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REPORT OF THE 2009 HAZARD AUDIT OF THE EASTERN STAR GAS OPERATIONS ASSOCIATED WITH THE NARRABRI PEL 238 PROJECT

Prepared for: **Eastern Star Gas**

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Acknowledgment

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Disclaimer

Rev	Date	Description	Prepared By	Authorised By
A	20/11/2009	Draft for Comment	Karin Nilsson	Brett Langley
B	16/12/2009	Final Report	Karin Nilsson	Brett Langley

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CONTENTS

LIST OF FIGURES

LIST OF APPENDICES

EXECUTIVE SUMMARY

This report constitutes the results of the first formal Hazard Audit, in accordance with the NSW Department of Planning's requirements, for the operations associated with Eastern Star Gas' developments which form part of the Narrabri PEL 238 Project.

The operations include the gathering lines from the off-take at the Coal Seam Gas wells, the flow line up to the Power Station and the Power Station B itself. The hazards are characterised flammable nature of the Coal Seam Gas, which is essentially natural gas.

The toxic risk of the facilities is negligible (Coal Seam Gas is not toxic and combustion products are carbon dioxide and water).

Compared with most potentially hazardous developments in NSW, the present development is as yet very small as only one out of ten generators have been installed. The power output from the Power Station is currently a maximum of 3 Megawatt (MW). The equipment is very new and in good repair. Further expansion, up to the levels of the approval, are pending over the next few years.

The systems used to manage plant and equipment as well as health and safety have, up until this point, been in keeping with the extent of the development. The systems used are on spreadsheets etc. which are centrally stored and accessible on the server. There is now a need to expand on these management systems to match the expansion of the operations. A major requirement is to upgrade the preventative maintenance (inspection and testing) system in use. Another major requirement is to upgrade procedures used for operations and maintenance.

Much of the work associated with the operations is done by contractors and contractor management is important.

A number of exceptions were identified, as listed in Table E1 below. The actions were prioritised as following:

- High (H) - To be commenced immediately and completed as soon as practicable.
- Medium (M) - To be completed by middle of 2010
- Low (L) - To be completed by end 2010

Table E1 – Management Action Plan

Recommendation	Priority
1. Valve in lube oil bund was left open during the audit. This valve needs to be closed at all times except during operator assisted draining to the oil separator.	HIGH
2. As-built checks required for the P&IDs.	LOW
3. Control systems changes “outside operating safe limits” to be managed, e.g. through the Change Management system for the Power Station.	MED
4. SOPs to be established for plant operations (including for start-up and shut-down/purging).	MED
5. Determine requirement for reviews of procedures (consider use of Job Cycle Checks system for this where one or two operators checks the written procedure while observing the procedure being carried out by another operator.)	LOW
6. Develop training modules for Power Station operators and other critical activities as required.	MED
7. Training needs analysis required. Determine gaps.	MED
8. Formalise operator job-training requirements, including formal sign-off, formalising buddy system, possibly several levels for Power Station operator.	MED
9. Determine what further refresher training is required (over and above the induction training) for staff and contractors.	MED
10. Formalise training requirements for Work Permit issuer.	MED
11. Review and upgrade the Change Management System (also include a sheet with prompts for hazards).	LOW
12. Training required in Change Management requirements (e.g. awareness training for all staff; more detailed training for people likely to implement change).	LOW
13. Internal monitoring/auditing of Control of Change to be done regularly (checklists required). This requirement needs to be included in management plan.	LOW
14. Approvals signature needs formalising on the Change Management form.	LOW
15. Develop formal maintenance and inspection programs for both mechanical and instrumented (trips/alarms) systems. Determine inspection frequencies and checks required (include vendor requirements).	MED
16. Develop list and inspection schedule for pressure vessels.	MED
17. Develop list and inspection schedule for critical valves.	MED
18. Initiate testing of earthing systems.	MED

Recommendation	Priority
19. Trip testing protocol to be established (including ensuring that any defeated trips are re-activated).	MED
20. Establish out-or-service equipment protocol for **critical** items equipment (e.g. Gas detectors etc.). Communicate system to technical staff.	MED
21. Incident investigation process to be reviewed for serious incidents.	LOW
22. Standardise the risk matrix on the incident form.	LOW
23. Review management of incident records to ensure that the final (signed off) document is available.	MED
24. Dematching system at the Power Station to be initiated (i.e. matches and lighters to be retained at entry to the site). Also retain mobile phones for people likely to access restricted areas (all people, including staff).	HIGH
25. Inspections of fire protection systems (extinguishers) and gas meters to be included in the ESG preventative maintenance system (even if the inspections are also initiated by the contractors performing the inspection/test).	MED
26. Establish Site Specific ERPs for Power Station, Compressor Station and other critical activities as required. Include plans showing location of emergency shut-down (ESD) buttons, evacuation points, fire plan.	MED
27. Update the existing drawings in the ERP.	LOW
28. Regular emergency drills/training in emergency response to be conducted and scheduled in the ERP.	MED
29. Bomb threat emergency response to be included in the ERP.	LOW
30. Pre-arrangements with outside services police/ambulance/fire brigade required.	MED
31. Establish management system to update the emergency procedures. This should include updating of telephone numbers.	MED
32. Health and Safety Management Plan to include schedule of audit requirements (internal and external).	MED
33. Formalise Health and Safety management training for technical staff and other staff as required.	MED
Opp. for improvement 1: link in with requirement to conduct HAZOP, risk assessment used in the change evaluation to be included on the Change Management form	
Opportunity for improvement: Internal monitoring/auditing of Permit to Work to be done regularly (checklists required)	

The management and manning of the sites is small and senior management has remained approximately constant since the plant start-up. As the

development expands so does the number of staff members and new roles are being filled.

The Narrabri Operations Manager has eight years of experience with Eastern Star Gas at Narrabri and has over 20 years experience in various roles within the oil and gas field. The Senior Engineering Manager (Surface) has been with the group for 1.5 years and has over 26 years experience in various roles within the oil and gas field. He has, up until recently, filled several positions, including Senior Operations Manager, Health and Safety Manager and Engineering Manager. A Health and Safety Manager has recently been appointed. He is assisted by a locally based experienced Health and Safety Supervisor.

While there were many shortcomings identified in the present audit of the management systems in use compared with those required by the NSW Department of Planning, it is emphasised that the operations associated with the Narrabri PEL 238 is still very small. As these operations expand it is clearly important that the management systems develop at a similar rate. The outcomes of the present Hazard Audit will need to be used to provide pointer as to where improvements are needed.

The Project Approval requires a second audit to be conducted once the output from the Power Station is 12MW, which is expected to take between one and two years.

The open philosophy of the staff taken during the audit was noted and commendable. A full disclosure attitude was shown which enhanced the purpose and outcomes of the audit.

GLOSSARY

DECC	Department of Environment and Climate Change
E&I	Electrical and Instrument
HAZOP	Hazard and operability
H&S	Health and Safety
JHA	Job Hazard Analysis
LOC	Loss of containment
MW	Mega Watt
PM	Preventative Maintenance
PPE	Personal Protective Equipment
SH&E	Safety, Health and Environment
SMS	Safety Management System

REPORT

1 Introduction

1.1 Background and Scope

This report constitutes the results of the first formal Hazard Audit, in accordance with the NSW Department of Planning's requirements, for the operations associated with Eastern Star Gas' (ESG) developments which form part of the Narrabri PEL 238 Project.

The requirement for a hazard audit forms part of the Project Approval, which specifies that the Applicant shall carry out a comprehensive hazard audit of the proposed development and submit a report on the audit to the Director-General. The auditor's approval by the Department of Planning is as per email from Fred Fatal dated 22 September 2009 (Ref 1).

The report is written in accordance with the guidelines used by the Department of Planning for Hazard Audits as set up in their Hazardous Industry Planning Advisory Paper No 5, *Hazard Audit Guidelines* (Ref 2).

1.2 OBJECTIVES AND AIM OF THE AUDIT

The objective of the Hazard Audit is to assess the operations associated with Eastern Star Gas' (ESG) developments which form part of the Narrabri PEL 238 Project against the requirements for safety management by the Department of Planning. The fundamental objectives of the hazard audit are:

- To assess whether the operations are being conducted and managed in a manner such that all the terms of the Ministerial Consent document relevant to the safety of the site are being met;
- To identify areas where improvements to operational and organisational safeguards are required with respect to safety, health and the environment;
- To recommend appropriate measures required to improve safety, health and environment deficiencies in the areas identified.

The scope of the audit encompassed:

- The above ground tie-in's located at Bibblewindi, Bohena and Wilga Park Power Station.
- The gas collection plant (and associated emergency flare) located at Bibblewindi.
- Gathering lines and gas flow lines.
- The Wilga Park Power Station Expansion (Power Station B).

The Hazard Audit was undertaken by Karin Nilsson, Principal Risk Consultant with Planager Pty Ltd (auditor approved by the Department, Ref 1).

The audit proper was conducted over two full days (18-19 November 2009) Subsequent document review was undertaken 20 November 2009. Planning and preparation for the audit was conducted in the weeks leading up to the audit (see Section 2.1).

