

Workplace Health and Safety Fatality Report



WORKER ELECTROCUTED DURING HIGH VOLTAGE CONTACTOR REPAIR

Type of Incident: Fatal

Date of Incident: December 12, 2007

Government of Alberta ■
Employment and Immigration

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SECTION 1.0 DATE AND TIME OF INCIDENT

1.1 December 12, 2007 at approximately 5:15 p.m.

SECTION 2.0 NAME AND ADDRESS OF PRINCIPAL PARTIES

2.1 Owner(s)

2.1.1 IKO Industries Ltd.
1600 – 42nd Avenue S.E.
Calgary, Alberta
T2P 2L2

2.2 Employer(s)

2.2.1 IKO Industries Ltd.
1600 – 42nd Avenue S.E.
Calgary, Alberta
T2P 2L2

2.3 Worker(s)

2.3.1 (Names and personal details were removed before distribution of this report)
Calgary, Alberta

2.4 Others

2.4.1 Calgary Police Services
133 – 6th Avenue S.E.
Calgary, Alberta
T2G 4Z1

SECTION 3.0 DESCRIPTION OF PRINCIPAL PARTIES

3.1 IKO Industries Ltd. is a manufacturer and distributor of asphaltic and bituminous waterproofing products. It is a Calgary based large corporation with manufacturing facilities throughout North America and Europe. At the time of the incident IKO facility in Calgary had approximately 200 workers.

3.2 The worker was a production supervisor who had been with IKO Industries Ltd. for nineteen years. He had been a supervisor for the last four years. The production supervisor had no formal training in an electrical field area.

- 3.3 Electrician #1 had a journeyman ticket and worked as an electrician for approximately 15 years. Electrician #2 had a journeyman ticket and worked as an electrician for approximately 40 years. Electrician #2 was the lead hand electrician at the time of the incident.

SECTION 4.0 LOCATION OF INCIDENT

- 4.1 The incident occurred in the electrical room on the third floor of the manufacturing plant building C3 located at 1600 – 42nd Avenue S.E. Calgary, Alberta (Refer to Attachment A-Map and Attachment B-Photographs 1 and 2).

SECTION 5.0 EQUIPMENT, MATERIAL AND OBSERVATIONS

5.1 Equipment and Material

- 5.1.1 The equipment involved in the incident was a GE Limitamp controller CR 7160 built in 1976 and had identification number 0385X0806R02 A0L. It was designed and used for starting, stopping and for overload protection of a high voltage motor of 2500 Horse Power used for a wood grinder designated L 42. The Limitamp enclosure was divided into high voltage and low voltage compartments. Each compartment had its own separate door and an interior barrier (Refer to Attachment B-Photographs 3, 4, 5, 6, 7, 8, 9, 10 and 11).
- 5.1.2 The high voltage contactor model IC 2814E was located in the lower compartment of the GE Limitamp enclosure. It was mounted on wheels and could be moved in and out of the GE Limitamp enclosure. The high voltage contactor could manually isolate the power circuit by the operation of a disconnect assembly. The disconnect assembly was part of the contactor and was mounted in such a manner that it could rotate. The rotation disconnected the stabs from the vertical bus that supplied a voltage of 4160 volts.
- 5.1.3 When the isolation switch handle was in the OFF position, the disconnect assembly rotated up to disconnect the stabs from the vertical bus and the shutter would come down to cover the bus opening. The disconnect assembly was locked in this position by the control arm. The contactor could be moved in and out of the enclosure at this setting. When the isolation switch handle was in the ON position, the shutter moved up exposing the bus and the stabs would contact the bus energizing the contactor.

- 5.1.4 Prior to opening of the lower compartment door, the contactor was de-energized by pushing the STOP button on the panel followed by operation of the isolating switch handle. The power to the bus could be disconnected only from the substation that was located in a different building of the facility. The control circuit that was located in the upper compartment had a voltage of 240 volts (Refer to Attachment B-Photographs 6, 7, 8, 9, and 10).
- 5.1.5 The magnet coil that needed repair was located in the lower compartment of the GE Limitamp enclosure. The magnet coil was part of the contactor and controlled the power to the load side.

5.2 Observations

- 5.2.1 When the lower compartment door was opened after the incident, it was observed that the shutter was up, exposing the bus and the stabs were in contact position with the live 4160 volt line bus. A weld on a control arm in the disconnect assembly was partially detached (Refer to Attachment B – Photographs 7 and 8).
- 5.2.2 The power supply from the substation was not disconnected and the fuses in the substation were blown off after the incident.
- 5.2.3 There was a product warning posted on the Internet regarding weld failure in the shutter assembly. The product warning was posted by the Carrier Group, a distributor for the GE Limitamp controller. IKO Industries Ltd. was unaware of the product warning posted on the Internet.
- 5.2.4 There was no hazard assessment conducted for the repair work carried out at the time of the incident.
- 5.2.5 IKO Industries Ltd. had purchased the used GE Limitamp controller from an unknown supplier.

