

REPORT ON ELECTRICAL INCIDENT WHERE PRIVATE CONTRACTORS WERE INJURED WHILST PERFORMING WORK ON 6 600 VOLT CABLES IN THE GERMISTON AREA: “NEAR MISS” OR A “NEAR FATAL INCIDENT”



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INTRODUCTION

An event referred to as a “near miss” or a “near fatal incident” occurred. The incident, therefore, requires the same actions as a fatal incident.

For the purpose of preventing incidents of this nature, the report is shared with all other.

The purpose is to report and inform all on the electrical incident that occurred in Ekurhuleni, Germiston area, corner of Newton and Essex Roads, when three persons of a contracting firm, sustained serious burns whilst performing work on 6 600 volt cables when at the same time personnel of the Germiston electricity division performed switching operations.

MOTIVATION

On instruction, an investigation team led by the Chief Engineer: Operations, Electricity, Corporate, investigated the incident.

An almost fatal incident occurred in the Germiston area, corner of Newton and Essex Roads, when three persons of a contracting firm, sustained burns whilst working close to a 6 600 volt cable when at the same time personnel of the Germiston electricity division performed switching operations.

A further reason for reporting this incident is due to the fact that this incident can be described as an event referred to as a “near miss” or a “near fatal incident”. The incident, therefore, requires the same actions as a fatal incident.

➤ INVESTIGATION TEAM

S Delpont (Chief Engineer: Operations: MI Electricity Corporate Office)
 (Chief Engineer: Maintenance, MI Electricity Corporate Office)
 (Area Manager: Alberton CCC)
 (Senior Engineer: Protection, Test and Metering: Brakpan CCC)

Definitions

Danger: Anything that may cause injury or damage to persons or property.

Hazard: The source of or an exposure to danger.

Risk: The probability that injury or damage will occur.

Safe: Free from any hazard.

At the investigation, the Senior Engineer: Operations and Maintenance, Germiston Electricity Division, explained to the investigation team the detail that lead to this incident.

A worker of a contractor was burned on both legs just below the knees and left arm and was hospitalized for two days. Another worker was also burned on both legs and both arms and was hospitalized one day.

INCIDENT PARTICULARS

Place/address of incident	cnr. Newton and Essex Roads, Meadowdale, Germiston
Name of person injured	Messrs. X and Y
Position of injured person	Contractors:
Operational personnel involved	Messrs. A & B & C & D
Statements received	Messrs. A & B & C & D

On a specific Monday morning, at approximately 09:00, Mr. A, an electrician, was requested by his senior, Mr B, to investigate a no power complaint from a customer receiving his supply from Rietcons 33 kV Substation, panel 59.

On arriving at the substation, Mr A found that panel 59 tripped (in the off position) and that the over-current and master trip relays indicated that a trip had been initiated.

Apparently Mr B then instructed Mr A to reset the indication relays and to make an attempt to close (switch-on), panel 59 circuit breaker. It was then reported by Mr. A that panel 59 circuit breaker tripped again.

Following the attempt to switch on panel 59, Mr C reported that people were injured (burnt) at the corner of Newton and Essex Roads, Meadodale, Germiston, where he and a contractor were working close to and around an opened joint pit.

1. Photo 1, below showing the cable arrangements at the site of the incident corner of Newton and Essex Road.



Photo 1

On investigating the incident, it was found that certain on site cable work were already performed on the day prior to the incident at the corner of Newton and Essex Roads that contributed to the incident on the day of the incident.

Not all preparation work and some switching operations carried out on the day prior to the incident, will be described in detail. The investigating team did not regard all of it as important factors that contributed to the cause of the incident. However, the statements received did described most of the work performed.

On the day prior to the incident, Mr D apparently identified a specific cable to be worked on the site in a joint hole amongst other cables. A certain cable identifying instrument was used to assist the Germiston personnel to identify the correct cable to be worked on.

After the cable was identified as the “correct” one to be worked on, it was spiked, intentionally damaging the cable to prove that the cable is “off” and to protect personnel from coming into close contact with a possible live cable.

Apparently, once the cable was safely isolated, earthed and spiked, the personnel incorrectly assumed that they were to perform work on the “correct” required cable and that there was no hazard or danger to prevent the contractor from proceeding with the work.

