

Delivering improved safety by driving engineering compliance

Stuart Morgan
Heineken UK

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Introduction

- MEng Chemical Engineering, The University of Edinburgh
- Brewing Operations Graduate with Heineken since 2017
- Rotational placements across the UK
 - Hereford (12 months) – Packaging Support Manager, Keg Manager
 - Manchester (4 months) – Utilities Engineer
 - Hereford (current) – Cider Production Shift Manager







Project Scope

- Manchester identified as focus area to improve compliance
- Three main reasons compliance is important:
 - Legal
 - Heineken standards
 - Changes in legislation
- Quick wins – focus on driving the score
- Short and long term actions
- Suitability as a project

| HeiQuest | | Manchester | | |
|--|--|------------|----------|--------------|
| Safety & Health Questions 2018 Section No. | Tracker | YE 2017 | 2018 YTD | % Change YTD |
| 1.8 | LOTO Implementation | 86% | 87% | 1% |
| 1.8 | Process Isolation to Standard | 75% | 78% | 3% |
| 1.9 | Work at Height Actions | 100% | 100% | |
| 1.9,1.12,1.19 | Control of Work | 97% | 97% | 0% |
| 1.10 | CO ₂ Actions (WER Risk Audit Actions) | 97% | 100% | |
| 1.10 | CO2 Checklist | 94% | 99% | 5% |
| 1.16 | DSEAR Dry Goods Process Hazard Assessment | 80% | 80% | 0% |
| 1.17 | Machinery Safety Compliance | 100% | 100% | |
| 1.21 | Ammonia Checklist | 68% | 73% | 5% |
| 1.24 | Process Safety | 64% | 82% | 18% |
| 1.25 | HAZOP | 7% | 38% | 31% |
| 1.26 | Boiler Safety | 67% | 70% | 3% |

Process Isolations

- HSG 253 – The safe isolation of plant and equipment
- Control of Work
- Lock out–Tag out (LOTO)
 - Partial Energisation
 - Minor Interventions
 - Isolation Points
 - Risk Assessment

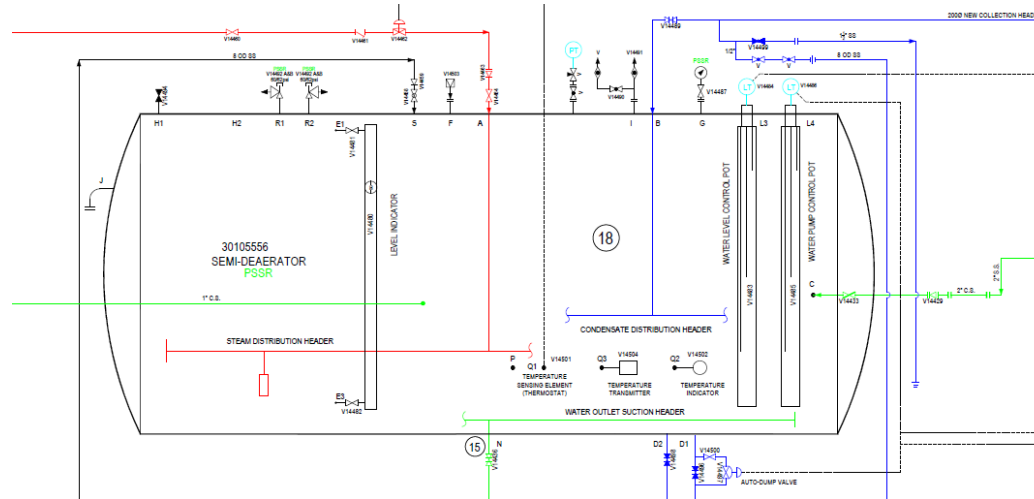
| | | | | | |
|---|----------------------|---|---------------------------|--------------------------------|---|
|  | | LOTO Procedure: ISOLATION POINTS | | | |
| Area | CO2 Storage Compound | Equipment Name | No.1 Bulk Storage Tank | Equipment Number / Ref | VC-101/30106738 |
| Each type of energy has to be isolated from the machine and safely locked off as per procedure Appropriate safety documentation must be used when required. Sources of stored energy must also be released before the machine can be considered to be safely isolated | | | | | |
| ISOLATION POINTS & STORED ENERGY CONTROL / RELEASE | | | | | |
| Energy Source | Isolation ID | Isolation Point Location | Method | Check | Reference Photo |
| CO2 | VC1408 | Inlet to Tank from Recovery Plant | Isolate, Lock Out/Tag Out | Ensure Valve Can Not be Opened |  |
| CO2 | UV1301 | Inlet to Tank from Recovery Plant | Isolate, Lock Out/Tag Out | Ensure Valve Can Not be Opened |  |
| CO2 | RV1327 & V04076 | Inlet to Tank from Recovery Plant Safety Valves | Open valves | Valves should bleed |  |