SECTION 6.0 NARRATIVE DESCRIPTION OF THE INCIDENT

- 6.1 On December 12, 2007, approximately at 2:30 p.m., the wood grinder unit L 42 could not be started. Electrician #1 and electrician #2 started repair work on the unit and traced the problem in the magnet coil located in the contactor of the Limitamp controller CR 7160.

- 6.2 Electrician #1 disconnected the 4160 volt power by moving the isolation switch handle to the OFF position. They opened the lower compartment unit door, pulled out the contactor and laid it on the floor. The electricians replaced the defective magnet coil. The production supervisor came to see how the repair work was progressing.
- 6.3 At approximately 5:15 p.m. the two electricians lifted the contactor and placed the front wheels on the rails in the lower compartment of the Limitamp Controller CR 7160. When they tried to lift up the rear wheels of the contactor, the production supervisor came to assist the electricians. The production supervisor tried to lift the rear wheels of the contactor from the left hand side. Once the contactor was lifted onto the rails, Electrician #1 moved away. The production supervisor pushed the contactor into the compartment from the left hand side while electrician #2 pushed it from the right hand side.
- 6.4 Suddenly there was a loud noise and a flash. The production supervisor was slumped partially over the contactor and electrician #2 fell to the floor. Electrician #2 got up and pulled the production supervisor away from the contactor, onto the floor. Electrician #1 called Emergency Medical Services (EMS). The production supervisor was not breathing and had no pulse. Shortly, the EMS arrived on scene and attended to the injured production supervisor. The production supervisor was pronounced dead at the scene by Medical Examiner's office.

SECTION 7.0 ANALYSIS

7.1 Direct Cause

The production supervisor was electrocuted when he came in contact with the 4160 volts energized contactor.

7.2 Contributing Factors

- 7.2.1 The control arm had a partially detached weld allowing the shutter to open and resulting in the contactor being energized with 4160 volts.
- 7.2.2 The supply of 4160 volts to the Limitamp controller CR 7160 was not locked out from the main power substation.
- 7.2.3 There was no hazard assessment conducted for the repair work involving the contactor.
- 7.2.4 The employer was unaware of a product warning related to the weld failure posted on the Internet.

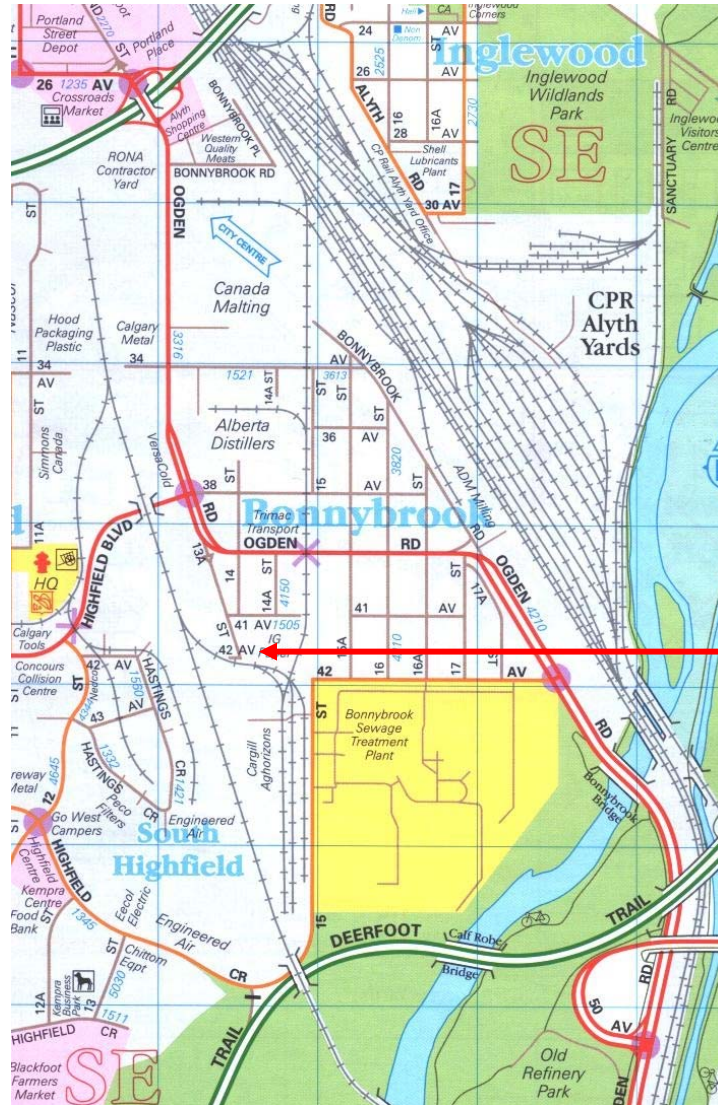
SECTION 8.0 FOLLOW-UP/ ACTION TAKEN

8.1 Employment and Immigration; Workplace Health and Safety Compliance

- 8.1.1 On December 12, 2007, Workplace Health and Safety Compliance (WHSC) received an incident notification, responded to the scene immediately and commenced an incident investigation.
- 8.1.2 WHSC issued an order requiring the employer to conduct an incident investigation and prepare a report.
- 8.1.3 WHSC issued an order requiring the employer to conduct a hazard assessment and develop safe work procedures for work involving the high voltage contactor.
- 8.1.4 WHSC issued an order requiring the employer to develop lock out tag out procedures for the high voltage contactor.
- 8.1.5 WHSC retained the services of a consulting electrical engineer to assist in the investigation.

