COMMONWEALTH OF KENTUCKY

BEFORE THE PUBLIC SERVICE COMMISSION

In the Matter of:

LOUISVILLE GAS AND ELECTRIC COMPANY	)	CASE NO. 2016-00264
ALLEGED FAILURE TO COMPLY WITH KRS 278.042	)	

ORDER

Louisville Gas and Electric Company ("LG&E"), a Kentucky corporation, engages in the distribution of gas and electricity to the public for compensation and is a utility subject to Commission jurisdiction.

KRS 278.042 requires the Commission to ensure that each electric utility constructs and maintains its plant and facilities in accordance with accepted engineering practices as set forth in the Commission's administrative regulations and orders and the most recent edition of the National Electrical Safety Code ("NESC").

KRS 278.030 requires every utility to furnish adequate, efficient and reasonable service. KRS 278.060 permits the Commission, upon its own motion, to investigate any act or practice of a utility that affects or is related to the service of a utility. KRS 278.280(1) further permits the Commission, after conducting such investigation and finding that a practice is unreasonable, unsafe, improper, or inadequate, to determine the reasonable, safe, proper, or adequate practice or methods to be observed and to fix the same by Order.

Pursuant to KRS 278.280(2), which directs the Commission to prescribe rules and regulations for the performance of service by utilities, the Commission has promulgated Administrative Regulation 807 KAR 5:006, Section 25, which requires all utilities to adopt and execute a safety program. 807 KAR 5:006, Section 25(1), requires each utility to establish a safety manual with written guidelines for safe working practices and procedures to be followed by utility employees. Here, LG&E has adopted the LG&E Health and Safety Manual ("LG&E Safety Manual").

Commission Staff submitted to the Commission an Accident Investigation Staff Report dated June 19, 2014 ("Staff Report"), attached hereto as the Appendix. The Staff Report alleges that on March 20, 2014, operators at the Trimble County Generating Station received an alarm that indicated the fly ash slurry pump would not start. Ben Creech, Auxiliary Operator, and Tom Bailey, Assistant Operator, were sent to a building housing a 480-volt circuit breaker serving the fly ash slurry pump to remove and reinstall ("rack") the breaker to clear the alarm on the control panel. According to LG&E, Mr. Creech and Mr. Bailey verbally conducted a job briefing prior to starting the job, but did not document the job briefing in writing. Neither Mr. Creech nor Mr. Bailey stated that they conducted a job briefing in their post-accident statement. Mr. Creech put on personal protective equipment ("PPE") consisting of fire-resistant pants with an arc rating of 12.4 calories ("cal"), a fire-resistant shirt with an arc rating of 8.7 cal, class 2 rubber gloves, and a hood with face shield with an arc rating of 100 cal. Mr. Bailey installed a chain barrier to block the doorway leading to the area, and then moved around the corner to maintain the required safety distance while Mr. Creech worked on the breaker.

Mr. Creech stated that he visually inspected the breaker open/closed indicator, which indicates whether the main contacts are opened or closed, before the breaker was removed and again before it was reinstalled. The breaker should be removed and reinstalled in the open position to prevent an arc flash, or electrical explosion. Mr. Creech stated that the breaker open/closed status indicator displayed open and that he removed the breaker without incident. With the breaker open/close indicator still displaying open, Mr. Creech attempted to reinstall the breaker, but the breaker failed, causing an arc flash that inflicted first- and second-degree burns to his legs. Mr. Bailey, standing around the corner, did not witness the arc flash, but reported hearing an explosion. When Mr. Bailey looked around the corner, he saw Mr. Creech engulfed in flames and smoke. Mr. Creech was transported to University Hospital in Louisville, Kentucky, where he was treated and released from the hospital the same day.

LG&E conducted a failure analysis after the accident occurred. LG&E determined that the internal mechanical interlocks failed to operate correctly, permitting the breaker to be reinstalled in the closed position when it should have been reinstalled in the open position. Additionally, the open/close indicator malfunctioned, failing to indicate that the breaker was in the closed position. LG&E also performed an arc hazard analysis on the 480-volt bus from which the breaker was energized. The arc hazard analysis called for a Category 3 protection level, which would require PPE to have an arc rating of 25 cal.

According to information provided by LG&E, the incident occurred at approximately 10:17 p.m. on March 20, 2014, and was immediately discovered by the utility. LG&E notified Commission Staff of the incident at approximately 12:23 a.m. on

March 21, 2014, approximately two hours after the discovery of the incident. Commission Staff conducted an initial on-site investigation on March 21, 2014, and a follow-up on-site investigation on June 13, 2014. LG&E submitted its written seven-day report to the Commission by mail on March 26, 2014; the Commission received it on March 27, 2014. LG&E included photographs taken as part of its investigation in the seven-day report. Commission Staff prepared the Staff Report on June 19, 2014.

Based on Commission Staff's investigation of the incident as set forth in the Staff Report and the information provided by LG&E in its seven-day summary report ("LG&E Summary Report") (Attachment A to the Staff Report), the Commission Staff alleges that LG&E has violated multiple provisions of the NESC, the LG&E Safety Manual, and KRS 278.042, which requires an electric utility to construct and maintain its plant and facilities in accordance with accepted engineering practices as set forth in the Commission's administrative regulations and Orders and in the most recent edition of the NESC. The Commission finds that *prima facie* evidence exists that LG&E has violated NESC and LG&E Safety Manual provisions, as described below. The three NESC and four LG&E Safety Manual alleged violations can be structured into two areas:

1. Failure to observe proper safety procedures on the job site to ensure the safety of all individuals involved.

   a. NESC, Part 4, Section 42, Rule 420.D – Work Rules for the Operation of Electric Supply and Communications Lines and Equipment – General Rules for Employees – General – Energized or Unknown Conditions – Employees shall consider electric supply equipment and lines to be energized, unless they are positively known to be de-energized. Before starting work, employees shall perform

preliminary inspections or tests to determine existing conditions.[1] Operating voltages of equipment and lines should be known before working on or in the vicinity of energized parts.

b. NESC, Part 4, Section 42, Rule 421.A.6–Work Rules for the Operation of Electric Supply and Communications Lines and Equipment – General Rules for Employees – General Operating Routines – Duties of a First-level Supervisor or Person in Charge. This individual shall conduct a job briefing with the employees involved before beginning each job. A job briefing should include at least the following items: work procedures, personal protective equipment requirements, energy source controls, hazards associated with the job, and special precautions.

c. LG&E Safety Manual, A.3.2.a.,b.,c.,d., and e. – General Rules – Supervisor's Responsibility for Safety – A job briefing/tailgate discussion shall be held prior to starting each job. The job briefing shall include at least the following subjects: a. hazards associated with the job; b. work procedures involved; c. special precautions; d. energy source controls; and e. personal protective equipment requirements.

d. LG&E Safety Manual, B.18.1.b. – General Rules – High- and Low-Voltage Circuits and Equipment – Before beginning work on any electrical system or equipment a voltage test shall be conducted. Note: Always verify proper operation of the testing equipment and its leads.

2. Failure to wear proper personal protective equipment ("PPE").

a. NESC, Part 4, Section 41, Rule 410 – Clothing and clothing systems (cal/cm^2) for voltages 50 V to 1000 V (ac) listed in Table 410-1. For equipment type metal-clad switchgear/motor control centers between 251 V and 600 V, clothing should be rated at 40 calories per square centimeter.

[1] The emphasis here is on the failure to "perform preliminary inspections or tests to determine existing conditions." The nature of the equipment involved and the work being performed would not typically require efforts to confirm the equipment was de-energized.

b. LG&E Safety Manual, A.19.1 – General Rules – Clothing – All employees shall always wear clothing that is suitable for the particular type of work which they are doing.

c. LG&E Safety Manual, A.19.2 – General Rules – Clothing – Employees exposed to the hazards of flames or electrical arcs shall not wear clothing that, when exposed to flames or electric arcs, could increase the extent of injury. Flame-retardant clothing that meets the requirements of either the National Fire Protection Association (NFPA) 70E-2009 standard, or Section 41 of 2007 National Electric Safety Code (NESC), or their most current revision, shall be used. When working on or near live-line parts where the possibility of an electric arc exists, protective clothing with full-length sleeves rolled down and buttoned shall be worn in addition to an electrical safety hat. When work is performed in the vicinity of exposed energized parts of equipment, employees shall remove all exposed conductive articles such as key or watch chains, rings, wristwatches or bands, if such articles increase the hazards associated with inadvertent contact with the energized parts.

Based on its review of the Staff Report and LG&E Summary Report, and being otherwise sufficiently advised, the Commission finds that *prima facie* evidence exists that LG&E has failed to comply with KRS 278.042 and the most recent edition of NESC, and the LG&E Safety Manual. The Commission further finds that a formal investigation into the incident that is the subject matter of the Staff Report should be conducted and that this investigation should also examine the adequacy, safety, and reasonableness of LG&E's practices related to the construction, installation and repair of electric facilities.

The Commission, on its own motion, HEREBY ORDERS that:

1. LG&E shall submit to the Commission a written response to the allegations contained in the Staff Report within 20 days of the date of this Order.

2. LG&E shall appear on October 11, 2016, at 9:00 a.m. Eastern Daylight Time, in Hearing Room 1 of the Commission's offices at 211 Sower Boulevard,

Frankfort, Kentucky, for the purpose of presenting evidence concerning the alleged violations of KRS 278.042, the most recent edition of NESC, and the LG&E Safety Manual, and showing cause why it should not be subject to the penalties prescribed in KRS 278.990(1) for these alleged violations.

3. The October 11, 2016 hearing shall be recorded by videotape only.

4. The Staff Report in the Appendix to this Order is made a part of the record in this case.

5. At the scheduled hearing in this matter, LG&E shall also present evidence on the adequacy, safety, and reasonableness of its practices related to the construction, installation, and repair of electric facilities as they relate to the facts of this case and whether such practices require revision as related to this incident.

6. Any request for an informal conference with Commission Staff to discuss the issues in this case shall be set forth in writing and filed with the Commission within 20 days of the date of this Order.

By the Commission

ENTERED
JUL 29 2016
KENTUCKY PUBLIC
SERVICE COMMISSION

ATTEST:

Aaron D. Greenwell
Executive Director for

APPENDIX

APPENDIX TO AN ORDER OF THE KENTUCKY PUBLIC SERVICE COMMISSION IN CASE NO. 2016-00264 DATED JUL 29 2016

Commonwealth of Kentucky
Public Service Commission
211 Sower Blvd.
P.O. Box 615
Frankfort, Kentucky 40602-0615
Telephone: (502) 564-3940
Fax: (502) 564-3460
psc.ky.gov

ACCIDENT INVESTIGATION STAFF REPORT

Report Date: June 19, 2014

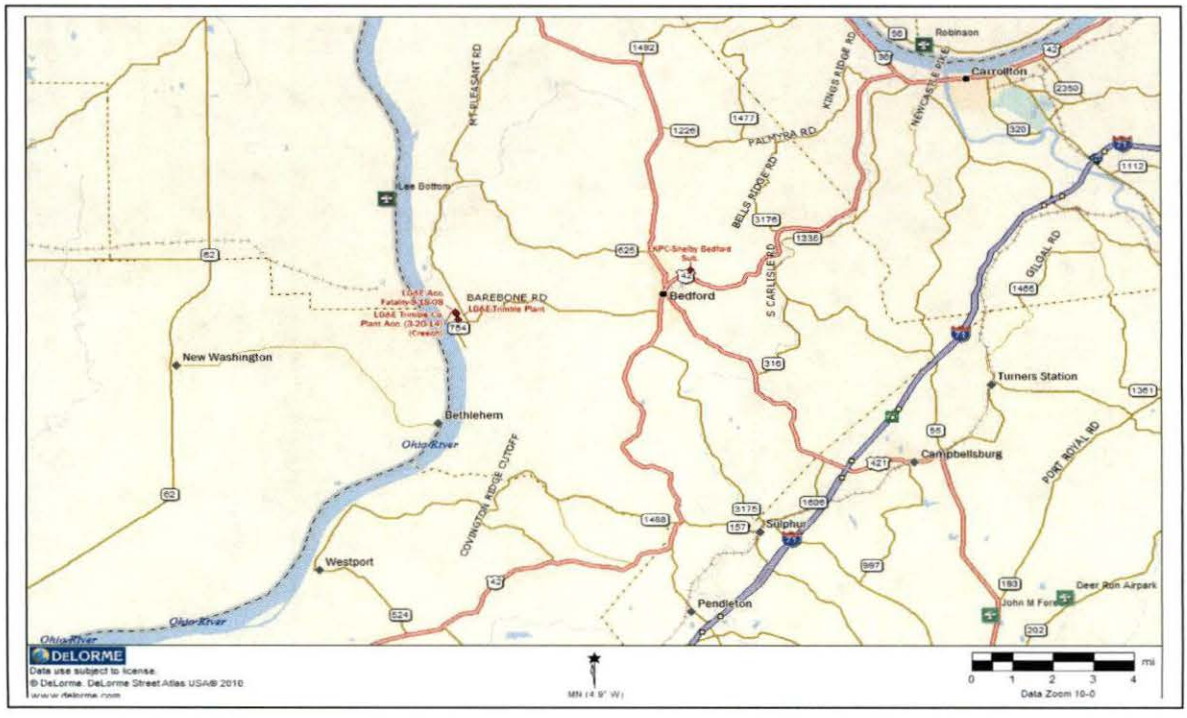
Accident Date: March 20, 2014

Serving Utility: Louisville Gas and Electric (LG&E)

Accident Location: LG&E Trimble County Generating Station
Bedford, Kentucky

Accident Victim: Ben Creech

PSC Investigator: Steve Kingsolver



Utility:	Louisville Gas and Electric (LG&E)
Reported By:	Doug Chin, LG&E / KU Safety Department
Accident Occurred:	Approximately 10:17 PM, March 20, 2014
Utility Discovered:	Approximately 10:17 PM, March 20, 2014
Victim Hospitalized:	Approximately 12:11 AM, March 21, 2014
PSC Notified:	Approximately 12:23 AM, March 21, 2014
Summary Report Received:	March 27, 2014 (Attachment A)
PSC On-Site Investigations:	
Initial Investigation:	Approximately 10:00 AM, March 21, 2014
Follow-Up Investigation:	Approximately 1:30 PM, June 13, 2014

Accident Description:

This accident took place at the Louisville Gas and Electric Trimble County Generating Station, 487 Corn Creek Road, Bedford, Kentucky on March 20, 2014. The victim, Ben Creech, an Auxiliary Operator, was in the process of removing and reinstalling (Racking) a 480 volt breaker. He had removed the breaker and was attempting to reinstall the breaker when the breaker failed causing an arc flash which caused first and second degree burns to the victim's legs. The victim was taken to University Hospital in Louisville, Kentucky. The victim was treated and released the same day. At the time of the accident the victim was wearing a 100 cal hood, fire resistant pants and shirt, and class 2 rubber gloves (20,000 Volt) along with the other required personal protective equipment.

The Louisville Gas and Electric Safety Manual and the National Electrical Safety Code (NESC) stated that a job briefing shall be held prior to starting each job. Louisville Gas and Electric states in their summary report and during the on-site investigations with the Kentucky Public Service Commission (KPSC) that a job briefing was conducted but was not documented.

The breaker the victim was working on at the time of the accident was rated as a 3 phase, 480 volt, 800 amp unit. The NESC Table 410-1 describes this as a Medal-Clad Switchgear / Motor Control Center and has an arc hazard protection level of 40 cal. LG&E performed an arc hazard analysis on the 480 volt bus that this breaker was energized from and the analysis called for a Category 3 Protection Level (25 cal). At the time of this accident the victim was wearing a fire resistant shirt rated at 8.7 cal and fire resistant pants rated at 12.4 cal. (Attachment B)

Louisville Gas and Electric performed a failure analysis after this accident. The analysis determined that the internal mechanical interlocks failed and allowed this breaker to be reinstalled in the closed position. This analysis also determined that the open/closed indicator malfunctioned and failed to

indicate the breaker was in the closed position. When reinstalling the breaker, it should have been in the open position.

During the on-site investigations and after reviewing the information provided on this accident by LG&E, it appears that adequate testing was not performed to determine the existing conditions of the equipment being worked on and indicating devices were solely relied on for existing conditions of the equipment.

The information in this Accident Investigation Report was provided to this investigator by employees of LG&E. The names of these employees will be listed in the body of this report.

See the utility summary report and utility additional information attached to this report for additional information concerning this accident. (See Attachments A and B)

Victim:	**Name:**	**Position:**	**Employer:**
	Been Creech	Auxiliary Operator	LG&E

Witness: (On work Site)	**Name:**	**Position**	**Employer:**
	Tom Baily	Assistant Operator	LG&E

Note: Statements from victim and employee in charge of this work site are part of the Utility Summary Report. (See Attachment A)

Information From:	**Name:**	**Position:**	**Employer:**
	Ken Sheridan	Safety Director	LG&E
	Keith McBride	LG&E Investigator	LG&E
	Doug Chin	Manager Generation Safety	LG&E
	Bryan Baker	Group Leader Engineering	LG&E
	Mike Buckner	Manager Operations	LG&E

Temp & Weather: N/A, Accident took place inside.

FINDINGS:

It is the investigator's opinion that Louisville Gas and Electric did not meet or exceed the following requirements set forth in the National Electrical Safety Code (NESC) and the Louisville Gas and Electric Safety Manual.

RELEVANT CODES, STATUTES, REGULATIONS, OR SAFETY MANUAL ISSUES THAT ARE PERTINENT TO THE INVESTIGATION

278.042 Service adequacy and safety standards for electric utilities National Electrical Safety Code

(1) For the purposes of this section, "NESC" means the National Electrical Safety Code as published by the Institute of Electrical and Electronics Engineers, Inc.
(2) Except as otherwise provided by law, the commission shall, in enforcing service adequacy and safety standards for electric utilities, ensure that each electric utility constructs and maintains its plant and facilities in accordance with accepted engineering practices as set forth in the commission's administrative regulations and orders and in the most recent edition of the NESC.

Effective: June 24, 2003

History: Created 2003 Ky. Acts Ch. 84, sec. 1, Effective June 24, 2003.

2012 National Electric Safety Code:
See 2012 NESC Code to view each rule in its entirety.

#1:
National Electrical Safety Code

Part 4:
Work Rules for the Operation of Electric Supply and Communications Lines and Equipment

Section 42: General rules for employees

420: General

D: Energized or unknown conditions
Employees shall consider electric supply equipment and lines to be energized, unless they are positively known to be de-energized. Before starting work, employees shall perform preliminary inspections or tests to determine existing conditions. Operating voltages of equipment and lines should be known before working on or in the vicinity of energized parts.

#2:
National Electrical Safety Code

Part 4:
Work Rules for the Operation of Electric Supply and Communications Lines and Equipment

Section 41: Supply and communications systems- Rules for employers
410 General requirements

Table 410-I: Clothing and clothing systems (cal/cm2) for voltages 50 V to 1000 V (ac)

Equipment type	Nominal voltage range and cal/cm²		
	50 V to 250 V	251 V to 600 V[15]	601 V to 1000 V
Self-contained meters / cabinets	4[7]	20[1]	30[9]
Pad-mounted transformers	4[5]	4[6]	6[2]
CT meters and control wiring	4[7]	4[6]	6[4]
Metal-clad switchgear / motor control centers	8[7]	40[*]	60[8]
Pedestals / pull boxes / hand holes	4[7]	8[6]	12[9]
Open air (includes lines)	4[7]	4[7]	6[9]
Equipment type	**Nominal voltage range and cal/cm²**		
	50 V to 250 V	**251 V to 600 V[16]**	**601 V to 1000 V**
Network protectors	4[16]	[16]	[16]
Panel boards—single phase (all) / three phase (≤100 A)	4[12]	8[12]	12[13]
Panel boards—three phase (>100 A)	4[12]	[13]	[13]

#3:
National Electrical Safety Code

Part 4:
Work Rules for the Operation of Electric Supply and Communications Lines and Equipment

421: General operating routines

A: Duties of a first-level supervisor or person in charge
This individual shall:

6: Conduct a job briefing with the employees involved before beginning each job. A job briefing should include at least the following items: work procedures, personal protective equipment requirements, energy source controls, hazards associated with the job, and special precautions.

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807 KAR 5:006. General rules.

RELATES TO: KRS 65.810, 74, 96.934, 220.510, 278, 49 C.F.R. Part 192, 49 U.S.C. 60105
STATUTORY AUTHORITY: KRS 278.230, 278.280(2), 49 C.F.R. 192
NECESSITY, FUNCTION, AND CONFORMITY: KRS 278.230(3) requires every utility to file with the commission reports, schedules, and other information that the commission requires. KRS 278.280(2) requires the commission to promulgate an administrative regulation for the performance of a service or the furnishing of a commodity by a utility. This administrative regulation establishes requirements that apply to electric, gas, water, sewage, and telephone utilities.

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807 KAR 5:006 General Rules
Section 25: Safety Program

Section 25: Safety Program: Each utility shall adopt and execute a safety program, appropriate to the size and type of its operations. At a minimum, the safety program shall:
(1) Establish a safety manual with written guidelines for safe working practices and procedures to be followed by utility employees.
(2) Instruct employees in safe methods of performing their work. For electric utilities, this is to include the standards established in 807 KAR 5:041, Section 3.
(3) Instruct employees who, in the course of their work, are subject to the hazard of electrical shock, asphyxiation or drowning, in accepted methods of artificial respiration.

LG&E Safety Manual
(March 20, 2014 Accident) (Victim: Creech)
See LG&E Safety Manual to view each rule in its entirety.

#1:
LG&E Safety Manual

A.3 Supervisors' Responsibility for Safety
A.3.2 A job briefing/tailgate discussion shall be held prior to starting each job. The job briefing shall include at least the following subjects:
a. Hazards associated with the job.
b. Work procedures involved.
c. Special precautions.
d. Energy source controls.
e. Personal Protective Equipment requirements

#2:
LG&E Safety Manual

A.19 Clothing
A.19.1 All employees shall always wear clothing that is suitable for the particular type of work which they are doing.
A.19.2 Employees exposed to the hazards of flames or electrical arcs shall not wear clothing that, when exposed to flames or electric arcs, could increase the extent of injury. Flame-retardant clothing that meets the requirements of either the National Fire Protection Association (NFPA) 70E –2009 standard, or Section 41 of 2007 National Electrical Safety Code (NESC), or their most current revision, shall be used. When working on or near live-line parts where the possibility of an electric arc exists, protective clothing with full-length sleeves rolled down and buttoned shall be worn in addition to an electrical safety hat. When work is performed in the vicinity of exposed energized parts of equipment, employees shall remove all exposed conductive articles such as key or watch chains, rings, wristwatches or bands, if such articles increase the hazards associated with inadvertent contact with the energized parts.

#3:
LG&E Safety Manual

B.18 High- and Low-Voltage Circuits and Equipment
See written Energy Services Electrical Safety Program for:
• Specific PPE requirements for exposure to electrical shock and/or arc flash;
• Energized electrical work permit requirements; and
• Shock and arc flash protective barriers.
B18.1 Before beginning work on any electrical system or equipment:
b. A voltage test shall be conducted. Note: Always verify proper operation of the testing equipment and its leads.

