CONVATEC RHYMNEY GELLING FIBRE PLANT

SECTION B2.8
Accident Prevention and Control
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1. INTRODUCTION

The hazard management system consists of the following main features: -

- The Unit 1 process and plant design were subjected to three different Hazard Study sessions, at key stages in the project. Further systematic Hazard Studies have also been carried out relating to the Annex housing a new suite to provide an increase to our capacity.
- All such Risk Assessments for the Hydrocel process were carried out by working parties which included:

  The Operations Manager, the Operations Engineer, the Hydrocel Production Manager, the EHS Manager, and members of the Operational Plant Staff as and when required.
- Measures were introduced to reduce the significant risks identified by the risk assessment.
- There are contingency plans for potential incidents or accidents involving loss of containment and fire throughout the site.
- In addition to first aid arrangements, there are measures in place for accident and incident reporting and investigation.
- The processes operated are subject to periodic inspections, under the EHS Management System, the Environmental Management System (ISO14001) and Process Safety Review systems.
- The most recent process safety hazard analysis review was completed on the Hydrocel 3 in 2023. No new significant environmental hazards / emergency scenarios were identified.
- There is a programme of internal environmental audits covering the whole business, which focuses on the environmental management system, by which operational control places scrutiny on containment and storage, energy and waste management, noise, and visual intrusion.

2. MAIN PROCESS ACTIVITIES

Within the plant areas, where the main process activities are carried out, the worst case escape potential is either the loss of up to 137kg (Hydrocel 3) or 75kg (Hydrocel 1&2) of a strong alkali solution in IDA, or up to 157kg (Hydrocel 3) or 85kg (Hydrocel 1&2) of strong acid solution. Either of these two scenarios could theoretically only occur if a major pipework or vessel leak went unnoticed by the operator, originally this could occur if two additions were made to the reactors in error; potential for this has now been removed following the automation of these processes. Any escape of liquids within the plant areas would be contained within a bund and pumped to the Industrial Denatured Alcohol (IDA) effluent storage tanks. This transfer process is also another potential area of loss.

If a reactor bursting disc were to rupture there would be a small gaseous discharge to atmosphere, via a roof mounted catch pot; the drying process would automatically shut down because of a low-pressure sensor in the drying circuit. Similarly, any failure in the Regenerative Thermal Oxidiser abatement system would result in a process control imbalance, which would shut down the driers.

The risks associated with overfilling vessels are managed by overflows to appropriate storage (whether flammable or not), and the application of process alarms with operator monitoring. Incompatible substances are separated from delivery through processing to product, and any wastes generated. The process is controlled to prevent any unwanted reactions; there are no uncontrolled reactions or reactions prone to thermal runaway. The risk from vandalism is controlled by security who are available on site 24 / 7 and the installation makes use of CCTV.

Emergency response plans will be updated prior to operations commencing within unit 3, however, environmentally, the risks posed to the environment by unit 3 processes will be significantly lower than those from unit 1 & the annex (NP3433BC installation).

2.1 Material handling

IDA is delivered via a road tanker and is stored in three interconnected 30m^3 bulk tanks in a bunded tank farm area. The bulk storage tanks maintain a nitrogen blanket in order to inert the flammable atmospheres contained within. The delivered IDA and the Waste IDA Effluent storage tanks are in the same tank farm. The tank farm and all plant areas are served by a fire protection system, which uses alcohol resistant foam and water on the area and the materials handled there. Transfer from the fixed storage tanks is carried out via pneumatically driven positive displacement pumps, which have various safety interlocks associated with their operation. A safety improvement in the installation of an additional fire water tank was completed in 2020, which enhanced the length of time which the site would be capable of fighting a fire.

30% Sodium hydroxide is delivered and stored in returnable 1000 litre IBC’s. Transfer from the IBC’s is via pneumatically driven pumps.

80% acetic acid and 20% citric acid is delivered and used from returnable 1000 litre IBC’s, with transfer via pneumatically driven pumps.

Silver Nitrate is delivered and stored in returnable 1000 litre IBCs. Transfer from the IBCs is via pneumatically driven pumps.

