# Hazard Audit

## Visy Pulp & Paper Tumut

Visy Pulp and Paper Tumut

20 December 2024

→ **The Power of Commitment**

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# Executive summary

Every three years, the Visy Pulp and Paper Mill in Tumut (Tumut), NSW requires a hazard audit in accord with the Department of Planning, Housing and Infrastructure's (DPHI) Hazard Audit Guidelines. This is the seventh audit of the site.

The review was conducted through a three-day site visit where GHD:

- Toured the site and observed operations
- Reviewed changes to operations that had occurred since the pervious audit
- Considered the quality of risk assessments
- Considered the design of the Safety Management System (SMS)
- Interviewed key operational staff
- Considered the key finding closure from the previous audit

In summary, Tumut:

- Employs the hierarchy of controls, including engineering, isolation and administrative controls to reduce the probability of hazardous events
- Relies on Personal Protective Equipment (PPE), emergency planning and response to mitigate the consequences of hazardous events
- Holds detailed standard operating procedures and specifically developed training materials covering all operational areas
- Arranges for external reviews and condition assessments to be performed over key items of equipment such as pressure vessels
- Conducts 1st and 2nd Line of Defence (LOD) assurance activities against safety compliance

During the review the following issues were identified with supporting recommendations.

***Table 1 Findings and recommendations***

| # | Finding | Recommendation |
|---|---|---|
| 1 | Tumut has an overarching Management of Change (MOC) procedure based upon the Modification of Change Request (MCR) process.<br>The supporting MCR forms design includes a column for risk assessment, but there is currently confusion as to the level of risk assessment to be applied given that the form can be used for both low-risk and high-risk modifications. | Update the MOC procedure to include a requirement for a risk assessment of the proposed modification/change. Include within the procedure, some principle-based guidance as to the appropriate risk assessment methodology. |
| 2 | Information Technology (IT) and Operational Technology (OT) cyber security risks are currently not reflected as a hazard/risk within Tumut's risk register.<br>A risk assessment is required to determine the degree of protection and whether the process would fall to a safe mode in the event of a cyber incident. | With the support of Visy Corporate, add IT and OT cyber security as a risk to the register and/or perform a specific risk assessment of the exposure. |
| 3 | During the previous audit, unguarded nip points were observed at the wet end (head box) of Paper Machine 9 (VP9).<br>The implementation of guarding is still under consideration by Tumut. | Review the Australian Standards (AS) requirements for machine guarding for the wet end (head box) of Paper Machine VP9 as there are unguarded nip points, i.e. ensure that the necessary guards are installed. |

| # | Finding | Recommendation |
|---|---|---|
| 4 | Visy Corporate has driven an arc flash study across Visy sites. At Tumut, High Voltage (HV) switch boards have been identified that required category 3 and 4 rating PPE.<br>The required PPE has been ordered and a risk assessment is underway, noting that arc flash detection devices represent another engineering control that should be considered as part of this assessment. | As part of the arc flash risk assessment, the use of arc flash detection devices should be included in the assessment as a potential control measure. |

This report is subject to, and must be read in conjunction with, the limitations set out in section 1.1 and the assumptions and qualifications contained throughout the Report.

# Glossary

| | |
|---|---|
| Appita | Australian and New Zealand Pulp and Paper Industry Association |
| AS | Australian Standard |
| BRR | Build Run Repair |
| CCTV | Closed Circuit Television |
| CEMS | Continuous Emission Monitoring System |
| DCS | Distributed Control System |
| DISPLAN | NSW State Disaster Response Plan |
| DPHI | Department of Planning, Housing and Infrastructure (NSW) |
| EMP | Emergency Management Plan |
| EPA | (NSW) Environment Protection Authority |
| ERP | Emergency Response Plan |
| EWIS | Emergency Warning & Intercommunication System |
| HAZCHEM | Hazardous chemical signs (placards) |
| HAZOP | Hazard and Operability Study |
| HSE | Health, Safety and Environment |
| HV | High Voltage |
| IBC | Intermediate Bulk Container |
| IFS | Software for asset management |
| IP | Ingress Protection (rating which grades the resistance of an enclosure against the ingress of dust/liquids) |
| IQMS | Visy intranet site providing access to management system documentation |
| ISO | International Organization for Standardisation |
| IT | Information Technology |
| JSEA | Job Safety Environmental Analysis |
| KPI | Key Performance Indicator |
| LOD | Line of Defence |
| MCR | Modification of Change Request |
| MOC | Management of Change |
| OEM | Original Equipment Manufacturer |
| OH&S | Occupational Health and Safety |
| OT | Operational Technology |
| PLC | Programmable Logic Controller |
| PPE | Personal Protective Equipment |
| PPE | Personal Protective Equipment |
| SDS | Safety Data Sheet |
| SMS | Safety Management System |
| SOP | Standard Operating Procedures |
| T-LAS | Tumut Learning Assessment System |
| Trevitest™ | A method of testing relief valves with no operational interruption |

| | |
|---|---|
| UPS | Uninterruptible Power Supply |
| VESDA | Very Early Smoke Detection Apparatus |
| VIE | Vacuum Insulated Expander |
| VP9 | Paper Machine 9 |

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# 1. Introduction

Every three years, the Department of Planning, Housing and Infrastructure (DPHI) requires a hazard audit in accord with the Department of Planning's Hazard Audit Guidelines. This is the seventh audit of the Visy Pulp and Paper Mill in Tumut (Tumut), NSW.

## 1.1 Purpose of this report

This report outlines the results of a hazard audit conducted for Tumut.

## 1.2 Scope and limitations

The review has been conducted in accordance with the Department of Planning's Hazard Audit Guidelines and meets the ongoing requirement for an independent hazard audit to verify the integrity of the safety systems and that the facility is being operated in accordance with its hazards-related conditions of consent.

