SAFETY, HEALTH AND ENVIRONMENTAL MANAGEMENT

CONFINED SPACE ENTRY AND GAS DETECTORS

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Compiled by:	Ken Joffe (KJ)
Authorised by:	Alfie Ngubo
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CHANGES SINCE LAST VERSION

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SUMMARY OF CHANGES

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Page 2	Deleted Old Hot Work Permit Addendum-A	
Page 4	Added bullet to paragraph 4.2	
Page 4	Added bullet to paragraph 3.0	
Pages 2 & 3	Changed Table of Content to a separate page	
Page 4	Changed heading 2 .0	
Page 12	New addendum to this guideline	
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Page 11	Added new heading 11	
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CONFINED SPACE AND GAS DETECTORS

1. SCOPE

To provide staff, who are required as part of their duty, to use a gas detector for testing the air quality in a confined space, with the necessary guidance to ensure uniformity and conformance to the minimum legal requirements.

To provide the staff working in confined spaces with the necessary safety precautionary measures to ensure their health and safety as far as possible and also to comply with the minimum legal requirements.

2. REFERENCE DOCUMENTATION

2.1 Applicable Documentation

The Occupational Health and Safety Act	Act 85 of 1993
General Safety Regulations 1	
General Safety Regulations 5	
General Safety Regulations 9	

2.2 Associated/Support Documentation

Incident Investigation	GL-OH0002
Personal Protective Equipment	GL-OH0003
Ladders	GL-OH0006
Tools & Equip. (Employees knowledge)	GL-OH0010
Symbolic Safety Signs	GL-OH0018
Public Indemnity	GL-OH0019
Risk Assessments	GL-OH0026
Lead Works	GL-OH0030
Gas Safety	GL-OH0031
First Aid & Emergency Equipment	GL-OH0035
Fire Prevention	GL-OH0041
Road works	GL-OH0046
Hauling	GL-OH0049
Calibration, Repair & Maintenance	WI-TE0016 / CTO-002774
Confined Space Air Certification	FO-OH1003
Notification of Unknown Petroleum Product	FO-OH0070

3. DEFINITIONS, ABBREVIATIONS AND ACRONYMS

3.1 Definitions

Act	The Occupational Health and Safety Act, Act 85 of 1993.
Confined Space	An enclosed, restricted or limited space in which, because of its construction, location or contents, or any work activity carried on therein, a hazardous substance may accumulate or an oxygen-deficient atmosphere may occur,

	and includes any chamber, tunnel, pipe, pit, sewer, container, valve, pump, sump or similar construction, equipment, machinery or object in which a dangerous liquid or dangerous concentration of gas, vapour, dust or fumes may be present.
Hot Work	Work that is categorised as - welding; flame cutting; grinding; soldering or similar work that is conducted in a confined space.
Manhole	An underground surface chamber, large enough to contain a person, in which scaled work is performed. By definition a manhole is a confined space.
Personal Protective Equipment	Equipment or clothing used in the workplace to protect the worker from risks and hazards. See Guideline GL-OH0003.

3.2 Abbreviations

LPG	Liquid Petroleum Gas
PPE	Personal Protective Equipment

3.3 Acronyms

N/A	

4. GENERAL SAFETY PRECAUTIONS

Before any employee planning to perform work in a confined space leaves the office / yard, he / she must first ensure that: -

A. The National Database for Confined Space Entry has been checked to ascertain whether or not any problems have been logged for that particular confined space. This information will greatly assist the employee concerned. The database can be found by clicking on this hyperlink: -
http://www.nfstemp.telkom.co.za/NFOLogin/Main/Validator.aspx?Ident=CSDB

B. The vehicle is equipped with a suitable: -
   i. First-aid box
   ii. Fire extinguisher (ABC Dry Chemical Powder) – For transporting a flammable gas / material / liquid
   iii. Apparatus for the safe removal of various types of manhole covers - Minimise the risk of injury (e.g.) Bomb proof cover.
   iv. LPG bottles / pipes / heating equipment in the vehicle have been checked and that no leaks exist