1.3 REQUIREMENTS OF THE AUDIT

The audit conducted included both the hardware and software aspects of the site. The term "hardware" covers facility and equipment, instrumentation and control systems, protection systems etc. The term "software" is used to denote people systems and people factors and covers the following items:

- Organisation (formal, emergency, tasks and roles)
- Methods and procedures
- Knowledge and skills (operator and maintenance employee training; ability to recognise faults and take corrective action)
- Attitudes towards tasks (reflecting whether the software systems are functioning effectively).

It is essential that the hardware and software aspects complement each other. For example, elaborate control and protection systems may be built into the installation based on rigorous hazard analysis. However, without regular inspection and testing their performance would deteriorate so that they would be ineffective when a demand is placed upon them. The performance of the management system of safety controls is a key element in effective risk management.

2 METHODOLOGY

The Hazard Audit covers a critical examination of the systems and procedures, which exist in order to operate and maintain the facility for the purpose for which it was designed. This requires a review of the documentation systems at the plant and records of the facility's operational history since start-up. In particular, it requires a review of the degree and frequency with which operating conditions vary from the design intent.

The audit covered the following topics:

- Plant and Process Systems
- Process Operator Training
- Maintenance Procedures
- Safety Training of Employees
- Plant Modification Control
- Testing of Protection Systems
- Electrical Equipment Handling
- Unusual Incident Reporting
- Injury/Accident Reporting
- Fire Protection and Training
- Emergency Procedures
- Management Safety System
- Security of Premises
- Environmental Protection
- Additional Requirements, such as maps and sketches and listing and location of hazardous materials.

Details of the topics covered are listed in Appendix 1.

2.1 BASIC APPROACH

This hazard audit has been conducted in compliance with the guidelines used in the Department in the Hazardous Industry Planning Advisory Paper No. 5 (Ref 2).

The remit of the audit was discussed with the Environment Manager and the Environment Officer prior to the audit, and the outline of the scope of the audit was presented prior to the audit proper. This outline was then communicated with the people involved in the audit, including the Narrabri Operations Manager, the Health and Safety (H&S) Manager, the Engineering Manager and

the H&S Supervisor. This allowed the requirements of the audit to be canvassed within the facility, which in turn allowed planning of the appropriate people to be available during the audit.

In broad terms, the methodology used was that of conducting detailed discussions with key operations, safety, engineering and maintenance personnel. A site tour was also conducted. Personnel within a "vertical cross-section" of the operation were interviewed. Documents obtained or sighted, which were deemed to be of particular interest with respect to the present audit, have been listed in Appendix 2.

2.2 METHOD OF ASSESSMENT

For the purposes of this hazard audit the method of assessment of safety in operation and management, in broad terms, was based on seeking answers to the following questions, applied to each of the topics listed in the scope:

- Were all assumptions made in previous hazard analyses and associated hazard and operability studies incorporated into the final design?
- Do all the assumptions embedded in the facility hardware or software remain effective and are they still relevant to the present operation?
- Do all management policies and procedures set in place regarding plant operation and maintenance remain adequate to ensure compliance with all relevant regulatory authorities (as well as the Conditions of Approval)?
- Are the internal management controls sufficient to ensure policies and procedures are carried out and records kept that demonstrate this performance?
- Have the procedures and controls been operating effectively throughout the period under consideration?

2.3 PERSONNEL INTERVIEWED

The following personnel were interviewed during the hazard audit:

▪ Brett Langley (BL)	Engineering Manager (Surface) and Operations Manager
▪ John Higgins (JH)	Manager Narrabri Operations
▪ Michael Kelly (MK)	HS&E Manager
▪ Tom Bennett (TB)	HS&E Officer
▪ Tim Donnan (TD)	Environment Manager
▪ Peter Jaeger (PJ)	Environment Officer

3 SITE OVERVIEW

3.1 SITE LOCATION, SURROUNDING LAND USES

In early 2007, Eastern Star Gas (ESG) submitted a Major Project Application to the NSW Department of Planning (NSW DoP) for the construction and operation of a 32km gas pipeline to supply Coal Seam Gas (CSG) from the Bibblewindi and Bohena CSG Pilots into the existing Wilga Park Powerstation. The project involves the collection and delivery of CSG to the Wilga Park facility which in turn will be expanded from its current 12MW capacity up to a maximum 40MW.

The above ground facilities referred to in the approval conditions include:

- The above ground tie-in's located at Bibblewindi, Bohena and Wilga Park Power Station.
- The gas collection plant (and associated emergency flare) located at Bibblewindi.
- Gathering lines and gas flow lines.
- The Wilga Park Power Station Expansion.

The gas gathering system traverses the Pilliga East State Forests incorporating the Bibblewindi State Forest.

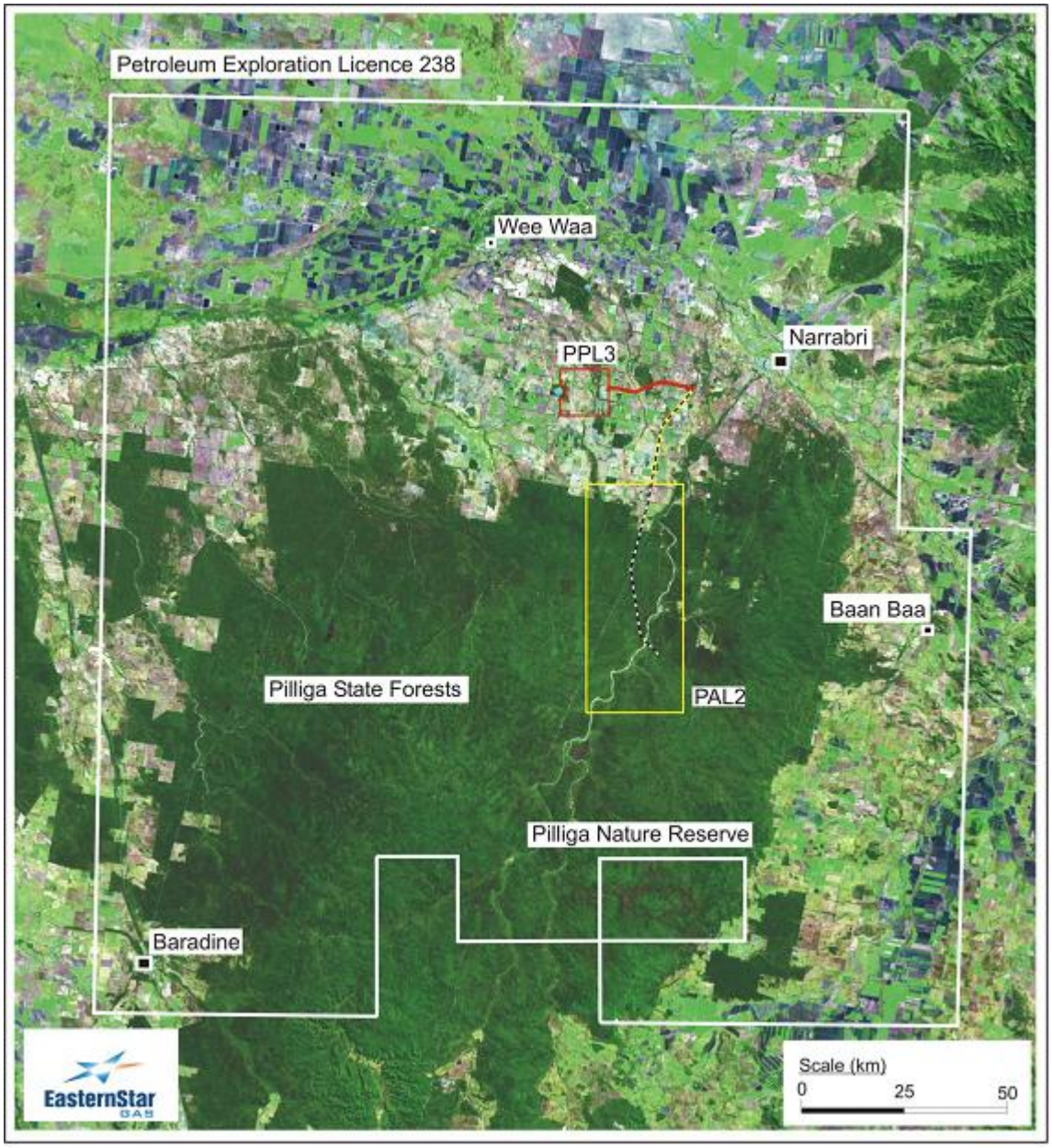
The gas compression facilities are located at the Bibblewindi CSG Pilot, within the Pilliga East State Forest incorporating the Bibblewindi State Forest.

The gas flowline consists of a 33 km long flowline. The first 15 km from the gas plant is in the Bibblewindi and Pilliga East State Forest, the balance is in >95% cleared grazing land.

The Wilga Park Power Station is located in >95% cleared grazing land.

A map of the area showing the location of the above development is presented below.

Figure 1 - Location of ESG Exploration, Assessment and Production Titles



3.2 STAFFING

At the moment, 1 to 5 persons during normal operating hours (7am to 4pm, 7 days) and 1 to 2 persons outside operating hours (security).

In the future it is expected that the Power Station will operate unmanned.

3.3 ACCESS AND SECURITY

3.3.1 Site

The plant is set up to operate 24 hrs/day, 365 days per year. The Power Station and the Compressor Station are surrounded by a six foot high security fence topped with barbwire.

There are at least two points of entry to each one of the enclosures.

The gates are locked.

