

ITEM/2004

MI EO(2004/07/050) BENONI CCC: INJURY ON DUTY: 11 000 VOLT INCIDENT: ARTISAN ASSISTANT: MR. P MAKHETHA: INVESTIGATION REPORT

(MI/E/13/4/12)

PURPOSE

To report to Council on the electrical incident that occurred on 12 June 2004 at the Benoni CCC, in North Road, Putfontein, at Pole No. BB19/B69/4 when an artisan assistant, Mr. P Makhetha sustained serious burns by inadvertently coming into contact with live 11 000 volt overhead lines whilst performing after-hour standby duties.

MOTIVATION

An unfortunate incident occurred on 12 June 2004, in Benoni when an artisan assistant, Mr. P Makhetha sustained very serious burns by inadvertently coming into contact with live 11 000 volt overhead lines whilst performing after-hour standby duties.

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

❖ **INVESTIGATION TEAM**

S Delport (Chief Engineer: Operations: Corporate)
H Marx (Senior Engineer: Operations and Maintenance, Germiston CCC)
David van Vuuren (Engineer: Operations and Maintenance, Tembisa CCC)

Also present:

B Lamprecht (Area Manager: Electricity Division: Benoni CCC)
C Day (Engineer: Operations and Maintenance: Benoni CCC)
N Motau, (Standby Electrician: Benoni CCC)
J Swanepoel, (Standby Duty Official: Benoni CCC)

On Friday, 18 June 2004 at the investigation, the Area Manager of the Electricity Division, Benoni CCC, reported that staff from the Linmed hospital informed him that there is a possibility that both hands of Mr. P Makhetha may have to be amputated due to the extensive damages caused to his hands during the incident. It has since been established that both hands of Mr. P Makhetha have been amputated between the wrists and the elbows.

❖ **INCIDENT PARTICULARS**

Date of incident	: 12 June 2004
Time of incident	: Approximately 14:00
Place/address of incident	: North Road, Putfontein Benoni. Pole No. BB19/B69/4
Name of person injured	: Mr. P Makhetha
Position of injured person	: Artisan Assistant
Operational personnel involved	: Mr. N Motau, Standby Electrician Mr. J Swanepoel, Standby Duty Official
Statements received	: Messrs. N Motau & J Swanepoel

On 12 June 2004, Mr. N. Motau, the electrician on standby and his assistant Mr. P Makhetha attended to the restoration of a power failure in North Road, Putfontein, Benoni. Mr. Makhetha inadvertently came into contact with live 11 000 volt overhead power lines.

❖ **DESCRIPTION OF EVENTS**

- Mr. N Motau received a complaint from the Eastern Regional Call Centre of a phase-out at Clyde Brickworks, North Road, Putfontein, Benoni.
- An investigation by Messrs. Motau and Makhetha showed that an 11 000 volt “jumper connector” at pole no. BB19/B69/4 North Road Putfontein, yellow phase, burned off, where it was connected to a set of “cut-out” fuse links.
- Mr. Motau contacted the Standby Duty Official, Mr. J Swanepoel to obtain permission to operate a set of “cut-out” fuse links at pole no. BB19/B69/1, the nearest point of isolation, in order to isolate the portion of overhead power lines where they were required to repair the said “jumper connection”.
- Permission was obtained from Mr. Swanepoel, after Mr. Swanepoel verified by means of a line diagram that by opening the fuse links at pole no. BB19/B69/1, they would safely isolate the overhead line where the repair work was to be carried out. Mr. Motau opened all three “cut-out” fuse links and proceeded to the point where the repair work was required.
- At pole no. BB19/B69/4, Messrs. Motau and Makhetha used a mobile elevating platform truck to rise to the top of the said pole, to test.
- During the process of moving upwards, Mr. Makhetha, who was reported to be with Mr. Motau in the bucket of the mobile elevating platform truck, inadvertently came into contact with the live 11000 volt overhead lines.
- Mr. Makhetha suffered electrical shock and burns to his arms and hands. The Ekurhuleni Metropolitan Municipality Emergency Services was called and after providing emergency treatment to Mr. Makhetha, in order to stabilize his condition, Mr. Makhetha was admitted to the Intensive Care Unit of the Linmed Hospital, Rynfield, Benoni for further treatment and observation.
- Mr. Swanepoel, after submitting the necessary documentation at the Linmed Hospital, proceeded to the site where the accident occurred in order to establish the cause of the accident and to restore the power. Mr. Swanepoel also notified Mr. Chris Day, Engineer: Operations and Maintenance, of the incident.