However, the investigation team is of the opinion that should the involved operational staff had performed a basic continuity test on the day prior to the incident; they would have realized that they had identified the incorrect cable to be worked on. Thus after spiking and cutting an incorrect live cable or possibly an old redundant cable. A basic continuity test to confirm the correct cable is identified must have had been performed.

The Investigation Team is of the opinion that all authorized operational personnel should be aware of such dangers involved in electricity and should as far as practicable possible follow the following essential to perform work safely on electrical/equipment/switchgear/transformers/machinery/wires and/or cables.

These essential steps are as follows:-

- a) A visible circuit element must be “switch-off”, “tested” and “earthed;”

- b) A visible “test” “dead” meaning “switched-off,”
- c) A visible “earth/s” is to be installed to protect the circuit from being electrically charged;
- d) The person spiking the cable shall wear a protective safety flash suite and follow all other operational procedures as stipulated in the Operational Procedures and Policies: Section No.10: Spiking of Cables;
- e) A continuity test must be carried out that will **confirm** that the correct cable/overhead line/switchgear/transformer or machinery has been earthed to prevent the danger from being charged or made live; and
- f) As far as practicable possible no person(s) be allowed to do work in a joint pit whenever switching operations are to be performed in a specific area, even when that area is perceived not to be affected.
- g) Work permit to be issued, by the authorised person, to responsible personnel /contractor performing the task.

Wherever practically possible and only after the above-mentioned procedures have been followed and proven to all involved, e.g. after the application of suitable visible earth/s to the circuit by the competent person/s, should it be expected from other personnel, un-skilled or semi-skilled, should personnel or contractors be allowed to start work on applicable electrical equipment/switchgear/Transformers /machinery/ wires and/or cables.

Such a procedure deems necessary as Electricians/Artisans unfortunately, from time to time, seem to take so called “short cuts” or due to previous experience or incorrect work methods used over years. They do not always regard it necessary to follow the recommended safe operational procedures.

The requirement to “**test**” to confirm whether the correct circuit is “**live**” meaning “**switched-on**” or “**dead**” meaning “**switched-off**” before work is performed cannot be over emphasized.

CONCLUSION

The Investigating Team acknowledges that the specific cable identifying instrument may not be reliable or trustworthy enough to identify a specific cable and that the personnel followed the correct procedure in spiking the identified cable by Mr D.

The Investigation Team found that no continuity test was performed immediately after spiking the identified cable in order to proof that work would have been performed onto the correct cable.

Should the responsible operational officer, Mr B, have performed a continuity test prior in authorising the work to proceed, and not only afterwards, the incident could have been prevented.

As a matter of concern it should be pointed out that no proof that a working permit was issued by the Germiston Operational staff could be found. This is an already standing instruction. Although a working permit, under the circumstances would probably not have prevented this incident from happening, it is been seen as a serious sign that short cuts are taken which may lead to dangerous situations created.

A statement made by Mr. B “***We did continuity test and realised we have spiked the wrong cable. From the new K4 I could get no continuity on one of the cables. At that***”

stage we checked the substations in the area and saw that the power was on. It looked like we spiked a redundant cable as we were not aware of any power failures”, it is clear that the assumption was made that they had probably spiked a redundant cable whilst in fact they have spiked a live 6600volt cable, further stresses the point that a confirmed test is required rather than to make any assumptions whilst working on dangerous high or medium voltage electrical networks.

For the sole purpose of preventing incidents of this nature, it was recommended that the Training Centre Manager in conjunction with the Germiston CCC Senior Engineer: Operations and Maintenance, have to prepare an informative presentation on the incident and that the Training Manager arrange to share it with all other similar areas electricity divisions operational staff to reduced the risk and dangers of similar incidents and injury to employees from happening.

It was also recommended that a record of attendance be kept to ensure that all relevant personnel under their control attend such a presentation/information sharing session.

It is to be mentioned that the OHSACT Electrical Machinery Regulation’s requirement for work on disconnected electrical machinery regulation 3 states as follows:-

“Without derogating from any specific duty imposed on employers or users of machinery by the act, the employer or user shall, whenever work is to be carried out on any electrical machinery which has been disconnected from all sources of electrical energy but which is liable to acquire an electrical charge, as far as practicable, cause precautions to be taken by earthing or other means to discharge the electrical energy to earth from such electrical machinery or any adjacent electrical machinery if there is danger there from before it is handled and to prevent any electrical machinery from being charged or made live while persons are working thereon”.