The audit focused upon changes to operations that have occurred since the last audit performed by Pinnacle Risk Management Pty Ltd in December 2021.

The audit also considered:

- The effectiveness of management systems covering key hazards
- The quality of risk assessments
- The consultation process during risk assessment
- The application of the hierarchy of controls
- Interfaces with planning processes
- Governance
- The quality of key interfaces between different management systems such as assets management processes

The audit covered:

- Closure of audit findings from the previous audit
- Site location and layout risk context
- Risk assessment quality and evidence to support consultation
- Management systems effectiveness, including but not limited to OH&S, Asset Management, Electrical and Environmental
- Process controls/safety
- Asset management processes, including maintenance, inspections and change management
- Training and credentialling
- Security
- Governance

*The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.*

*The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.*

## 1.3 Methodology

The audit was performed across a three-day site visit. Prior to the visit, GHD requested and considered the following:

- Risk assessments covering Health Safety and Environment (HSE)
- Occupational Health and Safety (OH&S), Asset Management, Electrical and Environmental management systems

During the site visit GHD:

- Performed a walkthrough of the plant's operation and site
- Interviewed key staff across all levels who hold risk management responsibility
- Reviewed recent incidents
- Performed selection testing of key controls where required based on the judgement of the Lead Auditor, including spot checks of procedures and documentation, maintenance records and permits
- Considered findings from the previous audit.

## 1.4 Lead Auditor

The independent Lead Auditor for this engagement was GHD's Bruce Clarke. Bruce is an Executive Advisor – Assurance, Audit and Compliance with over 30 years of professional experience. He has previously completed audits for a range of high hazard industry clients, including in the oil and gas, mining, manufacturing and power sectors.

## 1.5 Personnel interviewed

The personnel interviewed for the audit are listed in Table 2 below, and include operational representatives as well as safety, training and management.

***Table 2 Personnel interviewed***

| Name | Role |
|---|---|
| Matthew O'Donovan | HSE Manager |
| Luke Manton | Safety Coordinator |
| Isabella Kane | Environmental Officer |
| Uday Bhagwat | Pulp Mill Manager |
| Brad Baker | Major Shutdown Coordinator |
| Ravin Dayanand | Reliability & Maintenance Manager |
| Don McLeod | Paper Machine Manager |
| Troy Watling | Area R&M Manager |
| Carel Kruger | EIC Reliability Manager |
| Gary Le Roux | Project Manager Visy – Build Run Repair |
| Craig Cullinger | Training Coordinator |

| Name | Role |
|---|---|
| Fonnie Botha | Technical Manager |
| Altair Zolio | Area Manager-Digester & White Liquor Plant |
| Andrew Pringle | Reliability & Maintenance Services Manager |

# 2. Site overview

## 2.1 Site location and surrounding context

The plant is located approximately 7 kilometres west of Tumut in a rural environment. Landholding with recent property acquisitions now encompasses approximately 2,124 hectares.

The area is subject to bushfires, with the Tumut site most likely to be exposed to grass fires.

The site has a closed loop waste water system. Direct discharge to the nearby Sandy Creek is only permitted under extremely wet conditions and after following an established protocol in accordance with the site's Environment Protection Licence, which requires obtaining written approval from the NSW Environment Protection Authority (EPA).

Figure 1 below illustrates the site's setting.


***Figure 1 Site setting***

Source: Image © 2024 Google, Airbus

## 2.2 Site layout

The site layout drawing, provided by Tumut, is shown in Figure 2 overleaf.

