

# CHIEF DIRECTORATE OF OCCUPATIONAL HEALTH AND SAFETY

## MAJOR HAZARD INSTALLATION CONFERENCE,

Rachel Aphane  
Specialist MHI

[mhiregulations2022@labour.gov.za](mailto:mhiregulations2022@labour.gov.za)

23 November 2023



**employment & labour**

Department:  
Employment and Labour  
**REPUBLIC OF SOUTH AFRICA**



# Contents

- Application of MHI Regulations, 2022
- Summary of Key Requirements
- Land Use Planning
- New Establishments
- Risk based Approach
  - LPG Industry
  - Large Scale Flammable Stores (with and without VCEs)
  - Fertiliser Blending and Storage
  - Warehouses
- Challenges in the MHI fraternity
- Transition Strategy
- Way Forward



**employment & labour**

Department:  
Employment and Labour  
**REPUBLIC OF SOUTH AFRICA**

# Major Hazard Installation Regulations, 2022

## Application

- Promulgated in November 2022
- Published and became implementable from 31 January 2023
- MHI Regulations, 2001 was repealed in 17 May 2023 ( which means 2022 version is in full force)
  
- Scope of application
  - Major hazard Installations
  - MHIs that keep prescribed quantities
  - 3 classes : Low, Medium and High
  
- Exclusions
  - Nuclear Installations (DMR + NERSA)
  - MHI in transit (DoT)
  - Explosives (Ex Regulations + SAPS)



**employment & labour**

Department:  
Employment and Labour  
**REPUBLIC OF SOUTH AFRICA**

# Major Hazard Installation Regulations, 2022

## 1. Added Definitions

- installation
- change
- Dangerous Substance
- Establishment**
- Duty holder
- Impact zone

## 2. Applicability

- All classes of MHI (Annexure MHI 1)
- Pipelines

## 3. Management

- Responsible Person
- High hazard hold a qualification
- Deputy (-ies)
- Consultation
- Record keeping



**employment & labour**

Department:  
Employment and Labour  
**REPUBLIC OF SOUTH AFRICA**

# Major Hazard Installation Regulations, 2022

4. & 5  
Notification  
Registration

- Form A
- Supporting documents
- Advertisements ( two Languages English + )
- Public Participation
- Formal Registration upon payable fee and compliance to 4

10 & 15

- Implementation of Standard
- 1461 : QRA
- 1415: EP

17, 18 read with 9  
Information and Training

- Consultation and regular updating of neighbors
- Training of employees, operators, contractors, etc.
- Suppliers information sharing regarding the substance



**employment & labour**

Department:  
Employment and Labour  
**REPUBLIC OF SOUTH AFRICA**

# Major Hazard Installation Regulations, 2022

## Land Use Planning approach

- This requirement is in the Local Government mandate
- Planning applicants for new establishments are required to submit a QRA to Government should evaluate the submitted **QRA** before advising the Council on the acceptability
- Planning Section need to consult with the emergency services on any potential impact on local access/egress arrangements in the context of availability of emergency resources and systems at the establishment including how the public will be notified of any event of an emergency.
- The council will then the Local Government and sometimes to Environment regulator
- The Local issue an approval in writing in terms of **NBR&BSA** and by-laws if they are applicable



employment & labour

Department:  
Employment and Labour  
REPUBLIC OF SOUTH AFRICA

# Major Hazard Installation Regulations, 2022

## New Establishments

The regulations is immediately applicable and they should:

- demonstrate that they do present an tolerable risk of fatality to their current non-residential type neighbours and their nearest residential type property.
- Submit a Form A + risk assessment + prescribed supporting documents to the LG to obtain buy-in.
- Submit an endorsed notification (Form A + proof of payment) to the Department for formal registration.



**employment & labour**

Department:  
Employment and Labour  
REPUBLIC OF SOUTH AFRICA

# RISK BASED ASSESSMENTS

## 1. LPG Installations

- the off-site risks for LPG storage will generally be dominated by large BLEVE events
- If there are several vessels of different size, which are at some distance apart, then the risks from each vessel should be **aggregated** and **2% rule** be applied
- Other events (such as VCEs and BLEVEs of a road tanker- when recharging the installation) may also be significant, and these should be included as part of the aggregation if they are considered to be credible events

## Risk Based Approach

- Compliance with applicable legislations including PER and all applicable standards and etc.



employment & labour

Department:  
Employment and Labour  
REPUBLIC OF SOUTH AFRICA



# RISK BASED ASSESSMENTS

## LPG Installations

### Risk Reduction Interventions

#### 1. Fully mounding of LPG vessels

- If the LPG vessels are fully mounded (or buried) then the likelihood of a BLEVE becomes reduced, and the risk based zones should be based on a BLEVE of 50% of the full contents of the road tanker
- Consideration of VCE, the extent of the Inner Zone should be at least as large as the road tanker BLEVE fireball radius.