3.3.2 Road Tanker Unloading and Loading

Tanker loading and unloading is limited to the occasional topping up of spent oil and delivery of coolant (actually a corrosion inhibitor) and the removal of either once spent. This happens about 8 times per year. Any tanker transfer would be supervised by the Power Station operator.

3.4 SITE LAYOUT

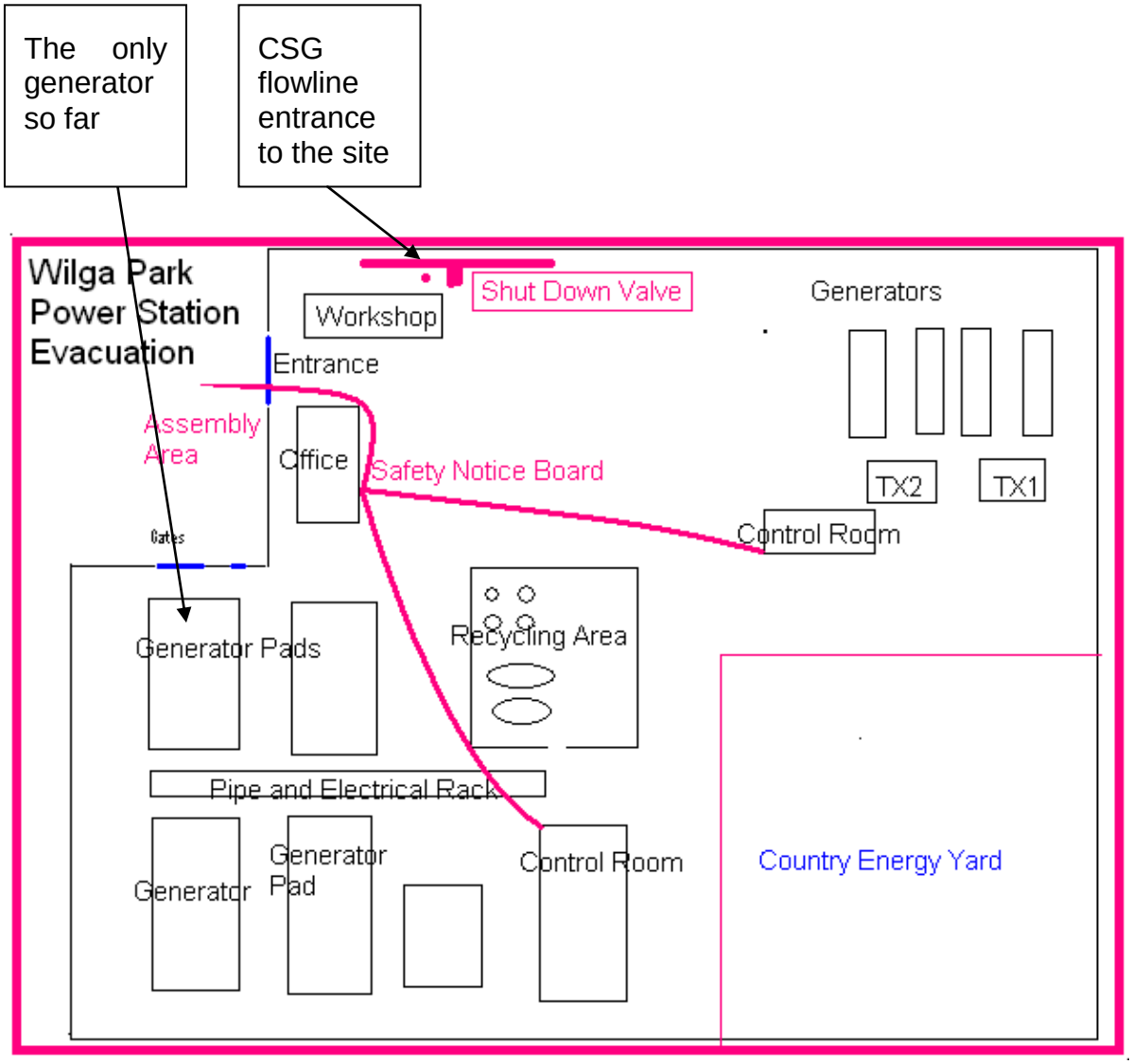
The site includes the original Power Station A as well as Power Station B.

Power Station A has four generators.

Power Station B is set up to have a maximum of 10 generators (each of 3MW capacity). Only one is installed at this point in time.

The site layout is presented in Figure 2 below. This schematic also shows the evacuation paths from the site.

Figure 2 - Site Layout



4 HAZARD AUDIT OF PLANT EQUIPMENT AND OPERATIONS

4.1 PLANT, MATERIALS AND PROCESS SYSTEMS

4.2 PROCESS SAFETY INFORMATION

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
1 Any changes to the site since the last hazard audit	N/A		This is the first Hazard Audit.	
2 The nature and quantity of material stored	Y	Plant tour. Discussions JH., BL, MK. Chemicals register, Narrabri.	Natural gas is produced from coal seam gas CSG. It is pipelined to the power station where it is used as fuel to produce electricity which is put into the grid. Lube oil is stored in an above ground tank at the Power Station. There is some storage of corrosion inhibitor ("coolant") at the Power Station, Lube oil and coolant storage is adequate. There is also an underground tank associated with the oil separator.	
2 Physical condition of equipment, storage, pipelines, buildings and structures. Standard of maintenance.	Y	Plant tour (Power Station, Compressor Stn, Gas wells). Discussions with JH, BL	There are no visible signs of leaks or oil spills at the Power Station. The ground at the Power Station and at the Compressor Station is clean and well maintained. Also inside the flowline end of line facilities. No deterioration of seals identified. Bund (lube oil/coolant) is clean and clear. No signs of spills. No accumulated debris in bund. No evidence of mechanical impact, corrosion or overstressing of plant	

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
			equipment on Power Station or on Compressor Station. Conditions of valves, gaskets and other components appears very good. Process instrumentation in working order (pressure transmitters checked).	
3 Warehouses – adequacy of the stacking height, aisle spacing, fixed fire protection and equipment	Y	-"-	Workshop at the Narrabri office (centre) is organised. Good housekeeping. Stack height appears adequate. Racks are in good condition.	
4 Labelling and identification of equipment/valves/instruments/pipes	Y	-"-	Pipelines at the Power Station are labelled. Pipelines at the Compressor Station are not labelled (natural gas is however the only material present - it is a gas plant) --> this is considered adequate.	
5 Are all items of equipment and control functioning satisfactorily	Y	-"-	Some mechanical issues with the prechamber of the compressor (this is not a safety issue). Also issues around the coolant. Other than this the equipment and control are functioning satisfactorily,	
6 Is the plant operating as designed	Y	-"-	Plant is designed for 10 generators @ 3MW each. Currently only one is installed. Gas pressures etc. are within the design envelope (though on the lower range). Noise testing is done but will need to be repeated.	
7 Is rotating equipment guarded	Y	-"-	Prechamber gas compressor at Power Station: guarded. Generator (only one installed so far) is guarded. No compressor	

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
			(booster) at the Compressor Station installed as yet.	
8 Support structures	Y	-"-	Support structures at the Power Station appear extremely sturdy and can carry much more weight than what they are currently doing. No corrosion apparent. They are visually inspected.	
9 General housekeeping of premises	Y	-"-	Housekeeping is excellent at the Power Station, Compressor Station and the Narrabri Centre (also at the workshop).	
10 Asbestos register	N/A	-"-	No asbestos.	
11 Adequacy of containment systems	N	-"-	Bund around lobe oil tank and coolant (corrosion inhibitor) sized to 100% of largest tank volume. Valve allows operator to drain from bund to oil separator in case of rain. Oil separator visually inspected during the audit and appears to be in good working order. Valve in lube oil bund was left open during the audit. This valve needs to be closed at all times except during operator assisted draining to the oil separator.	1. Valve in lube oil bund was left open during the audit. This valve needs to be closed at all times except during operator assisted draining to the oil separator.
12 Siting of storage vessels and storage areas	Y	-"-	Siting of lube oil tank and of coolant vessels relative to process areas and to the site boundary is appropriate. Spacing on the site is very generous (only 1 out of 10 generators installed as yet!).	

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
13 Assess effects of fires etc on control rooms, off-site facilities etc to determine any layout issues	Y	-"-	Generator well separated from the Control Room. A fire or explosion at the generator enclosure is unlikely to affect the Control Room.Lube oil tank is well separated from the Control Room and the Generator. Domino effects unlikely even in case of a fire in the lube oil tank.End of line facilities are well separated from the rest of the plant.Flare at the Compressor station has a cleared buffer zone around it to neighbouring bush. Management of vegetation around the flare is important and appears to be in hand by Ops Mgt and Eng Mgt.	
14 Adequacy of access and egress points, roadways for emergency vehicles	Y	-"-	Access to Power Station through gates in opposite directions. Same for Compressor Station. Location of the muster point in case of an incident at the Power Station and at the gas wells/Compressor Station is currently being worked out in conjunction with the local fire brigades.	
15 Adequacy of emergency stop button locations. Fire alarms. Location, audible, visual. Any sirens?	Y	-"-	Four or five E-stops at Power Station. Appear to be adequately located in case of an emergency. Strobe light inside generator enclosure. Siren out in the yard. Fire panel available outside the generator, showing LEL detectors (x2), LEL pre-alarm (20%) and alarm (40%), IR detectors (x2).	