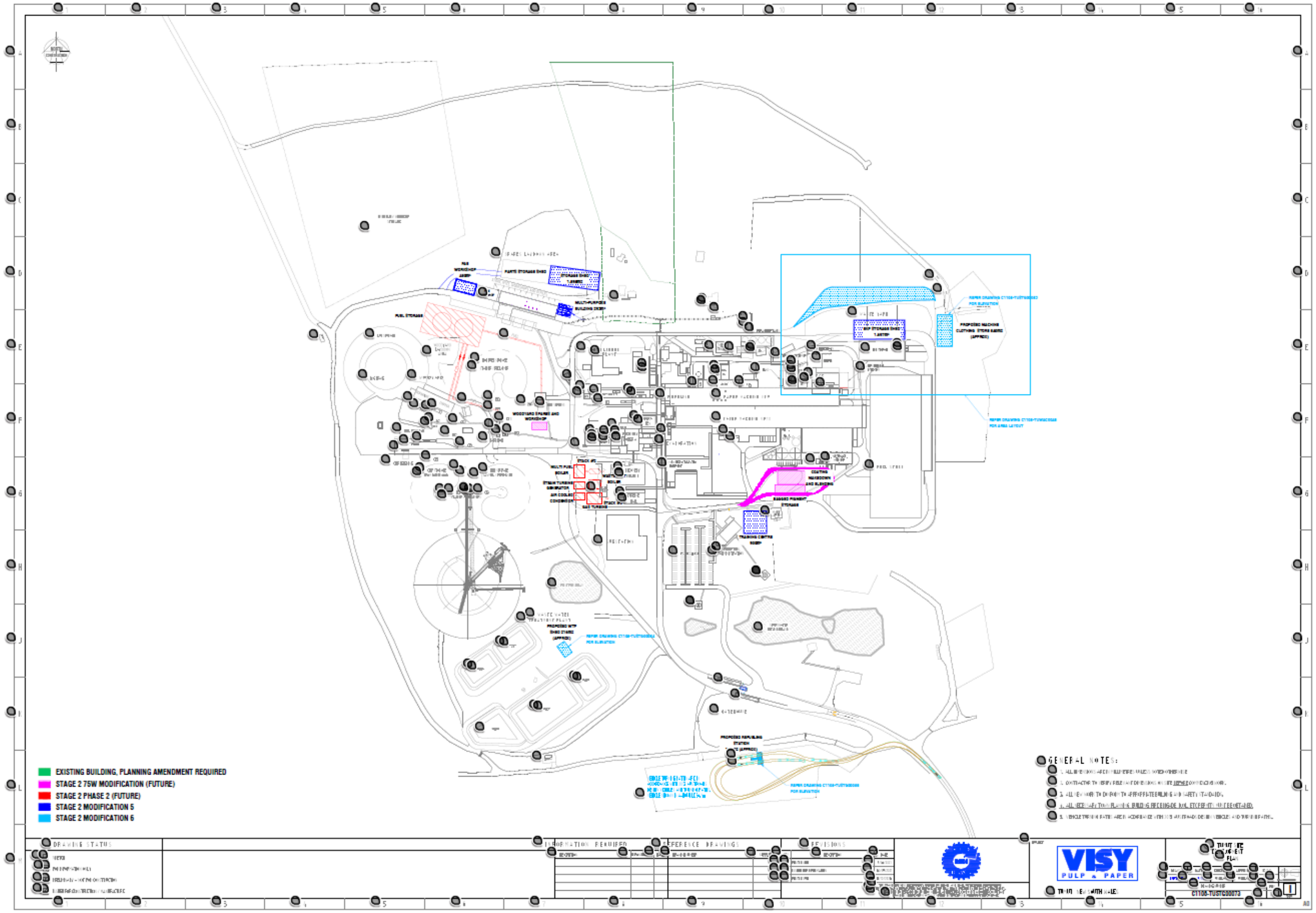


*Figure 2* *Visy Tumut Site layout*

# 3. Process description

The Tumut mill produces approximately 700,000 tonnes per year of paper using a combination of virgin material (including woodchips) and recycled waste paper and cardboard. The mill uses the kraft process, a method for conversion of wood into wood pulp (almost pure cellulose fibres).

The main components of the mill are the:

- Wood yard
- Kraft pulp mill and recycled paper plant
- Kraft liner paper mill
- Water management and recycling scheme
- Ancillary infrastructure

The unbleached kraft pulp and paper manufacturing process consists of essentially the main components described below.

**Wood**

Wood is delivered to the wood yard, debarked and cut into chips.

**Pulping and chemical recovery**

Within the Digester, woodchips are mixed with white liquor, which is an aqueous solution of sodium hydroxide and sodium sulphide. Heat is applied and the mixture is pressurised to 8 bar.

During this chemical pulping, lignin is dissolved from the cellulose fibres required for paper making to yield a liquid by-product called weak black liquor.

The cellulose is formed into a slurry, which is washed and refined to produce the pulp required for the paper machine.

This washing water is returned to the Digester and pulp is transferred to the pulp store. The weak black liquor is transferred to an Evaporator where concentrated black liquor is used to feed the Recovery Boiler.

The Recovery Boiler is primarily a chemical recovery process unit in which organic materials in the black liquor are burned while the oxidized sulphur compounds of sodium and potassium are reduced and drained as molten smelt from the furnace bottom. At the same time, the heat released is used for generation of steam for power and the process.

To the molten smelt, water and lime are added to produce white liquor.

**Recycled fibre**

Waste paper is conveyed into a large vat, called a Pulper, which contains water. A rotor mounted on a vertical shaft on the centroid of the vat cuts the paper into its smallest fibre, eventually turning the mixture into a pulp. The recycled pulp is forced through screens containing holes and slots of various shapes and sizes. These screens remove small contaminants such as plastic, staples and glues. The recycled pulp further undergoes cleaning, separation and refining prior to being transferred to the paper machine.

**Paper making**

The resultant pulp is transferred to the headbox of the paper machine from where it is sprayed onto a continuous wide jet onto a large flat wire screen which is moving very quickly through the paper machine. On the screen, water starts to drain from the pulp and the fibres quickly begin to bond together to form a watery sheet. The sheet moves quickly through a series of felt covered press rollers where more water is squeezed from the sheet. The sheet then passes through a series of

heated rollers called dryers, which dry the paper. Finally, the paper is wound into a large 38 to 50 tonne jumbo roll and removed from the paper machine.

The jumbo roll is rewound and cut into smaller rolls before being transferred to the reel store ready for distribution.

**Co-generation**

The Power Boiler is designed to generate process steam to be used by the mill and is fuelled by wood by-products and natural gas. The steam is combined with steam generated from the Recovery Boiler and sent to a steam turbine generator where electricity is produced and used by the respective mill operations and can be sold into the local electricity grid.

Much of the process water used by the paper making process is recycled back into the process, with the excess water being treated by the wastewater treatment plant. The treated effluent is used to support an environmentally sustainable irrigation scheme.

**Reel store**

The reel store is the main warehouse and distribution centre for the finished paper products. The building is over 14,000 square metres in floor area and a height of 9.5 metres. The paper in the form of tightly wound reels varying in sizes from 800 to 3,000 millimetres long is transferred across from the paper machine building by an elevated conveyor system. The reels are then removed from the conveyor into storage via a self-propelled, automated guided vehicle system.

# 4. Management systems

Tumut's health safety and environment management system is externally certified against:

– AS 45001 Occupational health and safety management systems – Requirements with guidance for use
– ISO 14001 Environmental management systems — Requirements with guidance for use
– ISO 9001 Quality management systems — Requirements

Tumut does not have formalised safety or asset management frameworks but relies upon the operation of key elements that would be typically present in a SMS and asset management framework.

These elements are embedded within operational practices, with staff interviewed aware of operational requirements.

Tumut has a low staff turnover, with staff typically experienced in several process areas. As a result, there is a strong understanding of interrelationships and the processes to be followed to achieve safety objectives.

Training, mentoring and succession planning is evident at Tumut, with the training program designed to lift skills for motivated staff. Junior staff are supervised and mentored by those in more senior positions.

As a general observation, based upon interview and observation, the safety culture is positive and embedded.