Investigated By:	Name:	Company:
	Steve Kingsolver	KPSC

Signed: Steve Kingsolver

Date: 6-19-14

Attachments:

A. Utility Summary Report
B. Utility Additional Information
C. KPSC Photographs of Accident Site
D. KPSC Map of Accident Site
E. KPSC Notification

Attachment A

Utility Summary Report

Engineering - Bowman

PPL companies

RECEIVED

MAR 27 2014

PUBLIC SERVICE COMMISSION

LG&E and KU Energy, LLC
Corporate Law
220 W. Main Street
Louisville, Kentucky 40202
www.lge-ku.com

Jay Warren
Senior Corporate Attorney
T 502-627-3203
F 502-627-3367
Jay.Warren@lge-ku.com

March 26, 2014

Mr. Eric Bowman
Kentucky Public Service Commission
211 Sower Blvd.
P.O. Box 615
Frankfort, KY 40602

Re: Report #14-ES-E-009

Dear Mr. Bowman:

I am forwarding the enclosed Investigation Report prepared by Keith McBride regarding the injury of LG&E employee Ben Creech that occurred in Trimble County, Kentucky on Thursday, March 20, 2014. Louisville Gas & Electric Company is providing this report to the KPSC in accordance with the applicable seven-day reporting requirement. Please return a file stamped copy of the report in the envelope provided.

Should you need additional information concerning this incident, please contact me at (502) 627-3203.

Sincerely,

Jay Warren

Enclosures

KPSC INVESTIGATION REPORT

Employee Received Burns
Type of Report

14-ES-E-009
Report Number

McBride
Investigator

March 20, 2014
Date of Incident

Location: **LG&E Trimble County Generating Station**
487 Corn Creek Road
Bedford, Kentucky 40006 / Trimble County

Incident Summary

On March 20, 2014 at approximately 10:17 P.M. an Auxiliary Operator at the Trimble County Generating Station was attempting to rack a 480 volt breaker back into place when the breaker failed resulting in an arc flash.

The Auxiliary Operator received burns to the lower legs. The Auxiliary Operator was transported to University Hospital in Louisville, Kentucky where he was treated for minor burns and released that same night. The Auxiliary Operator was released to return to work with restrictions.

Doug Chin, Manager Generation Safety LG&E-KU, notified the Kentucky Public Service Commission of the incident and subsequent medical treatment.

Incident Investigation

On March 20, 2014 the Operators at the Trimble County Generating Station were unable to start the 0A fly ash slurry pump and received an alarm on the control panel indicating same.

Ben Creech, Auxiliary Operator, and Tom Baily, Assistant Operator, were sent to the building housing the 480 volt breaker serving the pump to rack out (remove) the breaker from its operating position and then immediately rack in (re-insert) the breaker to its operating position to clear the alarm on the control panel.

While Mr. Creech was putting on his PPE, which included his FR shirts and pants, leather work gloves and a 100 calorie hood with face shield, Mr. Baily was installing a chain barrier leading to the inside of the breaker room.

Once Mr. Creech started the operation, Mr. Baily moved around the corner to maintain the required safety distance while Mr. Creech was working on the breaker.

Mr. Creech racked the breaker out with no issues. At approximately 10:17 P.M. while Mr. Creech was attempting to rack the 480 volt breaker back into place, the breaker failed resulting in an arc flash.

The Trimble County Emergency Response Team (ERT) was immediately called to the scene. The plant ERT personnel stabilized Mr. Creech and transported him to University Hospital in Louisville, Kentucky.

Mr. Creech was treated for minor first and second degree burns to his lower legs. Mr. Creech was released a couple of hours later.

A job briefing was conducted verbally between Mr. Creech and Mr. Baily but was not documented due to the simple and routine nature of the work being performed.

A failure analysis determined that internal mechanical interlocks failed to operate correctly which enabled the breaker to be racked to a connected position while closed. In addition, the open/close indicator malfunctioned and failed to indicate the closed position of the breaker.

Ben Creech – Auxiliary Operator – Injured
DOB – 02/27/1991
Hire date – 10/01/2012

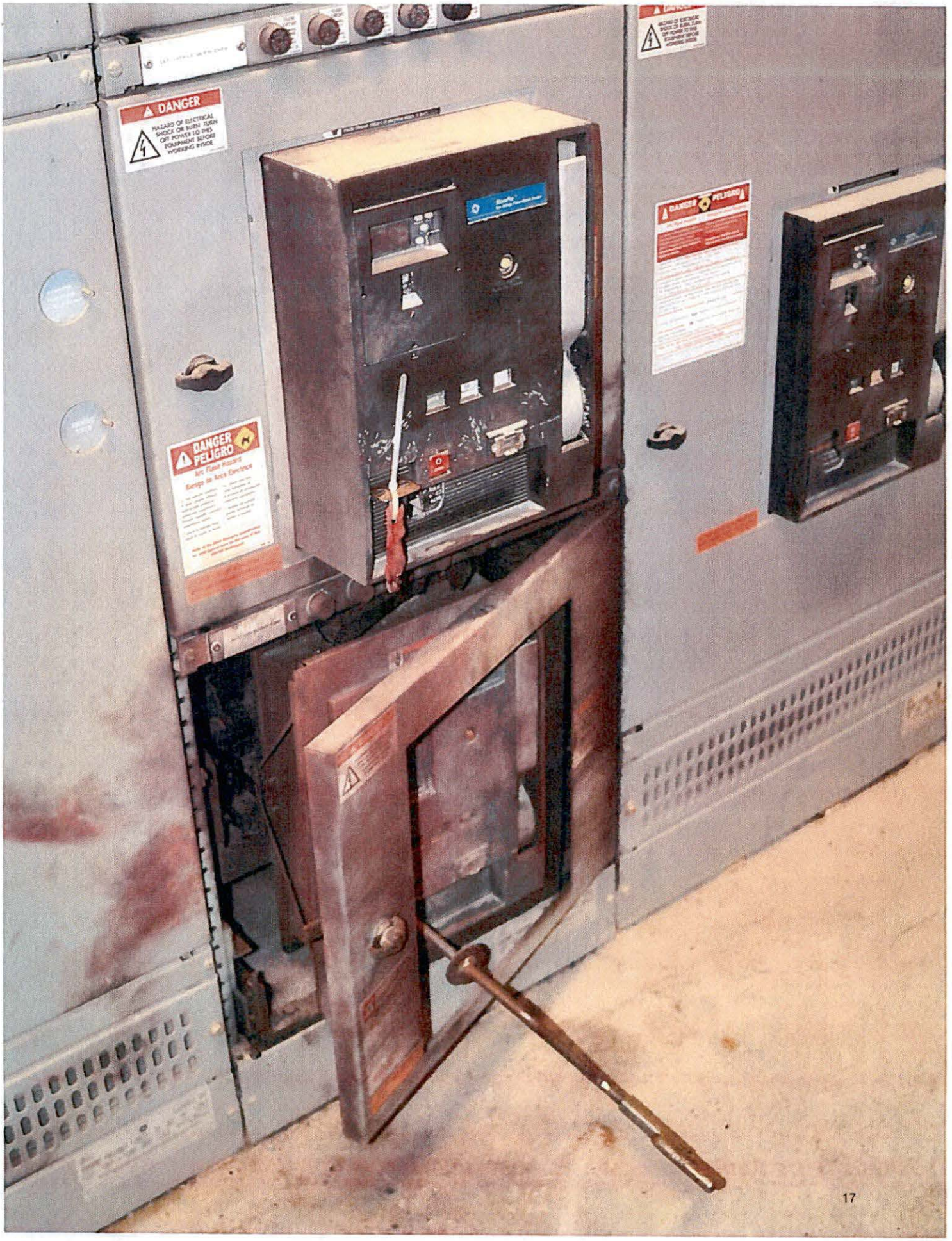
Tom Baily – Assistant Operator - Co-worker – not an eye witness

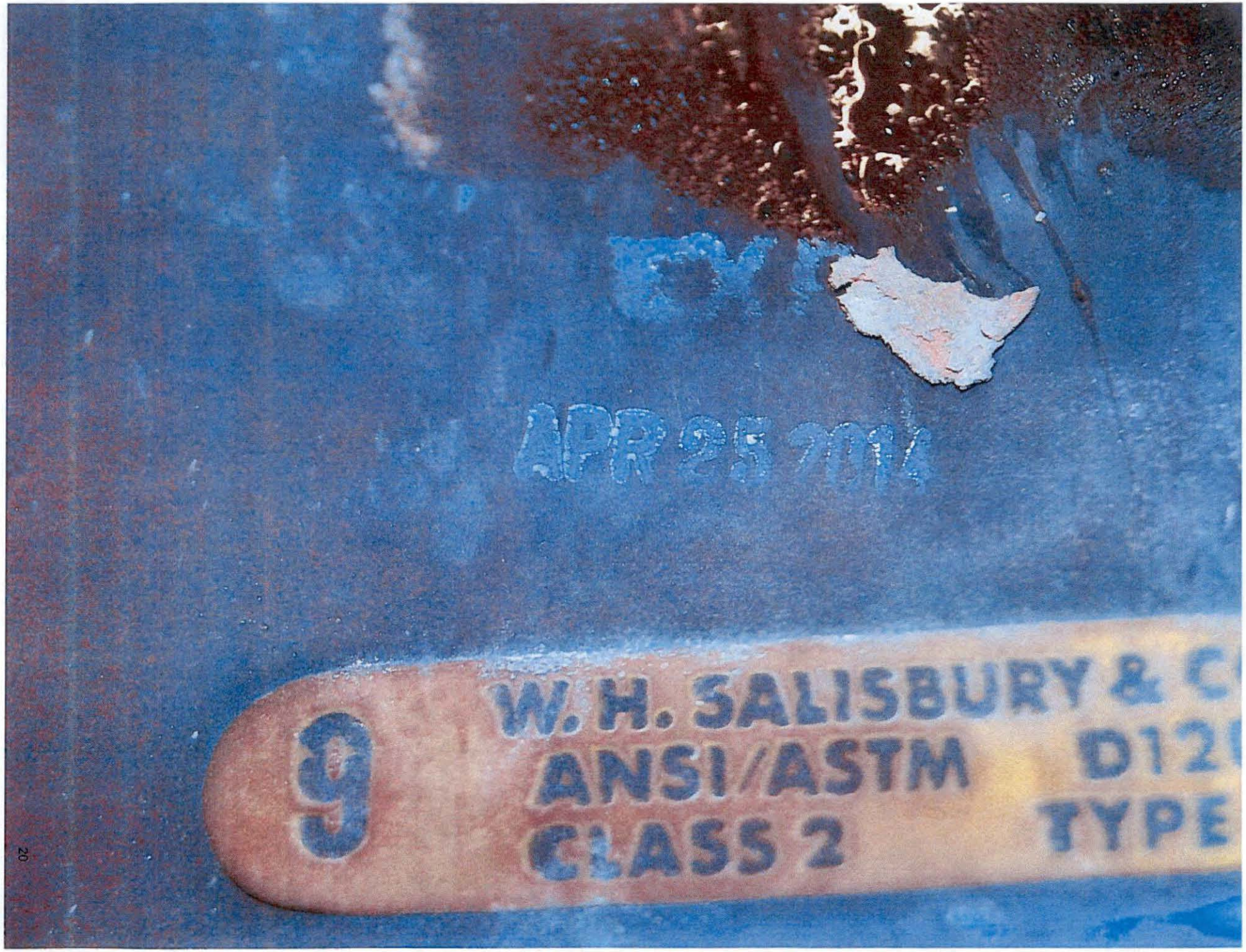
DATE OF REPORT: March 26, 2014
END OF REPORT


DANGER
DANGER
DANGER


B Creech


30XUF
STYLE GP0298
6025NV
COLOR NAVY
71-12
ASSEMBLED IN
OF USA FABRIC
READ WARNING
LABEL BEFORE
WEARING OR WASHING
RN # 40005
ATPV 12.4
ULTRA
DO NOT REMOVE THIS LABEL


DANGER
HAZARD OF ELECTRICAL SHOCK OR BURN. TURN OFF POWER TO EMS EQUIPMENT BEFORE WORKING INSIDE.
DANGER PELIGRO
Arc Flash Hazard
Riesgo de Arco Electrico
DANGER PELIGRO


APR 25 2014
9
W. H. SALISBURY &
ANSI/ASTM D12
CLASS 2 TYPE

On Thursday, 3/20/14 (unknown time), I was asked by Billy Ginn to rack in and out the OA, OB fly ash slurry pump 480V breakers. Yellow tags were placed on both pumps from DCS. After pacing the yellow tags, on, Tom Bailey and I went to the fly ash silo to perform the switching.

First, I looked at the OB slurry pump breaker. The breaker was open and the springs charged. I racked the breaker out, the springs discharged. With the springs discharged and the breaker open, I racked It back in normally. I then moved to the OA slurry pump breaker. The breaker showed open and springs charged. I racked out the breaker and the springs discharged and the breaker showed open. With the springs discharged and the breaker open,, I started to rack the breaker in. I remember seeing the test position roll around on the indication strip. After seeing the test position, I saw an orange fireball. After that I remember being on my back down by the door with my pants down. I do not remember how I got there. ERT responded and transported me to the University of Louisville emergency room. I do not remember the details between the blast and the hospital.

LG&E KU

After Bill Ginn ask Ben Creech and myself to Check breakers on 0A & 0B Flyash Slurry pumps. Ben went to DCS, ask Josh Barnes to put yellow tags on both Flyash Slurry pumps. Ben gather his switchgear equipment, and we went out to the Flyash Building, on 2nd landi to switchgear room. It was about 22:15 PM, I have look at my pager on the way out. When we arrive, Ben and I both look & inspected the breakers to make suve they was not trip. They were not tripped and they were in the open position, charging Springs charg Ben put his switchgear equipment on, Hood and Class 2 gloves. He had on the required uniform. I step around corner to hang red chain across door way. Ben racked the First breaker out, I could hear the charging spring discharge, then heard the charging spring motor charged the springs. A few seconds pass and then I heard the 2nd breaker charging springs discharge. I then heard the 2nd breaker charging spring motor charging the springs. A few second pass an I heard a explosion. I look around corner and I saw Ben engulf in a ball of flame and smoke.

3/21/2014

LG&E KU

Ben jump away from the breaker and ran toward me, yelling he was burning up. Ben ran past me trying to remove his pants. I was trying to get Ben to calm down to make sure he was O.K. I called Control Room and told operator we need ERT out here, we had a man hurt. The breaker had blown up on Ben. Ben was lying on floor and I seen that his legs were burnt. A few minutes past and ERT had arrive on the scene and had taken control of the scene. Ben was treated for his burns & placed on back board. Ben was carried to the ambulance and transported to the hospital.

Tom Bailey

Attachment B

Utility Additional Information

LG&E KU

PPL companies

Kentucky Utilities Company
Legal Department
220 W. Main St.
Louisville, Kentucky 40202
www.lge-ku.com

Kelly Hollis
Paralegal
T 502-627-3409
F 502-627-3367
Kelly.Hollis@lge-ku.com

April 21, 2014

Mr. Steve Kingsolver
Kentucky Public Service Commission
211 Sower Blvd.
PO Box 615
Frankfort, KY 40601

Re: Employee Injury
Incident Date: March 20, 2014
Report Number: 14-ES-E-009

Dear Mr. Bowman:

As requested, enclosed for your review and file are copies of the following:

- Electrical Safe Work Practices for Power Production;
- Explanation of job process; and
- Written statement of co-worker Tom Bailey

The written statement of Ben Creech will be provided upon his return to work. If you need additional information concerning this incident, please contact me at (502) 627-3203.

Sincerely,

Kelly Hollis

Kelly Hollis

Enclosures

LG&E KU
Power Production

Electrical Safe Work Practices
Employee Training

Initial Training

INDEX
Electrical Safe Work Practices
For Qualified Employees

Electrical Safe Work Practices

For Qualified Employees

Introduction

This training is drawn from the consensuses requirements of NFPA 70E, KOSHA 1910.269, and 1910 Subpart S. All three are contained in this training because these three standards are inter-related. The three, together, provide overarching protective procedures, personal protective equipment requirements, and equipment access restrictions for all personnel at our facilities with a focus on, but not limited to, those performing electrical work with the potential of shock or arc flash exposures.

Scope and Responsibility

This training is applicable to all LG&E KU Power Production personnel who perform work on or near exposed energized electrical conductors or circuit parts for which there may be a potential exposure to an electrical shock/arc flash.

All employees are responsible for ensuring compliance with this program.

Management is responsible for:

a) Providing resources necessary for the implementation of the program.
b) Providing necessary support to ensure employees complete training and qualification as required.
c) Ensuring compliance with each element of the written program and training requirements.

Supervisors/Leaders/Chiefs/Contract Proponents are responsible to ensure that:

a) Authorized employees have been trained and qualified and understand the hazards of the work.
b) Authorized employees conduct their work in accordance with established work procedures.
c) Routine inspections are conducted for the purpose of identifying employee non-compliance with the written program and the required safe work practices.
d) Audits are conducted to determine the level of overall program compliance. (See section detailing Audits and Inspections)
e) Contractors are advised of our electrical work requirements. The Supervisor, Engineer, Planner, or Contracts Coordinator responsible for a contractor's work shall ensure that a copy of LG&E KU Power Production Electrical Safe Work Practices Job Task Identification tables are provided to the contractor.

Health & Safety personnel are responsible for:

a) Assisting management in ensuring compliance with the written program.
b) Conducting routine inspections for identifying employee non-compliance with the written program and the required safe work practices.
c) Conducting audits to determine level of overall program compliance. (See section detailing Audits and Inspections)

d) Working with the Energy Services Health and Safety Coordinator to complete any additional "Job Task Assessments" and category assignment identified at their facility. (See appendix F as a primary example)
e) Electrical Safety Work Practices Training

Training and Competencies

All employees must receive training on the specific electrical hazards to which they are exposed. In addition, employees involved in LOTO procedures must be trained and qualified.

Level of Training

In general, the level of training provided must be adequate for the tasks involved in order to insure that work is performed in a safe manner:

"Qualified" employees shall be trained and knowledgeable of the construction and operation of the equipment and the hazards involved.

Non-Qualified employees shall be trained in any safety-related practices necessary to ensure their safety, but are not authorized to work on or near energized parts.

Qualified Employees shall be trained and competent in:

a) the skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment.
b) the skills and techniques necessary to determine the nominal voltage of exposed live parts.
c) the minimum approach distances specified in this section, corresponding to the voltages to which the qualified employee will be exposed, and
d) the proper use of the special precautionary techniques , personal protective equipment, insulating and shielding materials, and insulated tools for working on or near exposed energized parts of electrical equipment.

The Employer shall determine that each employee is complying with the safety-related work practices required here-in through:

a) regular Supervision, **and**
b) inspections conducted at least annually.

Employees shall receive this training annually and shall receive additional training if:
a) either supervision or inspections identify a deficiency.
b) new technology or equipment is applied or if procedures are changed.
c) the employee must apply safety related work practices not normally used during his/her regular job duties.

Employees performing safety - related tasks less than once a year should be retrained before performance of work.

This Training shall be either:

a) of class room type, or
b) on the Job

The training shall:
Establish the employee's proficiency in the required work practices.
The employer shall certify that the employees have received this training when the employees demonstrate the required proficiencies. This shall be accomplished under the direct supervision of a qualified person. Employees are required to maintain these proficiencies for the duration of employment.

Records of this training shall be maintained on each qualified employee.

Job Briefings

Job Briefings shall be conducted before the start of each job.

The manager of each work group shall determine how job briefings are to be conducted and / or documented.

The extent of the job briefing

If the employees involved, by virtue of experience and training can reasonably be expected to recognize and avoid hazards associated with a job, a brief discussion is satisfactory.

Job briefing **must always** touch on at least:

a) The hazards associated with the job.
b) Work Procedures.
c) Special precautions. (e.g. engineering controls)
d) Energy source controls (Lockout / Tagout procedures)
e) Personal protective equipment requirements
f) Information on any required Electrical Work Permit

A more extensive discussion shall be conducted if:

a) The work is complicated or particularly hazardous, or
b) Any employee cannot be expected to recognize and avoid the hazards associated with the job.

An additional Job Briefing shall be held if significant changes, which might affect the safety of the employees, occur during the course of the work.

De-energizing (Lockout/Tagout)

It is the policy of LG&E KU Power Production that, prior to conducting any electrical work, such **equipment shall be de-energized unless specific requirements of the program are met.** De-energizing shall be in accordance with the applicable Lockout/Tagout policies and procedures.

Live electrical parts (energized at greater than 50 volts) to which an employee may be exposed shall be put into an "electrically safe work condition" (see this definition in appendix G), applying energy isolation procedures (Locked or Tagged) before performing work, unless de-energizing: (1910.333 &/or NFPA 70 E)

a) Introduces additional or increased hazards OR
b) Is not feasible due to equipment design OR
c) Is not feasible due to operational limitations.

Energized parts that operate at less than 50 volts to ground are not required to be de-energized if there will be no increased exposure to electrical burns or to explosion due to electric arcs.

Work on 120/220 volt plug cord connected electric equipment, for which exposure to the hazards of unexpected energization or startup can be controlled by unplugging the equipment from the energy source does not require lockout, as long as the plug is under the exclusive control of the employee performing such work (line of sight). If line of sight / exclusive control is not maintained, then LOTO procedural requirements apply.

Line of sight / Exclusive control provisions do not apply to work on:

a) Motor control centers (MCC's)
b) MCC related motor control circuits
c) Switchgear or related controls
d) Any circuits energized at greater than 50 volts that are not 120/220 volt plug cord connected devices

Energized Electrical Work Permit

If exposed live electrical parts are not placed in an electrically safe work condition, work to be performed, such as installing or moving energized conductors, shall be considered energized electrical work and shall be performed by written permit only.
Refer to Appendix A for the "Energized Electrical Work Permit."

Work performed on or near live parts by qualified employees related to tasks such as testing, troubleshooting, voltage measuring, and operational switching for lockout/tagout may be performed without an "Energized Electrical Work Permit", provided appropriate safe work practices and PPE are provided and used.

Refer to Appendix C for specific PPE and procedural requirements. If energized conductors must be moved (i.e. lifting wire) then an "Energized Electrical Work Permit" is required. (Appendix A),

Where situations exist for which electrical equipment cannot be worked de-energized, the following electrical safe work practices shall be included:

- Provide protection to the employee(s) engaged in electrical work.
- Identify appropriate control measures and/or work practices for the protection of the employee(s).

- Require proper PPE for the level of potential exposure.
- Comply with applicable Occupational Safety and Health Administration (OSHA), National Fire Protection Association (NFPA) 70 & 70E, Institute of Electrical and Electronics Engineers (IEEE) regulations.

Boundaries and Physical Barriers for Exposed Live Parts and Arc Flash

Safety related conditions associated with work on or near electric lines or equipment shall be determined "Before" work is initiated. Such conditions may include, but are not limited to:

a) Electric Shock / Shock Hazard Analysis

Prior to approaching (moving within required boundary, barrier and/or clearance distance limits) exposed electrical equipment, employees shall determine the voltage to which they will be exposed. This includes the following:

- The voltage level of lines and equipment
- Maximum switching transient voltages
- The presence of hazardous induced voltages
- The presence and condition of protective grounds and grounding conductors.
- Environmental conditions relative to safety (e.g.: wet locations, rain, dew, etc)
- The location of circuits and equipment including power and communications lines and fire protective signaling circuits.

The voltage level shall determine the required electrical PPE necessary to minimize the possibility of electric shock. Refer to the equipment specific label for the arc flash and PPE appropriate for your job. You may also refer to the Electrical Safety Requirements / Job Task Identification in Appendix C for the specific electrical protective equipment required for each job to be completed. The equipment specific label shall take precedence over the tables. If your electrical job task is not identified within the table or you believe that a deviation from an existing requirement is needed you must submit a **Procedural Deviation Request and Documentation Form** (Appendix F) and receive approval before proceeding. The supervisor, leader or "chief electrician" must contact the facility Health and Safety Specialist who will ensure that a job task analysis is completed for the task and is included in the table for all of LG&E KU Power Production.

b) Shock and Arc Flash Protective Boundaries, Physical Barriers, and Alerting Techniques

In order to protect all employees from electrical shock and arc flash hazards when there is exposed electrical equipment, Qualified employees shall set up and enforce a physical boundary around the perimeter of the exposure area. This boundary shall be a minimum of 4 feet from any energized conductor(s) when the exposed voltages are between 50 and 240 volts. These boundaries apply to all category 1 work on the tables in Appendix C. The qualified employee shall ensure that no Qualified or unqualified person shall inadvertently enter the barriered area and expose themselves or cause the exposure of the Qualified person performing the task. When the voltage is in excess of 240 volts, a physical boundary is again

required and shall be no less than 10 feet from any energized conductor(s). This is all category 2 and greater work on the tables in appendix C. Unqualified persons shall not be permitted to enter this space unless the electric equipment is in an electrically safe work condition.
If the equipment specific label requires a greater distance, then the label shall hold precedence over the tables. The information on the label represents necessary changes in the requirements as a result of arc flash analysis calculations for that specific piece of equipment.