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
16 Possible to reduce storage volumes	Y	-"-	Storage volumes are insignificant. Natural gas (CSG) is not stored.	
17 Loading/unloading operations (consider overfill, drive-away and hose rupture etc)	Y	-"-	Unloading of lube oil. About 4t/yr. Loading of spent lube oil about 4t/yr. (Un)loading area is adequate. ESG operator always present during (un)loading operations.	
18 Transport routes minimise off-site risk?	Y	-"-	Minimal transporting of material to and from the site (only lube oil and coolant).	
19 Number of operators adequate	Y	-"-	Currently one operator during normal daylight hours present at the Power Station. In the future, the Power Station will operate unmanned. Critical alarms are SMSed (priority escalation with Mgr Narrabri Operations last on the list). Possible to log onto SCADA remotely using laptops.	
20 Assumptions in hazard analysis study incorporated in plant hardware	Y	-"-	Gas detectors and IR detectors installed in generator enclosure Smoke detector close to the fire panel (electrical cabelling in this area). Gas detectors initiate pre-alarm at 20% with start-up of fan in enclosure. Gas detectors initiate shut-down alarm at 40% with closure of louvers and shut-down of fan. No blow-out panel available (low pressures, low voltage). ESD on gas inlet pipe at Power Station. ESG on wells initiated by high and low P. Also P-relief (x2) downstream of ESD and well structure designed to max pressure upstream of ESD.	

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
			HAZOPs conducted for gathering line, flowline and Power Station; actions closed out.	
21 Identify materials harmful to the environment and what controls are installed / needed (materials to include toxics, flammables, explosives, radioactives, oxidisers and biologicals)	Y	Discussions JH, BL	Coal Seam Gas (natural gas) is the predominant component.Lube oil (generators and at the Power Station).Diesel back-up for generators (small amount - only what is held in generator tank).Coolants (small amounts).	
22 Identification of Hazards and Risk Assessment	Y	HAZOB, Hazard Regis-ter, Risk Mgt Procedure, list of JSAs, example JSA. HAZOP report, Wilga park. AS2885 risk assess-ment for flowline.	Three levels: 1) HAZO**B** (Hazard Observation) = simple form used to highlight unsafe work practices and situations. Managed through a register (spreadsheet). Shows date action is closed out. Register appears to be reasonably up-to-date (last entry - 12/10/09). 2) JSA (Job Safety Analysis). Used when carrying out tasks. Initiated by supervisor, SHE officer, Mgr Narrabri Operations, etc. Includes task/Step; Hazard/Exposure; Existing Controls; Risk Score; Future Controls. Most Future Controls are implemented then and there. if not they end up in the risk register. 3) HAZOP (for engineering and design). The original project design was HAZOPed by a multidisciplinary team (checked), standard guidewords (checked), more or less standard minute sheet.	

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
			Further, the Bibblewindi flowline was subject to an AS2885 risk assessment.	
23 Materials inventory system and records	N/A	-	No flammable fuels stored. No dangerous goods stored. Lube oil (average/max): 5,000/10,000 L	
24 Pre Start-up Safety Review	Y	Discussi ons JH, BL	Pre-start up safety review is conducted by Manager Narrabri Operations. This is not done formally. Refer discussion on need to develop SOPs (action No 39).	
25 Master P&IDs and process flow diagrams available an up-to-date	N	Master P&ID folder	A comprehensive set of P&Ids are available at Narrabri Centre and at the Power Station. They appear to be of good quality and to use standard information. They are dated pre-construction (and are labelled "for construction". No post-construction updates have been made available as yet.	2. As-built checks required for the P&IDs.

4.3 PLANT MONITORING AND PROCESS CONTROL

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
26 Adequacy of control systems in control room, field panels etc	Y	Discussi ons JH. Existing SCADA screens.	Existing SCADA control system is in the process of being upgraded, with better visuals. Existing SCADA can be seen on computer at the centre and also on laptops. Includes normal information on plant and process conditions. Layout is logical. Colour coding is adequate. Mgr Narrabri Operations checks about 4 t/day. During nighttime, no	

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
			checks. The system can fully shut down and stay down for extended period of time without adverse effect. Critical alarms are SMSed (escalation of alarm, finishing at Manager Narrabri Operations).	
27 Adequacy of protective systems (Alarms and Trips, Need for redundancy)	Y	-"-	Critical trips are: High/Low pressure at well; High/Low pressure water; High/Low level (separator), High water pump tourque. 2nd level of defence for pressure: P-relief on well head, on top of separator and on manifold at gathering line. Upstream of remote operating shut-in valve: ANSI rating of 600 (=1200kPa - achieved after about 8 months of closed in well). No second level of defence on the separator level. Flammable gas (low concentrations) would flow out here in case of failure of trip. Hazardous Area Classification available around waste discharge into the evaporation pond.	
28 Manual control available	Y	-"-	Well system is fail-safe and can shut in. Shut-in well is in a safe condition. Power station would shut down in case of loss of utilities (ESD). This is also a safe situation. If no gas required at the Power Station it is vented at the Compressor (booster) station.	

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
29 Coping with Loss of Utilities	Y	-"-	- Communication failure: If coms go down it does not affect the safe shutdown mode of the plant. Data-logger (indep from SCADA, harddrive), can hold 30 days of data. - Power failure: Loss of power initiates safe shut-down. Battery-pack avail. For communications (2-3 days). Generators are checked daily by operators. Power station would shut down and gas would vent at the compressor (booster) station.	
30 Process systems monitoring records, e.g. operator logs, alarms and trips – review to determine plant history	Y	Alarm Logs and Even Logs. Discussi ons With JH.	Alarm log for each well available. Listing of alarms shown. Mgr Narrabri Operations checks alarm and even logs regularly.	
31 Maintenance Workers Logs	Y	-"-	Even log shows any changes to set-points on instrumentation. Only Mgr Narrabri Operations has engineering rights. There is no "safe limit" set on trip and alarms set-points. However, in the wells, as they are linked via the gathering system, an error in the set-point would be made "ineffective" through the other 7 redundant set-points. Mgr Narrabri Operations checks alarm and even logs regularly.	Refer action 37.
32 Response on power failure (UPS available and tested)	Y	-"-	See item number 29 above.	
33 Fail safe response (also on restart)	Y	-"-	See item number 29 above.	
34 Failure history recorded	Y	-"-	See item number 31 above.	

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
35 Records of spurious and real trips	Y	-"-	See item number 30 above.	
36 Operator knowledge (and training) of control systems	Y	-"-	Manager Narrabri Operations and Operations Supervisor are trained in the Control System. Also plant engineer. Only Mgr Narrabri Operations has "engineering rights" to change anything on the control system. Others have Admin rights.	
37 Control system changes documented	N	-"-	No formal control of control systems change apart from the fact that only the Manager Narrabri Operations has "engineering rights". Control systems changes “outside operating safe limits” to be managed, e.g. through the Change Management system for the Power Station.	3. Control systems changes “outside operating safe limits” to be managed, e.g. through the Change Management system for the Power Station.
38 Documentation on the installation and testing of both hardware and software systems	Y	-"-	Control system set up as per vendor guides. Testing etc. as per vendor guides.	

5 OPERATIONAL CONTROLS

5.1 OPERATING PROCEDURES

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
39 Who writes them	N	Disc. JH, BL, M, TB	No formal SOPs exist. An HSE Manger has recently been appointed to establish procedures (based on JSAs) for plant operations.	4. SOPs to be established for plant operations (including for start-up and shut-down/purging).

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
40 How often are they reviewed	N	-"-	Procedures are currently set to be reviewed yearly. Some procedures have not been reviewed since start-up. ESG are looking at relaxing the time between reviews.	5. Determine requirement for reviews of procedures to be determined (consider use of Job Cycle Checks system for this where one or two operators checks the written procedure while observing the procedure being carried out by another operator.)
41 Are they up-to-date	N	-"-	Refer item number 40.	Refer action number 40.
42 Do Safe Work Practices exist. Are they different to actual work practices. Are the different to Operating Procedures.	Y	-"-	Safe work practices have been established. Ops Mgr supervises.	
43 Method sheets with quick summaries or checklists used / required	N/A	-"-	Refer item number 39.	
44 How does the Supervisor know how well the procedure is working out	Y	Contract or inspecti on checklist s (x5); Safe work observa -tions	Job observations are performed, as follows: - Contractor inspection (for contractors) - Safe Work Observations/Job Observations (for staff). About 50/yr. 90% of all work at the plant is performed by contractors.	
45 How do Managers keep informed about satisfactory operation of the procedures	Y	-"-	Refer item number 44 above.	
46 Back-up systems (eg. trip systems) on procedural failures	Y	Disc. JH, BL	Gas wells, gathering lines etc. is largely automatic. Very little manual operation. Fail-safe response ensures wells are shut-in in case of procedural failures. See item number 29 above.	
47 Are abnormal situations included, e.g. startup, shutdown, filling,	N	-"-	Refer item number 39.	Refer action number 39.

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
transferring				
48 Are process hazards included in the procedures	N	Disc. MK	Refer item number 39.	Refer action number 39.

