



4 Square Engineering Consultancy Limited

DSEAR Risk Assessment for the Refrigerant Transfer System

Report provided for: GAP Group - Gateshead

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Prepared by:

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Recommendations detailed within this document are provided as examples of potential solutions or risk reduction measures. The recommendations are neither prescriptive, nor exhaustive and other alternative actions may be appropriate. The application of any such recommendations is the responsibility of the client.

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1.0 ASSESSMENT SUMMARY

This DSEAR Risk Assessment document details the dangerous substances and flammable / explosive hazards associated with the Refrigerant Transfer System and the control and mitigation measures in place to reduce the associated risk to a tolerable level.

This assessment (using the criteria described herein) suggests that the overall level of risk can be reduced to a tolerable level. It is essential that this assessment is periodically reviewed by the site operator to ensure that the site management implement the existing and proposed safety measures to achieve the level of risk stated in the assessment.

1.1 Assessment Scope

The assessment has been produced in accordance with the requirements of DSEAR Regulation 5 (SI2002 2776) and is intended to directly meet the risk assessment criteria stated therein.

The objectives of this assessment were as stated below:

- To establish and quantify the risks associated with the activities carried out at the Refrigerant Transfer System.
- To determine any actions required in order to reduce risk to an acceptable level.
- To determine any further actions necessary with which to identify and control risk.

This assessment serves to show how risk has been reduced to a tolerable level and in accordance specifically with DSEAR. The assessment is founded on the protection of personnel by the prevention of the release of dangerous / flammable substances with the subsequent potential for fires and explosions and/or the prevention of escalation mechanisms likely to lead to a risk of harm to personnel. All measures implemented in achieving this will also reduce the risk and exposure to commercial loss but DSEAR does not require such losses to be assessed unless they present a risk to personnel.

In the tables that follow, proposed control and mitigation measures are shown in **CAPITALISED BOLD TEXT**. Control and mitigation measures already in place are shown in normal text.

**2.0 RISK ASSESSMENT CRITERIA
HAZARD EFFECT (HE)**

| Personal Injury | Property Damage | Environmental Impact | HE Rating |
|--|--|---|-----------|
| Fatality | Major Loss Loss: > 2 weeks production | Total Loss of Containment. Public affected. Assistance required from external agency. | A |
| Likely Permanent Disability | Significant Damage Loss: 1 to 2 weeks production | Significant Loss of Containment. Public not affected. Assistance required from external agency. | B |
| Hospital Stay | Moderate Damage Loss: 2 days to 1 week production | Significant Loss of Containment. Workplace Affected. Assistance required from external agency. | C |
| Lost Time Injury, Medical Treatment, Onshore Treatment by Doctor | Minor Damage Loss: 1 to 2 days production | Minor Loss of Containment. Workplace Affected. Production Loss. | D |
| Simple On/Offshore First Aid | Insignificant Damage Loss: < 1 day production | Slight Loss of Containment. Workplace Affected. No Production Loss. | E |

RESIDUAL RISK (R)

| HE | P | R | CONTROL ACTIONS |
|------------------|------------------|---------------------|--|
| A B C | H H H | 15 14 13 | Immediate action, task must not proceed , serious loss potential. Task should be redefined or further control measures put in place to reduce risk. These controls again must be subject to a full assessment and accepted before the task may commence. |
| A B C D | M M M H | 12 11 10 9 | Task may only proceed following direct authorisation from Senior Manager following consultation with any specialist personnel and full assessment team. Wherever possible the task should be redefined to take account of the hazards involved or the risk should be reduced further prior to the task commencing. |
| A B C | L L L | 8 7 6 | The task may proceed, however, only under strict supervision and monitoring. The team must revisit all areas of the assessment to see if risks may be reduced further before the task is allowed to proceed. |
| D E E D | M H M L | 5 4 3 2 | Acceptable measures, however, review to see if risk can be reduced still further. |
| E | L | 1 | Acceptable level of risk – no need to consider further measures. Review to ensure that level of risk does not increase. |

PROBABILITY (P)

| Likelihood of event occurring and resulting in the specified Hazard Effect | P Rating |
|--|------------|
| Will occur nearly every time. | High (H) |
| Will occur sometimes. | Medium (M) |
| Will occur hardly ever. | Low (L) |