Sodium monochloroacetate (SMCA) is delivered on pallets in the form of multiple 25-kg plastic sacks. The sacks are cut open and a measured quantity is weighed out into plastic containers for use in Hydrocel 3 and could be used in H1 / H2 if demand required us to run at capacity. Plastic containers are transferred into the Annex SMCA area where aqueous solutions are made up. The plastic sacks are disposed of as hazardous waste, and the plastic containers are wiped clean for re-use.

Nitrogen is piped into the wet process to provide an inert atmosphere for the IDA. It is also used as a means of improving the efficiency of the washing stages by blowing nitrogen through the fibre bundle between all process stages to minimise liquor (and therefore by-product) carry over from one stage to another. Furthermore, it is used to transfer solution from the pre-mix vessels into kiers in Hydrocel 3. Nitrogen is generated on site by means of an air products owned Pressure Swing Absorption system installed in 2022. Top up nitrogen is delivered by road tanker to a bulk storage tank and delivery system. The nitrogen supplies six of the storage tanks, and the Hydrocel 3 effluent pump tank to provide additional nitrogen inertion as an increased safety feature.

Tween soft finish is delivered in 25 litre steel drums; the drums are opened, weighed out and added to the kier vessels manually.

The effluent produced from the process is collected in bulk storage tanks in the tank farm and is removed by an approved waste disposal contractor’s road tanker. The effluent is re-distilled and recovered; the recovered material is then returned to the site as 96% IDA for processing, which is described as ‘toll recovery’.

The main potential for environmental accidents/incidents will arise from either a spillage of IDA or effluent. The potential frequency of such spillages is judged to be very low.

The tank farm is situated in a concrete bund.

The road tanker loading/unloading bay is bunded and drains to an underground interceptor (divert) tank when tankers are in the process of loading or unloading. The underground tank level is monitored for rainwater collection and emptied by tanker as and when necessary.

2.2 Spillage procedures

A trained spillage team is in place covering all working patterns, spillage kits are available at strategic points throughout the site. Refresher training for spill team members was carried out in 2024. Spillages located inside or outside the building will be contained by spill kits and disposed of as hazardous waste. Under no circumstances will spillages be allowed to enter the drainage systems, foul or surface water.

The potential for chemical spillages has been identified in five separate areas within the Hydrocel and Silver Hydrocel plant operations.

- Leaks or spillages from containers in storage areas, or while being transported to and from storage areas. (Sodium hydroxide, acetic acid, etc).

- Leaks or spillages from containers in bunded storage areas, and the tank farm. (IDA, sodium hydroxide, acetic acid, etc).

- Leaks or spillages inside the Hydrocel plant, from the reactor, measure vessels, mixing vessel, or from pipe flanges during pumping operations.

- Leaks from pipe flanges between the plant and the tank farm.

- Spillage of chemicals in the raw materials and dispensing area.

The spillage procedure is as follows:

2.2.1 General Action

Major leaks or spillages must be reported immediately to a supervisor. This is particularly important when the plant is being operated by a Lone Worker – Lone workers do not operate in plant where significant spillages could occur. A Lone Worker will not tackle a major spillage. It is not anticipated that anybody will undertake lone work at site.

Plant staff dealing with any such incident must be trained and wear the appropriate personal protective equipment (PPE).

Major leaks should be reported through the Incident Reporting Procedure.

The source of any spillage or leak should be identified as quickly as possible, and action taken to prevent further leakage.

2.2.2 Leaks from chemical containers in storage or in transport.

Leaks or spillages from IBCs in the storage area will be contained in the storage enclosure bund and shall be pumped into suitable containers (IBC's), labelled and disposed of as hazardous waste. IBC storage was upgraded in 2022, with intermediate storage improvement planned for 2026.

Leaking containers should be reported to the Team Leader and should not be removed from the area.

If a container develops a leak during transport, all pathways to drains must be protected and the spillage contained using suitable spillage materials. Contaminated spillage materials must then be disposed of as hazardous waste.