8.2 Industry

- 8.2.1 After the incident, IKO Industries Ltd. voluntarily stopped work prior to the arrival of WHSC.
- 8.2.2 The employer conducted an incident investigation and submitted a report to WHSC for review.
- 8.2.3 The employer removed the GE Limitamp Controller CR 7160 from service.
- 8.2.4 The employer conducted a hazard assessment and prepared safe work procedures including lockout/tag out procedures for work involving the newly installed high voltage contactor.
- 8.2.5 The employer complied with all the orders issued by WHSC.



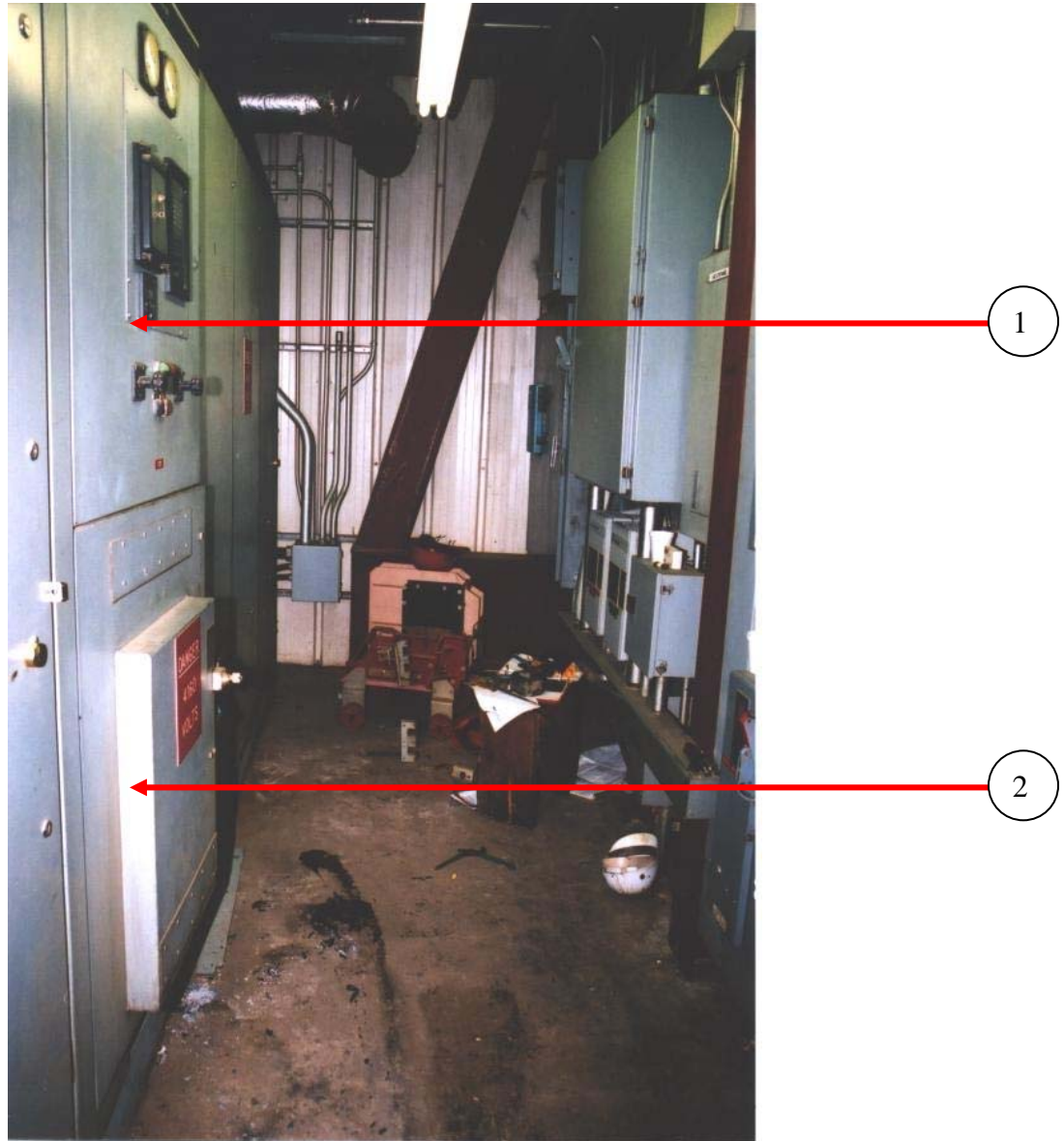
Map: Arrow shows the location of IKO Industries Ltd., where the incident occurred.