3. **Post-Incident Action**

- Mr. Swanepoel discovered that, after close inspection of the overhead line circuit that the yellow or centre phase “cut-out” fuse link at pole no. BB19/B69/1 was bridged out on the line side of the fuse link. The opening of the “cut-out” fuse link, therefore, had no affect on the action taken to isolate the 11 000 volt power line.

- Mr. Swanepoel, with the assistance of the standby electrician responsible for the town area, Mr. B Tabu, isolated the power line at the next point of isolation viz. "Triswitch" pole no. BB19/B60 in Combrink Road, and successfully completed the necessary repair work at pole no. BB19/B69/4. The power was restored at approximately 18:00.
- On Monday 14 June 2004, the Area Manager, Mr B Lamprecht and senior officials Messrs. C Day, N Barnard and J Swanepoel conducted a site inspection.
- Specific attention was given to the arrangement of the "cut-out" fuse link at pole no. BB19/B69/1 and it was concluded that two possibilities existed, namely that during the upgrading and strengthening of the rural network during the 2000/2001 Capex Budget, the "cut-out" fuse link could have been wired incorrectly or, since the said upgrade, the fuse link could have been bridged out as a "temporary repair" in order to restore power as soon as possible and the same was never normalised.
- At pole no. BB19/B69/6, which forms part of the same circuit, a Delta/Star 11000/400 Volt pole mounted transformer, is installed supplying the 400 volt overhead network in North road, Putfontein. Since the yellow phase remained energized via the bridged out fuse link at pole no. BB19/B69/1, a back feed was created through the transformer primary winding, resulting in both the red and blue phases at pole no. BB19/B69/4 being live.
- Mr. P Makhetha will be consulted with, once his health condition permits such action.
- In terms of departmental instructions and operating procedures and acceptable procedures permitted and put forward during in-house training sessions, it is alleged that Mr. Motau did not comply with the said standing instructions and procedures, which could be considered an act of gross negligence on his behalf. The necessary disciplinary action will be instituted against Mr. Motau.

4. **Steps taken to prevent the recurrence of future accidents:**

- The Acting Operations Officer, Mr. J Bronkhorst, Benoni CCC, was verbally instructed on 16 June 2004, to immediately conduct a survey by means of using a line diagram to physically inspect all similar "cut-out" fuse links as well as any other overhead line isolator equipment installed in the total Benoni CCC's medium voltage rural networks, to ascertain the condition and status of such equipment and to report without any delay any irregularities found to the Engineer, Operations and Maintenance, Mr. Chris Day, in order to take corrective measures.
- The Acting Operations Officer Mr. J Bronkhorst, was to take the necessary corrective measures to have the subject fuse link at pole no. BB19/B69/1 correctly installed on 20 June 2004. On the said date it was established beyond any doubt that the fuse link was bridged out as a "temporary repair" by a staff member unknown at this stage, in order to restore power as soon as possible to the subject area and the same was never normalised

- A written instruction is to be re-issued to all competent operating staff confirming the previous resolution taken by the Mayoral Committee on 19 February 2004, where it was resolved that as far as practically possible (should be in most cases), both sides of any high/medium voltage switchgear, transformers, isolators or equipment, be switched off, tested as “Dead” and be earthed on both sides (where applicable) from where it can be made “live” before work is allowed to be carried out.
- The investigation team supported the following recommendations of the Benoni CCC, Area Manager, Electricity Division:-
 - a. *“That after isolation of any High/Medium voltage overhead line network or circuit, the testing of such a line network or circuit to demonstrate that it is electrically dead, shall be conducted from ground level, making use of a high voltage proximity tester attached to an extendable operating link stick. This instruction will merely reiterate the standard procedure in place, which was the only acceptable procedure permitted and put forward during in-house training sessions.*
 - b. *That the use of a mobile elevating platform is not permitted until “working earths” have been applied on both sides of the workplace. The application of earths shall be by means of an extendable operating link stick, from ground level.*
 - c. *That no staff will be permitted, for whatever reason, to bypass any “cut-out” fuse link or isolation apparatus installed on medium voltage overhead line networks, unless specific approval was obtained from a senior staff member.”*