5. SAFETY PRECAUTIONS UPON ARRIVAL AT A CONFINED SPACE SITE

Should the confined space be a manhole situated on a road or nearby a road, the worker must comply with Guideline GL-OH0046 Safety at Roadwork's in Urban and Rural Areas, of which the following points are important to remember: -

A. The vehicle should be parked in such a manner that it does not create an obstruction / hazard to vehicular traffic and / or pedestrians. **DO NOT** park the vehicle on the wrong side of the road facing oncoming traffic. This act is a traffic violation

B. If the vehicle must be parked in the road due to a shortage of parking space, 750mm road traffic cones must be used to warn vehicular traffic and / or pedestrians.

For work being conducted at night: -

   i. Use of amber coloured flashing lamps are required
   ii. A safety reflective flap must be mounted on back of the vehicle when parked on a road or on the shoulder of a road such that other vehicles approaching from behind will easily be able to identify it as a hazard.
   iii. Each person working at this road site **must** wear a safety reflective vest.
   iv. Use the correct lifting equipment to remove the manhole cover. (i.e.) Prego-lifter / Airolifter / Manhole key. If the manhole is equipped with more than one lid, then all the lids should be opened for ventilation purposes.

v. Place standard guards around the manhole immediately after the lid have been removed and ensure that guards are sturdy and clearly visible.
vi. Only enter / exit a manhole by means of a ladder.
vii. Any other type of temporary dugout that is known to be open or that poses a safety risk to third parties / public should immediately be barricaded with red & white striped hazard tape, no matter where they are situated and no matter what the circumstances are.

6. PERSONAL SAFETY PRECAUTIONS BEFORE ENTERING CONFINED SPACE

6.1 Less than 1% of all manholes associated with exchange vaults, have permanently installed electrical water-pumps. Before entering such manhole, it is imperative that the power feed to such pump has been *switched off* and *locked-out* in order to prevent electrical shock.

6.2 Before entering any manhole, in order to conduct any work, the correct PPE must be worn.

a. The following PPE must be worn according to the risk or where applicable: -
   i. Overall
   ii. Safety boots with steel toe-cap
   iii. Breathing protection with appropriate filter / Dust mask
   iv. Safety glasses
   v. Hard hat
b. The following PPE must be worn when and where necessary: -
   i. Safety gloves (When there is a chance of personal injury (i.e.) Cuts while hauling cable
   ii. Safety gum-boots (Where water is present in manhole)
   iii. Safety goggles (when using a gas flame / angle grinder)

6.3 In order to ensure your personal safety, besides any other tools that might be required for use in the manhole please have with you the following tools before entering the manhole: -

a. Flashlight (Batteries must be okay)
b. Hammer
c. Hack-knife / Pocket knife
d. Buttinski Cellphone

6.4 As a safety rule, the use of an angle grinder to grind off locks or welding on bombproof manhole covers is prohibited.

7. TESTING AIR QUALITY BEFORE ENTERING A CONFINED SPACE

General Safety Regulation 5 – Work in Confined Spaces states: -

5.(1) An employer or user of machinery shall take steps to ensure that a confined space is entered by an employee or other person only after the air therein has been tested and evaluated by a person who is competent to pronounce on the safety thereof, and who has certified in writing that the confined space is safe and will remain safe while any person is in the confined space, taking into account the nature and duration of the work to be performed therein.

a. Therefore, after the manhole cover has been removed and before physically entering the confined space, a test must be performed to measure the oxygen content as well as to detect the presence of any toxic or flammable gas. Use the gas detector in accordance with the manufacturers specification or user guide.
b. In conformance with this regulation, only a competent person (suitably trained regarding the type of gas detector being used) may perform this test. Should the employee that is required to perform work in the confined space be trained as a competent person he / she must keep a record of such confined space entry, for audit purposes. Form FO-OH1003 may be used for this purpose.
c. Should the confined space be a manhole, conduct testing in every corner of the manhole at the top, the middle and the bottom. Hold the tester for 15 seconds at the top, 15 sec in the middle and 15 at the bottom of the manhole. Should no alarm sound, you or persons required to conduct work, may enter.
d. Every new manhole that is opened, in which work is to be conducted, requires a separate air quality test to be performed from outside the manhole.