Photograph 1: Arrow shows the location of the electrical room.



Photograph 2: Arrow shows the entrance door to the electrical room.



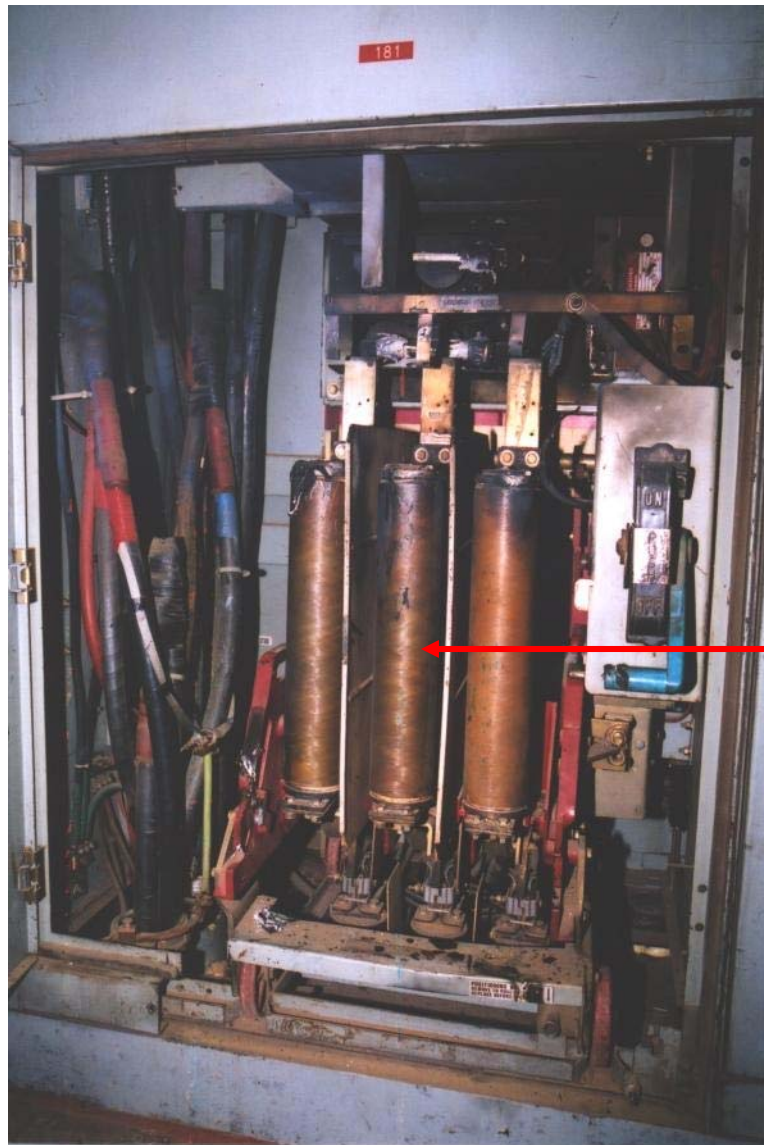
Photograph 3: Shows the inside view of the electrical room.

1. Shows the low voltage of 240 volts compartment of the GE Limitamp
2. Shows the high voltage of 4160 volts compartment of the GE Limitamp enclosure.