5. PARTICULARS OF STAFF MEMBERS INVOLVED

Standby duty official: Mr. J Swanepoel
ID number: 6903035071009
Date engaged: 01 January 1990
Position: Acting Engineer: Protection, Test and Metering
Years applicable experience: Approximately 12 years

Area B standby electrician: Mr. N. Motau
ID number: 5608145794082
Date engaged: 05 May 1997
Position: Electrician: Medium Voltage Distribution, Operations and Maintenance
Years applicable experience: 7 years

Artisan assistant injured: Mr. P Makhetha
ID number: 5109255391082
Date engaged: 26 January 1988
Position: Artisan Assistant: Protection, Test and Metering
Years applicable experience: 16 years

Area A standby electrician: Mr. B Tabu
ID number: 6409095962087
Date engaged: 17 July 1995
Position: Test Technician: Protection, Test and Metering
Years applicable experience: 8 years

6. In addition to the steps already recommended the investigation team felt that the following **NEW** procedures should also be recommended for approval:-

- Procedure for refusal to work on grounds of safety concerns. (Attached as **Annexure “B”**);
- With the sole purpose to support and protect the rights of all personnel in the electricity division:

Such a procedure deemed 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 any circuit is “**live**” meaning “**switched-on**” or “**dead**” meaning “**switched-off**” before “**earthed**” cannot be over emphasized.

The Investigation Team is of the opinion that with some basic knowledge and training, all personnel assisting Electricians/Artisans can be made aware of the dangers involved in electricity and can be made aware of the essential steps required to perform work safely on electrical equipment / switchgear / transformers/ wires and/ or cables.

These essential steps are as follows:-

- 1) A **visible** circuit element must be “**switch-off**” and “**earthed**”
- (2) A **visible “test”** must be done to demonstrate that a circuit is “**live**” meaning “**switched-on**” or “**dead**” meaning “**switched-off**”
- (3) A **visible “earth/s”** is to be installed to protect the circuit from being electrically charged.

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, and should such personnel allow themselves to start work on applicable equipment / switchgear / transformers/ wires and or cables etc.

CONCLUSION

The Investigating Team acknowledges that an abnormal situation existed on the overhead line circuit in that the yellow or centre phase “cut-out” fuse link at pole no. BB19/B69/1 was bridged out on the line (live) side of the fuse link. The opening of the “cut-out” fuse link, therefore, had no affect on the action taken to isolate the 11 000 volt power line.

If this extremely dangerous and abnormal situation of “bridge out” did not occur prior to the incident, the opening of the fuse links by the electrician, Mr N Motau, would have probably isolated the line sufficient to prevent injury to personnel.

At the investigation the Electrician, Mr N Motau, mentioned that he was going to perform a test to determine the status of the line whilst approaching the line with the hydraulic elevated platform.

The Investigation Team found it unacceptable that he had brought the elevated platform within touchable reach from the injured person and himself before any testing have been performed. It is alleged that Mr. Motau did not comply with standing instructions and procedures, which could be considered an act of gross negligence. The necessary disciplinary action will be instituted against Mr. Motau.

Should the responsible electrician have followed the prescribed procedure to test the line, with the testing equipment that he apparently had available, the incident could have been prevented.

The down-stream transformer delta winding configuration aggravated the live condition of the line in causing all three phases to become alive by means of back feeding through the windings and with reference to ground (earth).

For the sole purpose of preventing incidents of this nature it is recommended that the Area Manager or his delegated persons in the Electricity Division at Benoni CCC, prepare an informative presentation on the incident practical and factual aspects and share it with all CCC's Electricity Division operational staff. The sharing of such information may be vital in preventing injury of employees in future.

It is also recommended that the three Regional Directors: Electricity, keep a record of attendance to ensure that all relevant personnel under their control attend such a presentation.

Lastly, 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".