Framework formalisation typically adds roles and responsibilities, governance requirements and assurance processes over the key elements. Formalisation can also counter the risk of high staff turnover, which is not present at Tumut. Where these exist through other mechanisms or through operational rhythms, the lack of formalization is not considered an issue.

Tumut's SMS is based upon several key elements described in the following sub-sections.

## 4.1 Hazard identification and risk assessment

Tumut has separate risk registers covering safety and environmental hazards / risks. They detail the identified hazards/risks and outline the application of the hierarchy of controls. The control hierarchy is analysed in a separate column within the risk register as related to elimination, engineering controls, administrative controls and PPE.

The risk register is subject to annual review by the management team or upon incident investigation indicating a control weakness.

The registers are detailed but lack a risk assessment of IT and OT risks.

## 4.2 Training and credentialing

Tumut has a comprehensive competency framework. This details the training elements that need to be completed by all staff and specific training relevant to each plant operation for all position levels.

The training includes a mixture of internally developed material, external courses such as firefighting and Australian and New Zealand Pulp and Paper Industry Association (Appita) training content.

Internal training procedures are developed by the area managers and include the plant operating procedures. Process operator training is typically conducted one-on-one and is evaluated by observation from the trained assessors, the completion of checklists and audits. Precautions to take and why they are required are integral to the operating procedures and the knowledge and

competency tests (e.g. correct use of PPE). Non-trained personnel are not permitted to perform the relevant operations by themselves.

Other internal courses are assessed through written test results.

All materials are held on T-LAS (Tumut Learning Assessment System) intranet portal. Records of completion of training materials are held in the system by employee, with the reclassification of employees requiring a formal approval process that includes attached evidence of training completion.

## 4.3 Access controls

Each processing area, as outlined in training materials, possesses different hazards and in some cases requires different PPE requirements (i.e. specific PPE for boilers and electrical work).

Access to electrical installations is controlled by swipe card access with access further limited by lock and key.

Access to other plant areas is controlled by swipe card access, which is site wide with staff specifically trained for each area.

Security of the site is achieved by a number of means including:

- Permanently manned security gate for the control of people/vehicles into and from the site
- Full perimeter fencing
- CCTV
- Night security patrols by operations personnel
- Swipe card access, with certain areas under lock and key

## 4.4 Operating procedures

Operating procedures exist for the activities performed at this facility and are stored within the DCS or IQMS, which are intranet sites available to all staff.

The operating procedures are written by the relevant area supervisors and then reviewed by the operators. Any changes are agreed to by the appropriate senior manager.

The operating procedures include information such as hazards, PPE and tasks. Photos are included to help avoid any ambiguity when performing a task.

Assessment of how well the requirements of the procedures are known by the plant operators is included in the operator training program. Should an incident occur where there was a breakdown in the procedures, an incident review is performed. The incident reviews assess people and activities with the objective of improvement if deficiencies are found.

Activities that do not have written procedures are reviewed for hazards by conducting a Job Safety Environmental Analysis (JSEA).

New operators are constantly supervised and mentored until appropriate training has been received.

Operating procedures are required to be reviewed on a cyclic basis. The system sends a reminder email to the responsible employee and the system can run exception reports.

As part of continuous improvement, Tumut has recently ensured that operating procedures are assigned to a responsible reviewer and have updated a large number of procedures to improve effectiveness.

## 4.5 Capital projects and safety in design

Capital projects are delivered by a separate division of Visy known as Build Run Repair (BRR). This represents a project management division who will design, construct and hand over assets to the site for operation.

The only major change to the process since the last review was the build of the new Reclaim Stacker.

BRR was interviewed regarding the Reclaim Stacker design, build and handover to operations. BRR confirmed that as part of the design process, Hazard and Operability (HAZOP) studies were completed by BRR with the Original Equipment Manufacturer (OEM).

Asset commissioning was conducted with the Tumut Woodyard team with any outstanding issues communicated and handed over to site.

During commissioning, Standard Operating Procedures (SOPs) were developed by Tumut for the asset's operation.

## 4.6 Asset management processes

Tumut does not have a formalized asset management framework or specific asset management plans for asset classes. Rather, reliance is placed upon the IFS maintenance system which represents a key control for plant reliability and safety.

This system has been developed over time and includes:

- Technical schedules that drive the profile of planned maintenance and inspection activities through work order generation; these are based upon OEM recommendations and past operational performance issues
- The ability to assign priority ratings (based upon time frames) that can be used as a proxy for risk rating
- The ability to monitor outstanding work orders
- A library of work instructions for tasks

IFS drives planned and reactive maintenance activities, directs and records asset condition assessment and interfaces with management of change and work permitting requirements.

### 4.6.1 Planned maintenance

Assets have technical schedules within the IFS system that drive work orders based upon manufacturing recommendations and past operating history. Work orders issued may relate to maintenance or condition monitoring activities. All work orders have a time-based priority ranking that can be used as a proxy for risk rating.

The mechanical engineers for the various operational areas monitor the system and initiate the required maintenance activities. Root cause analysis is used to track equipment items' histories and to check for recurring causes and the root cause.

All of the site's pressure vessel maintenance records are kept within IFS. Relief valves are included on a list and are either changed annually or undergo Trevitest™ valve testing. Test certificates are received for each relief valve following the test. Bursting discs are typically replaced every 3 to 5 years (e.g. to avoid fouling on the inside preventing operation on demand).

Independent testing of pressure vessels during shut down or other times is also driven and recorded in IFS.

Work orders raised in the last week and any outstanding work orders are discussed in the weekly Backlog Meeting for scheduling purposes. Reports of the aged profile of outstanding work orders

are reviewed by the maintenance manager and are available for the mechanical, electrical and operations to review.

### 4.6.2 Reactive maintenance

Reactive maintenance follows the same process as planned maintenance, with manual entry of the requirement, which is again priority rated and monitored for closure.