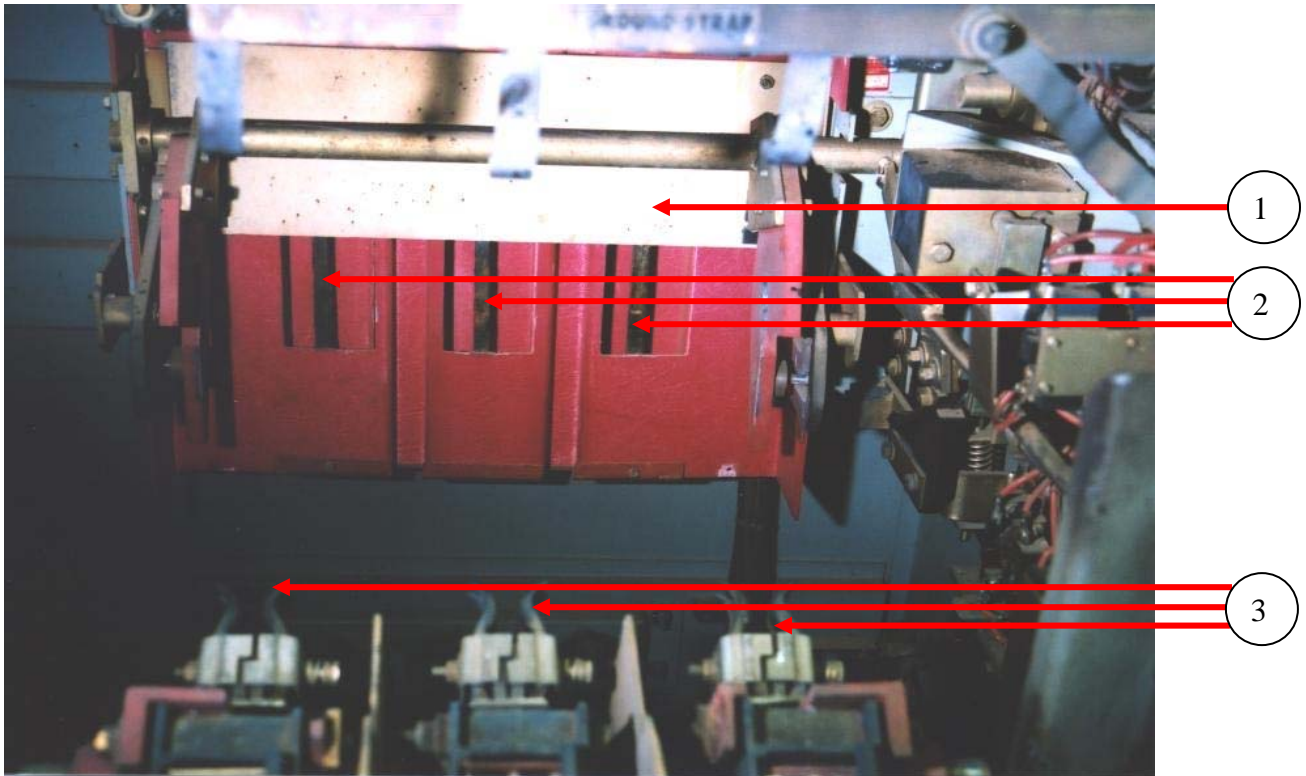


Photograph 4: Shows the high voltage of 4160 volts compartment of the GE Limitamp enclosure.

1. Shows the isolation switch handle in off position.

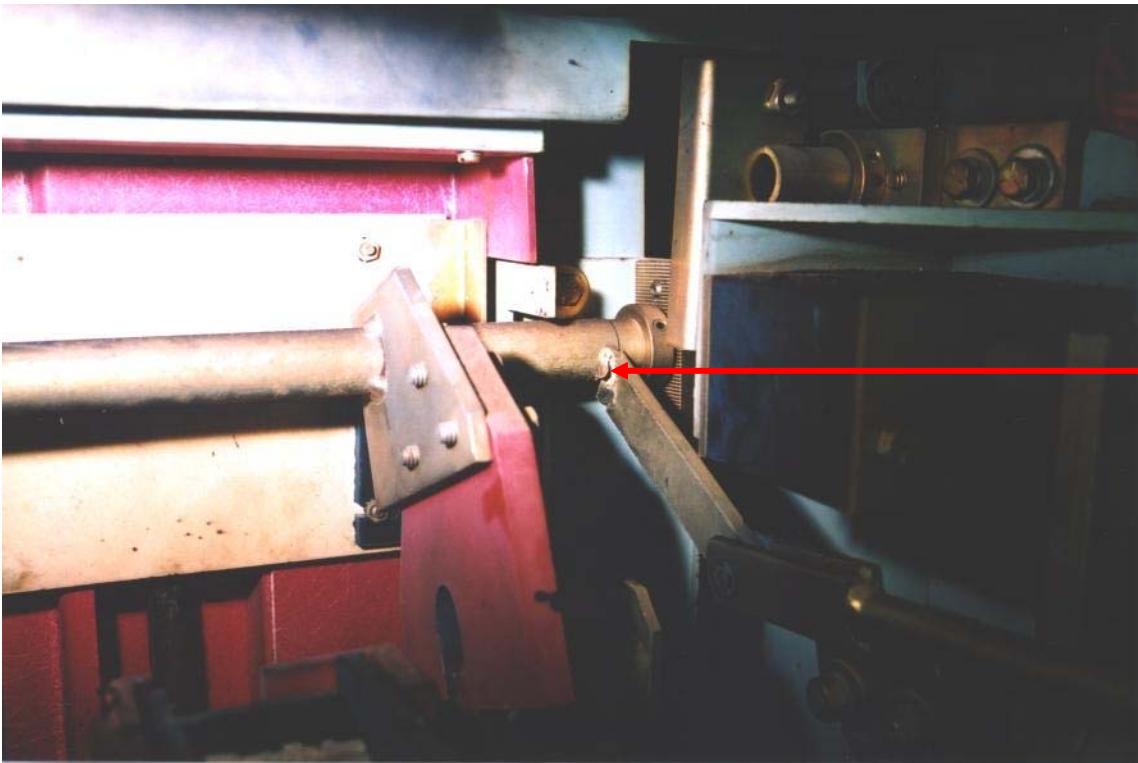


Photograph 5: Shows the inside view of the high voltage of 4160 volts compartment. Arrow shows the high voltage contactor unit inside the compartment.