The following **Annexures** are attached:-

1. **Annexure A:** Photo 1, showing the arrangement of pole no. BB19/B69/1, intended point of isolation.
2. **Annexure B:** Proposed procedure to refuse work for reasons on grounds of safety concerns.
3. **Annexure C:** Proposed model notification form.
4. **Annexure D:** Proposed flow diagram for handling the refusal to work due to safety concerns.

COMMENTS FROM RELEVANT DEPARTMENTS

Corporate and Legal Services

"The recommendations are in order. A further recommendation should be added as follows: That Council's Insurers be notified immediately of the incident."

Human Resources:

“Recommendation R2 of the report is supported by the Psychological Services of the Employee Well-Being Division.”

Finance Department:

“The contents of the report and recommendations are noted”.

RECOMMENDATION

1. **That** the contents of the report by the Executive Director: Municipal Infrastructure, to report to Council on the electrical incident that occurred on 12 June 2004 at the Benoni CCC, in North Road, Putfontein, at pole no. BB19/B69/4, when an artisan assistant Mr. P Makhetha sustained serious burns by inadvertently coming into close contact with a live 11 000 volt overhead line whilst performing after-hour standby duties, **BE NOTED**.
2. **That** the new procedure for refusal to work on grounds of safety concerns, **BE APPROVED** and this procedure **BE ADOPTED** and **INCLUDED** into the MI Department's Electricity Division standing instructions.
3. **That** basic training **BE ARRANGED** and **SCEDULED** by the Ekurhuleni Training Centre, for all personnel of the Electricity Division involved in operations, maintenance, commissioning and testing of the electrical installations, equipment etc. to be made aware of the dangers involved in electricity and their right to follow the procedure for refusal to work on grounds of safety concerns as **APPROVED** by Council.
4. **That**, for the sole purpose of preventing incidents of this nature, the Area Manager or his delegated person at the Electricity Division in Benoni CCC, prepare an informative presentation on the incident and share it with all CCC's Electricity Division operational staff members to prevent injury of employees.
5. **That** a follow up report **BE SUBMITTED** to Council by the Executive Director: Municipal Infrastructure, on the outcome of the disciplinary action instituted against Mr. N Motau.
6. **That** Messrs N Motau and P Makhetha, **BE AFFORDED** the opportunity to consult with the Employee Well-being Division: Psychological Services, Department of Human Resources and Development.
7. **That** the incident **BE REPORTED** to the relevant Inspector of the Occupational Health and Safety Act, Act 85 of 1993 and the determinations of the Electrical Machinery Regulations.
8. **That** the injuries sustained by Mr. P Makhetha, **BE REPORTED** to the Compensations Commissioner in terms of Section 24 of Occupational Injuries and Diseases Act, Act 83 of 1995
9. **That** Council's Insurers **BE NOTIFIED** immediately of the incident.

ANNEXURE "B"

EKURHULENI METROPOLITAN MUNICIPALITY

MUNICIPAL INFRASTRUCTURE : ELECTRICITY

POLICY: OPERATIONAL PROCEDURE

TITLE: PROCEDURE FOR REFUSAL TO WORK ON GROUNDS OF SAFETY

DATE: JUNE 2004

APPROVED

DATE:.....

COMPILED BY: Director: Operations and Maintenance: Mr. J J Roos

AUTHORIZED BY:

Executive Director: Municipal Infrastructure: Mr. M Wilson (Pr.Eng)

Contents

	Page
1. Scope	2
2. Normative references	2
3. Definitions	2
4. Requirements	2
a. General	
b. Responsibilities	
c. Procedure for handling the refusal to work due to unsafe working conditions	3
d. Victimization or discrimination	4

Annexures

C	Model notification form for the refusal to work on the 'grounds of health and safety concerns	5
D	Flow diagram for a procedure for handling the refusal to work due to safety concerns	6

PROCEDURE FOR REFUSAL TO WORK ON GROUNDS OF HEALTH AND SAFETY

Foreword

This procedure was prepared by: S Delpont

1 Scope

1.1 Purpose

The purpose of this procedure is to ensure the protection of employees' rights to health and safety within the workplace and to clarify the refusal to work procedure for the employer in the event of such incidents.

1.2 Applicability

This procedure is applicable to all Municipal Infrastructure employees, in the Electricity Division.