5.2 PROCESS OPERATOR TRAINING

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
49 Training modules (why and what of operation)	N	List of training completed. Discussions JH, BL	Training register exists. 5 out of 12 ops have First Aid Training; 3 qualified mechanics; 2 electricians (one training in Haz Area requirements, the other beginning training); 6 out of 12 have chemicals handling training. Training program: 1) Induction (very comprehensive, self training, Quiz, 2-yrly repeat). This training is relatively comprehensive. 2) New operator will go 2 days with Mgr Narrabri Operations and then with buddy. There are no formal training modules developed for Power Station operators.	6. Develop training modules for Power Station operators and other critical activities as required. 7. Training needs analysis required. Determine gaps.
50 Training methods and records (view records)	Y	-"-	The list of completed training includes first aid, chemical handling, driver licence, etc. Other training has been carried out but is not on the list.	
51 What restrictions on operator who has not completed training	Y	-"-	Manager Narrabri Operations will set the tasks. Only trained operators are allowed to work independently (without a buddy).	

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
52 Methods used to evaluate training	N	-"-	There is a formal, documented evaluation of induction training. W.r.t. operator training, new operator will go 2 days with Mgr Narrabri Operations and then with buddy. There are no formal evaluation for operator training.	8. Formalise operator job-training requirements, including formal sign-off, formalising buddy system, possibly several levels for Power Station operator.
53 Personal precautions in handling flammable or toxic materials	Y	Discussi ons TB	Induction training includes appreciation of hazards associated with plants and materials used and produced. PPE requirements included in the induction training. Contractors specifically required to wear correct PPE before arriving on-site.	
54 Appreciation of hazards, identification and control	Y	Discussi ons TB	See above.	
55 Refresher training	N	Fitness for Work Manage -ment procedu re. Return to Work Procedu re and Plan	There is a return-to-work procedure and plan available. The SHE Supervisor has been trained in the requirements. There is a 2-yearly requirement to update Induction training for staff and contractors. Seeing contractor do 90% of work there is a need to further this requirement if they have been away for a prolonged period of time.. There are no other formal refresher training requirements (staff or contractors).	9. Determine what further refresher training is required (over and above the induction training) for staff and contractors.

5.3 SAFETY TRAINING OF STAFF AND CONTRACTORS

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
56 Personal safety training and records (view records)	Y	Induction training program. Quiz. Discussions TB	Induction training includes appreciation of hazards associated with plants and materials used and produced. PPE requirements included in the induction training. Contractors specifically required to wear correct PPE before arriving on-site.	
57 Induction training of new employees	Y	-"-	2-yearly comprehensive Induction training with Closed Book Quiz.	
58 Work permit procedures	N	List of training completed. Discussions JH, BL	Work permit requirements needs to be upgraded.	10. Formalise training requirements for Work Permit issuer.
59 Appreciation of inherent hazards in plant and during maintenance	Y	Induction training program. Quiz. Discussions TB	Induction training includes appreciation of hazards associated with plants and materials used and produced is a requirement for staff and contractors. 2-yearly repeats.	
60 Protective clothing	Y	Induction training program. Quiz. Discussions TB	Induction training includes PPE requirements. Contractors specifically required to wear correct PPE before arriving on-site.	
61 Equipment to be used (e.g. non sparking tools)	Y	-"-	Hazardous Area Classification defined. Induction training includes information and need for the Permit in case of work within Haz Area zone. Tools used by operators are non sparking. Contractor supervision.	

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
62 Control of electrical equipment in classified hazardous areas	Y	Register for portable electrical equipment.	See above. Register for portable electrical equipment.	
63 Control of electrical equipment in classified hazardous areas	Y	Register for portable electrical equipment.	See above. Register for portable electrical equipment.	

6 CONTROL OF CHANGE

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
64 How is this documented (view records)	N	Ch. Mgt Proc. Inter-view w. JH / BL / MK	A procedure exists for Change Management (Change Management Procedures, Rev 1, 22/9/08). Change is defined as *1. The introduction of a new item of plant, equipment, process, operating system, or associated facilities; or 2. A modification made whether temporary or permanent, to an existing unit of plant, equipment, process, and operating system or associated facilities from its current design or state.* Only few changes have been made to-date. These have been adequately documented. Docs scanned onto server.	11. Review and upgrade the Change Management System (also include a sheet with prompts for hazards). 12. Training required in Change Management requirements (e.g. awareness training for all staff; more detailed training for people likely to implement change). 13. Internal monitoring/auditing of Control of Change to be done regularly (checklists required). This requirement needs to be included in management plan.
65 Who approves modification	N	-"-	It includes an assessment of risk according to risk matrix. Approval depends on level of risk. If high/Mod	14. Approvals signature needs formalising on the Change Management form.

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
			risk: approval by Site Manager (can be Mgr Narrabri Operations or Mgr Surface Eng.); if Mod/Low risk: approval by Supervisor/HSEC Mgr.	
66 Who screens and reviews the proposal	N	-"-	As above	See action 65 above.
67 How is updating of drawings and operating/maintenance procedures co-ordinated	Y	-"-	Change Mgt form includes a checklist for admin requirements (not a haz id checklist).	
68 Are HAZOP techniques employed	Y	-"-	HAZOPs are conducted by staff in case of physical change to plant. It is not a formal requirement in the Change Management procedure/on the form.	**Opp. for improvement 1:** link in with requirement to conduct HAZOP, risk assessment used in the change evaluation to be included on the Change Management form.
69 What documentation exists	Y	-"-	Documentation is adequate. Documents are scanned in and held on the server.	

7 CONTROL OF SAFE PLANT PERFORMANCE

7.1 MAINTENANCE PROCEDURES

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
70 Do formal procedures exist (preventative as well as corrective?)	N	10, 20k hr maint. c/l; battery charger c/l; maint. Record of 4 generat ors; transfor mer maint. book; oil sample report; Inspet report for HV.	Existing maintenance program is adequate for the level of operation at the plant and the age of the equipment. It consists of simple spreadsheets which are managed by Mgr Narrabri Operations and Operators and is mainly targeted for rotating equipment. It is difficult to see level of outstanding work. There will be a significant upgrade as a new maintenance system has been purchased (MEX) and a technician has been recently employed to populate this database. Workorders will be issued. Once established, training will be provided as required.	15. Develop formal maintenance and inspection programs for both mechanical and instrumented (trips/alarms) systems. Determine inspection frequencies and checks required (include vendor requirements).
71 Are the aims of procedures clearly outlined	N	-"-	See above.	See above.
72 How do supervisors keep informed about how well the procedures are working	N	-"-	See above.	See above.
73 Are vendor manuals included	N	-"-	See above.	See above.

7.2 TESTING AND INSPECTIONS AND MAINTENANCE

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
74 How and where are records kept (view records)	N	-"-	See above.	See above.

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
75 Frequency of maintenance	N	-"-	See above.	See above.
76 Pressure vessel testing schedule. Relief valve installation and testing schedule. - Frequency of testing - Is there a test schedule	N	-"-	See above.	16. Develop list and inspection schedule for pressure vessels.
77 List of critical valves checked regularly	N	-"-	See above.	17. Develop list and inspection schedule for critical valves.

7.3 WORK PERMIT SYSTEM

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
79 Work permit system – cold work	Y	Cold work permi form	A Cold work permit and procedure exists.	
80 Vessel entry (independent sheet per confined space)	Y	Confine d space permit form	A vessel entry permit and procedure exists.	
81 Hot work clearance system	Y	Hot work permit form and procedu re. Filled in forms.	A Hot work permit and procedure exists. Form includes need for gas testing, authorisation + acceptance of permit, sign-offs (both issuer and holder). Procedure includes definition of hot work, when a permit is required, need for stand-by person (evidence that stand-by person is used). There is no formal training of Permit to Work.	**Opportunity for improvement 2:** Internal monitoring/ auditing of Permit to Work to be done regularly (checklists required) Refer action 10.
82 Excavation authority (hand-digging vs machinery)	Y	Excavati on permit form	An Excavation permit and procedure exists.	

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
83 How are correct materials of construction verified	Y	List of enginee ring specific a-tions	A book of engineering specifications have been prepared and is available. It lists piping and valving specs. etc.	
84 Emergency repair equipment/spares available	Y	Discussi ons BL	Repair equipment and spares are available.	
85 Isolation procedures	Y	Isolation procedu re (PR-035).	Power Station and Gas Plant can be double-blocked-and bleed. Some positive isolations (spading) have been done. (evidence). Pressures are relatively low. There is no use of isolation valve lists for field work. Power Station has a register. Only Mgr Narrabri Operations (or suitably qualified and delegated person) can put on tags and locks. Locks available at Power Stn (not at field work).	
86 Line venting/depressuring/purging procedures	N		Refer Item number 39.	Refer action number 39.

7.4 ELECTRICAL EQUIPMENT HANDLING

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
Maintenance procedures	N	Refer item number 70.	Refer item number 70.	Refer action number 70.
Defining areas in plant where portable electrical equipment prohibited	Y	Haz Area Drawing s; portable el. Equip. register.	Portable el. equipment required hot work permit if inside the Hazardous Area zone. Induction training includes information. Portable el equipment registered, including testing of power lines.	