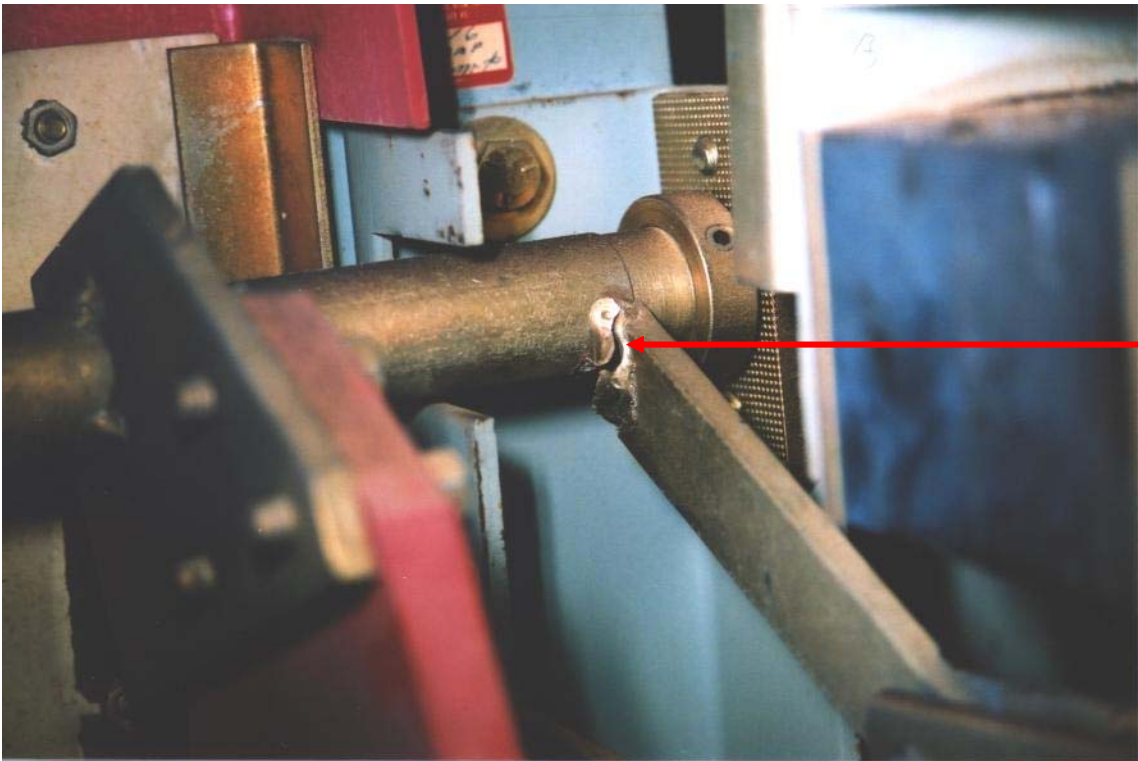
Photograph 6: Shows the bus and the shutter assembly inside the high voltage of 4160 volts compartment at the time of the incident.

1. Shows the shutter in up position
2. Shows the exposed 4160 volt line bus
3. Shows the stabs that were in contact with the line bus