In regard to the electrical exposures, no Qualified person shall move any closer than the required barrier, nor shall they take any conductive object closer to exposed live parts operating at 50 volts or more than the required boundary, unless one of the following apply:

- The Qualified employee is insulated or guarded from the live parts operating at 50 volts or more. (See Appendix C)
- The live part operating at 50 volts or more is insulated from the Qualified employee and from any other conductive object.

These electrical protective techniques, barriers and PPE do not mitigate the requirements for ARC Flash protective equipment.

Alerting Technique Requirements

- Safety signs/labels shall be used to warn employees about electrical hazards that might endanger them.

and

- Barricades shall be erected to prevent or limit employee access to work areas containing live parts. Red barrier tape or rope shall be used imprinted with the wording: "Danger, High Voltage, Keep Out". Conductive barricades shall not be used where it might cause an electrical hazard.

If signs and barricades do not provide sufficient warning and protection from electrical hazards, an attendant shall be stationed to warn and protect employees.

c) Arc Flash

Refer to the Electrical Safety Requirements / Job Task Identification in Appendix C for the specific arc flash protective equipment required for each job to be completed. The equipment specific label shall hold precedence over the tables.

Where there is a need for an employee not "qualified" to cross the 10 foot protective boundary, a qualified employee shall advise them of the possible hazards and continuously escort the employee while inside the boundary.

Working On Or Near Exposed Energized Parts

a) General. Employees conducting electrical work tasks on energized electrical equipment shall wear protective clothing and other protective equipment in accordance with the appropriate Hazard Risk Category.
b) Head Protection. Employees shall wear nonconductive head protection wherever there is a danger of head injury from electric shock or burns due to contact with live parts or from flying objects resulting from an electrical explosion. An arc rated balaclava shall be used on all category 2 or greater work where a 40 cal. Hood is not required or optionally used. The arc rate balaclava shall always be used with an arc rated face shield and chin guard.
c) Eye & Face Protection. Employees shall wear protective equipment for the eyes and face (arc rated face shields require a chin guard) whenever there is danger of injury from electric arcs, flashes, or from flying objects resulting from an electrical explosion.
d) Hand and Arm Protection. Employees shall wear Class 0 rubber insulating electrical gloves with protectors for electrical exposures at 50 to 600 volts (inclusive). Class 2 rubber insulating electrical gloves with protectors and sleeves are required for voltage levels above 600 volts, where there is danger of hand and arm injury from electric shock due to contact with live parts. Hand and arm protection shall be worn where there is possible exposure to arc flash burn.
e) Foot and Leg Protection. EH rated protective footwear is recommended for electrical work. FR leggings shall be worn during category 4 work where a 40 calorie jacket/coat is worn. (Unless 40 calorie pants/coveralls are worn)
f) **Only Qualified employees** may work with potential exposures to parts, lines, or energized equipment operating at 50 volts or more.
g) **Only Qualified employees** may work in areas containing unguarded, uninsulated lines, parts, or equipment operating at 50 volts or more.
h) A minimum of two employees shall be used in situations where exposures to energized lines or components exist at more than 600 volts.
i) At 600 volts or more supervision, leadership, and employees shall ensure that:
   - Employees work in a safe position (can't slip or fall into danger).
   - Employees shall not wear rings, watches, chains, bracelets, bands etc. or they shall be rendered non-conductive.

j) When operating any disconnect, energized at greater than 1KV, where the disconnect is within 8 feet of the employee, this shall be considered as category 4 work. If the disconnect is located greater than 8 feet from the employee this shall be considered as category 2 work. Refer to the tables in appendix C.

Note:
Clothing made of acetate, nylon, polyester, rayon, or spandex (either alone or in blends) shall not be worn while working on the plant site unless it has been demonstrated that the fabric has been treated to withstand the conditions that may be encountered and is approved by management. While the switching smocks, jackets, hoods, leggings, and more will protect employees while performing certain activities, there are numerous other job tasks where employees have potential

exposures to open flames. Employees wearing clothing made of anything other than 100% natural fibers (cotton, wool, or silk) would most likely increase the extent of injury or burns if exposures did occur. Reference section A 19 of the E.ON U.S Health and Safety manual as well as 1910.269

Qualified employees shall be made aware that the flames and arcs associated with these types of equipment are extremely hazardous and can cause serious injuries (including severe burns), loss of limbs and/or death.

Safe Work Practices

For jobs involving conductors energized at greater than 50 volts, employees shall:

a) ensure that all of their PPE, tools and equipment are inspected before each use and that they are in good working order. The equipment shall not be used if a defect is identified.
b) stand clear of ground. (Not leaning against cabinets, doors or other conductive surfaces.) When cabinet doors will not stay open on their own and stand clear of the employee performing electrical work with exposures at greater than 50 volts an approved "preventer" shall be applied to the door to hold it clear of the employee. This may take the form of a functional door stop at ground level or a clamp applied to the door such as the device shown below on the right.

The clamp on the right is all plastic except for the spring and hinge pin.
Open the MCC door or other cabinet door that will not stay clear of the employee. Clamp this over the top or bottom edge of the door and slide it, on the door, toward the cabinet facing until it makes contact with the facing of the cabinet itself. The clamp will keep the door from swinging into the employee.

c) not kneel or sit unless the surfaces are barriered by electrical protective goods or equipment.
d) ensure that they are not standing in or on wet surfaces.
e) ensure their work boots are clean and dry. (4 buckle overshoes may be used to accomplish this requirement.)
f) stand, stoop, and / or crank from the hinged side of the door when there is a door protecting the employee from possible flash blasts. This is done so that if the door is blown open the employee shall not be in the path of the electrical plasma and debris from the blast.
g) meet all requirements from appendix C for their specific job.
h) contact their supervisor, leader or health & safety specialist before proceeding if there is any doubt about any interpretation.

Other Protective Equipment

a) Insulated Tools and Equipment: Employees shall use insulated tools and/or handling equipment when working inside the protective boundary of exposed live parts where tools or handling equipment could make accidental contact. Insulated tools shall be protected from damage to the insulating material.

b) Requirements for Insulated Tools:
- Insulated tools shall be rated for the voltages on which they are used, and regularly maintained.
- Insulated tools shall be designed and constructed for the environment to which they are exposed and the manner in which they are used.
- Fuse or fuse holder handling equipment, insulated for the circuit voltage, shall be used to remove or install a fuse if the fuse terminals are energized.

Live Line Tools

These tools shall be:
- Wiped clean before use.
- Visually inspected for defects before each use.
- Removed from service immediately if any defect is found.
- Examined, repaired and tested before returning to service by a competent person.
- Removed from service per manufacturer's specifications to be cleaned, inspected, tested, and repaired as needed.
- Only Qualified Persons shall perform tasks such as testing, troubleshooting, and voltage measuring of energized electrical conductors or circuit parts operating at 50 volts or more or where an electrical hazard exists.

Ladders

The use of ladders shall be governed by the LG&E KU Health and Safety Manual. Specific issues pertaining to portable ladders are as follows:
- The ladder must be inspected before each use.
- The ladder must never be placed against moveable objects.
- Never climb higher than the third rung from the top on extension ladders or the second tread from the top on step ladders.
- Ensure good footing of the ladder (any ladder).
- Ladders must extend at least 3 feet above the next working surface.
- Ladders shall be tied off as close as possible to the top of the ladder.(Straight/Extension Ladders)
- The feet of extension ladders shall be set back 1 foot for every 4 feet of height.
- Ladders shall not be constructed of conductive materials.
- When working from ladders in excess of **4 feet** employees **shall** use personal fall protection where anchorage exists.

Hand and Portable Power Tools

Electric tools shall:

- Have their frames grounded (even portable generators), or
- Be double insulated. (The manufacturer's label on the tool must indicate that the tool is double insulated.) Double insulated tools will have a 2 prong plug and do not require the use of a GFI / GFCI unless an extension cord is used with the double insulated tool. When the extension cord is added, the cord must be protected by a GFI / GFCI at the source / receptacle.

GFI's / GFCI's shall be used with all portable electric tools that are not double insulated. GFI's / GFCI's shall be placed at the wall outlet, not at the receptacle end of extension cords. This applies full ground fault protection to the extension cords. GFI's / GFCI's shall be inspected and tested prior to each use.

Hydraulic and Pneumatic Tools: Safe operating pressures for these tools and their associated hoses, pipes, valves, fitters, and fittings may not be exceeded.

Employees shall inspect these tools before use. If hazardous defects are identified, the tools shall not be used until properly repaired by qualified personnel. In the absence of defects, the tools may be used within manufacturer's specifications.

Pneumatic and hydraulic tools may not be used where they may come into contact with live (electrically energized parts), unless they are designed and maintained for such purposes. Hydraulic systems and tools must be appropriately selected and applied, relative to the expected exposure to live components and the manufacturer's recommendations for application.

Pneumatic tools that are to be exposed to live parts shall additionally provide protection against the accumulation of moisture in the air system. (See manufacturer's specifications).

Pressurized lines and equipment shall be de-pressurized before connections are broken (opened/disconnected) unless quick-acting; self-closing connections are used (see manufacturer's specifications).

Employees shall not use any part of their body to locate or stop a hydraulic leak.

Medical Services And First Aid

When Qualified employees are performing work on, or associated with, exposed lines or equipment energized at 50 volts or more:

a) All qualified personnel shall receive first aid and CPR training every two years.
   or
b) The employer shall ensure that any employee exposed to electric shock can be reached within 4 minutes by a trained person.

It is recognized that areas of our facilities are sufficiently remote that this requirement may not be attainable. Where a sufficient number of CPR/First Aid trained employees

are not expected to be available to meet these criteria, a minimum of two qualified employees shall be utilized to ensure compliance with this requirement. "High stack" work would be an appropriate example.

However, where the existing number of employees is insufficient to meet this requirement, all employees at the work location shall be trained.

First Aid Kits shall be:

a) placed in weather proof containers where exposed to weather.
b) readily available for use.
c) maintained.
d) inspected frequently enough that expended items are replaced (but not less than annually).

Labeling

Labels shall be applied to all switchboards, switchgear, electrical breaker boxes, panel boards, and motor control centers. Labels, in a bilingual format, shall warn of potential arc flash hazards, PPE hazard / risk category, boundary distances, and PPE for electrical shock protection. Labels shall be applied to all removable panels or doors, hinged or bolted.

Material Handling and Storage

a) In areas not restricted to Qualified personnel, materials may not be stored closer to energized lines or equipment than as indicated below:
- 50kv or less = 10 feet (example: pertains to overhead lines)
- Greater than 50kv = 10 feet + 4 inches for every additional 10 kv.

b) In areas restricted to Qualified personnel, materials may not be stored in the working space about energized lines or equipment.
c) Switchgear rooms shall not be used as storage or work areas. The only materials that shall be stored in switchgear rooms are switchgear specific tools and equipment. The only work to be completed in a switchgear room is that work specific to the maintenance and care of the switchgear and its associated circuits and equipment.

Audits and Inspections

a) Electrical Safety Program Audits are a management tool to ensure that all aspects of the program are in place and effective in preventing accidents, injuries and equipment damage. The audit should focus on employee knowledge, management control and means of hazard recognition and correction. The frequency of the audit shall not exceed three years.
b) Electrical inspections are physical inspections of facility equipment and electrical controls.
c) Field Work Audits shall take place to verify the requirements contained in these electrical safe work practice procedures are being followed. When the audit determines that the principles and the procedures of the Electrical Safety

Program are not being followed, the appropriate revisions to the training program or revisions to the procedures shall be made.

All audits are required to be documented and maintained by the group or facility Health and Safety Specialist. See detailed requirements for the audits in the ESWP Program Document.

Grounding For The Protection Of Employees

In general, only Qualified Instrument and/or Electrical personnel or Substation Maintenance personnel responsible for the application of grounds and grounding devices shall apply grounds at our facilities. Specific grounding operations on tools and equipment, such as power washers and barges, may be completed by any personnel that have been specifically qualified and trained. (***Grounding practices shall be consistent with the*** LG&EKU Health and Safety Manual).

Underground Electric Installations

With regard to underground electric installations, including underground vaults / pull-ways, the following requirements apply:

a) Ladders shall be used when entering vaults greater than 4 feet in depth.
b) Equipment being used to lower materials or other equipment into such an area shall be capable of supporting the weight to be lowered.
c) While work is being performed in a manhole containing energized electric equipment, an employee with First Aid and CPR training shall act as an attendant during the entry.
d) Reliable communications must be in place between all entrants and the attendant.
e) When multiple cables exist in the manhole, the cable(s) on which work is to be performed shall be identified by electrical means unless the identity of these cables is obvious and unmistakable through other means such as distinctive markings or location.
f) Energized cables which are to be moved shall be thoroughly inspected for defects first.
g) When defects are located on an energized cable, the cable shall be de-energized, or relative to service load demands, employees entering the manhole shall be effectively protected against the potential of fault during entry. Particular attention should be paid to oil compounds leaking from cables or joints, broken cable sheaths or joint sleeves, hot localized surface temperatures of cables or joints or cables or joints that are swollen beyond normal that may be an indication of impending fault.

Guarding Of Rooms Containing Electric Supply Equipment

If exposed live parts operating at 50 to 150 volts to ground are located within 8.5 feet of ground or other working surfaces inside a room or space, the following requirements apply:

a) These rooms or areas shall be enclosed to minimize the possibility that unqualified personnel may enter.
b) Signs warning all unqualified personnel to keep out shall be displayed at all entrances.
c) Entrances to spaces that are not under the observation of an attendant shall be locked.
   Examples of rooms or areas that shall be locked are:
   - Generator alterex/exciter enclosure walk-in doors.
   - Battery rooms.

   Examples of areas or equipment that do not require locks are:
   - Terminal boxes.
   - Enclosures behind gauge boards that are not walk-in.
   - Walk-in vertical panels behind gauge boards that are attended.
   - Generator alterex diode cabinets.

d) Unqualified personnel may not enter these areas while exposed conductors in this voltage range are energized.
e) Guards shall be placed over exposed conductors in this voltage range (50 -150 volts) any time the working space does not provide a working area clearance of at least 30 inches, where the exposure is on only one side of the employee, or where the employee may be exposed on both sides between exposed conductors and the clearance is less than 48 inches.

If exposed live parts operating at 151 to 600 volts to ground are located within 8.5 feet of ground or other working surfaces inside a room or space, the area shall also be subject to paragraphs **a)** through **d)** above or guards shall be provided around all live parts operating at more than 150 volts to ground without an insulating covering, unless these parts are positioned horizontally and vertically to prevent inadvertent or accidental contact by employees.

When guards are removed from energized equipment, barriers shall be installed around the work area to protect all other workers in the area from coming into contact with exposed energized equipment.

Further LG&E KU Power Production Facility Requirements

a) All interlocks and other safety devices shall be maintained in safe operable condition. No interlock or other safety device may be modified to defeat its function except for test, repair, or adjustment of the device.
b) Changing Brushes: Brushes shall only be changed by qualified personnel and brushes may not be changed on energized exciters or generators if a ground

condition exists. Where circuitry would allow this condition to exist, the technicians must check (the associated instruments/indications) that grounds DO NOT exist before changing any brushes.

c) The leakage of hydrogen from generators shall be treated as an emergency and shall be corrected immediately. Running with a known **excessive** hydrogen leak is not acceptable.

d) Coal and Ash Handling

1) Before a locomotive or locomotive crane is moved, a warning shall be given to employees in the area.
2) Employees engaged in switching or dumping cars may not use their feet to line up drawheads.
3) Drawheads and knuckles may not be shifted while locomotives or cars are in motion.
4) When a railroad car is stopped for unloading, the car shall be secured.
5) An emergency means of stopping dumping operations shall be provided at rail car dump locations.
6) Employees who work in coal or ash handling conveyor areas shall be knowledgeable in conveyor operation and in the requirements below:
   Employees may not:
   - ride a coal or ash handling conveyor belt at anytime.
   - cross over the conveyor belt, except at walkways, unless the conveyor's energy source has been de-energized and has been tagged out.
7) Conveyors may not be started until personnel in the area are alerted by a signal or by a designated person that the conveyor is about to start.
8) When a conveyor is started automatically from a remote location, an audible device (warning signal) shall be provided that sounds an alarm that will be recognized by each employee. This warning device must be heard clearly at all points along the conveyor where personnel may be present. The warning device shall be activated by the device starting the conveyor and shall continue for a period of time before the conveyor starts that is sufficient to allow employees to move clear of the conveyor system. A visual warning may be used in place of the audible device if the employer can demonstrate that it will provide an equally effective warning.
9) Remotely and automatically controlled conveyors and conveyors that have operating stations which are not manned or which are beyond voice and visual contact from device areas, loading areas, transfer points, and other locations on the conveyor path not guarded by location, position, or guards, shall be furnished with emergency stop buttons, pull cords, limit switches, or similar emergency stop devices unless the employer can demonstrate that the design, function, and operation of the conveyor does not expose an employee to hazards. Emergency Stop devices shall be easily identifiable in the immediate vicinity of such locations.
10) Emergency Stop devices shall act directly on the control of the conveyor and may not depend on the stopping of any other equipment.
11) Emergency stop devices shall be installed so that they cannot be over-ridden from other locations.

12) Where coal-handling operations may produce a combustible atmosphere from fuel sources, or from flammable gases, or dust, sources of ignition shall be eliminated or safely controlled to prevent ignition of the combustible atmosphere. Locations that are hazardous because of the presence of combustible dust are classified as Class II hazardous locations and electrical equipment located in these areas must meet specifications detailed in 1910.307 and NFPA 70 of the National Electric Code.
13) An employee may not work on or beneath over-hanging coal in coal bunkers, coal silos, or coal storage areas, unless the employee is protected from all hazards posed by shifting coal.
14) An employee entering a bunker or silo to dislodge the contents shall wear a body harness with lifeline attached. The lifeline shall **be secured to a fixed support outside the bunker** and shall be attended at all times by an employee located outside the bunker or facility. All current Confined Space Entry requirements shall additionally be met.

LG&E KU Appendix A & B

Modification of Energized Electrical Work Permit Requirements

Energy Services

8/8/2011

When energized electrical work must be performed under one of the proceeding three exceptions one of the two Energized Electrical Work Permits (EEWP) shall be applied and approved as required.

The EEWP is a tool for documenting the electrical hazards and controls associated with a specific task, and providing authorization to perform that specific work.

The EEWP requirement was not developed with the intent to make electrical work more administratively difficult, but as a required tool to protect the employee, control unwarranted live work and ensure only qualified workers perform warranted live work.

Two (2) 'energized electrical work permits' are now available and each has its own specific application.

1) **Routine Energized Work Permit**
2) **Non-Routine Energized Work Permit.**

Supervisor/Management responsibilities remain for both permits.

Routine *Defined as conducted repetitively such as multiple times in a single week.*

1) The Routine EWP will apply to energized tasks that can be grouped under one permit for a longer period of time. This applies to repetitive energized tasks over a longer time frame. A particular routine electrical task could be written for up to one year's timeframe. The 70E handbook allows for a standing permit for routine live electrical work tasks performed by trained and qualified persons only. Identification of those electrical tasks, that would be considered routine, would need to be developed along with Safe Operating Procedures for each, and to create a Routine energized electrical work permit for each.

See **Routine Energized Work Permit**

2) Non-Routine energized work permit would be used for all other energized work. This would cover non-routine electrical tasks and would be only good for as long as it takes to perform that task.

See Non-**Routine Energized Work Permit**

Each station shall identify those "routine electrical work task" that would qualify as routine and thus be identified on the "Routine EEWP".

A "Routine EEWP" shall be completed for each specific work task so management and field workers clearly understand what "hot" work is permitted on a daily basis without further scrutiny.

Each permit for a specifically designated period of time shall be maintained in file by the appropriate department Supervisor.

- Routine electrical work would typically consist of low risk electrical work.
- After the one year time frame, (permit expiration) the routine permit shall be reviewed by management for possible changes prior to updating and issuing new permits.
- Any changes to the updated permit would need to be conveyed to all qualified employees.
- Only the well "Qualified" employees shall be permitted to perform the routine energized electrical work tasks.
- Employees shall be trained on this new approach for utilizing energized electrical work permits.

Appendix A ROUTINE ENERGIZED ELECTRICAL WORK PERMIT

FORM TO BE COMPLETED BY THE DEPARTMENT SUPERVISOR

Dated Time Period Covered: _____ to _____ (12 months max.)
(This permit is void after the time period indicated)

Specific job task description covered under this routine permit: _____

_____

_____

Description of circuit/equipment/job location: _____

_____

Justification of why the circuit/equipment cannot be de-energized or the work deferred until off peak availability or the next scheduled outage: _____

_____

Detail work procedure to be performed: _____

_____

Description of the safety work practices to be followed: _____

_____

Description of the Safe Work Practices to be employed: _____ _____

_____

Identify voltage level of potential exposure: _____

Identify Hazard Risk Category: II_____; IV_____; Label Specific_____

Identify the Protective Boundary/Barrier distances (4', 10' or calculated distance):_____

Necessary PPE to safely perform the specific work task: _____

_____

Means employed to restrict the access of unqualified person from the area: _____

_____

Job Briefing discussion details: _____

_____

Do you agree that the above described work can be done safely? [ ] Yes [ ] No
(If checked 'No', a Routine Permit shall not be written)

_____ _____
Supervisor / Leader Date

APPROVAL TO PERFORM THE WORK WHILE ELECTRICALLY ENERGIZED:

_____ _____
Maintenance / Operations Manager Date

Note: This Routine Energized Electrical Work Permit shall be maintained by the appropriate Supervisor/Leader for the time period identified. Upon expiration of the time period, the particular work task shall be reviewed to confirm work remains 'routine'. The worker qualifications shall be reviewed to ensure they remain qualified.

Appendix B

NON-ROUTINE
ENERGIZED ELECTRICAL WORK PERMIT

PART I: TO BE COMPLETED BY THE REQUESTER:

Job/Work Order Number_____

(1) Description of circuit/equipment/job location: _____

(2) Description of work to be done: _____

(3) Justification of why the circuit/equipment cannot be de-energized or the work deferred until off peak availability or the next scheduled outage:

_____

_____ _____

Requester/Title Date

Part II: TO BE COMPLETED BY THE ELECTRICALLY QUALIFIED PERSONS DOING THE WORK:

	Check when Complete
(1) Detailed job description procedure to be used. _____	[ ]
(2) Description of the Safe Work Practices to be employed: _____	[ ]
(3) Identify voltage level of potential exposure: _____	[ ]
(4) Identify Hazard Risk Category: 2_____; 4_____; Label Specific _____	[ ]
(5) Demarcate 4 or 10 foot Protective Boundary/Barrier: _____	[ ]
(6) Necessary PPE to safely perform the assigned task: _____	[ ]
(7) Means employed to restrict the access of unqualified person from the area: _____	[ ]
(8) Job Briefing discussions: _____	[ ]

(9) Do you agree the above described work can be done safely? [ ] Yes [ ] No
(If checked 'No', return to requester)

_____ _____

Electrically Qualified Person Date

_____ _____

Electrically Qualified Person Date

Part III: APPROVAL TO PERFORM THE WORK WHILE ELECTRICALLY ENERGIZED:

_____ _____

Supervisor/Leader/Chief Date

Note: Upon completion of the work, this form shall be sent to the station Health & Safety Specialist for review and retention.