Lastly, but of importance, note is to be taken that the investigation team found that no early alarm warning system is installed at the Rietcons Substation, in Germiston, and various other substations. This is of real importance. Had the Germiston personnel been informed immediately of a circuit breaker that tripped in the network they would probably have realised that they had spiked the wrong cable.

The following **Annexures** are attached:-

2. Annexure “A”: Human Resources: OHSACT Section

“The Occupational Health and Safety (OH&S) Section support comments made by the investigation team with the following additions:

- 1. In future the division should have an Occupational Health and Safety (OH&S) Officer located in the affected Customer Care Centre (CCC) to be part of the investigation team.*
- 2. There was lack of communication between the people who switched on from the one site with the people who were working on the other site.*
- 3. Bearing in mind the experience of the Municipal Infrastructure (MI): Electricity personnel who were involved in this accident it indicates that refresher or induction course is not continuously offered.*
- 4. It is not indicated any where in the report as to whether a valid contractual agreement between Electricity Department and Eletassure was entered into.*
- 5. No proper Personal Protective Equipment/Uniform was used during the course of work.*
- 6. There is an indication of unclear safe work procedures and lack of communication*

on safe work procedures.

Recommendations:

1. *Involve OH&S Officers in the investigation of major accidents (Fatal cases).*
2. *Improve the communication system especially between call centres and field workers who perform work from different places, poles, substations etc.*
3. *Provide continuous training, supervision and monitoring of electricity personnel.*
4. *Always enter into a **valid contractual agreement** with all contractors. As for this one please furnish the OH&S Section with a copy of the contractual agreement entered into.*
5. *Document and strengthen the communication of Safe Work Procedures.*
6. *Do job analysis of each task and provide appropriate Personal Protective Equipment or Clothing.”*

RECOMMENDATION

1. **That** the contents of the report, to report to Council the electrical incident that occurred at the Germiston CCC, corner of Newton and Essex Roads, when three persons of a contracting firm, sustained burns whilst working close to a 6 600 volt cable when at the same time personnel of the Germiston electricity division performed switching operations, **BE NOTED.**
2. **That** authorized electrical operational staff **BE INSTRUCTED** to as far as practicable possible, also perform a continuity test from the point of work to proof that the correct cable/switchgear/overhead line/transformer or machinery is correctly identified. That all precautions be taken by earthing and testing to prevent applicable electrical equipment/switchgear/transformers/machinery/ wires and/or cables, or adjacent electrical machinery from being charged or made live while persons are working thereon.
3. That the following essential steps as far as practicable possible, **BE FOLLOWED:-**
 - a) A visible circuit element must be “switch-off”, “tested” and “earthed”
 - b) A visible “test” for “dead” meaning “switched-off” performed
 - c) A visible “earth/s” is to be installed to protect the circuit from being electrically charged.
 - d) The person spiking the cable shall wear a protective safety flash suite and follow all other operational procedures as stipulated in the Operational Procedures and Policies: Section No.10: Spiking of Cables.
 - e) As far as practicable possible, a continuity test be carried out that will confirm that the correct cable/overhead line/switchgear/transformer or machinery has been earthed to prevent the danger from being charged or made live.
 - f) As far as practicable possible, a visible continuity test be carried out that will confirm that the correct cable/overhead line/switchgear/transformer or machinery has been earthed to prevent the danger from being charged or made live.
 - g) As far as practicable possible no person(s) be allowed to do work in a joint pit whenever switching operations are to be performed in a specific area, even when

that area is perceived not to be affected.

- h) Work permit to be issued, by the authorised person, to responsible personnel/contractor performing the task.
4. **That** the essential steps in **3** above, **BE APPROVED** and **BE ADOPTED** and **INCLUDED** into the Electricity and Energy Department's standing instructions.
 5. **That** for the sole purpose of preventing incidents of this nature, the Training Centre Manager in conjunction with the Germiston CCC Senior Engineer: Operations and Maintenance, **PREPARE** an informative presentation on the incident and that the Training Manager **ARRANGE** to share it with all other CCC's Electricity Divisions applicable operational staff members **TO REDUCED** the risk and danger of injury to employees.

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