Activities Assessment

3.0 ACTIVITIES ASSESSMENT

| | |
|---|---|
| Equipment: | Refrigerant Transfer System |
| Location: | Refrigerant Transfer System |
| Review Date / Criteria: | June 2023 / Plant or process modification, accident, incident, near miss |
| <p>Circumstances of Work? (Quantity of material, work processes, substances and their interactions, handling, storage). High Risk Activities? (Maintenance, draining down, new operations processes, etc.)</p> <p>The Refrigerant Transfer System is to be used for decanting 1-tonne tanks into larger 22m³ iso-tankers. The system is comprised of a pump specially selected for the refrigerant duty and this will pump into an adjacent iso-tanker. The pump suction is connected to the 1-tonne tank by a flexible hose with a quick-connect coupling and the discharge port is connected to the iso-tanker by a similar means.</p> <p>The 1-tonne tanks contain pentane or freon, or a combination of both, in unknown concentrations.</p> <p>The final location of the system within the site is being selected based on minimising risk on the site from vehicle movements, affecting other adjacent processes (and vice-versa), minimising the number of people affected, etc. The proposed location of the refrigerant transfer activity is stated to be approximately 15m away from the perimeter of the site. An earth bund is located between this location and the perimeter though, thereby minimising the likelihood of fire and explosion incidents affecting the public directly in the short term after an incident occurring.</p> <p>The iso-tanker will be filled over an extended period of time (expected to be around twenty days) as a result of decanting one 1-tonne tank per day. The decanting operation is expected to take around twenty to thirty minutes to complete.</p> <p>The current design of the iso-tanker includes for a pressure gauge being fitted to determine when the tanker is ready to be transported off-site for the further processing of the refrigerant contents. The current methodology is that it will be deemed to be full when a pressure of 10barg is achieved in the headspace.</p> <p>The Gateshead facility is a large complex that contains several waste treatment, handling and processing systems. This risk assessment refers only to the refrigerant handling / transfer system being installed.</p> <p>Power failure is unlikely to give rise to an immediate increased risk of release or ignition.</p> <p>High risk activities such as draining down / emptying for maintenance purposes are carried out periodically as part of the planned preventative maintenance programme. Any such activities are stated to only be carried out after flammables or dangerous substances have been removed, i.e. the area is made safe by removal of flammable materials.</p> | |

Activities Assessment

| | | | | | |
|---|--|------------------------------------|---|---|---|
| Equipment: | Refrigerant Transfer System | | | | |
| Location: | Refrigerant Transfer System | | | | |
| Can hazard be removed? | No | | Can hazard be substituted? | No | |
| Dangerous or Explosive Substances Present? | Hazardous Properties Available? | Area / Zone Classification? | Potential Ignition Sources | Scale of Effects of Explosion? | Places connected by openings or ducts? |
| YES Pentane Freon Nitrogen Gas oil / diesel (lorries) | YES | Yes HAC Document | Hot surfaces. Smoking. Portable electronic devices. Naked flames. Non-Ex electrical apparatus. Non-Ex non-electrical apparatus. Electrostatic discharge (personnel and plant). Vehicle engines, exhausts and ancillary systems. Lightning. Stray electric currents. Welding / Grinding / buffing. | Potential fatality. Public alarm / risk. Equipment damage. Operations disruption. Environmental damage. | YES Fluid drains. Adjacent areas. |