REMEMBER

Live electrical parts to which an employee may be exposed shall be put into an electrically safe work condition, applying energy isolation procedures (Locked or Tagged) before performing work, unless de-energizing: (1910.333 &/or NFPA 70 E)

a) Introduces additional or increased hazards OR
b) Is not feasible due to equipment design OR
c) Is not feasible due to operational limitations.

Appendix C
Electrical Safe Work Practices
Tables

Appendix D
The Inspection and Wearing of Arc Wear

Inspection Before Each Use

The switching jacket (smock), leggings, and hood shall not have tears, holes, abrasions, or open seams of any type. If a defect of these types is identified, the garment shall not be used and must be returned to the Health and Safety Specialist for repair or replacement.

The garment shall not be used when it is coated nor impregnated with dirt, mud, coal dust, flyash, oil, degreasers, grease, or combustible materials or chemicals of any type. These materials and chemicals will negatively impact the garments protective rating. The garment must be laundered per established procedures at your facility and as recommended by the manufacturer's guidelines before being returned to service. If the garment becomes so soiled that it cannot be cleaned it must be returned to the Health and Safety Specialist for repair or replacement.

The garment's arc flash protective rating will also be negatively impacted if the garment is soaked with water. Efforts shall be made not to use the garment when it is wet enough to impact its rating. The garments are not intended for use as rain gear and shall be protected from such exposures.

Inspect the hood's face shield, hard hat attachment, and hard hat. If the hard hat is to remain as an integral component of the hood and not to be changed out by each user the hat shall be wiped out and sanitized by each successive user with a sanitizing wipe and a hat liner, shield, or barrier shall be used. Ensure that the Velcro seal around the edges of the face shield are all closed and in place. If the seals are torn, missing or will not remain secure the hood must be returned to the Health and Safety Specialist for repair or replacement. The face shield shall not be allowed to become so scratched that it in any way impedes your vision. If it is so scratched or it is cracked, the hood must be returned to the Health and Safety Specialist for assessment and possible replacement of the face shield. If your hood is equipped with cooling fans, ensure that the fans work properly and that the batteries are good.

Donning the Garments

Leggings On First
Sit down in a stable chair without wheels. Put on the leggings first. Hold the top corners of the legging at the top Velcro straps with the outer surface of the legging facing away from your leg. Center the legging over the front part of the lower leg so that the boot cover flap is centered over the foot and so that the top center of the legging is just below the knee. Wrap the left top corner around the back of the leg just above the top of your calf muscle and hold it to the back of the leg with your left had. Bring the right corner across the back of the leg at the same point and place it Velcro strip over its mate from the left. The top should be tight around the leg. This top attachment is the point that

holds the legging up and keeps it from becoming a tripping hazard. It needs to be tight enough to keep the legging up but not so tight that it impedes circulation.
Close the next two Velcro strips across the back of the leg to keep the legging centered on the front of the leg and comfortably tight around the leg.

Jacket Second
The switching jacket (40 cal.) should be applied in a standing position. Be sure that no one is standing close when the jacket is being applied to ensure that they are not hit by your arms or hands. Put it on like any normal jacket and ensure that the Velcro strip that closes the front of the jacket is sealed along its entire length.

Hood Third (Hearing protection required)
Ensure that the hard hat band is adjusted so that your head will fit in it. Place the hood over your head and adjust the hat band so that the hat and hood will remain in place. The flaps of the hood are worn on the outside of the jacket and drape over your shoulders.

Electrical protective gloves and sleeves, as required, should be put on last.
Gloves and sleeves should be inspected before donning the arc wear garments.

> This switching jacket should be applied in a standing position. Be sure that no one is standing close when the jacket is being applied to ensure that they are not hit by your arms or hands. Put it on like any normal jacket and ensure that the Velcro strip that closes the front of the jacket is sealed along its entire length. The jacket must be fully closed and shall be worn with the collar up and around the neck unless the double layered switching hood is used.

Shown Here: PPE for Category 4 work.

Appendix E
Levels of Electrical Safe Work Practices Training

Level 1 Training Requirements
This training is for employees with exposure to live parts energized at 50 to 14,000 volts.
Level 1 Training Requirements (This is generally I & E, E & I or I & C personnel or switching persons who will have exposures to energized electrical conductors in this voltage range)

- Electrical Safe Work Practices Employee Training
- Lockout / Tagout Training specific to the station(s) at which they will perform work.
- Qualified Employee Training for the specific electrical work practices and procedures that the employee will perform.
- PPE Training specific to all of the Electrical and Arc Flash personal protective equipment that the employee will use.

Level(s) 2 Training Requirements
This training is for employees with exposure to live parts energized at 50 to 600 volts.
Level 2A personnel who do live voltage tests in the 50 to 600 volt range.
Level 2B Personnel who do not perform live voltage tests in the 50 to 600 volt range but that will perform electrical switching and isolation.
Level 2C Personnel who do not perform live voltage tests, electrical isolation or switching but that will have exposures in the 50 to 151 volt range during isolation inspections.

Level 2A Training Requirements

- Electrical Safe Work Practices Employee Training
- Lockout / Tagout Training specific to the station(s) at which they will perform work.
- Qualified Employee Training for the specific electrical work practices and procedures that the employee will perform. (Switchman Training, Electrical Isolation Procedures, Voltage Testing and Qualification.)
- PPE Training specific to all of the Electrical and Arc Flash personal protective equipment that the employee will use.

Level 2B Training Requirements

- Electrical Safe Work Practices Employee Training
- Lockout / Tagout Training specific to the station(s) at which they will perform work.
- Qualified Employee Training for the specific electrical work practices and procedures that the employee will perform. (Switchman Training, Electrical Isolation Procedures, and Qualification.)
- PPE Training specific to all of the Electrical and Arc Flash personal protective equipment that the employee will use.

Level 2C Training Requirements

- 1910.269 Employee Training prescribed for mechanics and all other non-electrical related crafts that are not trained and qualified to perform isolation and switching activities.

- Lockout / Tagout Training specific to the station(s) at which they will perform work.
- Qualified Employee Training under Appendix H and/or J of the Electrical Safe Work Practices Training that includes the PPE Training specific to all of the Electrical and Arc Flash personal protective equipment that the employee will use.

Level 3 Training Requirements
This training is for employees that **do not have exposure** to live parts energized at 50 volts or greater. (Example: mechanics that **do not open** 4 KV breaker doors when checking clearances)

Level 3A Training Requirements

- Lockout / Tagout Training specific to the station(s) at which they will perform work.
- 1910.269 Employee Training prescribed for mechanics and all other non-electrical related crafts that are not trained and qualified to perform isolation and switching activities.

Appendix F

Procedural Deviation Request and Documentation Form

This form is required any time the need for a procedural deviation is to be undertaken. New procedures may be added to Appendix C of this document for all stations based on the review and possible approval of this procedural deviation request.
The deviation may not be undertaken without the approval of the Maintenance Manager and submission to the facility's Health and Safety Specialist.

What electrical equipment is involved? _____

_____

What is the exposed voltage? _____

Describe the deviation request in writing below. Include why you believe it is necessary.

_____

_____

_____

_____

_____

How frequently will this specific deviation be necessary? (Explain)

_____

_____

_____

You must attach a copy of your Electrical Energized Work Permit.
"If exposed live electrical parts are not placed in an electrically safe work condition, work to be performed, such as installing or moving energized conductors, shall be considered energized electrical work and shall be performed by written permit only.
Refer to Appendix A for a sample "Energized Electrical Work Permit.""

Form completed by :_____ E# _____
Date:_____/____/_____

Submit to your supervisor or leader. Supervisor must submit to Manager and Health & Safety Specialist. The Health and Safety Specialist will forward a copy to the Health and Safety Coordinator for Energy Services.

Supervisor or leader submitting to the manager:

_____ E# _____
Date: ____/____/_____

Manager Approval _____ E#_____
Date____/____/_____

Appendix G

Definitions

Electrically Safe Work Condition
(This definition is taken verbatim from the NFPA 70 E and 1910.333 (b) Subpart S requirements.)

The following steps shall be executed before an electrical circuit is considered to be in an "electrically safe work condition":

1. Determine all possible sources of electrical supply to the specific equipment. Review all reliable and up-to-date drawings, documentation, and identification tags and labels. Drawings must include ***all*** energy sources, including temporary and back up power sources.
2. After properly interrupting the load current, open all disconnecting devices for each source. At this point, the equipment or circuit is simply de-energized.
3. Where possible, visually verify that all disconnecting devices, including draw out circuit breakers, are open. Also check that all disconnecting devices meet appropriate codes and standards.
4. Apply lockout/tagout devices in accordance with energy isolation procedures.
5. Use adequately rated testers to verify the absence of voltage on each point where physical contact is expected.
6. Where the possibility of induced voltage or stored energy exists, ground the phase conductors before touching them. Where it is reasonable to expect that the conductors could be re-energized due to accidental contact with another source of energy, install grounding devices rated for the available fault current.

Note 1: While putting circuits/equipment in an electrically safe work condition, safe work practices appropriate for the circuit voltage and arc-flash energy level shall be used, including adequate personal protective equipment. When a disconnect is opened, the circuit may be de-energized but the circuit is not yet considered to be in an electrically safe work condition until all the above steps are successfully completed.

Appendix H

Procedure and Training for the Visual Verification of Clearance on Medium Voltage Switchgear

(With no physical entry into the cubicle / door open for inspection)

Medium voltage switchgears in generation stations will include those switchgears with voltages greater than 600 volts and less than 15,000 volts.

This procedure will be applied by authorized persons (e.g. mechanics, designated residential contractors, designated contractor "persons in charge," and others designated by plant management) who have been trained, qualified, and certified to perform this procedure.

Training

Qualified/Authorized Employees shall be trained and qualified in:

a) the skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment. The authorized employee being trained shall be escorted to each of the specific types of switchgear on which they will be required to verify clearance where the door to the equipment must be opened to complete this task. The qualified person providing this training shall review with each of the authorized persons being trained, the exposed electrical conductors within the cubicle and on the back of the door that are, or may be, energized when the breaker and the control fuses are isolated and carded.

b) the skills and techniques necessary to determine the nominal voltage of exposed live parts. The qualified person providing this training shall review with each of the authorized persons being trained that the exposed live parts within these cubicles are energized in the 50 to 151 volt range.

c) the minimum approach distances specified in this section, corresponding to the voltages to which the qualified employee will be exposed. The qualified person providing this training shall review with each of the authorized persons being trained that they shall avoid contact with all exposed conductors within the cubicle.

d) the proper use of the special precautionary techniques and personal protective equipment for working on or near exposed energized parts of electrical equipment.
   - The qualified person providing this training shall review with each of the authorized persons being trained the specific use of and the specific steps for the inspection of the class "0" electrical protective gloves that must be completed before each use.
   - With the exception of a flash light, absolutely no tools shall be taken within the established 4 foot barrier for this procedure.

Safe Work Practices

For jobs involving conductors energized at greater than 50 volts, employees shall:

a) ensure that all of their PPE, tools and equipment are inspected before each use and that they are in good working order. The equipment shall not be used if a defect is identified.
b) stand clear of ground. (Do not lean against, or make any contact with, cabinets, doors or other conductive surfaces.)
c) not kneel or sit while performing this procedure.
d) ensure that they are not standing in, or on, wet surfaces.
e) ensure their work boots are clean and dry. (4 buckle overshoes may be used to accomplish this requirement.)
f) comply with the proper use and inspection of all personal protective equipment required for this procedure.
h) contact their supervisor, leader or health & safety specialist before proceeding if there is any doubt about the procedure being applied or the condition of the mechanical or electrical equipment involved with the application of this procedure.

Electric Shock and Electrical Arc Flash Hazards

We must be constantly aware of the potential for electrical shock and arc flash hazards associated with electrical exposures. Should you fail to correctly apply proper electrical safe work practices and the associated personal protective equipment, you may jeopardize your life and the safety of others. This would constitute a serious safety violation. Procedures were developed to ensure the safety of all concerned. Remember, the correct way is the safe way. If you are not sure about something, **stop and ask**. Remember, electricity can kill: Treat it with respect.

Electrical shock kills and injures thousands of workers worldwide each year. Most of these accidents happen because people don't look, don't think, don't follow established procedures, or just don't understand the power of electricity.

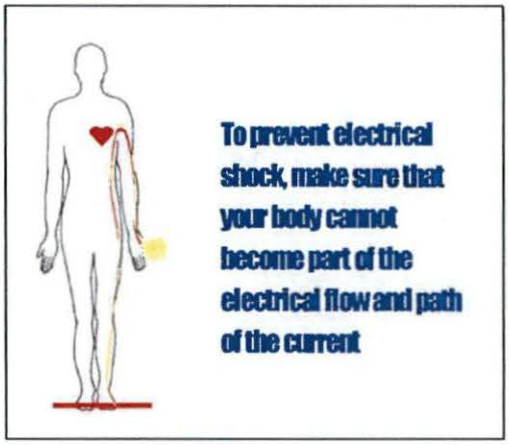
Electrical shock can only occur when a part of the body completes a circuit between two conductors or a conductor and ground.

Everyone who works on or around electrical equipment must understand the dangers involved and the steps that must be taken to ensure the protection of everyone involved.

Voltage, current and resistance are the basic terms used when talking about electricity.

A. Voltage is the force or pressure that causes the current or electrons to flow.
B. Current (amperage) refers to the amount of electricity (electrons) that is flowing.
C. Resistance denotes the forces that oppose, slow down or stop the flow. In simple terms this is measured in ohms of resistance.
D. Watts is basically the voltage times the current in the circuit and can perhaps be better understood by knowing that 746 watts = 1 horse power.

Voltage does not cause death or injury. The current that flows through the body when conductance occurs or the flash from an associated electrical blast causes the damage. The severity of electrical shock depends on how much current passes through the body as well as the path it takes.



In general, the current will take the shortest possible path through the body. For example, if a person is touching energized conductors with both hands or if they are touching an energized conductor with one hand and a grounded object with the other, the current will pass directly through the person's heart. It takes as little as 1/10th of an amp of current to interrupt heart action.

If only one hand is touching an energized conductor the current travels to ground along the path of least resistance. In this case the current moves up the arm, down the body and out through the nearest leg. The current tends to stay on one side of the body so it's less likely to pass through the heart.

The dry outer skin of the human body offers extremely high resistance to electrical flow. However, this resistance is reduced to almost zero when the skin is wet and especially if the skin is wet because of perspiration. One way to keep the body's resistance high is to **keep it dry**, particularly the hands and feet. This must be accomplished by wearing proper personal protective equipment such as approved rubber gloves. To prevent electrical shock make sure your body cannot become part of the electrical current path. Keep your feet and shoes dry.

Helping an electrical shock victim.

A. First, stop the current flowing from the circuit through the victim's body if it hasn't already been done. Often, particularly in cases of low voltage shock, victims are unable to pull away from the source of current. (50 to 600 volts)
B. If power cannot be cut, a nonconductive item such as dry clothing or an insulated pole should be used to move the victim away from the conductor. **Never** touch the victim's body with your own.
C. Call or send for help.
D. Next check to see if the victim's heart and/or breathing has stopped. If so give required first aid (artificial respiration and/or CPR) until professional help arrives.

Electrical Protective Equipment

Anyone working on or near energized electrical circuits must use special equipment to provide protection from electrical shock.

It should be noted that this electrical protective equipment is required in addition to other normally required personal protective equipment. Standard PPE typically includes hard hats, which are rated for electrical resistance, eye protection, hearing protection, and a

uniform that generally has a minimum rating of 8 cal. per square centimeter of surface area.

Low Voltage Gloves

Gloves approved for protection from electrical shock are made of rubber.

A separate leather cover protects the rubber from punctures or other damage. The rubber is the insulating barrier and the leather protects the rubber. Both materials are required and necessary.

Gloves are essential required protection for anyone who is working around energized circuits or circuits that may be energized. They protect the wearer by insulating the hands from electrical shock.

Gloves are rated as providing protection from certain amounts of voltage. For example, gloves for low voltage are rated up to 1000 volts, while medium voltage gloves are rated at 17,000 volts. Low voltage gloves are specified for the application of this procedure.

Electrical protective gloves are made of rubber and provide protection from shock by insulating you from contact with current sources and/or with ground. Since this equipment provides insulation it cannot be effective unless it is in good condition. For this reason inspection is required for all protective equipment before using it. The rubber portion of protective gloves shall be checked carefully before each use for cracks, worn spots, cuts and holes. This will be done by careful visual and tactile observation of the entire glove. A simple way to check for small punctures is to twirl the glove around to inflate it and then listen and feel for any leaks. Apply a slight pressure and listen closely for any leak. This inspection is extremely important. Even a tiny pinhole leak can allow enough current to pass through to stop the human heart. Any leak, nick, cut or abrasion will disqualify the glove and it shall not be used.

Inspect the protective leather gloves that slip over the rubber gloves to protect them. The leather gloves shall not be torn, cut, burned, or soiled with grease or other conductive material.

The purpose of the leather glove cover is to prevent the small cuts and punctures that can destroy a rubber glove's insulating properties. Inspect these for any defect that could expose the insulating rubber.

All the gloves must be clean and dry when used.

In addition to the on-the-job checks, our company and KOSHA require periodic inspection and electrical testing of these rubber goods. Our rubber goods testing department must test rubber gloves every three months.

If you are sharing these gloves with others, sheer disposable latex liner gloves may be used directly over the hands before donning the electrical rubber gloves.

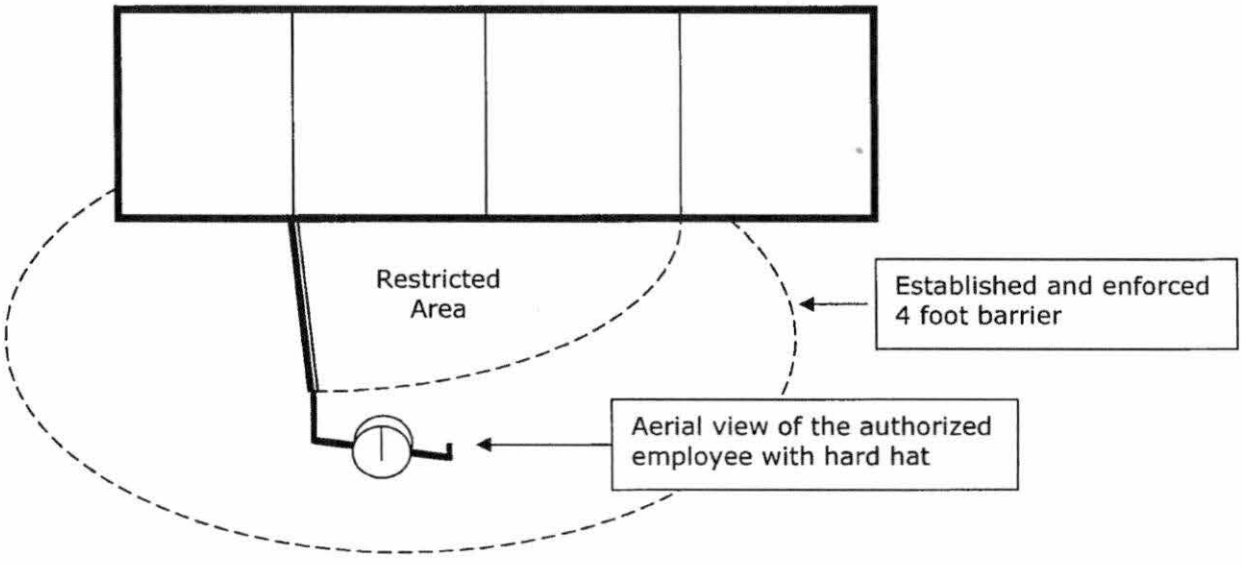
Qualification Performance

A designated qualified person shall establish the authorized employee's proficiency in the application of this Appendix H and shall document and certify that the authorized employee has received this training when the authorized employee demonstrates the required proficiencies. This shall be accomplished under the direct supervision of the designated qualified person. Employees are required to maintain these proficiencies for the duration of employment.

Procedural Steps for Verifying Energy Isolation

Notification: It must be understood that all requirements of your Lockout / Tagout procedure must be completed in conjunction with the performance of this procedure.

1. The authorized person shall proceed to the medium voltage switchgear cubicle for the specific piece of equipment where he/she is to verify isolation and shall ensure that he/she is at the correct cubicle by checking the exact name of the equipment on the name tag that is permanently affixed to the equipment door.
2. The authorized person shall establish a minimum 4 foot barrier around the door to the cubicle before opening the door.
3. The authorized person shall inspect his/her low voltage gloves and protectors and shall don the gloves. (Note that standard hard hat, safety glasses, and hearing protection must already be in place.)
4. The authorized employee shall make a final check of the name plate on the cubicle door and shall then open the door and make the visual inspection of the breaker, if necessary, for the specific equipment configuration. The breaker must be in the open and in the fully withdrawn position. Some equipment may be furnished with slide doors or view ports and the door may not need to be opened to accomplish this task. Some equipment may require that only the control equipment door be opened for visual inspection. In any case, if the door is to be opened and energized parts are exposed, the authorized employee shall not enter the restricted area as indicated in the following figure.



All visual inspections shall be made without the authorized employee crossing into the restricted area.

5. The authorized employee shall then close the cubicle door and secure the door using all of the manufacturer supplied latches or bolts. If any are missing or not functioning properly, a safety work order shall be generated to repair the required equipment.

_____ Empl # _____
Authorized Employee being qualified. (print)

_____ Empl # _____
Certification signature by the designated trained qualified person.

Date _____/_____/_____

Appendix J

Procedure and Training for the Visual Verification of Clearance on Medium Voltage Switchgear

(With Entry into the cubicle to place or remove personal lock or inspect Hold Cards)

Medium voltage switchgears in generation stations will include those switchgears with voltages greater than 600 volts and less than 15,000 volts.

This procedure will be applied by authorized persons (e.g.; mechanics, designated residential contractors, designated contractor "persons in charge," and others designated by plant management) who have been trained, qualified, and certified to perform this procedure.

Training

Authorized Qualified Employees shall be trained and qualified in:

a) the skills and techniques necessary to distinguish exposed live parts from other parts of electric equipment. The authorized employee being trained shall be escorted to each of the specific types of switchgear on which they will be required to verify clearance, and/or place or remove personal locks where entry into the cubicle must be made to complete these tasks. The qualified person providing this training shall review with each of the authorized persons being trained, the exposed electrical conductors within the cubicle and on the back of the door that are, or may be, energized when the breaker and the control fuses are isolated and carded.

b) the skills and techniques necessary to determine the nominal voltage of exposed live parts. The qualified person providing this training shall review with each of the authorized persons being trained that the exposed live parts within these cubicles are energized in the 50 to 151 volt range.

c) the minimum approach distances specified in this section, corresponding to the voltages to which the qualified employee will be exposed. The qualified person providing this training shall review with each of the authorized persons being trained that they shall avoid contact with all exposed conductors within the cubicle.

d) the proper use of the special precautionary techniques and personal protective equipment for working on or near exposed energized parts of electrical equipment.
   - The qualified person providing this training shall review with each of the authorized persons being trained the use and the specific steps for the inspection of the class "0" electrical protective gloves that must be completed before each use.
   - With the exception of a flash light and or a personal lock (i.e. LOTO requirements), absolutely no tools shall be taken within the established 4 foot barrier for this procedure.

Safe Work Practices

For jobs involving conductors energized at greater than 50 volts, authorized employees shall:

a) ensure that all of their PPE, tools and equipment are inspected before each use and that they are in good working order. The equipment shall not be used if a defect is identified.
b) stand clear of ground. (Do not lean against, or make any contact with, cabinets, doors or other conductive surfaces.)
c) not kneel or sit while performing this procedure.
d) ensure that they are not standing in or on wet surfaces.
e) ensure their work boots are clean and dry. (4 buckle overshoes may be used to accomplish this requirement.)
f) comply with the proper use and inspection of all personal protective equipment required for this procedure.
h) contact their supervisor, leader or health & safety specialist before proceeding if there is any doubt about the procedure being applied or the condition of the mechanical or electrical equipment involved with the application of this procedure.