2 Normative references

Eskom Occupational Health and Safety Directive: .Reference: SCSPVABP6

OCCUPATIONAL HEALTH AND SAFETY ACT 85 of 1993: ELECTRICAL MACHINERY REGULATIONS

3 Definitions

3.1 **danger:** Anything that may cause injury or damage to persons or property.

3.2 **employee:** Any person who is employed by or works for an employer and who receives or is entitled to receive any remuneration or who works under the supervision of an employer or any other person.

3.3 **employer:** Any person who employs or provides work for any person and remunerates that person or expressly or tacitly undertakes to remunerate him/her, but excludes a labour broker.

3.4 **hazard:** The source of, or an exposure to, danger.

3.5 **risk:** The probability that injury or damage will occur.

3.6 **safe:** Free from any hazard.

PROCEDURE FOR REFUSAL TO WORK ON GROUNDS OF HEALTH AND SAFETY

4 Requirements

a) General

This procedure will be monitored using the Risk Audit System (RAS) and cross-reference will be made between this procedure and RAS.

If an employee has a reasonable belief that the work to be undertaken is likely to endanger himself or any other person/s due to substandard acts or conditions, inadequate precautions or a lack of protective equipment or clothing, he/she has the right to refuse to work.

An employee has the right to refuse an unlawful instruction.

b) Responsibilities

Managers shall ensure that every employee is conversant with the hazards to his/her health and safety that are part of any work that he/she has to perform, as well as the precautionary measures required in respect of those hazards.

Supervisors shall immediately investigate and resolve an employee's refusal to work based on health and safety related issues.

c) Procedure for handling a refusal to work due to unsafe working conditions (refer to annexure B)

The employee shall promptly report the circumstances to the supervisor and the health and safety representative and remain in a safe place.

A refusal Notification Form (see annex C) shall be completed by the employee concerned and signed by both the employee and the supervisor, once a decision on the refusal has been reached.

The supervisor shall immediately investigate the situation in the presence of the employee and a safety committee member.

Agreement and/or resolution shall take place between the employee and the supervisor.

Where the situation is resolved and agreement is reached, to the satisfaction of the employee and the supervisor, the employee shall return to work.

If there is disagreement and the employee continues to refuse to work, and maintains that he still has reasonable grounds to believe that the work is still likely to represent a danger to himself, another employee or a member of the public, then the supervisor shall notify the line manager and the disputed instruction, equipment or workplace shall not be used pending further investigation and a decision.

The line manager and the supervisor shall investigate the matter in the presence of the employee, the health and safety representative and the Risk Co-ordinator / Practitioner.

Pending the outcome of the investigation, the employee may be assigned to other reasonable alternative work.

The line manager shall make a decision and inform the employee and the supervisor as soon as is practical.

PROCEDURE FOR REFUSAL TO WORK ON GROUNDS OF HEALTH AND SAFETY

The supervisor shall then see to it that the problem is corrected so as to eliminate the hazard, failing which he shall then reduce the hazard or the exposure to that hazard.

If agreement is reached the employee shall resume work.

The Refusal Notification Form (Annexure A) shall be filed and kept with all other reporting, recording and investigation documentation on site.

d) **Victimization or discrimination**

An employee shall not be victimized or discriminated against because he/she had chosen to exercise his/her right to refuse to work due to substandard acts or conditions.

MODEL NOTIFICATION FORM FOR THE REFUSAL TO WORK ON THE GROUNDS OF HEALTH AND SAFETY CONCERNS

NOTIFICATION FORM FOR THE REFUSAL TO WORK ON THE GROUNDS OF HEALTH AND SAFETY CONCERNS

1. Name and surname *of* employee:

2. Date : _____

3. Where did the refusal take place:

4. Reason for the refusal?

5. Has a similar situation been experienced previously: If yes, where and when ?

6. What action was taken?

7. What decisions were made?

Signature of employee

Date

Name and signature of supervisor

Date



ELECTRICAL SHOCK INCIDENT 12 JUNE 2004, MR. P MAKHETHA

Pole BB 19/B69/1 North road, Putfontein, Benoni.

"Cut- out" links were opened in order to repair a burned-off jumper conductor at Pole BB 19/B69-4 in North road, Putfontein Benoni.