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
Use of earthing straps	N	Discus-sions BL	Design and installation adequate: Earthgrid all around the Power Station. Fences are linked in to this grid. All generators (all skids) are earthed and earthstakes were tested at installation. Ongoing testing require improvement: Currently no testing of earthing systems.	18. Initiate testing of earthing systems.
Hazardous area classification drawings	Y	Haz Area Drawing s	Hazardous Area Classification drawings available.	
Calibration and set point testing facilities for instruments (view records)	Y	Gas detector service reports (both Centre and Power Station)	Gas detectors are serviced by contractors who will initiate the call-out. Evidence checked of servicing of 3 multigas meters (LEL, O2, CO, H2S) at the Narrabri Centre and 12 x LEL detectors at the Power Station.	
SCADA system servicing and maintenance	Y	Discus-sions BL	No servicing required for the SCADA system. SCADA can fail without any adverse safety conditions. Datalogger available at wells (2-3 days worth of data).	

7.5 TESTING OF PROTECTION SYSTEMS

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
Are all protection systems listed (e.g. PSVs, security, safety showers, BA sets, cathodic protection)	N	Refer items 70, 76 and 77.	Refer items 70, 76 and 77.	Refer actions 70, 76 and 77.
Records (view) for testing of critical equipment (e.g. pressure vessels, pipelines, relief systems)	N	Refer items 70, 76 and 77.	Refer items 70, 76 and 77.	Refer actions 70, 76 and 77.

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
Do the processes fail safe	Y	-"-	See item number 29 above.	
Testing of trips/alarms/emergency valves procedures documented	N	Refer items 70 and 77.	Refer items 70 and 77.	Refer actions 70 and 77.
Where are records kept (view records)	N	Refer item 70.	Refer item 70.	Refer action 70.
Authority to bypass trips during testing	Y	Discussi ons BL and JH	No by-passing or bridging required at this stage.	
Work permit for testing	Y	Discussi ons BL and JH. Permit to Work system.	Permits will need to be issued for protective systems testing inside the restricted areas.	
Check whether trip re-activated after testing	N	-"-	There is currently no system set up for testing of trips and alarms. A system is required, including re-activation of any trips if they have been defeated.	19. Trip testing protocol to be established (including ensuring that any defeated trips are re-activated).
Procedure if protection system taken out of service temporarily (i.e. an override list for hardware, bridges, and software)	N	-"-	There is no formal system available for out-of-service equipment. As the team is little there is small risk at this stage that critical equipment or instruments are taken out of service for example by a technician without the required communication and safety checks.	20. Establish out-or-service equipment protocol for **critical** items equipment (e.g. Gas detectors etc.). Communicate system to technical staff.
Ventilation air flows	Y	Plant tour, generat or enclosur e	Relevant for the generator enclosure. Ventilation air flow automatically established on initiation of the 20% pre-alarm condition of gas detector. Automatic shut-down of air ventilation in case of initiation of IR detector or initiation of 40% gas detector. Also shut-down of process and ESD of Power Station.	
Earthing of equipment and electrical continuity	N	Discus-sions BL	Refer item 90.	Refer action 90.

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
Corrosion protection systems tested	Y	Discus-sions BL. Plant tour	None installed. Fiberglas flow line. Polythene gathering line. Galvanised separator etc. at Power Station. Very little external corrosion in the area due to dry climate and distance from sea.	

8 ACCIDENTS AND INJURIES

8.1 UNUSUAL INCIDENT REPORTING

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
Reporting system (view records since previous audit)	Y	Hazard and Injury Procedure. Discussions with BL, JH, TB, MK. List of records since 2007/8/9. Details of all incidents at plant incl in scope of this audit (= 2 in total). Incident register.	2009=36 incidents (Year to Date) in total for whole of ESG 2008=27; 2007=8. Increase in number of incidents is use to increased activities and operational activities. The two incidents that have occurred for the plant included in the scope of work of this audit were reviewed. One involved a near miss and another a cut finger. Both were recorded as per form. The form includes information on what happened, actions, a decision checklist as to whether it is reportable to the Dept of Primary Industries (currently DII). Also action management and sign-offs.	
Any recurring types of incidents	Y	Incident register.	No recurring type of incidents identified.	
Any significant incidents	Y	Incident register.	No significant incident on plant included in the scope of this audit. Only	

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
			one near miss and one cut finger. None of these occurred at the Power Station.	
Investigation procedure. Who chairs the investigation team	N	Incid. Investigation and Reporting Procedure	Serious incidents are required to be investigated as per the Investigation procedure. However, at the moment most investigations have been carried out be weather the forestry or the Dept of Prim Industries.	21. Incident investigation process to be reviewed for serious incidents. 22. Standardise the risk matrix on the incident form.
Follow up action	Y	Incident register.	Incident register is managing follow up actions.	
Record maintenance	Y	Incident database on server	Records are held on the server. Hardcopies are scanned in with signatures. Also, hardcopies are kept.	23. Review management of incident records to ensure that the final (signed off) document is available.
Is an Unusual Incident defined by management (record the major types)	Y	Procedure and register.	Lost Time Case, Medical Treatment Case, Restricted Work Case, First Aid Case, Environmental Incident, Equipment Damage, High Potential	
Are transport incidents (include off-site) recorded (view records)	Y	Procedure and register.	Yes if they occur are part of work.	
Publicity for report and action	Y	Procedure and register.	Depending on risk ranking: - Safety committee in case of High or Extreme risk; - Line Management for > or = High risk; - Health and Safety Supervisor for > or = Low risk. Statutory reporting requirements defined in checklist which is included on the incident form.	
Safety targets set by management	Y	Discus-sions BL, JH, MK, TB	No safety targets are set. However, TRIFR (total reportable incident frequency rate) is	

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
			tracked by Management via statistics and tabled at the Board Report.	
Re-training program	Y	Training records	Incident training carried out by Mgr Narrabri Operations, Surface Engineering Mgr, Drilling Mgr, H&S Supervisor, H&S Manager.	

9 EMERGENCIES

9.1 FIRE PROTECTION AND TRAINING

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
Adequacy of fixed and portable protection systems (view test tags)	Y	Plant tour	Fire extinguishers checked July 2009 and then again November 2009. External contractor carries out the checks.	
Types of extinguishers	Y	Plant tour, extingui-sher register	Powder	
Number and location	Y	-"-	Extinguishers available at the Power Station. No layout plan available.	
Labelling	Y	-"-	Labelling adequate	
Accessibility	Y	-"-	Fire extinguishers are accessible at the Power Station.	
Adequacy of fire protection system.	Y	Fire Safety Study	The philosophy for fire protection is to isolate pipelines and let the fire burn out. Fire protection is limited to extinguishers. The philosophy has been accepted by the NSW Fire Brigades in the review of the Fire Safety Study.	

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
Dematching system	N	Discus-sion Power Station operator TC. Plant tour.	No dematching system currently in place at the Power Station. The pipeline end-of-line facility is separated by a 6-foot chain fence topped with barbwire. It has the appropriate warning signs mounted at the entrance gate to the compound, including no-flame and no-mobile phone. The appropriate signs are mounted at the entrance gate to the Power Station. Currently there is no restriction for a person entering the Power Station to access Hazardous Area restricted zones.	24. Dematching system at the Power Station to be initiated (i.e. matches and lighters to be retained at entry to the site). Also retain mobile phones for people likely to access restricted areas (all people, including staff).
Who maintains and repairs fire protection equipment	Y	-"-	Outside contractors. They will initiate the inspection.	25. Inspections of fire protection systems (extinguishers) and gas meters to be included in the ESG preventative maintenance system (even if the inspections are also initiated by the contractors performing the inspection/test).
Inspection and testing frequency (view records)	Y	-"-	Inspection of extinguishers adequate (July '09 and Nov '09). Inspection of gas detectors and hand-held detectors adequate (records viewed).	
Adequacy and reliability of firewater	N/A		Refer item 120 above	
Is all critical equipment protected	Y	-"-	The philosophy of fire protection is to: 1) isolate (remote manual or remote automatic via ESD valve). 2) Let the fire burn out.	
Fire training/drill for employees	N	-"-	See item 132.	

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
Fire protection manual (does a FSS exist)	Y	FSS	A fire safety study was compiled in conjunction with the Project Approval stage (FIRE STUDY, FOR EASTERN STAR GAS LTD'S, PROPOSED GAS GATHERING, GAS PLANT and SALES FLOWLINE, NARRABRI NSW (19 November 2008)	
Plan or register of fire protection equipment	Y	Extingui-sher register	There is a list of extinguishers. There is no plan available. Refer to action re plan of extinguishers to be available in emergency Response Plan. See action 129a)	

9.2 EMERGENCY PROCEDURES

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
Is there an emergency plan	N	Emerg. resp. plan. Emerg. Resp. manual (held in vehicles, cut down version)	An emergency plan has been developed for the Narrabri PEL238 project. It is not in accordance with the Industry Emergency Planning Guidelines 2. It is a high level procedure which is not site-specific. The plan covers procedures for raising the alarm, communications in an emergency, emergency first aid and rescue, the coordination of emergency activities with liaison with the police and fire brigade. Actions and procedures in the plan are clear and easy to implement promptly. There is no procedures for shutdown of the plant or	26. Establish Site Specific ERPs for Power Station, Compressor Station and other critical activities as required. Include plans showing location of emergency shut-down (ESD) buttons, evacuation points, fire plan. 27. Update the existing drawings in the ERP.