Electric Shock and Electrical Arc Flash Hazards

We must be constantly aware of the potential for electrical shock and arc flash hazards associated with electrical exposures. Should you fail to correctly apply proper electrical safe work practices and the associated personal protective equipment you may jeopardize your life and safety of others. This would constitute a serious safety violation. Procedures were developed to ensure the safety for all concerned. Remember the correct way is the safe way. If you are not sure about something, **stop and ask**. Remember, electricity can kill: Treat it with respect.

Electrical shock kills and injures thousands of workers worldwide each year. Most of these accidents happen because people don't look, don't think, don't follow established procedures, or just don't understand the power of electricity.

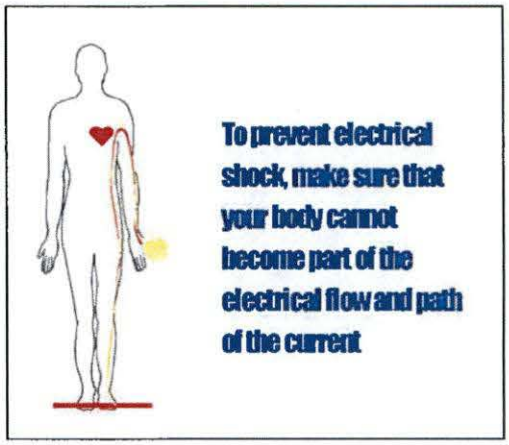
Electrical shock can only occur when a part of the body completes a circuit between two conductors or a conductor and ground.

Everyone who works on or around electrical equipment must understand the dangers involved and the steps that must be taken to ensure the protection of everyone involved.

Voltage, current and resistance are the basic terms used when talking about electricity.

A. Voltage is the force or pressure that causes the current or electrons to flow.
B. Current (amperage) refers to the amount of electricity (electrons) that is flowing.
C. Resistance denotes the forces that oppose, slow down or stop the flow. In simple terms this is measured in ohms of resistance.
D. Watts is basically the voltage times the current in the circuit and can perhaps be better understood by knowing that 746 watts = 1 horse power.

Voltage does not cause death or injury. The current that flows through the body when conductance occurs or the flash from an associated electrical blast causes the damage. The severity of electrical shock depends on how much current passes through the body as well as the path it takes.



In general, the current will take the shortest possible path through the body. For example, if a person is touching energized conductors with both hands or if they are touching an energized conductor with one hand and a grounded object with the other, the current will pass directly through the person's heart. It takes as little as 1/10th of an amp of current to interrupt heart action.

If only one hand is touching an energized conductor the current travels to ground along the path of least resistance. In this case the current moves up the arm, down the body and out through the nearest leg. The current tends to stay on one side of the body so it's less likely to pass through the heart.

The dry outer skin of the human body offers extremely high resistance to electrical flow. However, this resistance is reduced to almost zero when the skin is wet and especially if the skin is wet because of perspiration. One way to keep the body's resistance high is to **keep it dry**, particularly the hands and feet. This must be accomplished by wearing proper personal protective equipment such as approved rubber gloves. To prevent electrical shock make sure your body cannot become part of the electrical current path. Keep your feet and shoes dry.

Helping an electrical shock victim.

A. First, stop the current flowing from the circuit through the victim's body if it hasn't already been done. Often, particularly in cases of low voltage shock, victims are unable to pull away from the source of current. (50 to 600 volts)
B. If power cannot be cut, a nonconductive item such as dry clothing or an insulated pole should be used to move the victim away from the conductor. **Never** touch the victim's body with your own.
C. Call or send for help.
D. Next check to see if the victim's heart and/or breathing has stopped. If so give required first aid (artificial respiration and/or CPR) until professional help arrives.

Electrical Protective Equipment

Anyone working on or near energized electrical circuits must use special equipment to provide protection from electrical shock.

It should be noted that this electrical protective equipment is required in addition to other normally required personal protective equipment. Standard PPE typically includes hard hats, which are rated for electrical resistance, eye protection, hearing protection, and a

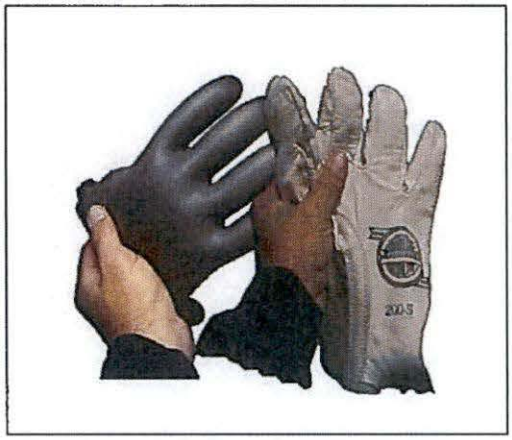
uniform that generally has a minimum rating of 8 cal. per square centimeter of surface area.

Low Voltage Gloves

Gloves approved for protection from electrical shock are made of rubber.

A separate leather cover protects the rubber from punctures or other damage. The rubber is the insulating barrier and the leather protects the rubber. Both materials are required and necessary.

Gloves are essential required protection for anyone who is working around energized circuits or circuits that may be energized. They protect the wearer by insulating the hands from electrical shock.



Gloves are rated as providing protection from certain amounts of voltage. For example, gloves for low voltage are rated up to 1000 volts, while medium voltage gloves are rated at 17,000 volts. Low voltage gloves are specified for the application of this procedure.

Electrical protective gloves are made of rubber and provide protection from shock by insulating you from contact with current sources and/or with ground. Since this equipment provides insulation it cannot be effective unless it is in good condition. For this reason inspection is required for all protective equipment before using it. The rubber portion of protective gloves shall be checked carefully before each use for cracks, worn spots, cuts and holes. This will be done by careful visual and tactile observation of the entire glove. A simple way to check for small punctures is to twirl the glove around to inflate it and then listen and feel for any leaks. Apply a slight pressure and listen closely for any leak. This inspection is extremely important. Even a tiny pinhole leak can allow enough current to pass through to stop the human heart. Any leak, nick, cut or abrasion will disqualify the glove and it shall not be used.

Inspect the protective leather gloves that slip over the rubber gloves to protect them. The leather gloves shall not be torn, cut, burned, or soiled with grease or other conductive material.

The purpose of the leather glove cover is to prevent the small cuts and punctures that can destroy a rubber glove's insulating properties. Inspect these for any defect that could expose the insulating rubber.

All the gloves must be clean and dry when used.

In addition to the on-the-job checks, our company and KOSHA require periodic inspection and electrical testing of these rubber goods. Our rubber goods testing department must test rubber gloves every three months.

If you are sharing these gloves with others sheer disposable latex liner gloves may be used directly over the hands before donning the electrical rubber gloves.

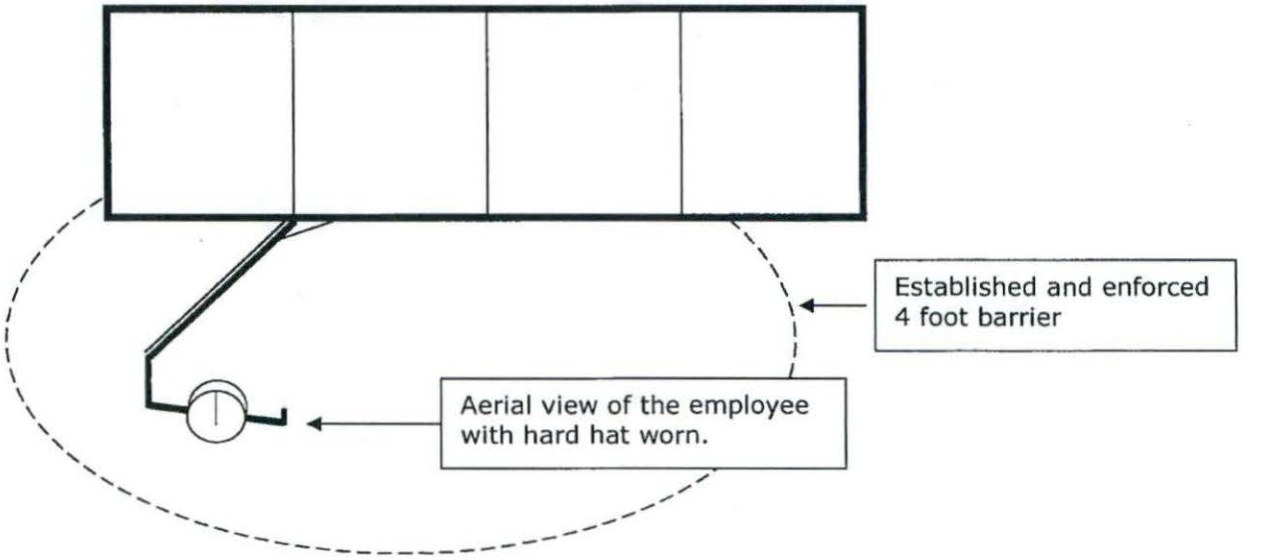
Qualification Performance

A designated qualified person shall establish the authorized employee's proficiency in the application of this Appendix J and shall document and certify that the authorized employee has received this training when the authorized employee demonstrates the required proficiencies. This shall be accomplished under the direct supervision of the designated qualified person. Employees are required to maintain these proficiencies for the duration of employment.

Procedural Steps for Verifying Energy Isolation and/or Applying or Removing Personal Locks Where Entry Into The Cubicle Is Required.

Notification: It must be understood that all requirements of your Lockout / Tagout procedure must be completed in conjunction with the performance of this procedure.

1. The authorized person shall proceed to the medium voltage switchgear cubicle for the specific piece of equipment where he/she is to verify isolation or place or remove personal locks. He/she shall first ensure that they are at the correct cubicle by checking the exact name of the equipment on the name tag that is permanently affixed to the equipment door.
2. The authorized person shall establish a minimum 4 foot barrier around the door to the cubicle before opening the door.
3. The authorized person shall inspect their low voltage gloves and protectors and shall don the gloves. (Note that standard hard hat, safety glasses, and hearing protection must already be in place.)
4. The authorized employee shall make a final check of the name plate on the cubicle door and shall then open the door wide open to the point where the latch (if provided by this manufacturer) latches the door in the open position. (See the figure below.)



5. Without entering the cubicle, the authorized person shall now visually check to see that the breaker is open and in the fully withdrawn position, the Hold Card is attached, and that the control fuses are withdrawn and their Hold Card is attached. If any of these are not correct the authorized person shall unlatch and close and secure the door. The authorized person shall then immediately notify the Administrative Authority of the irregularity. If the inspections where found to be correct, proceed to step 6.
6. The qualified person may now enter the cubicle to:
   A. Inspect the Hold Card(s) and verify the Hold Card number and/or
   B. Place or remove their personal lock to or from the breaker.

Note: Some equipment may require that a separate control equipment door be opened for the close inspection of the Hold Card and control fuses. In this case 5 and 6A above apply.
If a separate breaker door must be opened and entry made then all steps of this procedure apply.

Caution: Absolute care must be taken during this entry to ensure that contact between the employee and any exposed terminals within the cubicle are not made.

7. The authorized employee shall then close the cubicle door and secure the door using all of the manufacturer supplied latches or bolts. If any are missing or not functioning properly, a safety work order shall be generated to repair the required equipment.

_____ Empl # _____
Authorized Employee being qualified. (print)

_____ Empl # _____
Certification signature by the designated trained qualified person.

Date _____/_____/_____

Appendix K

Procedure and Training for the Visual Verification of Clearance on Medium Voltage Switchgear

(For escorted, Non-qualified Contractor "Person in Charge.")

(Where any entry into the cubicle to place or remove personal lock or inspect Hold Cards is accomplished by the qualified person escort for and under the observation of the contractor's "Person in Charge.")

Medium voltage switchgears in generation stations will include those switchgears with voltages greater than 600 volts and less than 15,000 volts.

This procedure will be applied where a contractor's "Person in Charge" is to be escorted to the switchgear by a qualified person for the purpose of verifying isolation and the "Person in Charge" shall not cross the established 4 foot barrier.

The qualified person that provides escort shall comply with the minimum requirements as specified in either Appendix H or J of this training document and shall complete the steps of Appendix H or J as a proxy for, and under the observation of, the contractor's non-qualified "Person in Charge."

Training

The contractor's non-qualified "Person in Charge" must have previously completed Lockout/Tagout training as is required at the specific facility at which they and their personnel are working and shall additionally be instructed that they shall not, under any circumstance, cross the established 4 foot barrier.

The qualified employee that is providing escort and proxy action under the direct observation of the contractor's non-qualified 'Person in Charge" shall have completed, at a minimum, training, qualification and certification on Appendix H, J, and K as applied.

Qualification Performance

A designated qualified person shall establish the "qualified person escort's" proficiency in the application of this procedure and its related electrical safe work practices detailed within its training requirements and shall document and certify that the employees have received this training when the "qualified person escort" demonstrates the required proficiencies. This shall be accomplished under the direct supervision of the designated qualified person. Employees are required to maintain these proficiencies for the duration of employment.

_____ Empl # _____

Authorized Employee being qualified. (print)

_____ Empl # _____

Certification signature by the designated trained qualified person.

Date _____/_____/_____

Appendix L
"Electrical Safe Work Practices" Inspection Form

This form is intended for the documentation of the inspection for Electrical Safe Work Practices for each employee. At least annually, this shall be completed for all employees applying these Electrical Safe work practices and shall be forwarded to the facilities Health and Safety Specialist for inspection and file retention.

Date and Time of the inspection: _____

Qualified person performing the inspection.

Name: _____ E# _____

Employee being observed:

Name: _____ E# _____

Describe the electrical practice being performed and include the voltage exposure.

_____

_____

_____

Describe the PPE and Barriers applied as well as the electrical safe work practices applied.

_____

_____

_____

Describe any correction that was required in the employee's application of the Electrical Safe Work Practices.

_____

_____

Signature of the qualified person performing the Inspection and date.

Name: _____ Date ____/____/____

Appendix: M / LG&E KU Power Production

Electrical Safety
(70E)
Standardized Barrier Alerting Technique
Guideline

A physical boundary around the perimeter of the electrically exposed area shall be demarcated, in order to keep all unnecessary or un-qualified personnel out of the boundary area. The following techniques shall be used as Energy Service's standard for barrier alerting.

Any area shall be identified with either a sign or imprinted barrier tape provided with the following wording:

Signage Wording:

1) Safety Sign: Only Safety Signs shall be used that are imprinted with the **"Danger"** header and with the wording **"High Voltage Keep Out".**
2) Barricade Tape: Tape shall be red with the imprinted wording **"Danger High Voltage Keep Out"**.

Demarcation:

1) All barricaded areas shall be identified and marked with either a safety sign or with red 3" imprinted barricade tape.
2) Optional high visibility barrier rope or non-conductive safety chain can be used but must be equipped with the "Danger High Voltage Keep Out" safety sign(s).
3) Where equipment configurations allow, a Wall-Mount 'TensaBarrier' can be used. (Similar to Lab Safety Supply, item #52051). Pull out tape must be equipped with the standard "Danger High Voltage Keep Out" safety sign.

Demarcating of Area:

1) Barricading of area shall consist of a single continuous barrier of imprinted barricade tape; or high visibility barrier rope or chain with an attached safety sign. They shall be erected such that persons cannot enter the restricted area from any direction. Signs shall be of sufficient number in order to be seen from all possible directions.

As a means to support the barricade tape, rope, or chain, any one of the following options shall be incorporated:

1) 36" High Visibility Traffic Cones
2) Floor Stands/Post (Stanchions)
3) Wall-Mount TensaBarrier

Where applicable, the barricade tape, rope or chain may be hung by itself where the need of supporting cones or floor stands are not needed.

Note: Traffic cones imprinted with the "Danger High Voltage Keep Out" wording, may be used to support the rope or chain without the need of additional signs.

Means for attaching signs or barrier tape to traffic cone supports shall be by two optional methods:

1) Use of a traffic cone Adapter. (Similar to Seton Catalog, style #M5859.)
2) Use of barrier tape cone clips. (Similar to Lab Safety Supply, item #42376.)

For enclosed switchgear rooms, it is permissible to install the safety sign at each closed door. In addition, as part of the barricading system, red imprinted barricade tape must also be installed inside the room between the door frames. In such a case, imprinted barricade tape can be attached to door frames by an adhesive tape or other adequate means.

ONLY if signs and barricades do not provide sufficient warning and protection from electrical hazards, or such barricades are impractical due to station configuration and/or extremely large boundary distances, shall it be permissible to account for all plant personnel in a controlled safe area. An attendant shall be assigned whose duty it is to restrict all station personnel's movement throughout the facility, thus preventing all unqualified persons from entering the work area that is designated within the protective boundary area. All persons shall remain in the safe area, with the attendant in charge as long as there is a potential for employees to be exposed to the electrical hazards.

6/11/07

PPL companies

Kentucky Utilities Company
Legal Department
220 W. Main St.
Louisville, Kentucky 40202
www.lge-ku.com

Kelly Hollis
Paralegal
T 502-627-3409
F 502-627-3367
Kelly.Hollis@lge-ku.com

June 4, 2014

Mr. Steve Kingsolver
Kentucky Public Service Commission
211 Sower Blvd.
PO Box 615
Frankfort, KY 40601

Re: Employee Injury
Incident Date: March 20, 2014
Report Number: 14-ES-E-009

Dear Mr. Kingsolver:

As per your request, enclosed please find a copy of the arc flash analysis for the equipment involved in the above referenced incident.

The equipment was 480 volt 3 phase switch gear with a breaker rating of 800 amps. The breaker position was visually inspected before it was racked out and before it was racked in.

Company practice is that a job briefing be held prior to an extensive job requiring a minimum of 2 workers. This particular job is typically performed by a single worker but, on that night, 2 workers were on the job site with only one worker performing the job. This was for oversight, not a requirement.

If you need additional information concerning this incident, please contact me at (502) 627-3203.

Sincerely,

Jay Warren

Enclosures

RELAY SETTING TABULATIONS FOR TRIMBLE COUNTY COMMON FLY ASH ELECTRICAL SYSTEMS E70 AND E48

REV	DATE	REASON FOR ISSUE	BY	CK	EGR	PE
4	4/27/10	REVISED AS NOTED AND ISSUED FOR CONSTRUCTION	KC	[illegible]	[illegible]	
3	3/27/2009	REVISED AS NOTED AND ISSUED FOR CONSTRUCTION	SKS	KC	JC	
2	3/13/2009	REVISED AS NOTED AND ISSUED FOR CONSTRUCTION	MM	JG	JG	
1	2/15/2009	REVISED AS NOTED AND ISSUED FOR CONSTRUCTION	MM	JPH	JPH	

BECHTEL
FREDERICK, MD
TRIMBLE COUNTY
TRIMBLE COUNTY UNIT 2 PROJECT
Relay Setting Tabulations for Common Fly Ash Electrical Systems E70 & E48

JOB NO.	UNIT	DRAWING NO.	SHEET	REV.
25191	000	E0-EM-00001	1	4

Location and Unit: TRIMBLE COUNTY UNIT 1
LG&E and KU Energy company — Generation Services
Title: Relay Setting Tabulations for common Fly Ash Electrical Systems E70 & E48

Originator	Job or Process No.	Drawing No.
BECHTEL	117149	TC0-E-05009-EM01

Drawn: BECHTEL
Checked: BECHTEL
Approved: BECHTEL
Released for: CONSTRUCTION

Revision Page:

This page has been added to identify which relay settings or other items have been revised in the latest revision for easy of reviewing the changes and installation of settings in the field.

Pages Revised or Added In this Revision

Page 9 revised and page 12 added.

TABLE OF CONTENTS

Reference:

1. Bechtel Calculation, Relay Setting Calculation for common Fly Ash Transformer No. 25191-000-EMC-EM-00001, Rev 002
2. Bechtel Calculation, Unit 0 Fly Ash System Arc Flash Calculation 25191-000-EMC-EM-00005, Rev 000.
3. Synch Check Relay Calculation, 25191-000-EMC-EM-00004, Rev 000

Attachments:

Attachment A – Relay Setting file for GE Multilin 750; 0A-2A XFMR FDR (7 Pages)
Attachment B – Relay Setting file for GE Multilin 750; 0B-2A XFMR FDR (7 Pages)

Common Fly Ash Relay Settings Information

1.0 Relay settings for Common Fly Ash XMER FDR from 7kV bus 070A1 & 070B1

Rev	Cubicle Description	Device	Manufacturer / Model	Settings	Comments
1	**0A-2A 0T48A11 XFMR FDR**	SBA\SR 750	GE Multilin SR 750	Refer Attachment A for complete relay settings file	Settings file name is 0A-2A.750
1	**0B-2A 0T48B11 XFMR FDR**	SBA\SR 750	GE Multilin SR 750	Refer Attachment B for complete relay settings file	Settings file name is 0B-2A.750

2.0 Relay setting for Common Fly Ash 480V power center 048A11 & 048B11.

2.1 Main incomer section 048A11-02B & 048B11-02B

Device	Parameters	Setting Range	Setting
MicroVersa Trip Plus on breaker 4000A sensor 4000A plug	Long-Time Pickup (LT)	0.50 to 1.10 times In, In steps of 0.05	0.9 (=3600A)
	Long-Time Delay Band	1 = 2.4 sec 2 = 4.9 sec 3 = 9.8 sec 4 = 20.0 sec	Band 1 (2.4 sec)
	Short-Time Pickup	1.5 to 9.0 times LT, In steps of 0.5	2.0 (=7200A)
	Short-Time Delay Band	Min (1) = 0.1 sec Int (2) = 0.21 sec Max (3) = 0.35 sec	Band 3 (0.35 sec)
	Short-Time Delay I^2T Function	IN OUT	OUT
	Ground Pickup	0.2 to 0.3	0.3 (=1200A)
	Ground Time Delay	Min (1) = 0.1 sec Int (2) = 0.21 sec Max (3) = 0.35 sec	Band 3 (0.35 sec)
	Ground -Time Delay I^2T Function	IN OUT	IN

2.2 Main incomer section 048A11-01A & 048B11-03A

Device	Parameters	Setting Range	Setting
Basler Ground fault relay 51G.A &51G.B BE1-51K	Curve Type		B3 – Definite Time (Selector position 5)
	Pick up	0.5 to 4 Amp	4
	Time Dial		16

2.3 Tie section 048A11-04B

Device	Parameters	Setting Range	Setting
MicroVersa Trip Plus on breaker 3200A sensor 2400A plug	Long-Time Pickup (LT)	0.50 to 1.10 times In, in steps of 0.05	1.0 (=2400A)
	Long-Time Delay Band	1 = 2.4 sec 2 = 4.9 sec 3 = 9.8 sec 4 = 20.0 sec	Band 1 (2.4 sec)
	Short-Time Pickup	1.5 to 9.0 times LT, in steps of 0.5	2 (=4800A)
	Short-Time Delay Band	Min (1) = 0.1 sec Int (2) = 0.21 sec Max (3) = 0.35 sec	Band 2 (0.21 sec)
	Short-Time Delay I^2T Function	IN OUT	OUT
	Ground Pickup	0.2 to 0.3	0.23 (=736A)
	Ground Time Delay	Min (1) = 0.1 sec Int (2) = 0.21 sec Max (3) = 0.35 sec	Int (2) (0.21 sec)
	Ground -Time Delay I^2T Function	IN OUT	IN