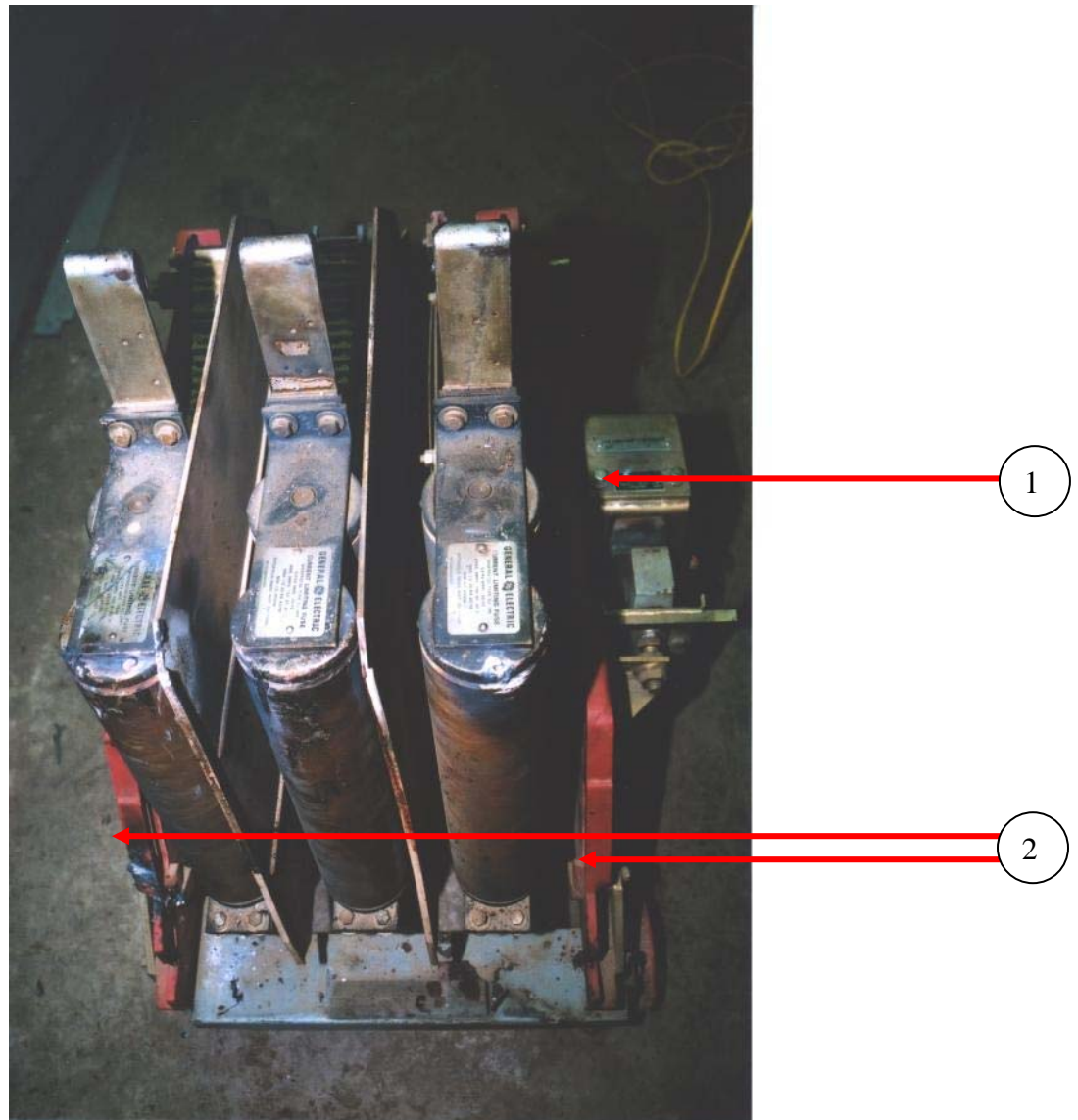


Photograph 7: Shows the control arm assembly

1. Shows the detached weld on the control arm

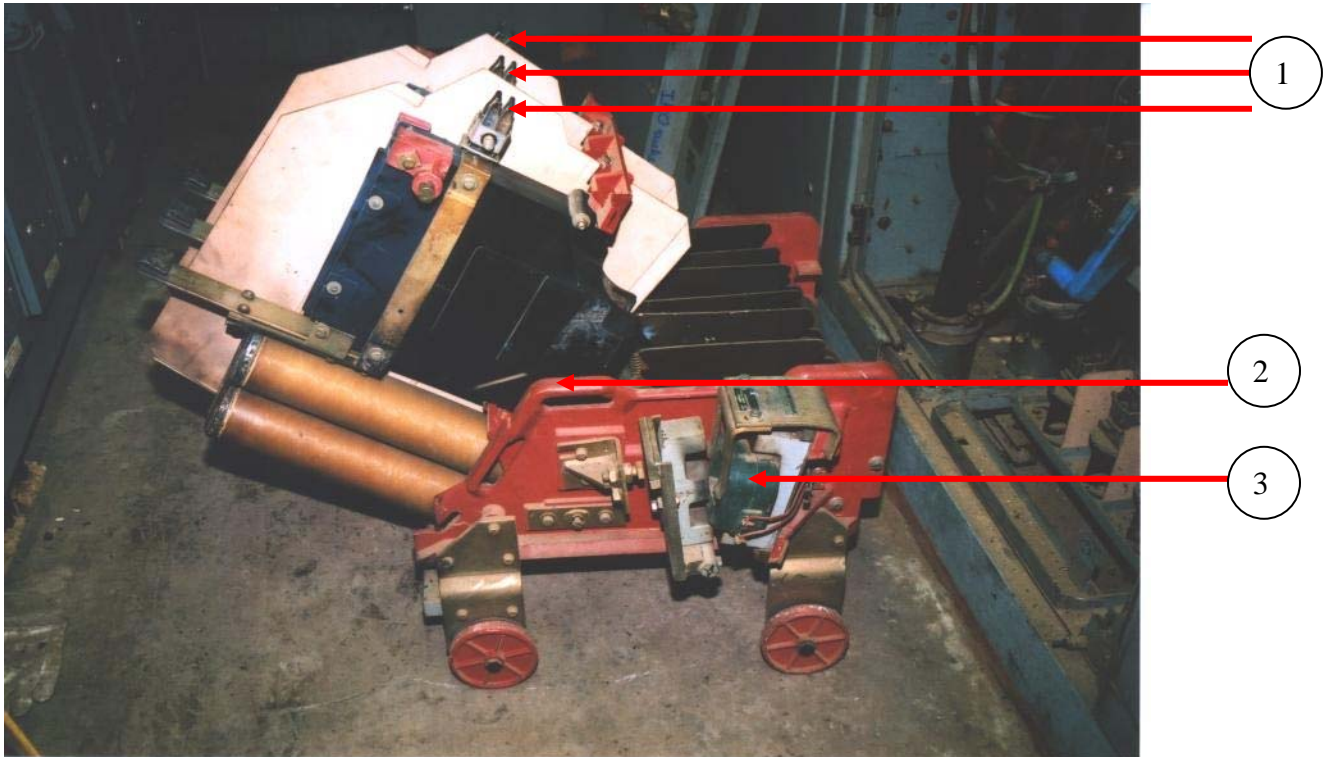


Photograph 8: Shows a close up view of the detached weld on the control arm.