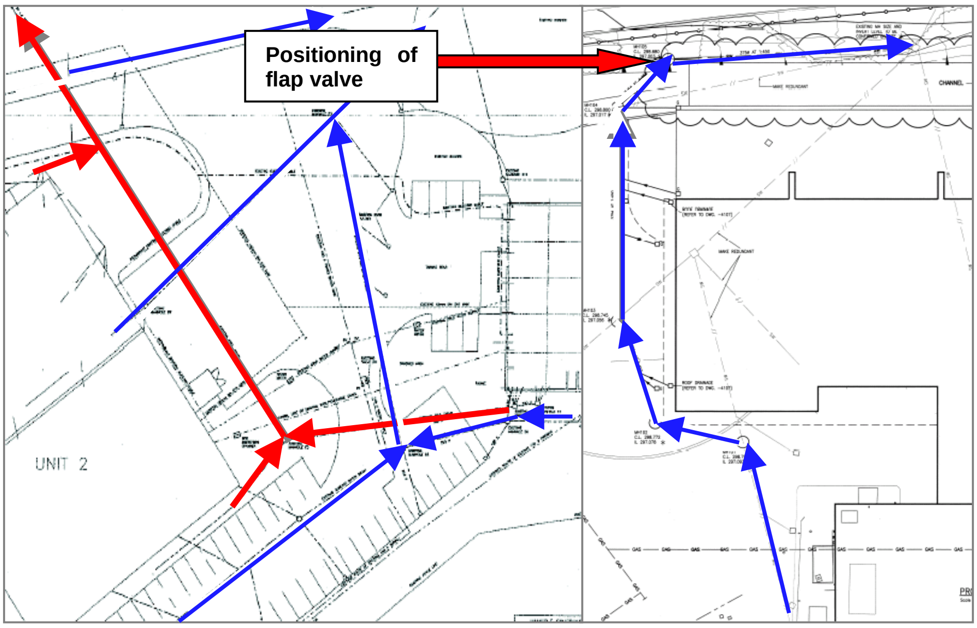
2.2.3 Leaks entering the rainwater drain system.

Should an uncontrollable leak enter the drainage system an isolating flap valve shall be activated manually to prevent spilled substances leaving the boundary of the site.

The flap valve (shown) can be activated by breaking the key box and operating the key switch. A solar panel maintains a battery voltage and a flap will move into position to prevent release when activated.

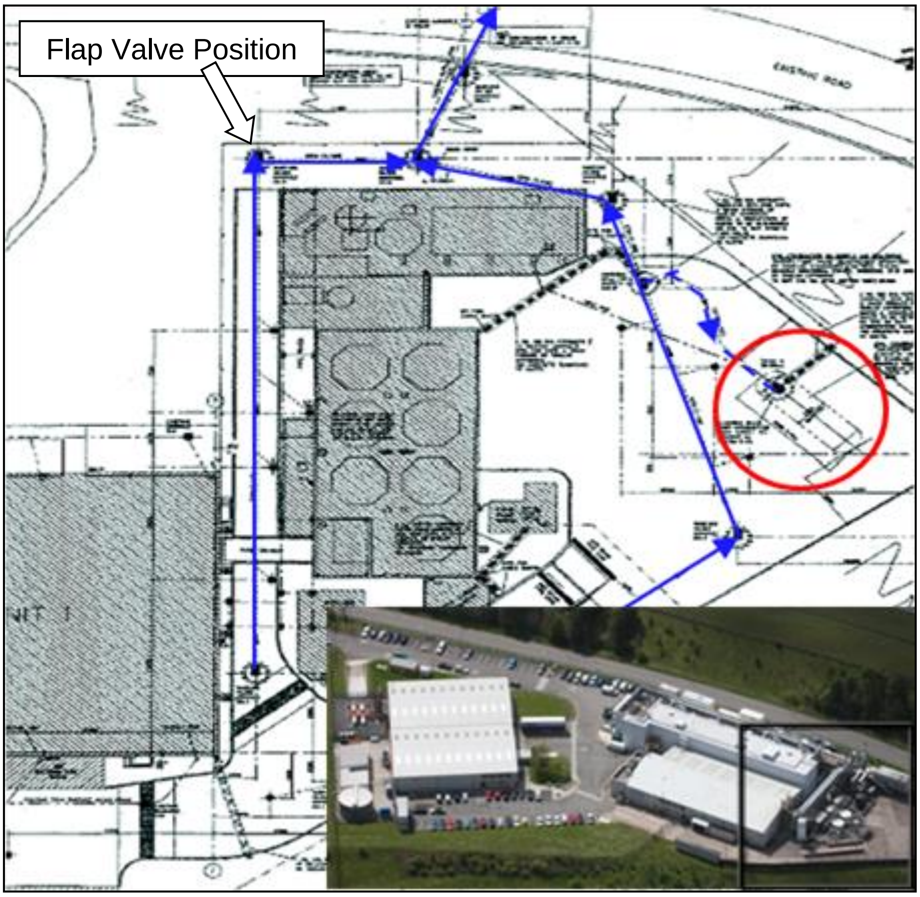
This provides time to contain the spillage, arrange for an emergency tanker to be summoned to site and dilute the isolated drain with copious amounts of water until the pH is neutral.