2.4 MCC Feeder section 048A11-03A & 048B11-01A

Device	Parameters	Setting Range	Setting
MicroVersa Trip Plus on breaker 1600A sensor 800A plug	Long-Time Pickup (LT)	0.50 to 1.10 times In, in steps of 0.05	0.5 (=400A)
	Long-Time Delay Band	1 = 2.4 sec 2 = 4.9 sec 3 = 9.8 sec 4 = 20.0 sec	Band 3 (9.8 sec)
	Short-Time Pickup	1.5 to 9.0 times LT, in steps of 0.5	5 (=2000A)
	Short-Time Delay Band	Min (1) = 0.1 sec Int (2) = 0.21 sec Max (3) = 0.35 sec	Min(1) (0.1 sec)
	Short-Time Delay I^2T Function	IN OUT	IN
	Ground Pickup	0.2 to 0.6	0.3 (=480A)
	Ground Time Delay	Min (1) = 0.1 sec Int (2) = 0.21 sec Max (3) = 0.35 sec	Min (1) (0.1 sec)
	Ground -Time Delay I^2T Function	IN OUT	IN

2.5 Motor Feeder sections 048A11-03B, 048A11-03C, 048B11-01B, 048B11-01C (Blower Motors)

Device	Parameters	Setting Range	Setting
MicroVersa Trip Plus on breaker 800A sensor 600A plug	Long-Time Pickup (LT)	0.50 to 1.10 times In, in steps of 0.05	0.6 (=360A)
	Long-Time Delay Band	1 = 2.4 sec 2 = 4.9 sec 3 = 9.8 sec 4 = 20.0 sec	Band 3 (9.8 sec)
	Short-Time Pickup	1.5 to 9.0 times LT, in steps of 0.5	9.0 (=3240A)
	Short-Time Delay Band	Min (1) = 0.1 sec Int (2) = 0.21 sec Max (3) = 0.35 sec	Min (1)
	Short-Time Delay I^2T Function	IN OUT	IN
	Instantaneous	1.5 to 13 times In	6.0 (=3600A)
	Ground Pickup	0.2 to 0.6	0.6 (=480A)
	Ground Time Delay	Min (1) = 0.1 sec Int (2) = 0.21 sec Max (3) = 0.35 sec	Min (1) (0.1 sec)
	Ground -Time Delay I^2T Function	IN OUT	OUT

2.6 Motor Feeder sections 048A11-03D, 048B11-01D (Slurry Pump Motors)

Device	Parameters	Setting Range	Setting
MicroVersa Trip Plus on breaker 800A sensor 600A plug	Long-Time Pickup (LT)	0.50 to 1.10 times In, in steps of 0.05	0.65 (=390A)
	Long-Time Delay Band	1 = 2.4 sec 2 = 4.9 sec 3 = 9.8 sec 4 = 20.0 sec	Band 3 (9.8 sec)
	Short-Time Pickup	1.5 to 9.0 times LT, in steps of 0.5	9.0 (=3510A)
	Short-Time Delay Band	Min (1) = 0.1 sec Int (2) = 0.21 sec Max (3) = 0.35 sec	Min (1)
	Short-Time Delay I^2T Function	IN OUT	IN
	Instantaneous	1.5 to 13 times In	7.5 (=4500A)
	Ground Pickup	0.2 to 0.6	0.6 (=480A)
	Ground Time Delay	Min (1) = 0.1 sec Int (2) = 0.21 sec Max (3) = 0.35 sec	Min (1) (0.1 sec)
	Ground -Time Delay I^2T Function	IN OUT	OUT

2.7 480V Power Center Synch : Basler BE1-25M Synch Ck Relay (048A11-04A)

Phase Angle ..... 00 to 99 degs set to 10

Time Delay..... 00 to 99 sec set to 01

Multiplier switch..... 0.1 or 1.0 set to 0.1

DB/ Not OV ..... 10 to 135 Vac set to 55

(LED will glow to indicate Line-2 "Dead". See note below.)

LB ..... 10 to 135 Vac set to 84

(LED will glow to indicate Line-2 "Live". See note below.)

ΔV ..... 1 to 135 Vac set to 21

DL/Not OV ..... 10 to 135 Vac set to 55

(LED will glow to indicate Line-1 "Dead". See note below.)

LL..... 10 to 135 Vac set to 84

(LED will glow to indicate Line-1 "Live". See note below.)

Mode Switch 1 = UP

Mode Switch 2 = UP

Condition Switches 1 = Up, 2 = Down, 3= Up, 4= Up, 5= Up

Note:'Line' and 'Bus' are nomenclature specific to the relay BE1-25M. 'Line' input to the relay is taken from Line-1 PT located before the incoming-1 breaker. 'Bus' input to the relay is taken from Line-2 PT located before the incoming-2 breaker. There will be a dead band between 55V to 84V of input to the synch check relay (corresponding to incoming line voltage of 220V and 336V), when none of the 'Dead' and 'Live' indication LEDs for a specific PT input will light up.

2.8 480V Power Center Undervoltage: BE1-27A (048A11-01A & 048B11-03A)

Phase Setting ..... 55 (minimum setting – dial set to dot)

Instantaneous Setting ..... 55 (minimum setting – dial set to dot)

2.9 480V timer relay : Agastat 7012PB and 7012PD (048A11-02A & 048B11-02A)

Timer located 048A11-02A: Nameplate "Main Breaker Trip" ..... 0.5 sec

Timerlocated 048A11-02A: Nameplate "Main Breaker Close" ..... 5.0 sec

Timer located 048B11-02A: Nameplate "Main Breaker Trip" ..... 0.5 sec

Timer located 048B11-02A: Nameplate "Main Breaker Close" ..... 5.0 sec

3.0 Arc – Flash Hazard Categories and Summarization

The arc flash scenarios were analyzed at different locations with different configurations as mentioned below these results are a factor of the protective relay settings listed in this document:

i. Normal Configuration (Tie Breaker 048A11-4B Open)
ii. Single-Ended Configuration (Tie Breaker 048A11-4B Closed)
iii. No Load Condition

The table below summarizes the results based on IEEE Std 1584-2002 Arc-Flash Hazard Calculator. This was validated using ETAP for one case. The ETAP arc flash results for normal configuration for an arc fault at 480 V Bus 048A11 with tie breaker 048A11-4B open which matches closely the IEEE Std 1584-2002 Arc-Flash Hazard Calculator.

The worst case results for the arc fault at different locations are as follows:

Fly Ash Arc Flash summary:

Arc Fault Location	Bus Voltage	Bolted Fault Current	Source ID	Source Protective Device Arcing Current	Incident Energy	Working Distance	Calculated Flash Protection Boundary	Recommended Flash Protection Boundary	Hazard Category
		kA		kA	cal/cm2	mm	ft	ft	Category
480 V Bus 048A11	0.48	52.028	048A11-2B	12.37	19	610	14	16 (note 1)	3
Line Side of 480 V Bus 048A11 Incoming Breaker 048A11-2B	0.48	56.78	0A-2A	11.47 (Transformer Secondary Side Current)	476	610	117	n/a (note 3)	>4
480 V MCC Bus 0FAMCA1	0.48	39.57	048A11-3A	19.45	13	455	7	16 (note 2)	3

Note that all the worst case results apply for the Tie Breaker 048A11-4B closed configuration.

Conclusion Notes:

1.0 The 480 V Fly Ash switchgear 048A11/048B11 Buses have an arc flash hazard risk category of 3 with recommended a flash protection boundary of 16 ft.

2.0 The 480 V Fly Ash MCC 0FAMCA1/0FAMCB1 Buses have an arc flash hazard risk category of 3 with recommended a flash protection boundary of 16 ft.

3.0 Based on arc-flash hazard category, we recommend any work on the line side of the 480 V Bus 048A11 Incoming Breaker 048A11-2B and 480 V Bus 048B11 Incoming Breaker 048B11-2B to be performed with the transformers 0T48A11 and 0T48B11 de-energized, this would include racking in and out the main breakers on the 480V power center buses.

4.0 Fly Ash Power Center Transformers Tap Settings

Transformer Description	Tap Setting
Fly Ash Power Center Transformers 0T48A11 & 0T48B11	a). For MV system voltage (at 6.9kV Bus 070A1 & 070B1) greater than and equal to 102% of 6.9kV, set tap to nominal. b). For MV system voltage (at 6.9kV Bus 070A1 & 070B1) less than 102% of 6.9kV, set tap to -2.5% of nominal

0A-2A.750
L:\CALCULATIONS\PROTECTIVE RELAY SETTING CALCS\RELAY SETTINGS DOC\UNIT 0 FLY ASH\RELAY SETTING FILES\
DEVICE DEFINITION
ORDER CODE: 750
VERSION: 7.0X
SERIAL NUMBER: (NONE)
DESCRIPTION: FLY ASH FEEDER 0A-2A
TEXT COLOR

RELAY SETUP

FRONT PANEL

Flash Message Time	4.0 s
Default Message Timeout	300 s

EVENT RECORDER

Event Recorder Function	Enabled
Record Pickup Events	Enabled
Record Dropout Events	Enabled
Record Trip Events	Enabled
Record Alarm Events	Enabled
Record Logic Input Events	Enabled
Record Set Time/Date Events	Enabled

TRACE MEMORY

Buffer Organization	16 x 512
Trigger Position	25 %
Trigger on pickup	Inactive
Trigger on dropout	Inactive
Trigger on trip	Inactive
Trigger on alarm	Inactive
Trigger on control	Inactive

USER TEXT MESSAGES

User Text Message 1	Trimble County Unit2 Power Plant Project
User Text Message 2	Station FAT 480V P.C. TRANS A
User Text Message 3	Bus / Breaker No.
User Text Message 4	7kV Station Bus 0A / 2A
User Text Message 5	Multilin SR 750

DATA LOGGER

Sample Rate	1 cycle
Buffer Org	16 x 256
Trigger Position(Relay Setup)	25 %
Trigger on alarm(Relay Setup)	Inactive
Trigger on control(Relay Setup)	Inactive
Trigger on dropout(Relay Setup)	Inactive
Trigger on pickup(Relay Setup)	Active
Trigger on trip(Relay Setup)	Inactive
Channel 1 Source	Phase A Current
Channel 2 Source	Phase B Current
Channel 3 Source	Phase C Current
Channel 4 Source	Ground Current
Channel 5 Source	Line A-B Voltage
Channel 6 Source	Line B-C Voltage
Channel 7 Source	Line C-A Voltage
Channel 8 Source	Frequency

INSTALLATION

: SR750/760 Operation	Ready

SYSTEM SETUP

SENSING

Phase CT Primary	1200 A
Ground CT Primary	50 A
Sensitive Ground CT Primary	1000 A
Bus VT Connection Type	Delta
Bus Nominal VT Secondary Voltage	120.0 V
Bus VT Ratio	60.0 : 1
Line VT Connection	Vcb
Line Nominal VT Secondary Voltage	120.0 V
Line VT Ratio	120.0 : 1
Nominal Frequency	60 Hz
Phase Sequence	ACB
Cost of energy	5.0 cents/kWh

FLEXCURVE A

FlexCurve A Trip Time at 1.03 x PU	0 ms
FlexCurve A Trip Time at 1.05 x PU	0 ms
FlexCurve A Trip Time at 1.10 x PU	0 ms
FlexCurve A Trip Time at 1.20 x PU	0 ms

0A-2A.750
L:\CALCULATIONS\PROTECTIVE RELAY SETTING CALCS\RELAY SETTINGS DOC\UNIT 0 FLY ASH\RELAY SETTING FILES\
DEVICE DEFINITION
ORDER CODE: 750
VERSION: 7.0X
SERIAL NUMBER: (NONE)
DESCRIPTION: FLY ASH FEEDER 0A-2A
TEXT COLOR

FLEXCURVE A (continued from last page)

FlexCurve A Trip Time at 1.30 x PU	0 ms
FlexCurve A Trip Time at 1.40 x PU	0 ms
FlexCurve A Trip Time at 1.50 x PU	0 ms
FlexCurve A Trip Time at 1.60 x PU	0 ms
FlexCurve A Trip Time at 1.70 x PU	0 ms
FlexCurve A Trip Time at 1.80 x PU	0 ms
FlexCurve A Trip Time at 1.90 x PU	0 ms
FlexCurve A Trip Time at 2.00 x PU	0 ms
FlexCurve A Trip Time at 2.10 x PU	0 ms
FlexCurve A Trip Time at 2.20 x PU	0 ms
FlexCurve A Trip Time at 2.30 x PU	0 ms
FlexCurve A Trip Time at 2.40 x PU	0 ms
FlexCurve A Trip Time at 2.50 x PU	0 ms
FlexCurve A Trip Time at 2.60 x PU	0 ms
FlexCurve A Trip Time at 2.70 x PU	0 ms
FlexCurve A Trip Time at 2.80 x PU	0 ms
FlexCurve A Trip Time at 2.90 x PU	0 ms
FlexCurve A Trip Time at 3.00 x PU	0 ms
FlexCurve A Trip Time at 3.10 x PU	0 ms
FlexCurve A Trip Time at 3.20 x PU	0 ms
FlexCurve A Trip Time at 3.30 x PU	0 ms
FlexCurve A Trip Time at 3.40 x PU	0 ms
FlexCurve A Trip Time at 3.50 x PU	0 ms
FlexCurve A Trip Time at 3.60 x PU	0 ms
FlexCurve A Trip Time at 3.70 x PU	0 ms
FlexCurve A Trip Time at 3.80 x PU	0 ms
FlexCurve A Trip Time at 3.90 x PU	0 ms
FlexCurve A Trip Time at 4.00 x PU	0 ms
FlexCurve A Trip Time at 4.10 x PU	0 ms
FlexCurve A Trip Time at 4.20 x PU	0 ms
FlexCurve A Trip Time at 4.30 x PU	0 ms
FlexCurve A Trip Time at 4.40 x PU	0 ms
FlexCurve A Trip Time at 4.50 x PU	0 ms
FlexCurve A Trip Time at 4.60 x PU	0 ms
FlexCurve A Trip Time at 4.70 x PU	0 ms
FlexCurve A Trip Time at 4.80 x PU	0 ms
FlexCurve A Trip Time at 4.90 x PU	0 ms
FlexCurve A Trip Time at 5.00 x PU	0 ms
FlexCurve A Trip Time at 5.10 x PU	0 ms
FlexCurve A Trip Time at 5.20 x PU	0 ms
FlexCurve A Trip Time at 5.30 x PU	0 ms
FlexCurve A Trip Time at 5.40 x PU	0 ms
FlexCurve A Trip Time at 5.50 x PU	0 ms
FlexCurve A Trip Time at 5.60 x PU	0 ms
FlexCurve A Trip Time at 5.70 x PU	0 ms
FlexCurve A Trip Time at 5.80 x PU	0 ms
FlexCurve A Trip Time at 5.90 x PU	0 ms
FlexCurve A Trip Time at 6.00 x PU	0 ms
FlexCurve A Trip Time at 6.50 x PU	0 ms
FlexCurve A Trip Time at 7.00 x PU	0 ms
FlexCurve A Trip Time at 7.50 x PU	0 ms
FlexCurve A Trip Time at 8.00 x PU	0 ms
FlexCurve A Trip Time at 8.50 x PU	0 ms
FlexCurve A Trip Time at 9.00 x PU	0 ms
FlexCurve A Trip Time at 9.50 x PU	0 ms
FlexCurve A Trip Time at 10.0 x PU	0 ms
FlexCurve A Trip Time at 10.5 x PU	0 ms
FlexCurve A Trip Time at 11.0 x PU	0 ms
FlexCurve A Trip Time at 11.5 x PU	0 ms
FlexCurve A Trip Time at 12.0 x PU	0 ms
FlexCurve A Trip Time at 12.5 x PU	0 ms
FlexCurve A Trip Time at 13.0 x PU	0 ms
FlexCurve A Trip Time at 13.5 x PU	0 ms
FlexCurve A Trip Time at 14.0 x PU	0 ms
FlexCurve A Trip Time at 14.5 x PU	0 ms
FlexCurve A Trip Time at 15.0 x PU	0 ms
FlexCurve A Trip Time at 15.5 x PU	0 ms
FlexCurve A Trip Time at 16.0 x PU	0 ms
FlexCurve A Trip Time at 16.5 x PU	0 ms
FlexCurve A Trip Time at 17.0 x PU	0 ms

0A-2A.750
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TEXT COLOR

FLEXCURVE A (continued from last page)	
FlexCurve A Trip Time at 17.5 x PU	0 ms
FlexCurve A Trip Time at 18.0 x PU	0 ms
FlexCurve A Trip Time at 18.5 x PU	0 ms
FlexCurve A Trip Time at 19.0 x PU	0 ms
FlexCurve A Trip Time at 19.5 x PU	0 ms
FlexCurve A Trip Time at 20.0 x PU	0 ms

FLEXCURVE B	
FlexCurve B Trip Time at 1.03 x PU	0 ms
FlexCurve B Trip Time at 1.05 x PU	0 ms
FlexCurve B Trip Time at 1.10 x PU	0 ms
FlexCurve B Trip Time at 1.20 x PU	0 ms
FlexCurve B Trip Time at 1.30 x PU	0 ms
FlexCurve B Trip Time at 1.40 x PU	0 ms
FlexCurve B Trip Time at 1.50 x PU	0 ms
FlexCurve B Trip Time at 1.60 x PU	0 ms
FlexCurve B Trip Time at 1.70 x PU	0 ms
FlexCurve B Trip Time at 1.80 x PU	0 ms
FlexCurve B Trip Time at 1.90 x PU	0 ms
FlexCurve B Trip Time at 2.00 x PU	0 ms
FlexCurve B Trip Time at 2.10 x PU	0 ms
FlexCurve B Trip Time at 2.20 x PU	0 ms
FlexCurve B Trip Time at 2.30 x PU	0 ms
FlexCurve B Trip Time at 2.40 x PU	0 ms
FlexCurve B Trip Time at 2.50 x PU	0 ms
FlexCurve B Trip Time at 2.60 x PU	0 ms
FlexCurve B Trip Time at 2.70 x PU	0 ms
FlexCurve B Trip Time at 2.80 x PU	0 ms
FlexCurve B Trip Time at 2.90 x PU	0 ms
FlexCurve B Trip Time at 3.00 x PU	0 ms
FlexCurve B Trip Time at 3.10 x PU	0 ms
FlexCurve B Trip Time at 3.20 x PU	0 ms
FlexCurve B Trip Time at 3.30 x PU	0 ms
FlexCurve B Trip Time at 3.40 x PU	0 ms
FlexCurve B Trip Time at 3.50 x PU	0 ms
FlexCurve B Trip Time at 3.60 x PU	0 ms
FlexCurve B Trip Time at 3.70 x PU	0 ms
FlexCurve B Trip Time at 3.80 x PU	0 ms
FlexCurve B Trip Time at 3.90 x PU	0 ms
FlexCurve B Trip Time at 4.00 x PU	0 ms
FlexCurve B Trip Time at 4.10 x PU	0 ms
FlexCurve B Trip Time at 4.20 x PU	0 ms
FlexCurve B Trip Time at 4.30 x PU	0 ms
FlexCurve B Trip Time at 4.40 x PU	0 ms
FlexCurve B Trip Time at 4.50 x PU	0 ms
FlexCurve B Trip Time at 4.60 x PU	0 ms
FlexCurve B Trip Time at 4.70 x PU	0 ms
FlexCurve B Trip Time at 4.80 x PU	0 ms
FlexCurve B Trip Time at 4.90 x PU	0 ms
FlexCurve B Trip Time at 5.00 x PU	0 ms
FlexCurve B Trip Time at 5.10 x PU	0 ms
FlexCurve B Trip Time at 5.20 x PU	0 ms
FlexCurve B Trip Time at 5.30 x PU	0 ms
FlexCurve B Trip Time at 5.40 x PU	0 ms
FlexCurve B Trip Time at 5.50 x PU	0 ms
FlexCurve B Trip Time at 5.60 x PU	0 ms
FlexCurve B Trip Time at 5.70 x PU	0 ms
FlexCurve B Trip Time at 5.80 x PU	0 ms
FlexCurve B Trip Time at 5.90 x PU	0 ms
FlexCurve B Trip Time at 6.00 x PU	0 ms
FlexCurve B Trip Time at 6.50 x PU	0 ms
FlexCurve B Trip Time at 7.00 x PU	0 ms
FlexCurve B Trip Time at 7.50 x PU	0 ms
FlexCurve B Trip Time at 8.00 x PU	0 ms
FlexCurve B Trip Time at 8.50 x PU	0 ms
FlexCurve B Trip Time at 9.00 x PU	0 ms
FlexCurve B Trip Time at 9.50 x PU	0 ms
FlexCurve B Trip Time at 10.0 x PU	0 ms
FlexCurve B Trip Time at 10.5 x PU	0 ms
FlexCurve B Trip Time at 11.0 x PU	0 ms

0A-2A.750
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DEVICE DEFINITION
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TEXT COLOR

FLEXCURVE B (continued from last page)

FlexCurve B Trip Time at 11.5 x PU	0 ms
FlexCurve B Trip Time at 12.0 x PU	0 ms
FlexCurve B Trip Time at 12.5 x PU	0 ms
FlexCurve B Trip Time at 13.0 x PU	0 ms
FlexCurve B Trip Time at 13.5 x PU	0 ms
FlexCurve B Trip Time at 14.0 x PU	0 ms
FlexCurve B Trip Time at 14.5 x PU	0 ms
FlexCurve B Trip Time at 15.0 x PU	0 ms
FlexCurve B Trip Time at 15.5 x PU	0 ms
FlexCurve B Trip Time at 16.0 x PU	0 ms
FlexCurve B Trip Time at 16.5 x PU	0 ms
FlexCurve B Trip Time at 17.0 x PU	0 ms
FlexCurve B Trip Time at 17.5 x PU	0 ms
FlexCurve B Trip Time at 18.0 x PU	0 ms
FlexCurve B Trip Time at 18.5 x PU	0 ms
FlexCurve B Trip Time at 19.0 x PU	0 ms
FlexCurve B Trip Time at 19.5 x PU	0 ms
FlexCurve B Trip Time at 20.0 x PU	0 ms

LOGIC INPUTS
LOGIC INPUT SETUP

LOGIC INPUT SETUP	
Logic Input 1	52 BKR STATUS
Logic Input 2	Logic Input 2
Logic Input 3	Logic Input 3
Logic Input 4	Logic Input 4
Logic Input 5	Logic Input 5
Logic Input 6	Logic Input 6
Logic Input 7	Logic Input 7
Logic Input 8	Logic Input 8
Logic Input 9	Logic Input 9
Logic Input 10	Logic Input 10
Logic Input 11	Logic Input 11
Logic Input 12	Logic Input 12
Logic Input 13	Logic Input 13
Logic Input 14	Logic Input 14
Logic Input 15	Logic Input 15
Logic Input 16	Logic Input 16
Logic Input 17	Logic Input 17
Logic Input 18	Logic Input 18
Logic Input 19	Logic Input 19
Logic Input 20	Logic Input 20
Logic Input 1 Asserted Logic	Contact Close
Logic Input 2 Asserted Logic	Contact Close
Logic Input 3 Asserted Logic	Contact Close
Logic Input 4 Asserted Logic	Contact Close
Logic Input 5 Asserted Logic	Contact Close
Logic Input 6 Asserted Logic	Contact Close
Logic Input 7 Asserted Logic	Contact Close
Logic Input 8 Asserted Logic	Contact Close
Logic Input 9 Asserted Logic	Contact Close
Logic Input 10 Asserted Logic	Contact Close
Logic Input 11 Asserted Logic	Contact Close
Logic Input 12 Asserted Logic	Contact Close
Logic Input 13 Asserted Logic	Contact Close
Logic Input 14 Asserted Logic	Contact Close