Process Isolations

- Any plant item without approved isolation procedures carries a significant risk for our technicians.
- Final remaining process isolations for utilities to reach 100% compliance were:
 - The most difficult to solve
 - Required significant investment for plant modifications
 - Inherent risk of plant modifications

Process Isolations

- Boiler de-aerator tank
- Intrusive inspections and maintenance carried out every 2 years



Boiler Compliance

- Quick wins – labelling pipework
- Start-up and shutdown standard operating procedures (SOPs)
- Verifying design criteria
 - Diameter of pressure relief exhaust piping



Boiler Compliance

- New set of regulations and guidance for Boiler Water Treatment outlined in BG04
- Change to ways of working and frequency of sampling for:
 - pH
 - Hardness
 - Sulphites
 - Phosphates
 - Total Dissolved Solids (TDS)

Boiler Water Treatment

GUIDANCE FOR SHELL BOILERS, COIL BOILERS,
STEAM GENERATORS AND HOT WATER BOILERS

REF: BG04

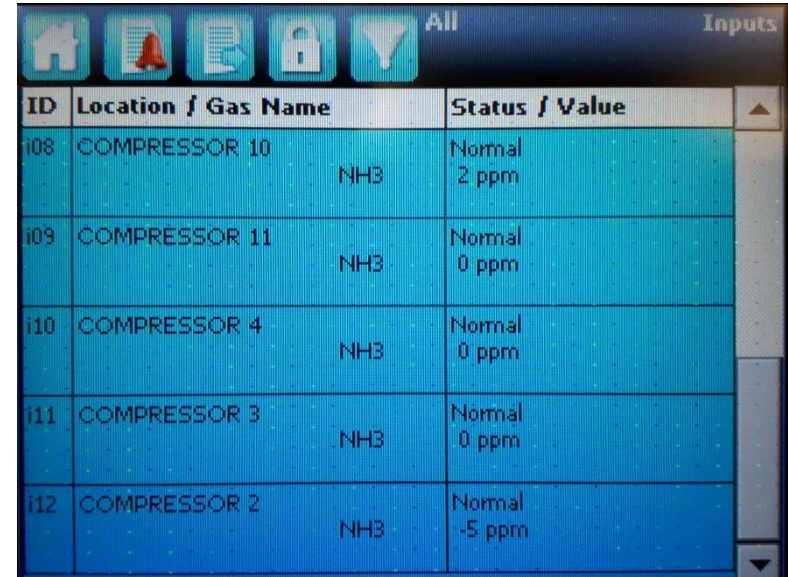


ICOM
Energy Association

CEA
Combustion Engineering Association

Ammonia Compliance

- Loss of containment can cause an immediate risk to life
- Ammonia detection system
 - Old limits – 500 and 10,000 ppm
 - Danger at 300 ppm^[1]
- No remote shutdown capability