The location of the flap valve is shown in the drawing below.



Similarly, the second flap valve shown below has the same mode of operation, whereby, the flap drops into place to restrict flow. The solar panel maintains the battery voltage to operate a small compressor to activate the flap.

The location of the flap valve is shown below.



The combination of the flap valve and intercept tank (indicated by the red circle above) provides a total isolation of the surface drainage system in the event of a major spillage, protecting the nearby Rhymney River.

The flap valves were replaced in 2023, due to spares for service and maintenance no longer being available. The new systems are more modern, reliable and efficient. These valves were serviced and maintained by specialist contractors in 2024.

2.2.4 Leaks in Bunded Areas.

Minor leaks of IDA in the tank farm can be flushed to the bund sump using copious quantities of water. The sump should be emptied following the procedures outlined in the Standard Operating Procedure for this section.

The Maintenance Engineer and EHS Manager must be notified of any spillage which occurs.

Major spillages should be covered with alcohol resistant foam, and the Fire Service should be called to assist and stand by in case of fire. The spillage should be flushed to the bund sump using copious quantities of water. The movement of vehicles in the area should be prevented until the spillage is cleared (emptied by tanker) and the area is safe. Fire extinguishers containing alcohol resistant foam are retained in the tank farm.

2.2.5 Leaks from a Kier or from Pipe Flanges.

Leaks or spillages inside the Hydrocel plant will be contained within the bunded area in the plant, or the centre of the floor in Hydrocel 3. The contents are pumped into the Kier for disposal into the IDA/water effluent storage tank.

Minor spillages (drips from flanges) can be dealt with by mixing with water and mopping up.

A major spillage of hazardous material inside the plant should also be contained within the bunded areas and will therefore be pumped to the IDA/water effluent storage tank.

The bunds should subsequently be cleaned thoroughly.

2.2.6 Leaks from pipe flanges between the plant and the tank farm.

Minor spillages will be contained in bunds for suitable removal either by tanker or trade effluent dependant on quantity and concentrations.

Major spillages should be covered with alcohol resistant foam, and the Fire Service should be called to assist and stand by in case of fire. The spillage should be flushed to the bund sump using copious quantities of water. All such spillages will be tankered from site as Hazardous waste. The movement of vehicles in the area should be prevented until the spillage is cleared (emptied by tanker) and the area is safe. Fire extinguishers containing alcohol resistant foam are retained in the tank farm.

2.2.7 Spillage of chemicals in the raw materials and dispensing area.

Spillages of chemicals in the Raw Materials and Dispensing area (SMCA) may be cleaned up using a suitable vacuum cleaner followed by washing of the affected floor area. (Vacuum cleaner bags should be disposed of as hazardous/special waste).

Tween should be wiped up using cloths, and the floor area washed.

Keys to the Tank farm are held within the Unit in a key cabinet.

2.2.8 Spillages in the Apollo suite

Any spillages within the Apollo suite will be contained (no drainage outlets in the area), collected and removed of as hazardous waste.

2.2.9 RTO Penstock Fire Water Containment

During the construction of the RTO, a penstock valve system was added to the compound where it is constructed. In the event of an onsite fire alarm activation, the penstock valve located within the RTO compound will activate, to prevent any deluge foam / fire water runoff from exiting the site boundary. It is not anticipated that any other type of major spill would occur within the RTO compound.