8. PERSONAL SAFETY PRECAUTIONS AFTER ENTERING CONFINED SPACE

a. Upon entering the manhole please ensure that the ladder being used is securely tied by means of rope, to a cable, cable bracket or any other sturdy structure inside the manhole. This action will prevent any person / s from accidentally or purposefully replacing the manhole cover in its original position, thereby trapping the person / s inside. In a few specialized environments, the manhole has a fixed ladder. Telkom SA is currently investigating the use of a manhole cover anti-sealing device that will prevent the cover from being returned to its original position and seal off the manhole, whilst there are persons inside.
b. Repeat the test in step 7.3 immediately after entering the manhole.
c. Continuous testing of the quality of the air in the confined space must now take place. The gas detector must be kept inside the confined space whilst the worker is still inside it. This is a legal requirement in order to continuously monitor for the presence of any new gasses that may enter the confined space, or for a reduction in the oxygen level.
d. In case of an alarm stop work and immediately evacuate the confined space.
e. Employees conducting work in manholes must not leave opened manholes unattended.

9. PERSONAL SAFETY PRECAUTIONS REGARDING HOT WORK

a. After testing the air quality and before entering any confined space to perform “hot work” such as welding, cutting, grinding, brazing, soldering etc. it is imperative that effective ventilation is provided and maintained.
b. Never enter a confined space / manhole if any flammable or toxic gas is above the safe working level or if the oxygen level is 16% per volume in the air or lower. Should the gas detector monitoring alarm be activated, the confined space / manhole must immediately be evacuated.
c. Once the manhole has been ventilated and the flammable or toxic gas is still above the safe working level report the event as per paragraph 10 in this guideline.
d. Should the worker start feeling dizzy, light-headed, and nauseous or feel any strange symptoms he / she must immediately vacate the manhole.
e. Before a naked flame using LPG as fuel is to be used in a confined space ensure that: -
   i. The LPG cylinder is **never** placed inside the manhole
   ii. The LPG cylinder is removed from the vehicle and properly secured to the chamber guard outside the manhole
   iii. The gas pipe form the LPG cylinder is long enough to reach the area where the work is to be performed
   iv. When exiting the confined space / manhole the pipe and gas torch is not left inside
   v. All gas equipment is properly inspected for leaks (i.e.) pipes, regulators, torches, etc.
   vi. Before putting gas equipment away ensure that the LPG cylinder open / close valve is properly shut off and the remaining gas in the pipe is burnt away.

10. TYPES OF GASSES OR FUELS NORMALLY PRESENT

Clean air has the following composition: -

a. Nitrogen (78%)
b. Oxygen (21%)

This sensor on the gas detector must be replaced yearly.

c. Carbon Dioxide (0.9%)
d. Hydrogen; Nitrogen Oxide; Ozone (0.1%)

Various gasses could be present in any confined space amongst, which are flammable gasses, flammable vapours from fuels and oxygen depleting gasses. However, the most prevalent gasses found in confined spaces, specifically manholes, are the following: -

i. Carbon Dioxide (CO_2)
ii. Hydrogen Sulphide (H_2S)

This sensor on the gas detector must be replaced every 3 years.

iii. Carbon Monoxide (CO)

This sensor on the gas detector must be replaced every 3 years.

iv. Flammable Fuels / Vapours

This sensor on the gas detector must be replaced every 7 years.

10.1 Carbon Dioxide (CO_2):

This gas replaces all available oxygen in the air and thus causes asphyxia if present in large quantities.

10.2 Hydrogen Sulphide (H_2S)

This is a colourless and flammable gas and smells like rotten eggs. It is fatal if large concentrations are inhaled. Breathing ceases immediately. Exposure to low concentrations cause eye irritations, nausea, blisters on the lips and stomach problems.