The screenshot shows a control interface for an ammonia detection system. At the top, there are five icons: a home button, a bell (alarm), a document with an arrow (report), a padlock (lock), and a funnel (filter). To the right of these icons is the word 'All' and a label 'Inputs'. Below the icons is a table with three columns: 'ID', 'Location / Gas Name', and 'Status / Value'. The table contains five rows of data for different compressors. The background of the interface is dark blue with a grid pattern.

| ID | Location / Gas Name | Status / Value |
|-----|----------------------|------------------|
| i08 | COMPRESSOR 10 NH3 | Normal 2 ppm |
| i09 | COMPRESSOR 11 NH3 | Normal 0 ppm |
| i10 | COMPRESSOR 4 NH3 | Normal 0 ppm |
| i11 | COMPRESSOR 3 NH3 | Normal 0 ppm |
| i12 | COMPRESSOR 2 NH3 | Normal -5 ppm |

[1] – NIOSH, “Ammonia: Immediately Dangerous to Life or Health Concentrations (IDLH)”, <https://www.cdc.gov/niosh/idlh/7664417.html>

Ammonia Compliance

- New external emergency stop installed
- Traffic light and additional break glass
- New Heineken standard limits set at 50 and 200 ppm



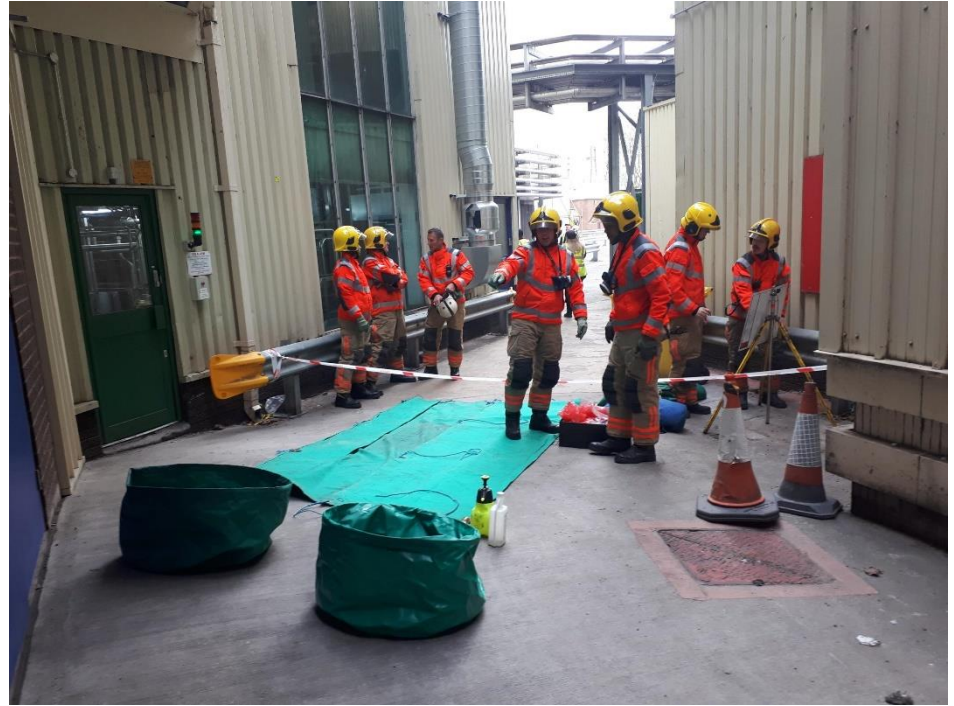
Ammonia Compliance

- Very experienced craftsmen and engineers
- No SOPs for start up and shutdown of the plant
- Moving away from dedicated area technicians to site-wide technicians
- Focus on people
 - Strengths and weaknesses
 - Capturing knowledge
 - Training and support for new technicians