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
			site specific evacuation plans or drawings. The control of utilities is not included as this is not considered an emergency. There is no site-specific emergency planning included.	
Who gets copies	Y	-"-	List of copies included on the ERP.	
Does everyone know who is in charge	Y	-"-	Procedure is clear and concise. It explains chain of command.	
Emergency drills conducted regularly	N	-"-; Discussions with BL, MK, TB; Emerg. Evac. Drill at Narrabri Centre	One drill has been conducted at the Centre (evacuation). No drills associated with the plants (Power Station, gas wells etc.). No other drills have been conducted.	28. Regular emergency drills/training in emergency response to be conducted and scheduled in the ERP.
Emergency lighting adequate	Y	Discussions with BL, JH	External lighting available at the Power Station. Large light to be provided at the Control Room at the Compressor Station.	
Are the following situations covered: - Fire - Explosion - Loss of utilities (power, water, instrument air, nitrogen) - Bomb threat - Flood - Toxic leaks and spills - Computer systems/transponder failure	Y	Emerg. resp. plan.	The following situations are covered: - Fire / Explosion - Injury - Leaks and spills Loss of utilities (power, water, instrument air, nitrogen, Flood and Computer systems/transponder failure are not considered emergencies. Bomb threat is not included.	29. Bomb threat emergency response to be included in the ERP.

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
Are off-site effects included and how to handle them	Y	Emerg. resp. plan.	Adequate information on off-site effects included and how to handle them.	
Outside services police/ambulance/fire brigade - pre-arrangements with the above	N	Discussi ons with BL, MK, TB	No discussions has been held to-date with outside emergency services.	30. Pre-arrangements with outside services police/ambulance/fire brigade required.
Are duties clearly defined for: - Fire fighting - Security - Safety - Medical contact - Evacuation and roll call - Communications - Media contact	Y	Emerg. resp. plan. Discussi ons BL, TB, MK	Duties defined for: - Fire fighting - Safety - Medical contact - Communications - Media contact	
System to update emergency procedures	N	-"-	No management system available to-date to update the emergency response plan. It is planned to be on the document management system.	31. Establish management system to update the emergency procedures. This should include updating of telephone numbers.
Whose telephone numbers listed and where	Y	-"-	List of tel. Nr. Appears to be adequate. Includes Mgr Narrabri Operations, Eng Support, Outside emerg services, Sept of Primary Industries, DECC (called EPA in Procedure!).	
Procedure to update telephone numbers	N	-"-	Refer item 138 above.	Refer action above.
Updating of the emergency plan.	N	-"-	Refer item 138 above.	Refer action above.
Is an area specific ERP needed	Y	-"-	No area specific ERP is needed.	

10 SAFETY MANAGEMENT SYSTEM

10.1 DOCUMENTATION

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
Quality and availability of documents	Y	HS Mgt Plan, HS Policies	A Health and Safety Management Plan and Policies are available. Existing documents are generally well laid out and comprehensive. Some are missing as highlighted in this audit above and below (including actions relating to SOPs, Control of Change, Permits to Work etc.).	

10.2 COMMITMENT AND LEADERSHIP

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
Commitments by senior management (ISO, local resident and industrial groups)	Y	HS Mgt Plan, HS Policies, HS Commit-tee meeting s (0910, 0908, 0907, 0907, 0906, 0905 etc.).	Signature of Managing Director on all Policies. Policies displayed prominently in all Centres. Executive Director together with all top management and the Narrabri Mgr Narrabri Operations and the Narrabri HS Supervisor attend the monthly Health and Safety Committee Meetings.	
SH&E Vision	Y	Discussi ons with BL, MK, TB	No Vision formulated. The Policies take the place of the vision.	
SH&E Strategy	Y	Policy docume nts (all)	The Health and Safety Strategy is outlined on the Policy documents.	

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
Policy Available		-"-	Community Relations Policy HS003 1208, Environmental Policy HS002 1208, Fitness for Work Policy HS004 1208, Health & Safety Policy HS001 1208, Smoking and Gas Ignition Policy HS006 1208, Workplace Rehabilitation Policy HS005 1208.	
Policy Maintenance and Review	Y	-"-	Policies available and up-to-date. Reminder to update before expiry (24-monthly).	
Audits (internal/external)	N	Discus-sions with BL, MK, TB	Contractor audits are conducted (weekly reports issued). Yearly Corporate Audits are conducted by an external independent specialist. Also (as initiated by the Dept of Primary Industries (now DII)), audits initiated externally. No schedule available and no audit-requirements available in the Plan.	32. Health and Safety Management Plan to include schedule of audit requirements (internal and external).
Process operator training	N	-"-	Health and Safety Supervisor (TB) has a diploma in H&S Mgt, drug& alcohol, return to work, incident investigation (together with other ESD staff). Other staff so not have formal H&S management training apart for the Induction training which is relatively comprehensive. Engineering Manager is clearly well versed in the H&S Management structure. The new H&S Manager is experienced in H&S Plans.	33. Formalise Health and Safety management training for technical staff and other staff as required.

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
Safety organisation and meetings (including minutes)	Y	HS Commit-tee meeting s (all records monthly since May '09)	HS Committee meetings monthly by Snr staff and management. Plan in place to initiate local H&S meetings with field staff. Dept of Primary Industries do not require such meetings for companies with <30 staff members.	
Who is responsible for safety organisation	Y	Discussi ons BL, MK	Up until 10 days ago: Surface Eng. Mgr. Now a H&S Manager has been appointed.	
Hazard Identification, Risk Assessment and Control	Y	HAZOB, Hazard Regis-ter, Risk Mgt Procedu re, list of JSAs, example JSA. HAZOP report, Wilga park. AS2885 risk assess-ment for flowline.	Three levels: 1) HAZOP (Hazard Observation) = simple form used to highlight unsafe work practices and situations. Managed through a register (spreadsheet). Shows date action is closed out. Register appears to be reasonably up-to-date (last entry - 12/10/09). 2) JSA = Job Safety Analysis. Used when carrying out tasks. Initiated by supervisor, SHE officer, Mgr Narrabri Operations, etc. Includes task/Step; Hazard/Exposure; Existing Controls; Risk Score; Future Controls. Most Future Controls are implemented then and there. if not they end up in the risk register. 3) HAZOP (for engineering and design). The original project design was HAZOPed by a multidisciplinary team (checked), standard guidewords (checked), more or less standard minute sheet. Further, the Bibblewindi	

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
			flowline was subject to an AS2885 risk assessment.	
System to monitor safe work practices and loss prevention methods	Y	Disc JH, BL	Contractors are supervised by either of two ESG staff members or by a contractor. Refer item 159 below.	
Protective equipment provided	Y	Disc JH, BL. General observa-tios	PPE provided as required. Other protective equipment as required (e.g. as defined through JSAs).	
First aid facilities/training	Y	List of training complet ed. Discussi ons JH, BL	5 out of 12 ops have First Aid Training. Facilities provided in Narrabri Centre and at Power Station.	
Workplace Hazardous Substances compliance and training	Y	Discussi ons BL	Not applicable	

11 CONTRACTOR MANAGEMENT

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
Managing On-Site Contractors	Y	Discussi ons TB, BL, MK	Management of contractors by H&S Supervisor, one ESG staff member (Victor) and a contractor. This is according to ESG sufficient. ESG gets the contractor's H&S Management Plans (including JSA, tool box, PPE, etc.) prior to engagement. Some alcohol testing is also conducted.	

12 SECURITY

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
Full time security staff provided	Y	Discussions JH, BL	Contracting security staff for rounds to wells. No security staff to Power Station (which is on privately owned land with gate 800m away from Station).	
Employees or contractors	Y	'-"-	Contractors	
Level of authority	Y	'-"-	Requirement is to phone Mgr Narrabri Operations in case of an issue. No level of authority.	
Control of access to facility	Y	Site visit	Power Stn: 6-foot chain mesh fence topped with barb wire. Locked access gates. Also locked gate 800m up the road from the Station. Compressor (booster) station: 6-foot chain mesh fence topped with barb wire. Locked access gates. Narrabri Centre: Standard locking of doors.	
Are security personnel trained in emergency procedures	Y	Discussions JH, BL	No emergency response requirements. Only requirement is to communicate with Mgr Narrabri Operations.	
What restrictions on access during emergency	Y	-"-	Fences and locked gates as per item number 163. Fire Brigade can drive through the locked gate.	
Any special restrictions on visitors	Y	-"-	Informal site induction when accessing the Power Station. Only accompanied by operator or Mgr Narrabri Operations. Unless formally inducted using quiz etc.	
Do security officers tour the premises	Y	-"-	Refer item 160.	

13 ENVIRONMENTAL PROTECTION

13.1 WASTES

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
Solid waste control and disposal (sludges, empty drums, carbon etc)	Y	Discussi ons TD, PJ	The only solid wastes are general wastes that go to the tip at Narrabri.	
Liquid waste control and disposal (containment, storage, processing and spill management)	Y	-"-. Contract or licence. Waste removal docume ntation (x2)	Lubricants --> waste oil tank --> Licensed contractor. Coolant. --> waste coolant --> Licensed contractor. Contractor licence sighted.	

13.2 ATMOSPHERIC EMISSIONS

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
Control of atmospheric emissions (smoke, gases, fumes and dust)	Y	-"-	Dusts from construction activities on unsealed roads. CO2 from engines (not a licensed facility as <25MTonnes). Very limited fugitive emissions. No smoke.	
Soil or groundwater contamination (testing required, e.g. monitoring wells for underground tanks)	N/A		Not applicable.	
Containment and disposal of spillages and contaminated firewater	Y	-"-	Spillages: Oil tanks and coolant bunded. Pumped out if spill. Valved to oily water separator. Limited amounts of fire water expected.	
Fugitive emissions program (if required by the EPA licence)	Y	-"-	Very limited fugitive emissions.	