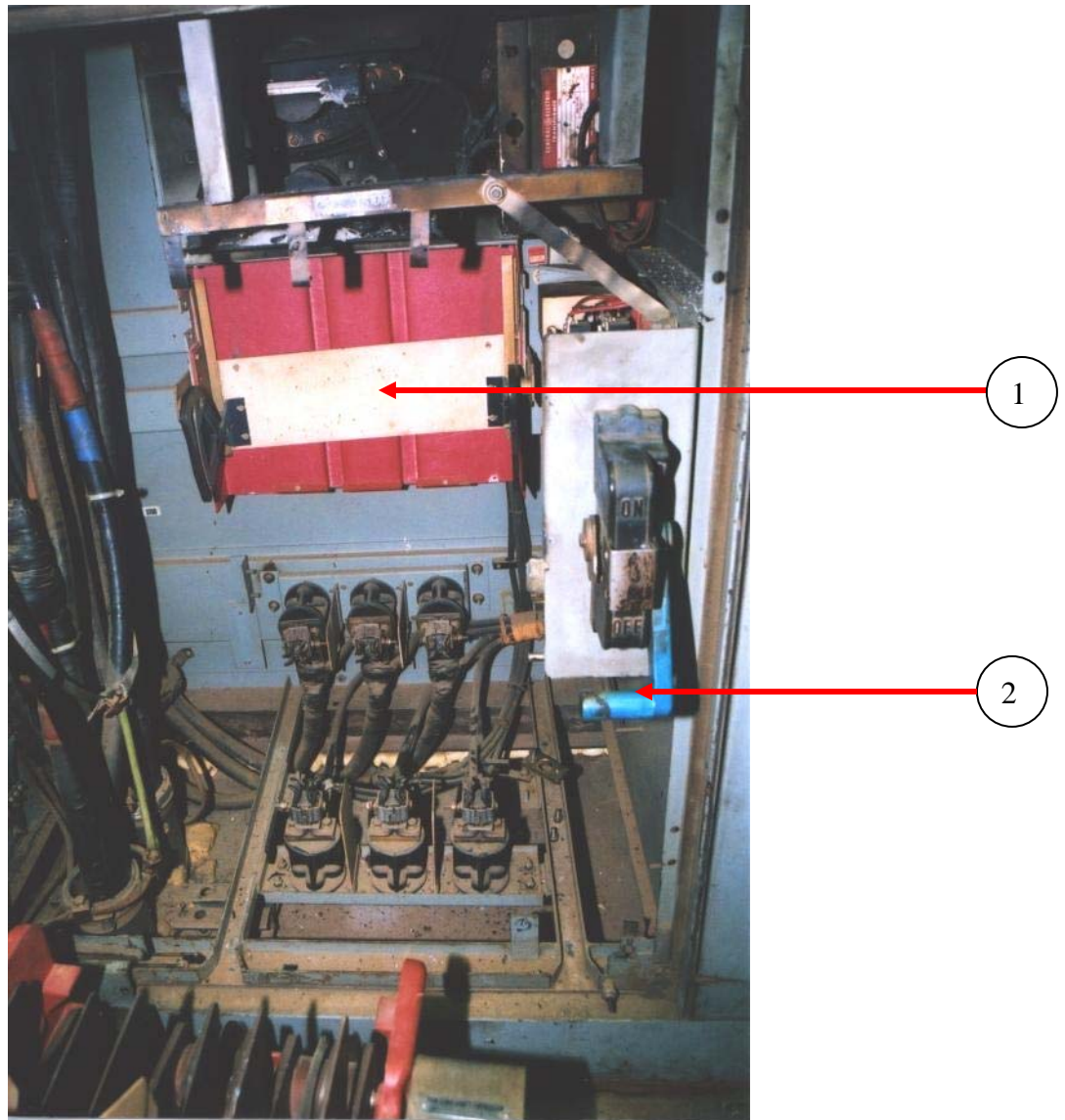
Photograph 9: Shows the high voltage of 4160 volts contactor unit taken out of the enclosure.

1. Shows the magnet coil needed repair.
2. Shows the handles of the high voltage of 4160 volts contactor.



Photograph 10: Shows the high voltage of 4160 volts contactor unit with the disconnect assembly rotated backwards.

1. Shows the stabs that would contact the 4160 volt line bus.
2. Shows the handle of the contactor.
3. Shows the magnet coil.



Photograph 11: Shows the high voltage of 4160 volts compartment without the contactor.

1. Shows the shutter in down position covering the 4160 volt line bus.
2. Shows the isolation switch handle in off position.