The results of the maintenance activities are received via written reports and are analysed by the mechanical engineers to determine if any follow-up action is required. Maintenance can be performed by Tumut personnel or by appropriate external contracting companies.

Key Performance Indicators (KPIs) are used to track compliance with the preventative and reactive maintenance requirements.

### 4.6.3 Asset replacement

Assets are monitored by age, condition assessments and OEM recommendations. The availability of critical spares and OEM support is also an issue that may result in a replacement decision. Any replacement requirements are progressed through annual planning processes or through a capital request if considered urgent.

## 4.7 Management of change

As indicated above, capital projects related to new plant are delivered by a separate Visy division, BRR. This division is responsible for design, construction and supporting the hand over to operations. Risk mitigation in the form of Safety in Design is incorporated into their project management methodology.

Plant modification falls under the MCR process. Under this process a MCR from is raised by the process engineers or other engineers and is subject to Visy Management approval processes.

The MCR process also interfaces with the work to permit system once the work order has been raised in IFS. In this case, the work order is raised by the maintenance team, including a JSEA assessment prepared by the maintenance supervisor. This is forwarded to the Control Room who issues a lock out procedure and isolation sheet.

The Isolation Lists Database and IQMS includes a library of lock out isolation sheets and procedure that may be selected, reducing the risk of human error in their preparation. A certified electrician is notified to perform electrical isolation and the MCR request is published on the Control Rooms “Isolation Board”. When ready, the operator will approve the work order. Upon completion a Permit back to operation is issued and de-isolation steps completed.

As observed in the previous audit, the MCR process relies heavily upon the experience of Tumut’s staff, noting that most staff have a long service record. It was also noted that the process lacked:

– A formal risk assessment process to confirm what process and plant items could be affected as a result of the change
– Guidance for handling temporary changes and emergency changes
– Guidance on how to ensure the installed change is ready for operation (e.g. a pre-start safety review)

Following the previous audit, Tumut added a risk assessment column to the MCR form’s design. However, interview results indicate that there is still some confusion as to the requirements. This may stem from the fact that the MCR process can be applied for both low and high-risk activities, which may have contributed to a lack of clarity, noting that in some cases a HAZOP Study is performed before the work order proceeds.

There is value in changing the form's design again to prompt a risk assessment and this is currently being considered by the maintenance team, who are undertaking some continuous improvement activities.

**Recommendation No. 1** – Update the Management of Change procedure to include a requirement for a risk assessment of the proposed modification/change. Include within the procedure some principle based guidance as to the appropriate risk assessment methodology.

## 4.8 Process control

The mill operations are controlled by various computer control systems, e.g. a Distributed Control System (DCS) for routine control and various local control systems (e.g. local tank level readouts for road tanker transfers and local operating consoles for the paper machines). Process control is performed via screens at the operator interface terminals in the main control room and within the paper machine control room.

The computer control systems operations include setpoints (e.g. tank levels), trips, interlocks, valve opening/closing and motor run/fault indications. To supplement the computing systems, process monitoring is also performed by operator walk-arounds.

For backup power supply in an emergency, there is an Uninterruptable Power Supply (UPS) and diesel generators for the computer control system. Manual control of the plant is also possible via the DCS.

There are a number of emergency shutdowns (machine stops) located around the facility. Upon activation, the emergency functions include shutting the appropriate valves and stopping the appropriate pumps/drives.

Since the last audit there was a cyber security incident that impacted site computers, although there were no impacts on OT.

The design of the plant is intended to shut down to a safe state and upon further risk assessment the risk of a cyber security events may be judged as acceptable. However, the current risk register does not recognise this to be a hazard.

**Recommendation 2** – With the support of Visy Corporate, add IT and OT cyber security as a risk to the register and/or perform a specific risk assessment of the exposure.

## 4.9 Permit to work system

For maintenance activities, a work permit is prepared. This includes the production and checking of a JSEA.

Any special precautions, e.g. hazard mitigation, are included on the work permit. The person performing the task is responsible for producing the required JSEA.

Tumut work supervisors locally manage the people performing the work. This person is the permit holder and JSEA reviewer. The permit issuers are the appropriately trained senior operators.

Line or equipment venting and isolation are performed by the operators prior to handover for the maintenance to begin. Isolation requirements are included in the permit.

The Work Permits used at the site are as follows:

- General Work Permit
- Hot Work Permit
- Excavation Permit
- High Voltage (HV) Permit
- Confined Space Entry Permit

Only trained personnel can issue the work permits. At the end of each day, the permits are required to be given back to the original issuer.

Management conducts routine work permit checks to ensure the system is being used as required, e.g. correct signatures are in-place, the JSEAs are adequate, and the appropriate PPE is being used.

Corrective maintenance requests can be initiated by any employee.

With the exception of simple maintenance activities, vendor manuals are used as required, e.g. the supplier's maintenance manual for the paper machine.

A lock-out/tag-out system is in place. Isolations are performed by the maintenance personnel and are checked by the operations personnel. Electrical isolations (padlocks) are applied on the switchroom isolators and circuits are tested for dead using meters.

Single line diagrams and underground services drawings are available. All emergency stop buttons and lanyards are tested six monthly.

Low voltage equipment is isolated (locked) in the motor control centres. High voltage equipment is isolated locally and at the high voltage switch gear.

Manual racking is performed within the HV switchroom. To reduce the risk associated with arc flash, this activity is only conducted by trained personnel wearing appropriate PPE as per the Tumut procedure. Exposures related to arc flash are discussed in section 5.7.

## 4.10 Contractor management

The contractor management procedure is typical for an industry of this type. Contractor selection is performed via Pegasus, an industry electronic system for contractor management. Visy specify their requirements and these are included in the Pegasus procurement system. Inductions are both on-line and face-to-face. If a contractor's licence has expired, then their access swipe card is automatically blocked.