BREAKER FUNCTIONS

BREAKER FUNCTIONS	
52b Contact	Input 1

USER INPUTS

USER INPUT A	
User Input A Name	User Input A

USER INPUT B	
User Input B Name	User Input B

USER INPUT C	
User Input C Name	User Input C

0A-2A.750
L:\CALCULATIONS\PROTECTIVE RELAY SETTING CALCS\RELAY SETTINGS DOC\UNIT 0 FLY ASH\RELAY SETTING FILES
DEVICE DEFINITION
ORDER CODE: 750
VERSION: 7.0X
SERIAL NUMBER: (NONE)
DESCRIPTION: FLY ASH FEEDER 0A-2A
TEXT COLOR

USER INPUT D	
User Input D Name	User Input D
USER INPUT E	
User Input E Name	User Input E
USER INPUT F	
User Input F Name	User Input F
USER INPUT G	
User Input G Name	User Input G
USER INPUT H	
User Input H Name	User Input H
USER INPUT I	
User Input I Name	User Input I
USER INPUT J	
User Input J Name	User Input J
USER INPUT K	
User Input K Name	User Input K
USER INPUT L	
User Input L Name	User Input L
USER INPUT M	
User Input M Name	User Input M
USER INPUT N	
User Input N Name	User Input N
USER INPUT O	
User Input O Name	User Input O
USER INPUT P	
User Input P Name	User Input P
USER INPUT Q	
User Input Q Name	User Input Q
USER INPUT R	
User Input R Name	User Input R
USER INPUT S	
User Input S Name	User Input S
USER INPUT T	
User Input T Name	User Input T
OUTPUT RELAYS	
1 TRIP	
1 TRIP Seal In Time	0.04 s
2 CLOSE	
2 CLOSE Seal In Time	0.04 s
3 AUXILIARY	
3 AUXILIARY Name	AUXILIARY
3 AUXILIARY Non-operated State	Energized
3 AUXILIARY Output Type	Latched
4 AUXILIARY	
4 AUXILIARY Name	AUXILIARY
4 AUXILIARY Non-operated State	Energized
4 AUXILIARY Output Type	Latched
5 AUXILIARY	
5 AUXILIARY Name	AUXILIARY

0A-2A.750
L:\CALCULATIONS\PROTECTIVE RELAY SETTING CALCS\RELAY SETTINGS DOC\UNIT 0 FLY ASH\RELAY SETTING FILES
DEVICE DEFINITION
ORDER CODE: 750
VERSION: 7.0X
SERIAL NUMBER: (NONE)
DESCRIPTION: FLY ASH FEEDER 0A-2A
TEXT COLOR

5 AUXILIARY (continued from last page)

5 AUXILIARY Non-operated State	De-energized
5 AUXILIARY Output Type	Self-Resetting

6 AUXILIARY

6 AUXILIARY Name	AUXILIARY
6 AUXILIARY Non-operated State	De-energized
6 AUXILIARY Output Type	Self-Resetting

7 AUXILIARY

7 AUXILIARY Name	AUXILIARY
7 AUXILIARY Non-operated State	De-energized
7 AUXILIARY Output Type	Latched

PROTECTION
PHASE CURRENT
PHASE TIME OVERCURRENT 1

Phase Time Overcurrent 1 Function	Trip
Phase Time Overcurrent 1: Relay 3	Do Not Operate
Phase Time Overcurrent 1: Relay 4	Do Not Operate
Phase Time Overcurrent 1: Relay 5	Do Not Operate
Phase Time Overcurrent 1: Relay 6	Do Not Operate
Phase Time Overcurrent 1: Relay 7	Operate
Phase Time Overcurrent 1 Pickup(Setpoints)	0.32 x CT
Phase Time Overcurrent 1 Curve	Very Inverse
Phase Time Overcurrent 1 Multiplier	12.10
Phase Time Overcurrent 1 Reset	Instantaneous

PHASE INSTANTANEOUS OVERCURRENT 1

Phase Instantaneous Overcurrent 1 Function	Trip
Phase Instantaneous Overcurrent 1: Relay 3	Do Not Operate
Phase Instantaneous Overcurrent 1: Relay 4	Do Not Operate
Phase Instantaneous Overcurrent 1: Relay 5	Do Not Operate
Phase Instantaneous Overcurrent 1: Relay 6	Do Not Operate
Phase Instantaneous Overcurrent 1: Relay 7	Operate
Phase Instantaneous Overcurrent 1 Pickup(Setpoints)	6.40 x CT
Phase Instantaneous Overcurrent 1 Delay	0.01 s
Phases Required for Operation(O/C 1)	Any One

GROUND CURRENT
GROUND TIME OVERCURRENT

Ground Time Overcurrent Function	Trip
Ground Time Overcurrent: Relay 3	Do Not Operate
Ground Time Overcurrent: Relay 4	Do Not Operate
Ground Time Overcurrent: Relay 5	Do Not Operate
Ground Time Overcurrent: Relay 6	Do Not Operate
Ground Time Overcurrent: Relay 7	Operate
Ground Time Overcurrent Pickup(Setpoints)	0.30 x CT
Ground Time Overcurrent Curve	Definite Time
Ground Time Overcurrent Multiplier	1.00
Ground Time Overcurrent Reset	Instantaneous

FAULT LOCATOR

Length of Feeder	0.1
Units of Length	km
Zpos (Resistive) of Feeder	0.01 Ohm
Zpos (Inductive) of Feeder	0.01 Ohm
Zzero (Resistive) of Feeder	0.01 Ohm
Zzero (Inductive) of Feeder	0.01 Ohm

ANALOG INPUT
SETUP

Analog Input Name (10 words)	ANALOG INPUT
Analog Input Units (3 words)	uA
Analog Input Range	0-20 mA
Analog Input Minimum Value	0 uA
Analog Input Maximum Value	20000 uA

THRESHOLD 1

Analog Input Threshold 1 Name	Analog Threshld 1

0A-2A.750
L:\CALCULATIONS\PROTECTIVE RELAY SETTING CALCS\RELAY SETTINGS DOC\UNIT 0 FLY ASH\RELAY SETTING FILES
DEVICE DEFINITION
ORDER CODE: 750
VERSION: 7.0X
SERIAL NUMBER: (NONE)
DESCRIPTION: FLY ASH FEEDER 0A-2A
TEXT COLOR

THRESHOLD 2

Analog Input Threshold 2 Name	Analog Threshld 2

COIL MONITOR 1

Coil Monitor 1 Name	Trip Coil Monitor
Coil Monitor 1 Function	Latched Alarm
Coil Monitor 1: Relay 3	Operate
Coil Monitor 1: Relay 4	Do Not Operate
Coil Monitor 1: Relay 5	Do Not Operate
Coil Monitor 1: Relay 6	Do Not Operate
Coil Monitor 1: Relay 7	Do Not Operate
Coil Monitor 1 Delay	5 s
Coil Monitor 1 Type	Trip

COIL MONITOR 2

Coil Monitor 2 Name	LOR Coil Monitor
Coil Monitor 2 Function	Latched Alarm
Coil Monitor 2: Relay 3	Do Not Operate
Coil Monitor 2: Relay 4	Operate
Coil Monitor 2: Relay 5	Do Not Operate
Coil Monitor 2: Relay 6	Do Not Operate
Coil Monitor 2: Relay 7	Do Not Operate
Coil Monitor 2 Delay	5 s
Coil Monitor 2 Type	Trip

CONTROL

SETPOINT GROUPS

SETPOINT GROUPS

Active Setpoint Group(Setpoints)	Group 1
Edit Setpoint Group(Setpoints)	Active Group

PROTECTION

PHASE CURRENT[SETPOINT GROUP 1]

PHASE TIME OVERCURRENT 1[SETPOINT GROUP 1]

Phase Time Overcurrent 1 Function	Trip
Phase Time Overcurrent 1: Relay 3	Do Not Operate
Phase Time Overcurrent 1: Relay 4	Do Not Operate
Phase Time Overcurrent 1: Relay 5	Do Not Operate
Phase Time Overcurrent 1: Relay 6	Do Not Operate
Phase Time Overcurrent 1: Relay 7	Operate
Phase Time Overcurrent 1 Pickup(Setpoints)	0.32 x CT
Phase Time Overcurrent 1 Curve	Very Inverse
Phase Time Overcurrent 1 Multiplier	12.10
Phase Time Overcurrent 1 Reset	Instantaneous

PHASE INSTANTANEOUS OVERCURRENT 1[SETPOINT GROUP 1]

Phase Instantaneous Overcurrent 1 Function	Trip
Phase Instantaneous Overcurrent 1: Relay 3	Do Not Operate
Phase Instantaneous Overcurrent 1: Relay 4	Do Not Operate
Phase Instantaneous Overcurrent 1: Relay 5	Do Not Operate
Phase Instantaneous Overcurrent 1: Relay 6	Do Not Operate
Phase Instantaneous Overcurrent 1: Relay 7	Operate
Phase Instantaneous Overcurrent 1 Pickup(Setpoints)	6.40 x CT
Phase Instantaneous Overcurrent 1 Delay	0.01 s
Phases Required for Operation(O/C 1)	Any One

GROUND CURRENT[SETPOINT GROUP 1]

GROUND TIME OVERCURRENT[SETPOINT GROUP 1]

Ground Time Overcurrent Function	Trip
Ground Time Overcurrent: Relay 3	Do Not Operate
Ground Time Overcurrent: Relay 4	Do Not Operate
Ground Time Overcurrent: Relay 5	Do Not Operate
Ground Time Overcurrent: Relay 6	Do Not Operate
Ground Time Overcurrent: Relay 7	Operate
Ground Time Overcurrent Pickup(Setpoints)	0.30 x CT
Ground Time Overcurrent Curve	Definite Time
Ground Time Overcurrent Multiplier	1.00
Ground Time Overcurrent Reset	Instantaneous

0B-2A.750
L:\CALCULATIONS\PROTECTIVE RELAY SETTING CALCS\RELAY SETTINGS DOC\UNIT 0 FLY ASH\RELAY SETTING FILES
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TEXT COLOR

RELAY SETUP

FRONT PANEL

Flash Message Time	4.0 s
Default Message Timeout	300 s

EVENT RECORDER

Event Recorder Function	Enabled
Record Pickup Events	Enabled
Record Dropout Events	Enabled
Record Trip Events	Enabled
Record Alarm Events	Enabled
Record Logic Input Events	Enabled
Record Set Time/Date Events	Enabled

TRACE MEMORY

Buffer Organization	16 x 512
Trigger Position	25 %
Trigger on pickup	Inactive
Trigger on dropout	Inactive
Trigger on trip	Inactive
Trigger on alarm	Inactive
Trigger on control	Inactive

USER TEXT MESSAGES

User Text Message 1	Trimble County Unit2 Power Plant Project
User Text Message 2	Station FAT 480V P.C. TRANS B
User Text Message 3	Bus / Breaker No.
User Text Message 4	7kV Station Bus 0B / 2A
User Text Message 5	Multilin SR 750

DATA LOGGER

Sample Rate	1 cycle
Buffer Org	16 x 256
Trigger Position(Relay Setup)	25 %
Trigger on alarm(Relay Setup)	Inactive
Trigger on control(Relay Setup)	Inactive
Trigger on dropout(Relay Setup)	Inactive
Trigger on pickup(Relay Setup)	Active
Trigger on trip(Relay Setup)	Inactive
Channel 1 Source	Phase A Current
Channel 2 Source	Phase B Current
Channel 3 Source	Phase C Current
Channel 4 Source	Ground Current
Channel 5 Source	Line A-B Voltage
Channel 6 Source	Line B-C Voltage
Channel 7 Source	Line C-A Voltage
Channel 8 Source	Frequency

INSTALLATION

: SR750/760 Operation	Ready

SYSTEM SETUP

SENSING

Phase CT Primary	1200 A
Ground CT Primary	50 A
Sensitive Ground CT Primary	1000 A
Bus VT Connection Type	Delta
Bus Nominal VT Secondary Voltage	120.0 V
Bus VT Ratio	60.0 : 1
Line VT Connection	Van
Line Nominal VT Secondary Voltage	120.0 V
Line VT Ratio	120.0 : 1
Nominal Frequency	60 Hz
Phase Sequence	ACB
Cost of energy	5.0 cents/kWh

FLEXCURVE A

FlexCurve A Trip Time at 1.03 x PU	0 ms
FlexCurve A Trip Time at 1.05 x PU	0 ms
FlexCurve A Trip Time at 1.10 x PU	0 ms
FlexCurve A Trip Time at 1.20 x PU	0 ms

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FLEXCURVE A (continued from last page)

FlexCurve A Trip Time at 1.30 x PU	0 ms
FlexCurve A Trip Time at 1.40 x PU	0 ms
FlexCurve A Trip Time at 1.50 x PU	0 ms
FlexCurve A Trip Time at 1.60 x PU	0 ms
FlexCurve A Trip Time at 1.70 x PU	0 ms
FlexCurve A Trip Time at 1.80 x PU	0 ms
FlexCurve A Trip Time at 1.90 x PU	0 ms
FlexCurve A Trip Time at 2.00 x PU	0 ms
FlexCurve A Trip Time at 2.10 x PU	0 ms
FlexCurve A Trip Time at 2.20 x PU	0 ms
FlexCurve A Trip Time at 2.30 x PU	0 ms
FlexCurve A Trip Time at 2.40 x PU	0 ms
FlexCurve A Trip Time at 2.50 x PU	0 ms
FlexCurve A Trip Time at 2.60 x PU	0 ms
FlexCurve A Trip Time at 2.70 x PU	0 ms
FlexCurve A Trip Time at 2.80 x PU	0 ms
FlexCurve A Trip Time at 2.90 x PU	0 ms
FlexCurve A Trip Time at 3.00 x PU	0 ms
FlexCurve A Trip Time at 3.10 x PU	0 ms
FlexCurve A Trip Time at 3.20 x PU	0 ms
FlexCurve A Trip Time at 3.30 x PU	0 ms
FlexCurve A Trip Time at 3.40 x PU	0 ms
FlexCurve A Trip Time at 3.50 x PU	0 ms
FlexCurve A Trip Time at 3.60 x PU	0 ms
FlexCurve A Trip Time at 3.70 x PU	0 ms
FlexCurve A Trip Time at 3.80 x PU	0 ms
FlexCurve A Trip Time at 3.90 x PU	0 ms
FlexCurve A Trip Time at 4.00 x PU	0 ms
FlexCurve A Trip Time at 4.10 x PU	0 ms
FlexCurve A Trip Time at 4.20 x PU	0 ms
FlexCurve A Trip Time at 4.30 x PU	0 ms
FlexCurve A Trip Time at 4.40 x PU	0 ms
FlexCurve A Trip Time at 4.50 x PU	0 ms
FlexCurve A Trip Time at 4.60 x PU	0 ms
FlexCurve A Trip Time at 4.70 x PU	0 ms
FlexCurve A Trip Time at 4.80 x PU	0 ms
FlexCurve A Trip Time at 4.90 x PU	0 ms
FlexCurve A Trip Time at 5.00 x PU	0 ms
FlexCurve A Trip Time at 5.10 x PU	0 ms
FlexCurve A Trip Time at 5.20 x PU	0 ms
FlexCurve A Trip Time at 5.30 x PU	0 ms
FlexCurve A Trip Time at 5.40 x PU	0 ms
FlexCurve A Trip Time at 5.50 x PU	0 ms
FlexCurve A Trip Time at 5.60 x PU	0 ms
FlexCurve A Trip Time at 5.70 x PU	0 ms
FlexCurve A Trip Time at 5.80 x PU	0 ms
FlexCurve A Trip Time at 5.90 x PU	0 ms
FlexCurve A Trip Time at 6.00 x PU	0 ms
FlexCurve A Trip Time at 6.50 x PU	0 ms
FlexCurve A Trip Time at 7.00 x PU	0 ms
FlexCurve A Trip Time at 7.50 x PU	0 ms
FlexCurve A Trip Time at 8.00 x PU	0 ms
FlexCurve A Trip Time at 8.50 x PU	0 ms
FlexCurve A Trip Time at 9.00 x PU	0 ms
FlexCurve A Trip Time at 9.50 x PU	0 ms
FlexCurve A Trip Time at 10.0 x PU	0 ms
FlexCurve A Trip Time at 10.5 x PU	0 ms
FlexCurve A Trip Time at 11.0 x PU	0 ms
FlexCurve A Trip Time at 11.5 x PU	0 ms
FlexCurve A Trip Time at 12.0 x PU	0 ms
FlexCurve A Trip Time at 12.5 x PU	0 ms
FlexCurve A Trip Time at 13.0 x PU	0 ms
FlexCurve A Trip Time at 13.5 x PU	0 ms
FlexCurve A Trip Time at 14.0 x PU	0 ms
FlexCurve A Trip Time at 14.5 x PU	0 ms
FlexCurve A Trip Time at 15.0 x PU	0 ms
FlexCurve A Trip Time at 15.5 x PU	0 ms
FlexCurve A Trip Time at 16.0 x PU	0 ms
FlexCurve A Trip Time at 16.5 x PU	0 ms
FlexCurve A Trip Time at 17.0 x PU	0 ms

0B-2A.750
L:\CALCULATIONS\PROTECTIVE RELAY SETTING CALCS\RELAY SETTINGS DOC\UNIT 0 FLY ASH\RELAY SETTING FILES
DEVICE DEFINITION
ORDER CODE: 750
VERSION: 7.0X
SERIAL NUMBER: (NONE)
DESCRIPTION: FLY ASH FEEDER 0B-2A
TEXT COLOR

FLEXCURVE A (continued from last page)	
FlexCurve A Trip Time at 17.5 x PU	0 ms
FlexCurve A Trip Time at 18.0 x PU	0 ms
FlexCurve A Trip Time at 18.5 x PU	0 ms
FlexCurve A Trip Time at 19.0 x PU	0 ms
FlexCurve A Trip Time at 19.5 x PU	0 ms
FlexCurve A Trip Time at 20.0 x PU	0 ms

FLEXCURVE B	
FlexCurve B Trip Time at 1.03 x PU	0 ms
FlexCurve B Trip Time at 1.05 x PU	0 ms
FlexCurve B Trip Time at 1.10 x PU	0 ms
FlexCurve B Trip Time at 1.20 x PU	0 ms
FlexCurve B Trip Time at 1.30 x PU	0 ms
FlexCurve B Trip Time at 1.40 x PU	0 ms
FlexCurve B Trip Time at 1.50 x PU	0 ms
FlexCurve B Trip Time at 1.60 x PU	0 ms
FlexCurve B Trip Time at 1.70 x PU	0 ms
FlexCurve B Trip Time at 1.80 x PU	0 ms
FlexCurve B Trip Time at 1.90 x PU	0 ms
FlexCurve B Trip Time at 2.00 x PU	0 ms
FlexCurve B Trip Time at 2.10 x PU	0 ms
FlexCurve B Trip Time at 2.20 x PU	0 ms
FlexCurve B Trip Time at 2.30 x PU	0 ms
FlexCurve B Trip Time at 2.40 x PU	0 ms
FlexCurve B Trip Time at 2.50 x PU	0 ms
FlexCurve B Trip Time at 2.60 x PU	0 ms
FlexCurve B Trip Time at 2.70 x PU	0 ms
FlexCurve B Trip Time at 2.80 x PU	0 ms
FlexCurve B Trip Time at 2.90 x PU	0 ms
FlexCurve B Trip Time at 3.00 x PU	0 ms
FlexCurve B Trip Time at 3.10 x PU	0 ms
FlexCurve B Trip Time at 3.20 x PU	0 ms
FlexCurve B Trip Time at 3.30 x PU	0 ms
FlexCurve B Trip Time at 3.40 x PU	0 ms
FlexCurve B Trip Time at 3.50 x PU	0 ms
FlexCurve B Trip Time at 3.60 x PU	0 ms
FlexCurve B Trip Time at 3.70 x PU	0 ms
FlexCurve B Trip Time at 3.80 x PU	0 ms
FlexCurve B Trip Time at 3.90 x PU	0 ms
FlexCurve B Trip Time at 4.00 x PU	0 ms
FlexCurve B Trip Time at 4.10 x PU	0 ms
FlexCurve B Trip Time at 4.20 x PU	0 ms
FlexCurve B Trip Time at 4.30 x PU	0 ms
FlexCurve B Trip Time at 4.40 x PU	0 ms
FlexCurve B Trip Time at 4.50 x PU	0 ms
FlexCurve B Trip Time at 4.60 x PU	0 ms
FlexCurve B Trip Time at 4.70 x PU	0 ms
FlexCurve B Trip Time at 4.80 x PU	0 ms
FlexCurve B Trip Time at 4.90 x PU	0 ms
FlexCurve B Trip Time at 5.00 x PU	0 ms
FlexCurve B Trip Time at 5.10 x PU	0 ms
FlexCurve B Trip Time at 5.20 x PU	0 ms
FlexCurve B Trip Time at 5.30 x PU	0 ms
FlexCurve B Trip Time at 5.40 x PU	0 ms
FlexCurve B Trip Time at 5.50 x PU	0 ms
FlexCurve B Trip Time at 5.60 x PU	0 ms
FlexCurve B Trip Time at 5.70 x PU	0 ms
FlexCurve B Trip Time at 5.80 x PU	0 ms
FlexCurve B Trip Time at 5.90 x PU	0 ms
FlexCurve B Trip Time at 6.00 x PU	0 ms
FlexCurve B Trip Time at 6.50 x PU	0 ms
FlexCurve B Trip Time at 7.00 x PU	0 ms
FlexCurve B Trip Time at 7.50 x PU	0 ms
FlexCurve B Trip Time at 8.00 x PU	0 ms
FlexCurve B Trip Time at 8.50 x PU	0 ms
FlexCurve B Trip Time at 9.00 x PU	0 ms
FlexCurve B Trip Time at 9.50 x PU	0 ms
FlexCurve B Trip Time at 10.0 x PU	0 ms
FlexCurve B Trip Time at 10.5 x PU	0 ms
FlexCurve B Trip Time at 11.0 x PU	0 ms

0B-2A.750
L:\CALCULATIONS\PROTECTIVE RELAY SETTING CALCS\RELAY SETTINGS DOC\UNIT 0 FLY ASH\RELAY SETTING FILES
DEVICE DEFINITION
ORDER CODE: 750
VERSION: 7.0X
SERIAL NUMBER: (NONE)
DESCRIPTION: FLY ASH FEEDER 0B-2A
TEXT COLOR

FLEXCURVE B (continued from last page)	
FlexCurve B Trip Time at 11.5 x PU	0 ms
FlexCurve B Trip Time at 12.0 x PU	0 ms
FlexCurve B Trip Time at 12.5 x PU	0 ms
FlexCurve B Trip Time at 13.0 x PU	0 ms
FlexCurve B Trip Time at 13.5 x PU	0 ms
FlexCurve B Trip Time at 14.0 x PU	0 ms
FlexCurve B Trip Time at 14.5 x PU	0 ms
FlexCurve B Trip Time at 15.0 x PU	0 ms
FlexCurve B Trip Time at 15.5 x PU	0 ms
FlexCurve B Trip Time at 16.0 x PU	0 ms
FlexCurve B Trip Time at 16.5 x PU	0 ms
FlexCurve B Trip Time at 17.0 x PU	0 ms
FlexCurve B Trip Time at 17.5 x PU	0 ms
FlexCurve B Trip Time at 18.0 x PU	0 ms
FlexCurve B Trip Time at 18.5 x PU	0 ms
FlexCurve B Trip Time at 19.0 x PU	0 ms
FlexCurve B Trip Time at 19.5 x PU	0 ms
FlexCurve B Trip Time at 20.0 x PU	0 ms