10.3 Carbon Monoxide (CO)

This is a colourless, odourless gas released with incomplete combustion. It causes asphyxia since it combines more readily with the haemoglobin in the blood, than oxygen.

10.4 Flammable Fuels / Vapours

Various types of flammable fuels or the vapours from them may be present in any confined space at any time. This category is comprised of various fuels amongst which the following are the most common: -

a. Petrol
b. Diesel
c. Paraffin
d. Oil

A distinction must be drawn between flammable fuels and combustible fuels of which the following is important to note: -

i. Flammable: Fuels that are easily ignited and as such are considered more hazardous than combustible fuels. These fuels produce sufficient vapours in the air to ignite at temperatures between 23^{o}C and 66^{o}C when a heat source is applied.
ii. Combustible: Fuels that are not easily ignited such as heavy diesel oil or heavy fuel oil. These fuels produce vapours in the air, which will only ignite at temperatures above 66^{o}C when a heat source is applied.

Flammable Range: In the case of petrol, a spark directly on the surface of the petrol will very rarely ignite the fuel. Where the percentage of vapour from the fuel mixed with air is within the flammable range (i.e.) 1 % - 7% and a spark is applied to the vapour-air mixture, it will ignite.

Lower Flammable Limit (LFL): Of any fuel, is the lowest concentration of the fuel vapour-air mixture that will ignite. In the case of petrol the LFL would be 1%. Below this value the vapour-air mixture would be too lean and would not ignite.

Upper Flammable Limit (UFL): Of any fuel, is the highest concentration of the fuel vapour-air mixture that will ignite. In the case of petrol the UFL would be 7%. Above this value the vapour-air mixture would be too rich and would not ignite.

10.5 Flammable Gasses

Liquefied Petroleum Gas (LPG) vapour presents a hazard comparable to that of any other flammable gas, except that it is heavier than air and would therefore always move towards the lowest level of any sewer / pit / manhole etc.

11. REPORTING A HAZARD ENCOUNTERED IN THE CONFINED SPACE

11.1 Operational Personnel:

a. If inside the confined space, stop work and immediately evacuate.
b. Once outside the confined space, report the hazard to your Ops. Manager / Supervisor.

11.2 Operations Manager / Supervisor:

a. Report any abnormal hazard to your Manager and your SHE Specialist immediately.
b. In the case of unidentified petroleum product / fumes contact the nearest or most likely petrol filling station and explain the problem to the owner.
c. The local fire department should be contacted in event of extremely high levels of petroleum fumes.
d. In case of town gas the gas company should be contacted.
e. If no satisfaction can be obtained from the above-mentioned authorities then the Department of Labour

(Occupational Health & Safety Division) must be notified.

f. Ensure that all other effected parties are informed of this hazard.
g. Capture this hazardous confined space incident on the NFO website.
h. Ensure that this hazard is mitigated before any further work ensues.
i. Ensure that the corrective action is captured on the NFO website.
j. Where foreign gases are detected in buildings/cable vaults, the building manager must liaise with the cable maintenance section/network owner for the specific area to assist with the detection and venting of the manholes within the proximity of the building.
k. The network owner (underground cable section) will be responsible for the monitoring and managing of the problem, this must be done in conjunction with the building owner.

In the Johannesburg metropolitan area: Where it is suspected or established that the foreign gas detected is a result of the Egoli Gas Company's operations, the process in Table 1 must be followed. For all other regions please make contact with the local gas supply company.

Table 1

- In the case of town gas the gas company (Egoli Gas) should be contacted. **Telephone No: (011) 726-4702** (This is a 24hr emergency number)
- Ensure that all affected parties are informed of the gas leak/hazard
- Egoli Gas will give progress feedback to the reporting party within 24 hours.
- Operations department must repair the leak or make safe and monitor within 48 hours.
- If the repair is successful feedback will be given to the reporting party without delay.
- Egoli Gas's leak detection supervisor must give feedback on final/feedback report to the reporting party with in 72 hrs
- If the leak was not fixed successful and after two attempts by Egoli Gas, they will give the necessary feedback and discuss a way forward to the reporting party and engage their Technical Engineer and Operations Manager.