## 4.11 Emergency planning

Tumut has an Emergency Response Plan (ERP) and approximately 30 emergency response members with at least three on site at any time.

The site's emergency response procedures are based on *AS 3745-2010 Planning for Emergencies in Facilities* and includes:

- Emergency Planning Committee
- Principals of emergency control and response
- Emergency Control Organisation
- Training
- Identified potential emergency scenarios conducted on a regular basis to maintain interest and hone effectiveness
- Roles cards and procedures based on potential scenarios
- Relationships with responding agencies and participation in the local council emergency management planning
- Evacuation drills conducted several times per year.

Chemical safety equipment and training is described in section 5.4.

Fire equipment on site and training is described in section 5.5. Members of the local Rural Fire Service and Fire and Rescue NSW branches visit site once per year for emergency preparedness.

Tumut holds regular evacuation drills:

- Raising alarms and response
- Traffic control
- Evacuation
- First aid capability
- Terminating an emergency
- Interaction with other agencies
- Training

The ERP includes events such as fires, explosions and spills. Contact numbers, e.g. police, ambulance and fire brigade, are given. The ERP acknowledges the Tumut DISPLAN.

Simulated emergency exercises are performed at least once per year. There are approximately 30 members of the site's emergency response team. At least one of these members is trained in a scenario per month.

Printed copies of all emergency response materials are available if IT systems are impacted by any event.

## 4.12 Incident investigations and continuous improvement

Tumut has an incident reporting system with more serious incidents subject to detailed reviews. Interviews indicated that only two serious incidents have occurred since the last review. These were examined in detail with supporting documentation indicating a comprehensive investigation and root cause analysis process. This included the development of corrective actions to reduce the probability of re-occurrence with verification of implementation.

## 4.13 Assurance

Assurance activities can take place from different LOD, (referring to the three line of defence risk management approach) and can be conducted by a few different providers.

- As a 1st LOD activity, site personnel conduct audits to check whether items such as PPE is available and in working order.
- As a 2nd LOD activity, internal audits are conducted by senior Tumut personnel and external audits such as hazard audits and environmental compliance auditing (i.e. independent industry reviews) take place.
- Within the design of the SMS, independent reviewers are involved in pressure vessel inspections, boiler inspections and dam safety reviews.

# 5. Site hazards

Tumut's risk register identifies 50 hazards/risks relating to safety generally and the environment. A number of these risks are common to construction or manufacturing activities, such as working from heights. Given that these risks and acceptable controls are well known, GHD has focused upon hazards that are either unique or are considered a high exposure at the Tumut site.

## 5.1 Vehicle movements

Approximately 400 trucks arrive at Tumut every day. Access is controlled via the gate house and, based upon the site tour, has traffic management in place.

Unloading of logs at the log yard requires drivers to exit the vehicle whilst lifting operations take place.

Forklift drivers hold licences and require three-meter separation distances from pedestrians. In areas where robots operate as forklifts, access is restricted, noting these automated forklifts can detect people movement triggering braking.

Key controls include the following, with a full listing of controls detailed in the risk register:

- Traffic management physical controls – booms, barriers, speed humps, pedestrian separation, gates fitted to the end of walkways
- Heavy vehicles speed limited
- Mandated clearance distances from moving vehicles, with training to communicate this control to the workforce
- Requirement to wear high-visibility clothing in operations area
- Positive communication via 2-way radios

## 5.2 Loading and unloading operations

Materials transported by truck into the site include logs, woodchips, chemicals (both in bulk and packaged forms) and waste paper for recycling.

Materials transported away from site mostly involve the finished product (i.e. rolls of paper inside large articulated semi-trailers).

The chemical transfer equipment was inspected during the previous audit. Chemical receiving tank levels are monitored by instrumentation. There are level indictors and high-level alarms installed to prevent overflows. Tank overflows are piped to bunded areas.

Unloading areas include bunding to contain spills. There are fire extinguishers and safety shower/eyewash stations installed. There are also hydrants and foam making equipment nearby for major firefighting.

Other safety features associated with the unloading bays and operations include:

- Drivers of bulk road tankers can perform emergency stops by shutting down the transfer pumps
- An earth strap is used for the turpentine road tanker
- There are operating procedures for the transfer operations

- Visy specify that brake interlocks are required for all bulk chemical road tankers as a means to prevent drive-away
- The unloading areas are bunded and drain to containment pits for treatment/disposal
- Drivers are inducted to the site's safety procedures.

Other materials brought into the facility includes the packaged chemicals in Intermediate Bulk Containers (IBCs). These are removed via forklift truck and placed into the desired positions. There is a Dangerous Goods storage shed for the IBCs and drums. This has been designed for hazardous areas with natural ventilation installed (open mesh door and wall sections under the roof).

Key controls include the following, with a full listing of controls detailed in the risk register:

- Loading area markings and signage
- Bollards and barriers in place to separate pedestrians
- Area access restriction, i.e. inside the waste yard and roll store where automated forklifts operate
- Loading area markings, signage and procedures
- Forklift licences
- Safety training modules

## 5.3 Moving plant

During the three-day site visit, GHD toured the site and observed that moving plant had physical guards in place. The only area observed where moving plant and existing guarding represented an issue was in the wet end of Paper Machine 9 (VP9).

Generally, this area is restricted and access to the plant is only required for cleaning rollers or to replace blades. Blade replacement is performed whilst the plant is stopped, whereas cleaning can occur when the machine is crawling. Paper Machine 10 had a recent upgrade in barriers whilst a similar upgrade is planned for Paper Machine 9 (VP9).

The same observation was made during the previous audit.

**Recommendation No. 3** Review the Australian Standards requirements for machine guarding for the wet end (head box) of Paper Machine 9 (VP9) as there are unguarded nip points, i.e. ensure that the necessary guards are installed.