LOGIC INPUTS

LOGIC INPUT SETUP

LOGIC INPUT SETUP	
Logic Input 1	52 BKR STATUS
Logic Input 2	Logic Input 2
Logic Input 3	Logic Input 3
Logic Input 4	Logic Input 4
Logic Input 5	Logic Input 5
Logic Input 6	Logic Input 6
Logic Input 7	Logic Input 7
Logic Input 8	Logic Input 8
Logic Input 9	Logic Input 9
Logic Input 10	Logic Input 10
Logic Input 11	Logic Input 11
Logic Input 12	Logic Input 12
Logic Input 13	Logic Input 13
Logic Input 14	Logic Input 14
Logic Input 15	Logic Input 15
Logic Input 16	Logic Input 16
Logic Input 17	Logic Input 17
Logic Input 18	Logic Input 18
Logic Input 19	Logic Input 19
Logic Input 20	Logic Input 20
Logic Input 1 Asserted Logic	Contact Close
Logic Input 2 Asserted Logic	Contact Close
Logic Input 3 Asserted Logic	Contact Close
Logic Input 4 Asserted Logic	Contact Close
Logic Input 5 Asserted Logic	Contact Close
Logic Input 6 Asserted Logic	Contact Close
Logic Input 7 Asserted Logic	Contact Close
Logic Input 8 Asserted Logic	Contact Close
Logic Input 9 Asserted Logic	Contact Close
Logic Input 10 Asserted Logic	Contact Close
Logic Input 11 Asserted Logic	Contact Close
Logic Input 12 Asserted Logic	Contact Close
Logic Input 13 Asserted Logic	Contact Close
Logic Input 14 Asserted Logic	Contact Close

BREAKER FUNCTIONS

BREAKER FUNCTIONS	
52b Contact	Input 1

USER INPUTS

USER INPUT A	
User Input A Name	User Input A

USER INPUT B	
User Input B Name	User Input B

USER INPUT C	
User Input C Name	User Input C

0B-2A.750
L:\CALCULATIONS\PROTECTIVE RELAY SETTING CALCS\RELAY SETTINGS DOC\UNIT 0 FLY ASH\RELAY SETTING FILES
DEVICE DEFINITION
ORDER CODE: 750
VERSION: 7.0X
SERIAL NUMBER: (NONE)
DESCRIPTION: FLY ASH FEEDER 0B-2A
TEXT COLOR

USER INPUT D	
User Input D Name	User Input D
USER INPUT E	
User Input E Name	User Input E
USER INPUT F	
User Input F Name	User Input F
USER INPUT G	
User Input G Name	User Input G
USER INPUT H	
User Input H Name	User Input H
USER INPUT I	
User Input I Name	User Input I
USER INPUT J	
User Input J Name	User Input J
USER INPUT K	
User Input K Name	User Input K
USER INPUT L	
User Input L Name	User Input L
USER INPUT M	
User Input M Name	User Input M
USER INPUT N	
User Input N Name	User Input N
USER INPUT O	
User Input O Name	User Input O
USER INPUT P	
User Input P Name	User Input P
USER INPUT Q	
User Input Q Name	User Input Q
USER INPUT R	
User Input R Name	User Input R
USER INPUT S	
User Input S Name	User Input S
USER INPUT T	
User Input T Name	User Input T
OUTPUT RELAYS	
1 TRIP	
1 TRIP Seal In Time	0.04 s
2 CLOSE	
2 CLOSE Seal In Time	0.04 s
3 AUXILIARY	
3 AUXILIARY Name	AUXILIARY
3 AUXILIARY Non-operated State	Energized
3 AUXILIARY Output Type	Latched
4 AUXILIARY	
4 AUXILIARY Name	AUXILIARY
4 AUXILIARY Non-operated State	Energized
4 AUXILIARY Output Type	Latched
5 AUXILIARY	
5 AUXILIARY Name	AUXILIARY

0B-2A.750
L:\CALCULATIONS\PROTECTIVE RELAY SETTING CALCS\RELAY SETTINGS DOC\UNIT 0 FLY ASH\RELAY SETTING FILES
DEVICE DEFINITION
ORDER CODE: 750
VERSION: 7.0X
SERIAL NUMBER: (NONE)
DESCRIPTION: FLY ASH FEEDER 0B-2A
TEXT COLOR

5 AUXILIARY (continued from last page)	
5 AUXILIARY Non-operated State	De-energized
5 AUXILIARY Output Type	Self-Resetting
6 AUXILIARY	
6 AUXILIARY Name	AUXILIARY
6 AUXILIARY Non-operated State	De-energized
6 AUXILIARY Output Type	Self-Resetting
7 AUXILIARY	
7 AUXILIARY Name	AUXILIARY
7 AUXILIARY Non-operated State	De-energized
7 AUXILIARY Output Type	Latched
PROTECTION	
PHASE CURRENT	
PHASE TIME OVERCURRENT 1	
Phase Time Overcurrent 1 Function	Trip
Phase Time Overcurrent 1: Relay 3	Do Not Operate
Phase Time Overcurrent 1: Relay 4	Do Not Operate
Phase Time Overcurrent 1: Relay 5	Do Not Operate
Phase Time Overcurrent 1: Relay 6	Do Not Operate
Phase Time Overcurrent 1: Relay 7	Operate
Phase Time Overcurrent 1 Pickup(Setpoints)	0.32 x CT
Phase Time Overcurrent 1 Curve	Very Inverse
Phase Time Overcurrent 1 Multiplier	12.10
Phase Time Overcurrent 1 Reset	Instantaneous
PHASE INSTANTANEOUS OVERCURRENT 1	
Phase Instantaneous Overcurrent 1 Function	Trip
Phase Instantaneous Overcurrent 1: Relay 3	Do Not Operate
Phase Instantaneous Overcurrent 1: Relay 4	Do Not Operate
Phase Instantaneous Overcurrent 1: Relay 5	Do Not Operate
Phase Instantaneous Overcurrent 1: Relay 6	Do Not Operate
Phase Instantaneous Overcurrent 1: Relay 7	Operate
Phase Instantaneous Overcurrent 1 Pickup(Setpoints)	6.40 x CT
Phase Instantaneous Overcurrent 1 Delay	0.01 s
Phases Required for Operation(O/C 1)	Any One
GROUND CURRENT	
GROUND TIME OVERCURRENT	
Ground Time Overcurrent Function	Trip
Ground Time Overcurrent: Relay 3	Do Not Operate
Ground Time Overcurrent: Relay 4	Do Not Operate
Ground Time Overcurrent: Relay 5	Do Not Operate
Ground Time Overcurrent: Relay 6	Do Not Operate
Ground Time Overcurrent: Relay 7	Operate
Ground Time Overcurrent Pickup(Setpoints)	0.30 x CT
Ground Time Overcurrent Curve	Definite Time
Ground Time Overcurrent Multiplier	1.00
Ground Time Overcurrent Reset	Instantaneous
FAULT LOCATOR	
Length of Feeder	0.1
Units of Length	km
Zpos (Resistive) of Feeder	0.01 Ohm
Zpos (Inductive) of Feeder	0.01 Ohm
Zzero (Resistive) of Feeder	0.01 Ohm
Zzero (Inductive) of Feeder	0.01 Ohm
ANALOG INPUT	
SETUP	
Analog Input Name (10 words)	ANALOG INPUT
Analog Input Units (3 words)	uA
Analog Input Range	0-20 mA
Analog Input Minimum Value	0 uA
Analog Input Maximum Value	20000 uA
THRESHOLD 1	
Analog Input Threshold 1 Name	Analog Threshld 1

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L:\CALCULATIONS\PROTECTIVE RELAY SETTING CALCS\RELAY SETTINGS DOC\UNIT 0 FLY ASH\RELAY SETTING FILES
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ORDER CODE: 750
VERSION: 7.0X
SERIAL NUMBER: (NONE)
DESCRIPTION: FLY ASH FEEDER 0B-2A
TEXT COLOR

THRESHOLD 2	
Analog Input Threshold 2 Name	Analog Threshld 2
COIL MONITOR 1	
Coil Monitor 1 Name	Trip Coil Monitor
Coil Monitor 1 Function	Latched Alarm
Coil Monitor 1: Relay 3	Operate
Coil Monitor 1: Relay 4	Do Not Operate
Coil Monitor 1: Relay 5	Do Not Operate
Coil Monitor 1: Relay 6	Do Not Operate
Coil Monitor 1: Relay 7	Do Not Operate
Coil Monitor 1 Delay	5 s
Coil Monitor 1 Type	Trip
COIL MONITOR 2	
Coil Monitor 2 Name	LOR Coil Monitor
Coil Monitor 2 Function	Latched Alarm
Coil Monitor 2: Relay 3	Do Not Operate
Coil Monitor 2: Relay 4	Operate
Coil Monitor 2: Relay 5	Do Not Operate
Coil Monitor 2: Relay 6	Do Not Operate
Coil Monitor 2: Relay 7	Do Not Operate
Coil Monitor 2 Delay	5 s
Coil Monitor 2 Type	Trip
CONTROL	
SETPOINT GROUPS	
SETPOINT GROUPS	
Active Setpoint Group(Setpoints)	Group 1
Edit Setpoint Group(Setpoints)	Active Group
PROTECTION	
PHASE CURRENT[SETPOINT GROUP 1]	
PHASE TIME OVERCURRENT 1[SETPOINT GROUP 1]	
Phase Time Overcurrent 1 Function	Trip
Phase Time Overcurrent 1: Relay 3	Do Not Operate
Phase Time Overcurrent 1: Relay 4	Do Not Operate
Phase Time Overcurrent 1: Relay 5	Do Not Operate
Phase Time Overcurrent 1: Relay 6	Do Not Operate
Phase Time Overcurrent 1: Relay 7	Operate
Phase Time Overcurrent 1 Pickup(Setpoints)	0.32 x CT
Phase Time Overcurrent 1 Curve	Very Inverse
Phase Time Overcurrent 1 Multiplier	12.10
Phase Time Overcurrent 1 Reset	Instantaneous
PHASE INSTANTANEOUS OVERCURRENT 1[SETPOINT GROUP 1]	
Phase Instantaneous Overcurrent 1 Function	Trip
Phase Instantaneous Overcurrent 1: Relay 3	Do Not Operate
Phase Instantaneous Overcurrent 1: Relay 4	Do Not Operate
Phase Instantaneous Overcurrent 1: Relay 5	Do Not Operate
Phase Instantaneous Overcurrent 1: Relay 6	Do Not Operate
Phase Instantaneous Overcurrent 1: Relay 7	Operate
Phase Instantaneous Overcurrent 1 Pickup(Setpoints)	6.40 x CT
Phase Instantaneous Overcurrent 1 Delay	0.01 s
Phases Required for Operation(O/C 1)	Any One
GROUND CURRENT[SETPOINT GROUP 1]	
GROUND TIME OVERCURRENT[SETPOINT GROUP 1]	
Ground Time Overcurrent Function	Trip
Ground Time Overcurrent: Relay 3	Do Not Operate
Ground Time Overcurrent: Relay 4	Do Not Operate
Ground Time Overcurrent: Relay 5	Do Not Operate
Ground Time Overcurrent: Relay 6	Do Not Operate
Ground Time Overcurrent: Relay 7	Operate
Ground Time Overcurrent Pickup(Setpoints)	0.30 x CT
Ground Time Overcurrent Curve	Definite Time
Ground Time Overcurrent Multiplier	1.00
Ground Time Overcurrent Reset	Instantaneous

Attachment C

KPSC Photographs of Accident Site

#1

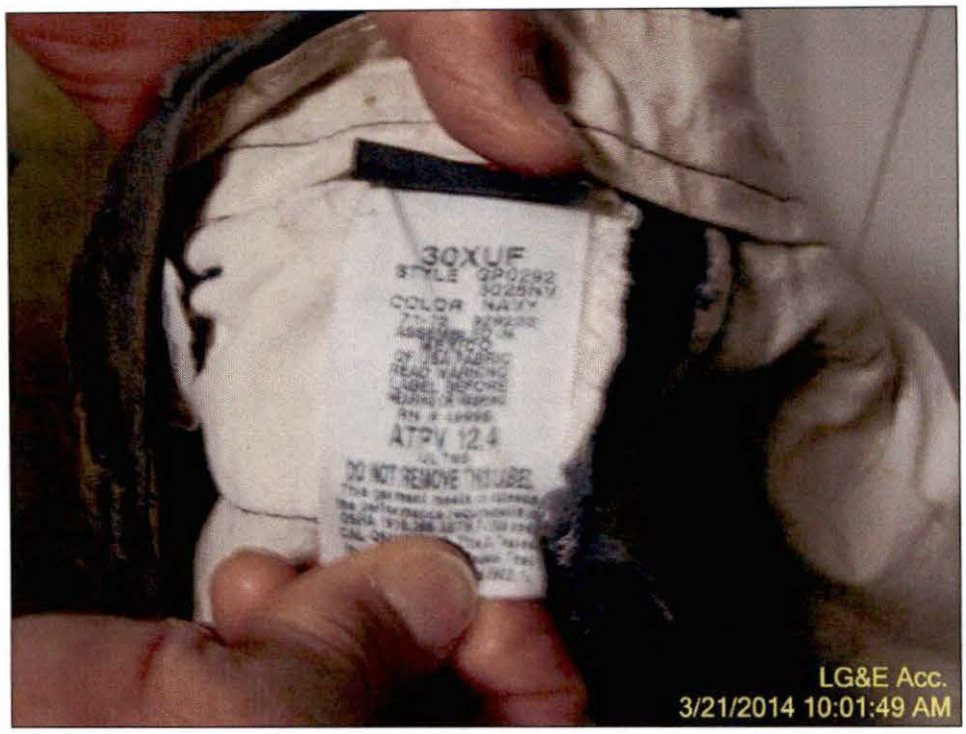
#2

#3

#4

#5

#6


30XUF
ATPV 12.4
DO NOT REMOVE THIS LABEL
LG&E Acc.
3/21/2014 10:01:49 AM

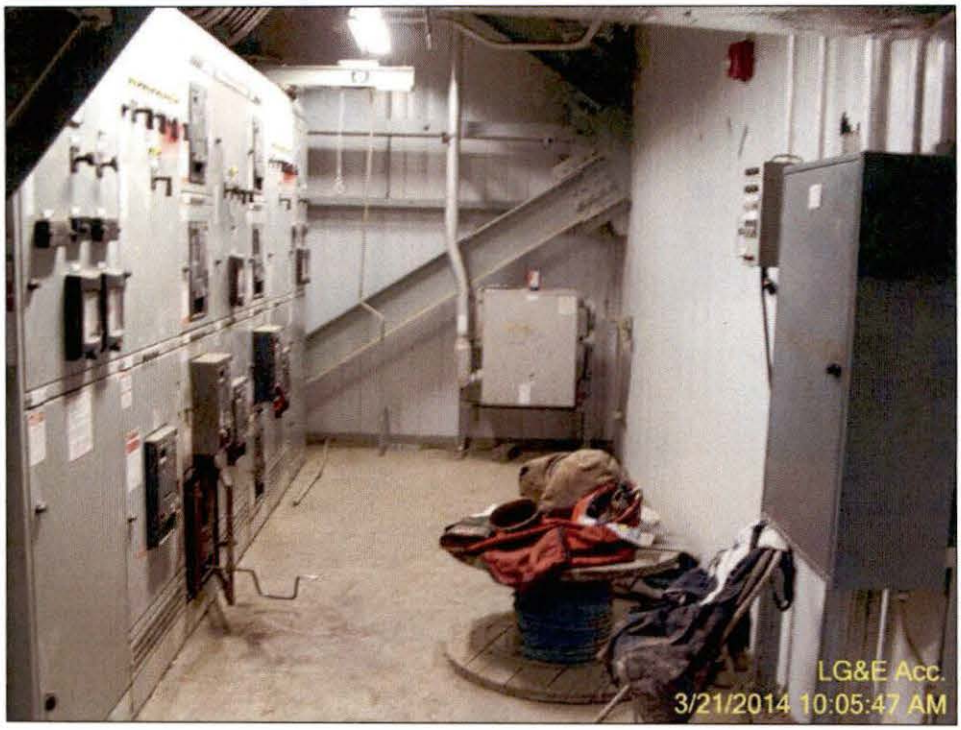
#7


LG&E Acc.
3/21/2014 10:02:48 AM

#8

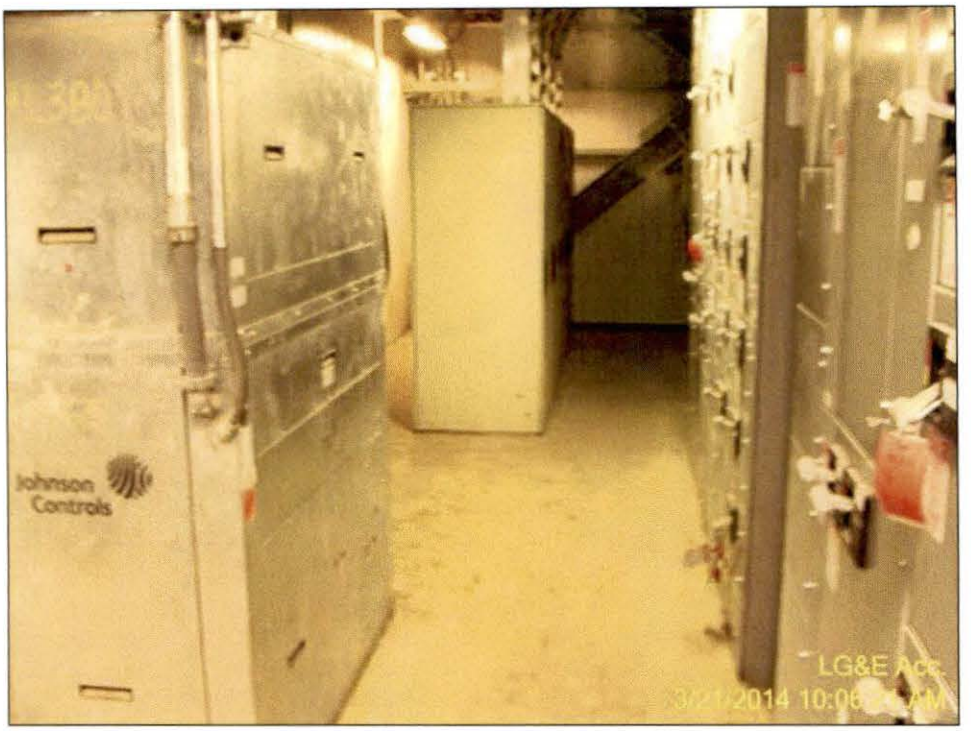
#9

#10



#11

#12



#13

#14

#15

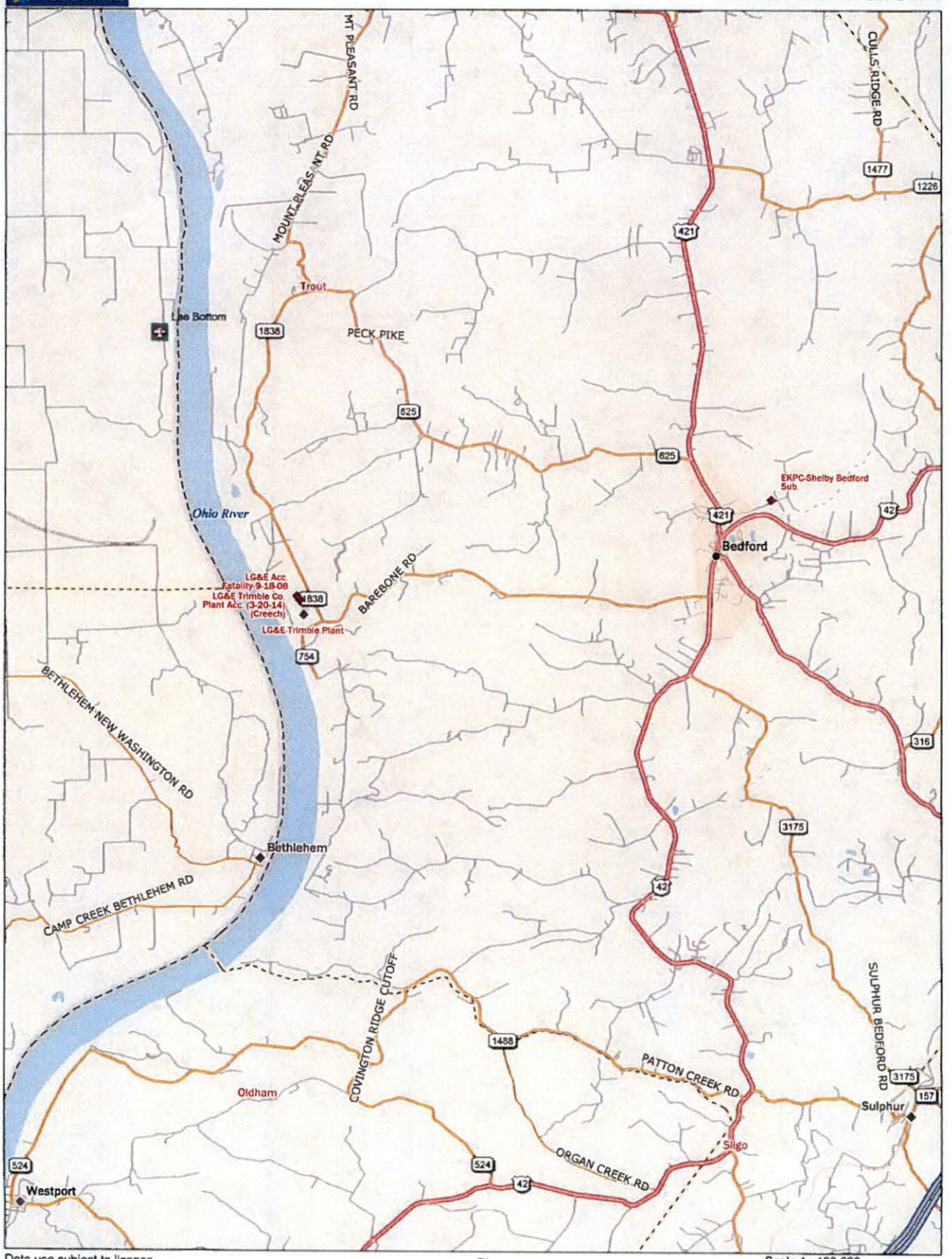
#16

Attachment D

KPSC Map of Accident Site

DeLorme

DeLorme Street Atlas USA® 2010



TN

MN (4.9°W)

Scale 1 : 100,000

1" = 1.58 mi

Data Zoom 11-0

Attachment E

KPSC Notification from LG&E

Kingsolver, Steve (PSC)

From: Kingsolver, Steve (PSC)
Sent: Friday, March 21, 2014 1:07 AM
To: Gorjian, Fereydoon (PSC); Moore, Jeffrey C (PSC); Shupp, John (PSC); Ernst, Melinda A (PSC); Morris, Scott A (PSC); Kingsolver, Steve (PSC); Bowman, Eric C (PSC); Johnson, Jeff A (PSC); Rice, James D (PSC); Willard, Kyle (PSC)
Subject: LG+E Reportable Accident

Employee Accident

Reported by: Doug Chinn
LG+E/KU Safety

Acc. Happened: Approx. 10:45PM
3-20-14

Victim Hospitalized / Admitted:
Approx. 12:11 AM
3-21-14

PSC Notified: Approx. 12:23PM. 3-21-14

Victim: Ben Creech
LG+E Employee at Trimble Co
Plant, Bedford, Ky.
2nd/3rd Degree burns on Legs

Victim was racking 480 volt breaker and the breaker exploded. Victim was taken to University Hospital in Louisville,Ky. where he was admitted.

Eric,

It is my intention to do a site investigation on 3-21-14 unless directed differently. As we discussed earlier, Scott Morris will be asked to to go with me.

I will be using B1790 unless you would prefer I drive something else. I do not think there will be c-time involved unless this runs long in the PM. The most would be a couple of hours. At this time I have approximately 125 hours C-time.

Steve Kingsolver.

*Louisville Gas and Electric Company
220 W. Main Street
P. O. Box 32010
Louisville, KY 40232-2010

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220 W. Main Street
P. O. Box 32010
Louisville, KY 40232-2010

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Louisville Gas and Electric Company
220 W. Main Street
P. O. Box 32010
Louisville, KY 40232-2010