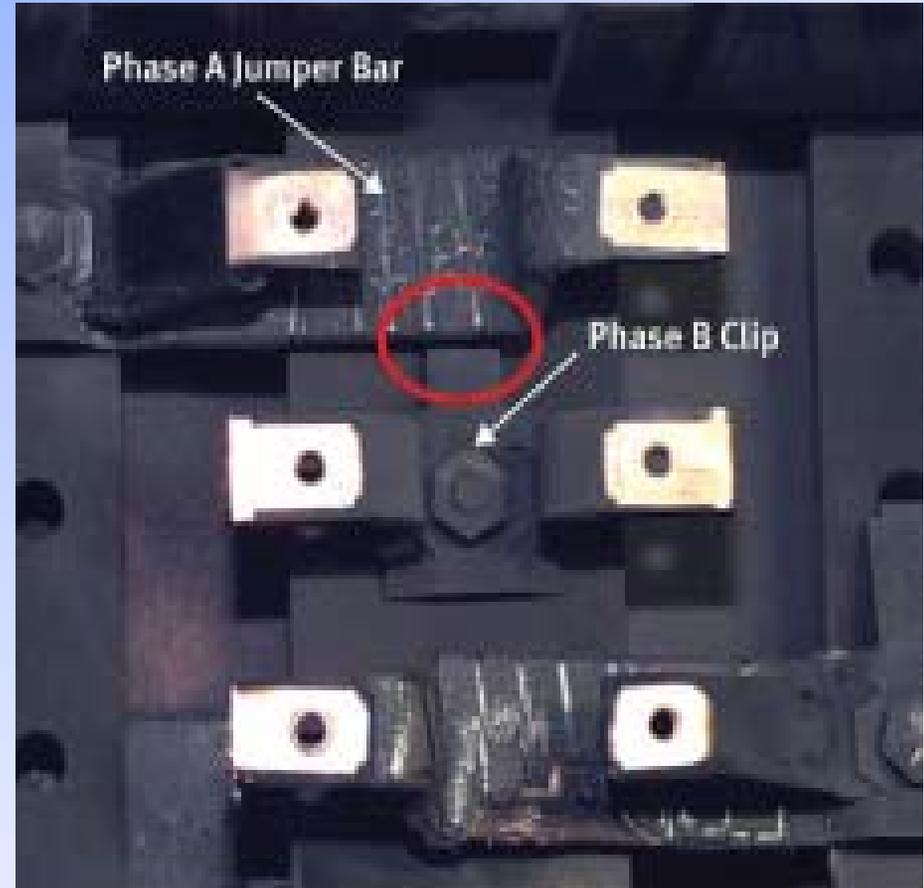


Figure 3-3. Close up of jumper bar and clip with the believed location of the fault circled in red