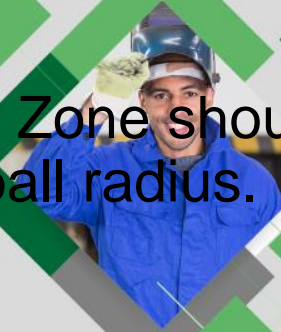
#### 2. Coating of vessels

- if properly applied and maintained, this should significantly reduce the likelihood of a BLEVE



**employment & labour**

Department:  
Employment and Labour  
REPUBLIC OF SOUTH AFRICA



# RISK BASED ASSESSMENTS

## 2. LARGE SCALE FLAMMABLE STORES (with VCEs)

- significant risks associated with potential vapour cloud explosions (VCEs)

For example:

- gasoline (petrol) depots including the storage of petrol and its distribution from terminals to service stations
- vertical, cylindrical, non-refrigerated, above-ground storage tanks
- filling rates greater than 100 m<sup>3</sup> /hour (this is approximately 75 tonnes/hour of gasoline)



**employment & labour**

Department:  
Employment and Labour  
REPUBLIC OF SOUTH AFRICA

# RISK BASED ASSESSMENTS

## LARGE SCALE FLAMMABLE STORES

### Risk Based Approach

- The VCE event could be centred anywhere on site
- The magnitude of the overpressure generated by the VCE is defined as that arising from a 50,000 m<sup>3</sup> VCE with an ignition strength of 7 and a combustion energy of 3.5 MJ/m<sup>3</sup> using the TNO multi-energy method

(AIA: some are using the TNO software)

Consideration for:

- individual risks of fatality
- multiple vessels, it may sometimes be preferable to assume a lower frequency
- **risks** associated with large pool fires



employment & labour

Department:  
Employment and Labour  
REPUBLIC OF SOUTH AFRICA



# RISK BASED ASSESSMENTS

## LARGE SCALE FLAMMABLE STORES

### Potential for Risk Reduction

- For congested areas and where releases are likely to occur, such as loading bays, then the risk of VCEs in these regions should also be included in the risk assessment



**employment & labour**

Department:  
Employment and Labour  
**REPUBLIC OF SOUTH AFRICA**

# RISK BASED ASSESSMENTS

## 3. LARGE SCALE FLAMMABLE STORES (without VCEs)

- sites where the likelihood of a major VCE is considered to be so low and can be negligible

- Associated risks:

- major off-site risks associated are associated with large pool fires, following a loss of containment
- worst case event is taken to be a circular pool fire located adjacent to the storage bund (i.e. due to bund overtopping or bund failure)
- A pool fire which covers the entire surface of the bund



**employment & labour**

Department:  
Employment and Labour  
REPUBLIC OF SOUTH AFRICA

# RISK BASED ASSESSMENTS

## LARGE SCALE FLAMMABLE STORES without VCEs

### Risk Reduction Approach

- A major unbunded pool fire extending up to 100 m from the bund wall
- A pool fire which covers the entire surface of the bund
- The levels of thermal radiation as a function of distance from the centre of the pool can be calculated using any standard pool fire model, in consideration of the wind direction as well



**employment & labour**

Department:  
Employment and Labour  
REPUBLIC OF SOUTH AFRICA

# RISK BASED ASSESSMENTS

## LARGE SCALE FLAMMABLE STORES (without VCEs)

### Potential Risk Reduction Measures

- compliance with current applicable legislations, standards and guidance
- if the material has a high flashpoint then the likelihood of a fire is reduced
- if the tanks are located in a large sunken bund, with little danger of overtopping, then it would be reasonable to adopt a lower frequency for large fires outside the bund
- If the topography of the area surrounding the bund has any special features, such as tertiary containment, then this could be accounted for by modifying the potential location of fires outside the bund



**employment & labour**

Department:  
Employment and Labour  
REPUBLIC OF SOUTH AFRICA

# RISK BASED ASSESSMENTS

## 4. FERTILISER BLENDING AND STORAGE SITES

- various grades of Ammonium Nitrate Fertilizer
- risks are associated with major fire, leading to a plume of toxic smoke which could travel for many kilometres, and the risk of an Ammonium Nitrate explosion

### Risk Based Approach

- Fire in vicinity of Ammonium Nitrate Fertilizer leading to the decomposition products Nitric Oxide and Nitrogen Dioxide being released.
- Explosion of molten/decomposing Ammonium Nitrate



**employment & labour**

Department:  
Employment and Labour  
REPUBLIC OF SOUTH AFRICA





# RISK BASED ASSESSMENTS

## FERTILISER BLENDING AND STORAGE SITES

- **Potential Risk Reduction Measures**
- take into account the effect of being indoors
- use appropriate air change rates for the toxic hazards
- vulnerability relationships for the overpressure hazards