DSEAR Risk Control & Mitigation

4.0 DSEAR RISK CONTROL & MITIGATION

| | | | | | | | | |
|---|--|--|--|--|--|------------------------------------|----------|----------------------|
| REF NO. 4SQ_IMBNZ_284_08_04_Rev_A | | SITE: Refrigerant Transfer System | | DEPARTMENT/LOCATION: Refrigerant Transfer System | | N°. PERSONS INVOLVED: 2+ | | |
| ACTIVITY: See Section 3.0. | | | | REFERENCES: | | SITE VISIT: YES | | |
| HAZARDS IDENTIFIED | | <ol style="list-style-type: none"> 1. Fire / explosion: alcohol materials: potential fatality. 2. Uncontrolled release of flammable gases: potential fatality. 3. Environmental damage: release of harmful gases. | | | | | | |
| HAZARD EFFECT Type of injury/damage or environmental impact. | | Fatality | | INITIAL RISK EVALUATION Refer to Section 2.0 | | HE | P | R |
| | | | | | | A | M | 12 |
| CONTROL MEASURES (including existing & proposed) | | | | | | ACTION | | |
| | | | | | | PERSON RESPONSIBLE | | DATE COMPLETE |
| <ol style="list-style-type: none"> 1. Worker induction system in place. INDUCTION TO BE UPDATED TO INCLUDE FLAMMABLE LIQUIDS. 2. Access control in place (personal & vehicular). Personnel empowered to challenge all people on site. 3. Duty of co-ordination / permit to work system in place. In use for all non-routine activities involving flammable / dangerous materials (in-house and contractor). 4. No smoking policy (not examined). 5. Job specific training matrices / plans in place (not examined). 6. COSHH assessments in place for materials in use (not examined). TO BE UPDATED. 7. Operations and maintenance procedures in place (not examined). 8. MANAGEMENT OF CHANGE PROCEDURES TO BE IN PLACE. 9. SHE information available to workers at point of use. 10. PORTABLE ELECTRONIC DEVICES POLICY TO BE IMPLEMENTED. 11. Explosion-certified equipment in place within the defined hazardous areas. 12. Informal periodic informal plant safety tours / inspections. FORMALISE AUDITS / INSPECTIONS BY RECORDING. 13. Informal personnel check out / competency assessment system in place (not examined). FORMALISE BY RECORDING COMPETENCY ASSESSMENTS / SIGN OFF. 14. Fire risk management procedures in place (not examined). 15. Spill response procedures and spill kits in place. 16. Ex signage in place. TO BE REVIEWED IN ACCORDANCE WITH HAZARDOUS AREA CLASSIFICATION. 17. EARTH BONDING TO BE FITTED TO ALL PROCESS SYSTEM VESSELS AND TANKER BAY. 18. PUWER ASSESSMENTS TO BE IN PLACE FOR ALL WORK EQUIPMENT ASSOCIATED WITH HANDLING FLAMMABLE MATERIALS. | | | | | | | | |

DSEAR Risk Control & Mitigation

| | | |
|---|---------------------------|----------------------|
| <p>19. Planned preventative maintenance programme for critical equipment in place. 20. Confined space working procedures. 21. Gas detection installed in fermentation room. 22. HAZARDOUS AREA EQUIPMENT INSPECTION POLICY (INCLUDING EQUIPMENT INVENTORY) TO BE IN PLACE. 23. PERSONNEL TO BE AWARE OF THE POTENTIAL FOR ELECTROSTATIC DISCHARGES AND HOW THEY ARE FORMED. 24. PERSONNEL WORKING DIRECTLY WITH FLAMMABLE MATERIALS TO BE SUPPLIED WITH ANTISTATIC PPE. 25. Emergency escape routes (including signage) are included in formal safety audits. 26. Bunding / catchment of liquid releases at tanker loading bay. 27. CONFIRM INTENDED OPERATING METHODOLOGY IS CORRECT AND THAT IT IS SAFE FOR ALL POTENTIAL MIXTURES OF FREON AND PENTANE). 28. FORMALISE HAZARDOUS AREA EQUIPMENT PROCUREMENT PROCESS.</p> | | |
| <p>MITIGATION MEASURES (including existing & proposed)</p> | ACTION | |
| <p>29. Emergency response procedures. 30. Periodic fire drills / emergency response exercises carried out. 31. Evacuation procedures. 32. Spill response procedures. CONFIRM SPILL COLLECTION / DRAINAGE IN ACCORDANCE WITH RED GUIDE.</p> | PERSON RESPONSIBLE | DATE COMPLETE |

DSEAR Risk Control & Mitigation

| RESIDUAL HAZARD EFFECT Type of injury / damage / environmental impact. | Fatality | RESIDUAL RISK EVALUATION Refer to Section 2.0. | HE | P | R |
|---|--|---|------------|---|---|
| | | | A | L | 8 |
| GENERAL COMMENTS: | | | | | |
| 1. The risk reduction shown in the residual risk column assumes that all listed actions are in place and strictly practiced / enforced. | | | | | |
| 2. Changes to the risk reduction measures implemented will require the risk reduction to be re-evaluated. | | | | | |
| 3. This assessment has been completed based on the site survey carried out by 4 Square Engineering Consultancy Limited in 2022. | | | | | |
| 4. It is essential that this risk assessment is periodically reviewed. | | | | | |
| | POSITION | SIGNATURE | DATE | | |
| COMPLETED BY: | | | | | |
| William Rose | Director (4 Square Engineering Consultancy Limited) | <i>W Rose</i> | 14/06/2022 | | |
| REVIEWED BY: | | | | | |
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| APPROVED BY: | | | | | |
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