Key controls include the following, with a full listing of controls detailed in the risk register:

- Guarding in place
- Interlocked gates
- Emergency stops with planned maintenance for testing
- Isolation points
- Lockout equipment (locks, hasps, etc.)
- Isolation and lockout plans for each machine with isolation points labelled
- Standard procedures for machines or JSEAs
- Training

## 5.4 Chemicals

Most of the dangerous goods stored or handled at the plant are either corrosives or flammable liquids or gases. Therefore, potential losses of containment of corrosives leading to on-site injury

or environmental impact are possible as well as ignition of the flammable materials. The product (paper) is a combustible solid as are the logs, woodchip and waste paper entering the facility. Liquid oxygen is stored in two vacuum insulated expanders (VIEs). There are a number of smaller storages (e.g. IBCs) of reagents such as dyes, defoamers and dispersants. Some of the IBCs are stored in a dedicated storage shed (e.g. corrosives, combustibles and oxidisers).

Key controls include the following, with a full listing of controls detailed in the risk register:

- Chemical Storage Facility, secure and segregated into chemical classes
- Chemical tank bunding
- Flammable goods storage cabinets
- Gas bottle storage racks/cages
- Cylinders restrained
- Tank high/low level alarms
- HSE site induction
- Spill Response training
- Safety Data Sheets (SDS) onsite
- Dangerous Goods manifest
- Chemical handling and unloading procedures
- Signage: placards; Hazardous Chemical (HAZCHEM) signs; pipe labelling; delivery instructions
- Emergency Management Plan (EMP) includes chemical scenarios (e.g. fire, spill, gas release)
- Procedures: decanting; handling; unloading; refuelling
- Chemical handling and spill response training
- Spill kits
- Emergency wash stations
- PPE for handling chemicals

Interviews indicate that, as part of continuous improvement, a new chemicals handling procedure is being developed that will extend from procurement to handling, storage and use. This will also involve an inventory of all site chemicals to identify any unrecorded chemical on site.

## 5.5 Fire

The fire protection system was reviewed during the previous audit.

The site is in a rural setting where grass fires may be present. There are cleared areas surrounding the site and an onsite fire fighting vehicle for quick response prior to other emergency services responding.

There are various areas across the facility with thermal exposures, fuel sources and pressure vessels.

Receiving areas where logs are stored are covered by water cannons and the waste paper storage areas are covered by the same system.

There are a number of hydrants and fixed monitors located throughout the facility which are supplied with fire water from the pumps. Fire hoses are stored locally to the fire hydrants and are routinely inspected. Foam supplies and equipment exist throughout the facility. There are seven monitors (cannons) installed around the waste paper recycling storage area. These monitors are inspected

monthly (observed during the audit) and water tested annually. Also, extinguishers are located at selected locations throughout the site.

Fire water is stored in a dam in the hills above the facility (dam capacity is 190 ML). Therefore, the pressure of the supply water is the static head from the dam to the facility (minus some friction losses). Water is pumped from the Tumut River to the dam when levels drop (dam water level monitoring is installed).

There are two pipes (375 mm diameter) supplying water to the facility with an interconnection between the pipes. Normally, one pipe will supply fire water; the other supplies process water. If one pipe becomes blocked or unavailable, then the interconnection can be opened to maintain supply. Water supply is monitored as it is critical to both plant operation and fire safety. The water supply pipes are routinely flushed to lower the likelihood of blockages.

There are three diesel fire water pumps for boosting pressure into the supply mains (two duty pumps; one standby). The system has the capacity to meet the most hydraulically disadvantaged case. The fire water pump station is suitably located away from hazardous equipment. Also, fire brigade booster connections exist and can be used should the main supply pumps fail. These appeared to be in good condition when observed during the audit.

The facility's fire protection equipment is maintained by the specialist subcontractors to the requirements of *AS 1851 Routine service of fire protection systems and equipment*.

Fire training for shift personnel occurs several times per year and includes use of fire extinguishers, fire blankets, fire hose reels, layout flat hoses and breathing apparatus use. The site also has a Cat 1 fire truck with more than 3,000 L water storage. There is also an additional Cat 7 fire truck at the site. The emergency response team also perform special routine fire training.

Key controls include the following, with a full listing of controls detailed in the risk register:

- Early detection systems, e.g. VESDA, thermal imaging
- Emergency Warning & Intercommunication System (EWIS)
- Hot work and permit to work processes
- Contractor Management process
- Fire sprinkler and alarm systems inside buildings
- Fire hydrants located in key areas onsite
- On site firefighting trucks
- Fire water cannons in high risk areas: Wasteyard and Woodyard to protect wastepaper and fibre stockpiles
- Planned maintenance of fire protection systems
- Training
- Emergency management
- Evacuation procedures

## 5.6 Lifting

There are a number of overhead and mobile cranes on site. Cranes are subject to statutory inspection cycles and maximum lifting weights. Worn or damaged lifting equipment below the hook may cause incidents.

Mobile cranes are provided by a contractor.

Key controls include the following, with a full listing of controls detailed in the risk register:

- Lifting equipment checks every 3 months

- Crane inspections are regularly done by contractor
- Lifting equipment inspections
- Crane pre-start checks
- Maintenance program: lifting equipment and cranes, including major inspection schedule
- Procedures: cranes and lifting equipment, use of taglines
- Crane training, with licence where required
- Dogman/rigger training where required
- Safe working limit and duty classification on cranes
- Working limit and manufacture date on lifting equipment

## 5.7 Electrical

Electricity is supplied to site via a Transgrid substation. Transgrid retains ownership and operational responsibility. PLCs and servers are backed by UPS and diesel generator back up. Based upon discussions during the audit, the process has been designed to shut down in the event of loss of power to control systems to a safe state.