**employment & labour**

Department:  
Employment and Labour  
**REPUBLIC OF SOUTH AFRICA**

# RISK BASED ASSESSMENTS

## 5. WAREHOUSES

- toxic substances (gases or volatile liquids),
- plume of toxic smoke which could travel many kilometres.
- thermal radiation effect

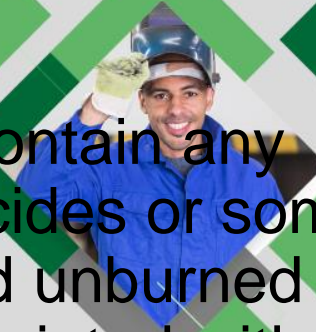
### **Risk Based Approach**

- Assuming that the warehouse does not contain any particularly toxic materials, such as pesticides or some agrochemicals, capable of being released unburned in the fire plume, then the main risk will be associated with toxic combustion products



**employment & labour**

Department:  
Employment and Labour  
REPUBLIC OF SOUTH AFRICA



# RISK BASED ASSESSMENTS

## WAREHOUSES

### Risk Based Approach...cont..

- it is impossible to predict the precise mix and quantity of each toxic combustion product
- so the approach that needs to be adopted, is to assume that the toxicity of the fire plume can be represented by an equivalent release rate of the most significant toxic combustion product
- release of NO<sub>x</sub>, HCl , SO<sub>x</sub>, etc. depending on the chemical mix within the warehouse



**employment & labour**

Department:  
Employment and Labour  
REPUBLIC OF SOUTH AFRICA

# RISK BASED ASSESSMENTS

## WAREHOUSES

### Potential Risk Reduction Measures

- The release rate of NO<sub>x</sub> , for example, can be estimated by assuming that 5% of the nitrogen content of the hazardous substances stored in the warehouse is combusted to form NO<sub>x</sub>, and that this is released over 2 hours for a small warehouse, or 4 hours for a large warehouse.
- For warehouses storing a more complex mix of hazardous substances, a judgment will need to be made to determine the representative release rates of NO<sub>x</sub> , HCl, SO<sub>x</sub> and any other dominant toxic combustion product
- Etc.



employment & labour

Department:  
Employment and Labour  
REPUBLIC OF SOUTH AFRICA

# RISK BASED ASSESSMENTS

Reference:

Policy & Approach of the Health & Safety Authority to  
COMAH Risk-based Land-use Planning (19 March 2010)



**employment & labour**

Department:  
Employment and Labour  
**REPUBLIC OF SOUTH AFRICA**

# RISK BASED ASSESSMENTS

## EMERGING CHALLENGES

- MHI facilities which were classified under 2001, disappears without closure notices
- Mushrooming of LPG facilities
  - No compliance with SANS 10087, bogus installers, sale of refurbished tanks without client's knowledge, etc.
- There is confusion of Environmental Authorisation with LG Approval
- QRA seen as a compliance documents to MHI Regulations and other linking legislations. **THIS IS NOT CORRECT**
- Mushrooming of mobile petrol station
  - No compliance with SANS 10089
- ETC.



**employment & labour**

Department:  
Employment and Labour  
**REPUBLIC OF SOUTH AFRICA**



# Way forward

## Implementation:

- new MHI/establishments
  - immediately upon the Regulations being in force
- Existing MHI/establishments
- Phase 1: (31 January 2024)
  - 12 months
  - Emergency Plan
- Phase 2: (31 January 2025)
  - 24 months
  - Registration of MHI/establishment
- Phase 3 (31 January 2026)
  - 36 months
  - Technical Requirements



**employment & labour**

Department:  
Employment and Labour  
**REPUBLIC OF SOUTH AFRICA**

# Conference Commitments

- An Explanatory Notes to the Regulations is underway, once accepted by Council, it will become a public document. However, it is not legally binding as some facilities will always do better than the recommendations, but the Explanatory Notes is a working document and will be improved if new information/technology comes to light
- The team that developed the Explanatory Notes were fully represented from Organised Business, Organised Labour, Government, Associates and Experts from the MHI Industry.
- Collaboration with Local Government is developing positively and we will find common grounds to implement the MHI Regulations correctly without conflicts and repetition of Requirements
- We commit to continual engagements with MHI stakeholders and as such those with specific needs can contact us and request a one on one advocacy session.
- The method of engagement, date and venue should be communicated in time to allow the Department to plan and execute.
- All the presentations will be loaded on the Departmental website



**employment & labour**

Department:  
Employment and Labour  
**REPUBLIC OF SOUTH AFRICA**





# Thank You...



**employment & labour**

Department:  
Employment and Labour  
**REPUBLIC OF SOUTH AFRICA**