13.3 INCOMPATIBLES

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
Likelihood of mixing incompatibles liquids in drainage system	Y	-"-	No incompatibles on site.	

13.4 LICENCES

Question	Item OK? (Y / N)	Docu-ment/ Person	Status / Description	Recommended Action
EPA and DG licence conformance	Y	-"-	- No DG Licence required. - No DECC Licence required (this Stn is 7MW; Licence required at 30MW). '- No Gas Production Licence (ESG does <1PJ; Licence required if >5PJ). - Pipeline not required to be licence.	
Effluent treatment and disposal (e.g. Trade Waste to Sydney Water)	Y	-"-	No effluents.	
Where are records kept (view records)	Y	-"-	No records required.	
Are incidents recorded (e.g. flare releases)	Y	-"-	As per requirements	

PLANAGER
Risk Management Consulting

Appendix 1

Details of the Topics Covered in the Hazard Audit

Report of the 2009 Hazard Audit of the Eastern Star Gas Operations Associated with the Narrabri PEL 238 Project

Appendix 1 – Details of the Topics Covered in the Hazard Audit.

1 Scope

The hazard audit is a requirement of the consent document associated with new plant or significant modifications. Formal guidelines are available (Advisory Paper No. 5). The main review areas of software and technical controls that have been targeted by the Department in past reports still form the basis of the proposed audit.

The key areas to be covered by the Audit are listed below. The audit comprises:

- Review of documents and procedures
- Inspection of facility
- Observation of operations

Discussions with employees at all levels, i.e. operators, maintenance employees, supervisors, managers, security officers, safety officer.

2 Plant and Process Systems

- Physical condition of equipment and storage
- Labelling and identification of equipment/valves/instruments/pipes
- Assumptions in hazard analysis study incorporated in plant hardware
- Are all items of equipment and control functioning satisfactorily
- P&ID's and process flow diagrams
- Process systems monitoring e.g. operator logs, alarms, trips
- General housekeeping of premises
- Materials inventory system and records
- Loading/unloading operations and transport records

3 Review of Operating Procedures

- Who writes them
- How often are they reviewed
- Who is authorised to make changes
- Are they up-to-date
- Method sheets with quick summaries
- How does the Supervisor know how well the procedure is working out
- How do Managers keep informed about satisfactory operation of the procedures
- Back-up systems (e.g. trip systems) on procedural failures

4 Process Operator Training

- Training modules (why and what of operation)
- Training methods and records
- What restrictions on operator who has not completed training
- Evaluation of training
- Personal precautions in handling flammable or toxic materials
- Appreciation of hazards, identification and control

5 Maintenance Procedures

- Do formal procedures exist (preventative?)
- Are the aims of procedures clearly outlined
- How do supervisors keep informed about how well the procedures are working
- How and where are records kept

- Frequency of maintenance
- Relief valve installation and testing schedule
- Pressure vessel testing schedule
- Work permit system
- Vessel entry
- Hot work clearance system
- How are correct materials of construction verified
- Emergency repair equipment/spares available
- Line venting/depressuring/purging procedures
- List of critical valves checked regularly
- Calibration and set point testing facilities for instruments
- Computer servicing and maintenance

6 Safety Training of Employees

- Personal safety training and records
- Induction training of new employees
- Appreciation of inherent hazards in plant and during maintenance
- Work permit procedures
- Equipment to be used (e.g. non sparking tools)
- Protective clothing
- Control of electrical equipment in classified hazardous areas
- Procedures for outside contractors working on premises

7 Plant Modification Control

- How is this documented
- Who approves modification
- Who screens and reviews the proposal
- How is updating of drawings and operating/maintenance procedures co-ordinated
- Are HAZOP techniques employed
- What documentation exists

8 Testing of Protection Systems

- Are all protection systems listed
- Testing of trips/alarms/emergency valves procedures documented
- Where are records kept
- Relief valves, bursting discs
- Frequency of testing
- Is there a test schedule
- Authority to bypass trips during testing
- Work permit for testing
- Check whether trip re-activated after testing
- Procedure if protection system taken out of service temporarily
- Ventilation air flows
- Earthing of equipment
- Other preventative maintenance checks

9 Electrical Equipment Handling

- Maintenance procedures
- Isolation procedures
- Defining areas in plant where portable electrical equipment prohibited
- Hazardous area classification drawings

10 Unusual Incident Reporting

- Reporting system
- Investigation procedure. Who chairs the investigation team
- Follow up action
- Record maintenance
- Is an Unusual Incident defined by management
- Publicity for report and action

11 Injury/Accident Reporting

- Reporting system
- Investigation procedure
- Follow up action
- Safety targets set by management
- Re-training program

12 Fire Protection and Training

- Fixed protection systems
- Types of extinguishers
- Number and location

- Labelling
- Accessibility
- Dematching system
- Who maintains and repairs fire protection equipment
- Inspection and testing frequency
- Adequacy of firewater
- Is all critical equipment protected
- Fire training/drill for employees
- Fire protection manual
- Plan or register of fire protection equipment

13 Emergency Procedures

- Is there an emergency plan
- Who gets copies
- Does everyone know who is in charge
- Emergency drills conducted regularly
- Emergency lighting adequate
- Are the following situations covered:
    - Fire
    - Explosion
    - Loss of utilities (power, water, instrument air, nitrogen)
    - Bomb threat
    - Flood

  - Toxic leaks and spills
  - Computer systems/transponder failure
  - Outside services police/ambulance/fire brigade - pre-arrangements with the above

- Are duties clearly defined for:
  - Fire fighting
  - Security
  - Safety
  - Medical contact
  - Evacuation and roll call
  - Communications
  - Media contact
- System to update emergency procedures
- Whose telephone numbers listed and where
- Procedure to update telephone numbers

14 Management Safety System

- Internal audits
- Safety policy
- Process operator training
- Safety organisation and meetings (including minutes)
- Hazard identification, risk assessment and control
- System to monitor safe work practices and loss prevention methods
- Who is responsible for safety organisation

- Protective equipment provided
- First aid facilities/training
- Workplace Hazardous Substances compliance and training

15 Security of Premises

- Full time security staff provided
- Employees or contractors
- Level of authority
- Control of access to facility
- Are security men trained in emergency procedures
- What restrictions on access during emergency
- Any special restrictions on visitors
- Do security officers tour the premises

16 Environmental Protection

- Solid and liquid waste disposal
- Control of atmospheric emissions
- Soil or groundwater contamination
- Containment and disposal of spillages
- EPA licences
- Effluent disposal (Sydney Water)
- Where are records kept

17 Additional Requirements

The Department's Advisory Paper No. 5 requires the following:

- Maps and sketches of the facility and of surrounding land uses
- Listing of hazardous materials being handled, stored or processed at the site, with an indication of variations in quantities held
- Locations of significant quantities of hazardous materials to be marked up on a site map
- Specific Material Safety Data Sheets may be included as attachments
- A map showing the layout of fire fighting services should be included as an attachment to the report (or reference the Fire Safety Study)
- Process description
- Other safety studies carried out on the facility. Recommendations made in these studies to be reviewed.

Appendix 2

Documents Sighted

Report of the 2009 Hazard Audit of the Eastern Star Gas Operations Associated with the Narrabri PEL 238 Project

Appendix 2 – Documents Sighted.

The following documents were sighted during the 2-day audit:

- Drawings and diagrams:
  - Various maps and Diagrams;
  - P&IDs in Control Room and in Narrabri Centre.
- Emergency:
  - Emergency procedures
  - Emergency drill (Narrabri Centre);
  - Fire Safety Study.
- Management of Safety Systems:
  - List of DGs;
  - Health and Safety Management Plan (SHEOS);
  - Results of the Sept 2009 Corporate Audit;
  - HSE committee minutes.
- Operations:
  - SCADA screens;
  - Logging of plant status.
  - Event Management.
  - Alarm Management.
- Environmental compliance:
  - Waste Removalist's Licence.
- Incident and accident management:
  - Incident and accident documentation, including reporting system for incidents, accidents and near misses;
  - Safety incident reports and investigations;
  - List of incidents;
  - Investigation follow-ups.
- Procedures:
  - Hazard & Incident Investigation & Reporting Procedure
  - Risk Management Procedure
  - HSEC Committee Procedure
  - Contractor Management Procedure
  - Chemical & Hazardous Substances Management Procedure

  - Change Management Procedure
  - Fitness for Work Procedure
- Maintenance:
  - Various spreadsheets to track the preventative maintenance program;
  - Reports on gas detector testing;
  - Clearance system and management, including Cold work permit, Confined spaces permit, Hot work permit;
  - JSAs (examples);
  - Modification Control forms (filled in).
- Training:
  - Training lists;
  - Technical training;
  - Safety training.

14 REFERENCES

1 Fatal F, *Approval for Hazard Auditor - Eastern Star Gas Narrabri, Coal Seam Gas (CSG) Utilisation Project*, Department of Planning, 22 September 2009

2 Department of Urban Affairs and Planning, *Hazardous Industry Planning Advisory Paper No. 5: Hazard Audit Guidelines;* NSW Government, Sydney, 1993 Edition