The electrical SMS includes:

- Lock out of any HV areas to prevent unauthorised access
- Electrical work carried out by trained electricians
- De-energisation prior to work on electrical equipment
- Lockable isolation points on electrical equipment
- Electrical panels closed and secured
- Electrical room design controls (e.g. fireproofing, escape)
- Equipment designed to applicable standards and IP rating (IP65 for wet areas)
- Residual Current Device s/earth leakage protection

Visy Corporate initiated an arc flash study across operational sites. At Tumut, discussions indicate that the HV switchboards have all been arc flash rated and the study assessed that some boards fell into category 3 and 4 PPE requirements due to the calorie rating determined.

Arc flash rated cabinets are designed to direct any blast upwards and, in Tumut's case, outside the building. Should that fail, there are varying classes of PPE required for protection with Category 4 representing the highest rating, with the required PPE on order.

Tumut is still completing their arc flash risk assessment. When completing the risk assessment, arc flash detection should be considered. Arc flash detection detects the first light from an arc flash ignition and cuts off the power.

**Recommendation No. 4** As part of the arc flash risk assessment, the use of arc flash detection devices should be included in the assessment as a potential control measure.

## 5.8 Hazardous energy and pressure

There are a number of pressure vessels on site, with the Digester being the largest. Pressure within the vessel is monitored with an automatic shut off when parameters are exceeded. Pressure relief values are in place and the Digester undergoes internal and external boiler maker and metallurgical inspections during each year's shut down.

There are other boilers and an evaporator on site. These pressure vessels are contained in a register and the IFS system drives a program of internal and external inspections.

Key controls include the following, with a full listing of controls detailed in the risk register:

- Construction/procurement to appropriate standards
- Pressure relief valves
- Hot pipes/equipment insulated
- Shielding of hot equipment
- Boilers, vessels and tanks registered and inspections completed by a third party on a set frequency compliant with legislation
- Safety valves calibrated and inspected as per legislative requirements
- Dedicated control room to check procedures are in place and are followed across all shifts
- Overpressure shut off
- Isolation and lockout procedure/plans are in place: all sources of energy are isolated/locked to prevent unintended movement of plant and engulfment during maintenance/repairs

## 5.9 Biological hazards and emissions

In addition to legionella, which is managed through dosing, hydrogen sulphide may be present in “Yellow” areas of the plant. The levels are typically low, but are monitored by fixed gas meters to warn all staff visiting operational areas in the case of an exceedance. Awareness is supported by training, with breathing apparatus available in higher risk areas.

Emissions management is part of the site’s environmental licence conditions.

Key controls include the following, with a full listing of controls detailed in the risk register:

- External emission monitoring is done on all stacks by an independent air emission consultant in accordance with the EPA licence
- Boilers and lime kilns all have electrostatic precipitators present on the discharge ducts to remove dust from flue gases and there are alarms inside the boiler stacks
- Tumut has installed an internal emission monitoring system called Continuous Emission Monitoring System (CEMS) which will record exceedances
- A biocide program is in place, dosing water to reduce organism activity, with regular testing by the supplier
- Cooling tower treatment and sampling is conducted as part of a schedule

## 5.10 Cyber security

Refer Recommendation 2 in section 4.8

## 5.11 Dam safety

There are a number of dams on site, including 190-ML and 480-ML dams.

All dams are subject to external dam safety reviews on a 5 yearly basis.

# 6. Previous audit findings

The following table details the status of the previous audit findings.

*Table 3 Status of previous audit findings*

| # | Previous audit finding | Status |
|---|---|---|
| 1 | Review the Australian Standards requirements for machine guarding for the wet end (head box) of paper machine VP9 as there are unguarded nip points, i.e. ensure that the necessary guards are installed. | Raised again as Finding 3 |
| 2 | Ensure all hoses used for transferring hazardous chemicals are included in the preventative maintenance system for routine integrity checks. For example, the caustic transfer hoses did not have test tags when checked. | In progress. Hoses have asset numbers assigned. Next step is to installed tags. |
| 3 | All old hoses used for transferring hazardous chemicals should be disposed of to avoid these being used. For example, some of the caustic transfer hoses viewed at the caustic tank transfer area appeared to be of poor integrity, e.g. bulging in one of the hoses. | Complete. Old hoses have been removed. |
| 4 | Ensure all tank bunds are kept free of waste material as the caustic tank bund was observed with dirt piles and waste materials (there is the potential for corrosion of the concrete under the materials). | Not observed in the recent site visit. |
| 5 | Update drawing TUSTF00040 to show the fire water system modifications for the woodchip area, e.g. the additional hydrants, hose reels, monitors and isolation valves. | Complete |
| 6 | Perform routine maintenance, including valve opening and closing, of the stormwater retention ponds outlet valves to ensure these can be operated in an emergency, e.g. to prevent them from being seized in the one position | Complete |
| 7 | Visy to review means for maintaining redundant equipment, e.g. the corroded base of the stairs into the former sulphuric acid bund. Typical industry practice is to have a redundant equipment register which requires routine inspections of all redundant equipment to ensure safety is not compromised. | Complete |
| 8 | Perform routine testing of all safety shower / eyewash units emergency pushbuttons including the WWTP pushbutton. This testing could be included in the Work Space Inspections | Complete |
| 9 | Ensure that the water flow from all safety showers / eyewash units meets the Australian Standard. One suggestion during the audit was to include photographs in the relevant test procedure to provide indication of the required acceptable flow rates. | Complete |

| # | Previous audit finding | Status |
|---|---|---|
| 10 | Identify all critical non-return valves in the process, e.g. the two on the boiler feed water pump discharge and the oxygen injection line, and include these in the preventative maintenance system for routine inspections. | Complete |
| 11 | Update the management of change procedure to include improved guidance for temporary changes, emergency changes, hazard screening checklists and pre-start safety reviews. | This recommendation was implemented, with Finding 1 requesting an additional change to improve effectiveness. |

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