Emergency Preparedness

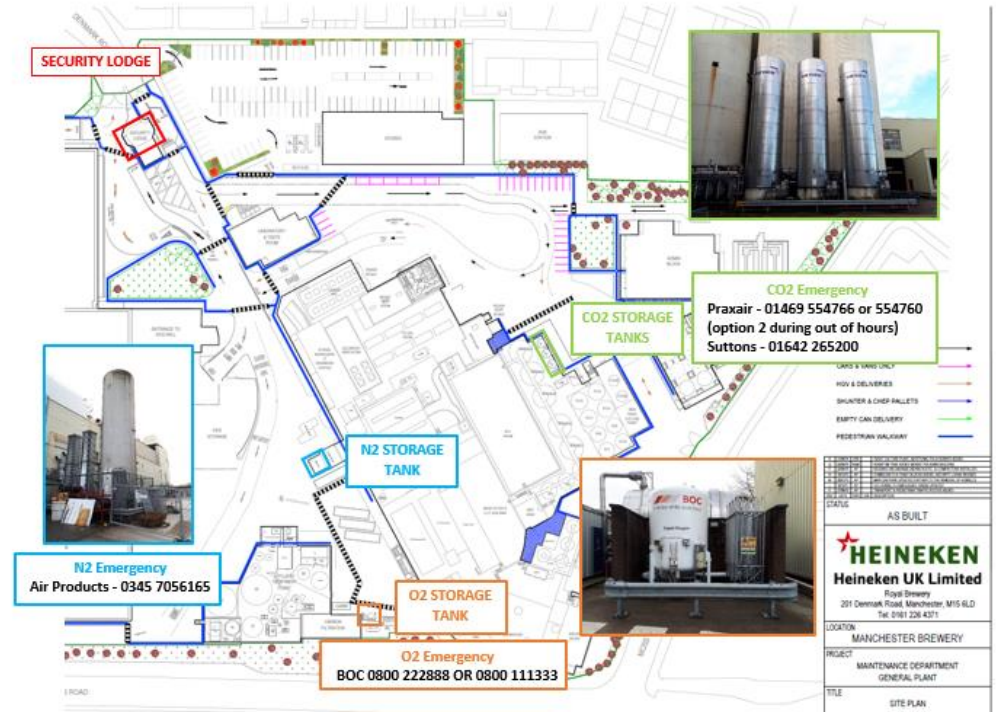
- How capable were we as a site to deal with a major emergency?
- Built a relationship with the local fire brigade
- Planned and executed site drills for combined training purposes



Emergency Preparedness

- Gathered feedback on our emergency pack
- Keep it very simple
- Developed documents on our two major emergency scenarios:
 - Gas/boiler explosion
 - Ammonia leak

Gas Storage Emergency



Emergency Preparedness

- Site-wide map of all ammonia locations
- Detailed map for the fire brigade of critical valves to maximise containment
- Valves highlighted in bright orange in each location



Conclusion

- Significant increase in compliance scores across the board
 - Long term actions remain
- Much better perception of compliance in Manchester
- Capturing knowledge of our colleagues

| HeiQuest | | Manchester | | |
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| Safety & Health Questions 2019 Section No. | Tracker | YE 2018 | 2019 YTD | % Change YTD |
| 1.8 | LOTO Implementation | 91% | 92% | 1% |
| 1.8 | Process Isolation to Standard | 85% | 85% | 0% |
| 1.9 | Work at Height Actions | 100% | 100% | |
| 1.9,1.12,1.19 | Control of Work | 97% | 97% | 0% |
| 1.10 | CO ₂ Actions (WER Risk Audit Actions) | 100% | 100% | |
| 1.10 | CO ₂ Checklist | 100% | 100% | |
| 1.16 | DSEAR Dry Goods Process Hazard Assessment | 89% | 89% | 0% |
| 1.17 | Machinery Safety Compliance | 100% | 100% | |
| 1.21 | Ammonia Checklist | 88% | 88% | 0% |
| 1.24 | Process Safety | 84% | 84% | 0% |
| 1.25 | HAZOP | 46% | 46% | 0% |
| 1.26 | Boiler Safety | 92% | 92% | 0% |



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