# Accident Analysis

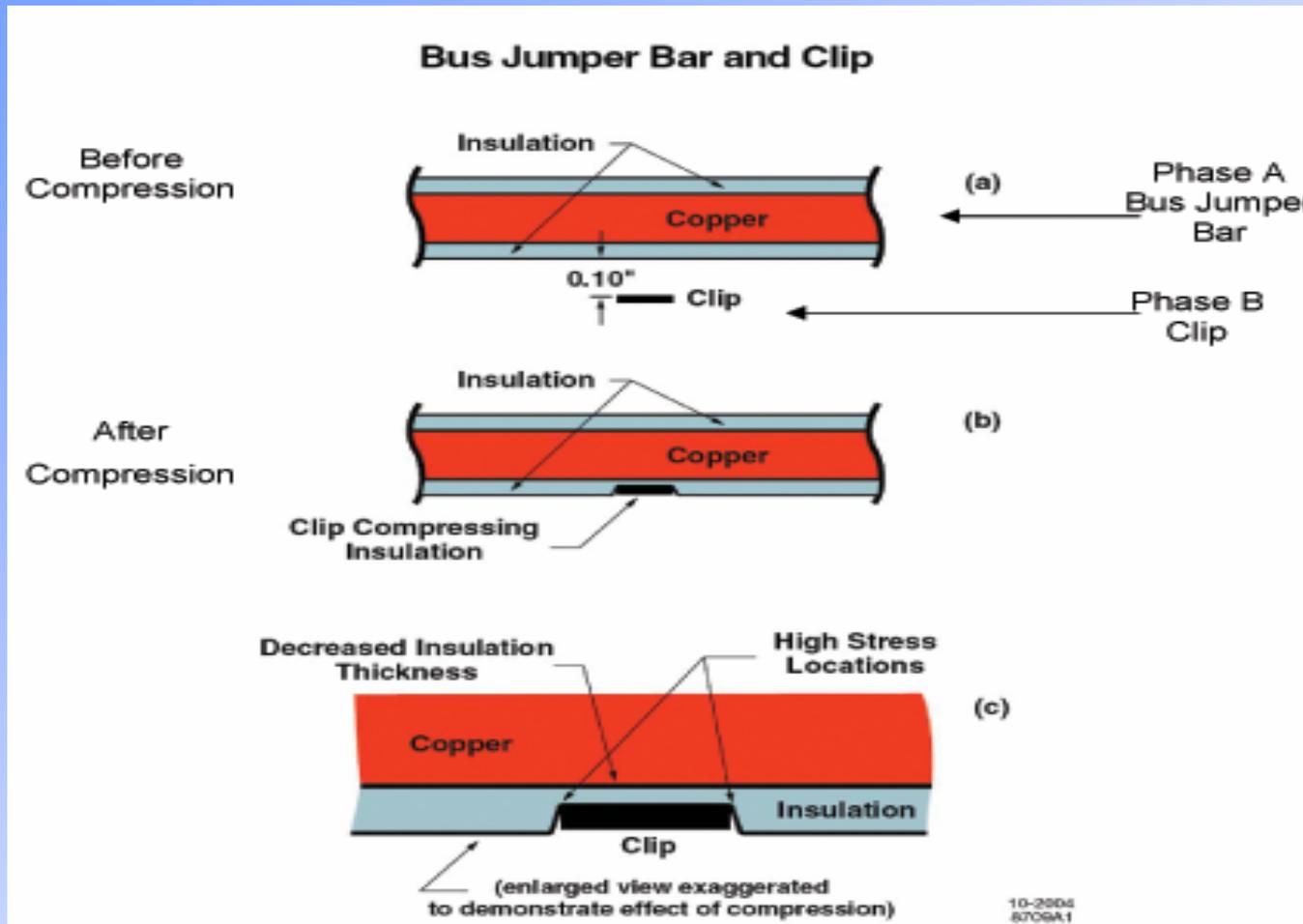


Figure 3-2. The effect of contact between the bus jumper bar and the clip (not to scale)

# Identified Deficiencies/Lessons Learned

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- A Pre-Work Hazards Analysis form was not completed
- There was no approved Electrical Hot Work Permit
- No one in the SLAC management chain had been informed of the decision by the supervisor to install the circuit breaker in an energized panel
- The workers did not wear the appropriate flame resistant clothing, and all required PPE
- The SLAC safety officials were not involved
- The subcontractor laborer was not trained to be a backup for the electrician
- If proper permitting procedures had been followed, the work would not have been done

# Lessons Learned



# The DOE Investigation Board Concludes that:

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- Unsafe conditions and operations have become an **accepted** part of the everyday way of doing business.
- Rigorous safety oversight, which should have elevated these issues for correction, is **frowned upon** and given very low priority.
- Within some divisions and departments at SLAC, the ISM Core Functions and Guiding Principles are not being followed and have **effectively no impact** because operations are placed above safety concerns.
- SLAC's emphasis on the scientific mission as a means to secure funding from the Office of Science and compete with other laboratories reached the supervisors level as direction to **"just get the job done."**