11.3 Manager:

a. Report any abnormal hazard to your Senior Manager.
b. Manage the process and ensure closure without delay.
c. Ensure that the following form is completed and submitted to the Centralized IOD office in Pretoria: - *Identification, Recording & Classification of Environmental Non-Conformances & Incidents FO-EM1500a* found on the following website: -http://www.webfarm.telkom.co.za/Bookshelf_II/edp/edoxpublic.asp?doc=SHE-000429

11.4 SHE Specialist:

a. Consult and advise line management on best practices.
b. Immediately follow up on any "unidentified petroleum product in manhole" by sending the following notification letter to the petrol company concerned.

NOTIFICATION OF UNKNOWN PETROLEUM PRODUCT LEAK (FO-OH0070)
http://www.webfarm.telkom.co.za/Bookshelf_II/edp/edoxpublic.asp?doc=SHE-000655

c. Also send a copy of this notification letter to Legal Services in case of later claims.
d. Consult and intervene when deadlocks are experienced between Petrol Filling Stations / Petrol Companies / Gas Suppliers / Local Municipalities etc.

12. AFTER COMPLETION OF WORK IN A CONFINED SPACE

a. Remove all tools and equipment. Lastly, remove the gas detector from the confined space and switch it off.
b. Should the gas detector have a charger unit, place the gas detector into an available slot in the charging-unit.
c. Should the gas detector being used be provided with downloading software, connect the charger unit interface to a communications port on your computer, using a serial cable. The resultant manhole entries together with the associated readings should be downloaded and stored for audit purposes. Should no downloading facility /

software be available for the gas detector the following form may be used to record the readings: -

CONFINED SPACE ENTRY CERTIFICATE - Form FO-OH1003 which can be found on:-
http://www.webfarm.telkom.co.za/Bookshelf_II/edp/edoxpublic.asp?doc=SHE-000382

13. CALIBRATION PROCESS

Please refer to Work Instruction WI-TE0016 – E-DOX NO. CTO-002774 for the calibration, repair and maintenance of gas detectors.

14. SAFETY, HEALTH AND ENVIRONMENTAL MANAGEMENT (SHE)

Applicable Health and Safety Legislation and relevant documentation for the following issues can be obtained at http://www.hr.webfarm.telkom.co.za/HR/defaultshe.asp .

a. OHS Act: All procedures must conform to the Occupational Health and Safety Act 85 of 1993.

b. Environment: All procedures and waste management must conform to the National Environment Management Act 107 of 1998

Note: Particular attention must be given to the Telkom Incident Prevention Plan and the reduction of risks to ensure a workplace is safe, healthy and environmentally friendly as per SHE Management principles.

15. DATA INTEGRITY

Data Quality Improvement covering all data for Telkom needs to be managed to ensure the integration of all systems, processes, measurements and data ownership.

http://www.webfarm.telkom.co.za/bookshelf_II/edp/EdoxPublic.asp?doc=CTO-004206

16. INFORMATION SECURITY

To communicate policy statements aimed at ensuring that only authorised parties have timely and appropriate access to computerised information, while safeguarding the information's confidentiality, security, and integrity.

http://www.webfarm.telkom.co.za/bookshelf_II/edp/EdoxPublic.asp?doc=ITSD-088343

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17. VALIDATION PAGE

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The following person(s) were involved with the validation of this document and may be contacted for more information:

VALIDATED BY:

SME Name	Section	Telephone Number	Head of SHE Electronic Acceptance
Sello Malomane	HR:SHE	012 311 7338	S Els – 2012/03/26
Ken Joffe	HR:SHE	011 907 4824	S Malomane – 2016/04/05

APPROVAL / AUTHORISATION PAGE

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APPROVED BY:

Name: Title/Position: Section:	Sello Malomane Head HR:SHE	Approved Signature	2016/04/07 Date

AUTHORISED BY:

Name: Title/Position: Section:	Alfie Ngubo Contract Worker Procurement Services	Authorised Signature	2016/04/07 Date