McGill Engineering Services Pty Ltd

Engineering, Adjudication & Arbitration Services ABN 45 106 691 169

BHP BILLITON WORSLEY ALUMINA PTY LTD

GENERATION LICENCE EGL 12

ASSET MANAGEMENT SYSTEM REVIEW

Prepared By Kevan McGill
Date 30 October 2010

McGill Engineering Services Pty Ltd

Engineering, Adjudication & Arbitration Services ABN 45 106 691 169

David Schmidt
Commercial Analyst
BHPBilliton Worsley Alumina Pty Ltd
Worsley Alumina Refinery
Collie WA 6225

Dear Mr Schmidt

Asset Management System Review Electricity Licences

The fieldwork on the asset management system review of Generation Licence EGL 12, for the review period (1 July 2008 to 30 June 2010) is complete and I am pleased to submit the report to you. The report reflects my findings and opinions.

In my opinion, the Licensee maintained effective control procedures in relation to the Generation Licence (EGL 12) for the review period and in my opinion, the Licensee maintained an effective asset management system in relation to the Generation licence (EGL 12) for the review period on the relevant clauses referred to within the objectives section of this report. Consistent with the scope limitation calculations are accurate.

Yours sincerely

Kevan McGill
Director

Date 30 October 2010

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Executive Summary

This asset management review was conducted in accordance with the guidelines[1] issued by the Economic Regulation Authority (*Authority)* for the review period (1 July 2008 to 30 June 2010).

The Licensee is an Alumina refinery which requires electricity and steam for the refining process. The Licensee provides electricity to the WEM when it has excess generation and sources electricity from the WEM at times of generation shortage. It has 110 MW of steam turbine generation plant.

An extension to the generation plant is occurring on site but not through this generation licence. There are 3 generation Licensees on the site.

OVERALL CONCLUSION

In my opinion, the Licensee maintained effective control procedures in relation to the Generation Licence (EGL 12) for the review period.

In my opinion, the Licensee maintained an effective asset management system in relation to the Generation licence (EGL 12) for the review period based on asset management system processes referred to within the objectives section of this report (Page 7). Consistent with the scope limitation calculations are accurate.

ASSET MANAGEMENT SYSTEM REVIEW

A summary of the findings of the asset management system review is:

RATINGS

The reviewer's assessment of both the process and policy definition rating and the performance rating for each key process in the Licensee's asset management system is assessed using the scales described below.

Asset management process and policy definition adequacy ratings

Rating	Description	Criteria
A	Adequately defined	• Processes and policies are documented. • Processes and policies adequately document the required performance of the assets. • Processes and policies are subject to regular reviews, and updated where necessary • The asset management information system(s) are adequate in relation to the assets that are being managed.
B	Requires some improvement	• Process and policy documentation requires improvement. • Processes and policies do not adequately document the required performance of the assets. • Reviews of processes and policies are not conducted regularly

[1] Economic Regulation Authority: Audit guidelines: Electricity, Gas and Water Licences Aug 2010

		enough. • The asset management information system(s) require minor improvements (taking into consideration the assets that are being managed).
C	Requires significant improvement	• Process and policy documentation is incomplete or requires significant improvement. • Processes and policies do not document the required performance of the assets. • Processes and policies are significantly out of date. • The asset management information system(s) require significant improvements (taking into consideration the assets that are being managed).
D	Inadequate	• Processes and policies are not documented. • The asset management information system(s) is not fit for purpose (taking into consideration the assets that are being managed).

Asset management review effectiveness rating scale

Rating	Description	Criteria
1	Performing effectively	• The performance of the process meets or exceeds the required levels of performance. • Process effectiveness is regularly assessed and corrective action taken where necessary.
2	Opportunity for improvement	• The performance of the process requires some improvement to meet the required level. • Process effectiveness reviews are not performed regularly enough. • Process improvement opportunities are not actioned.
3	Corrective action required	• The performance of the process requires significant improvement to meet the required level. • Process effectiveness reviews are performed irregularly, or not at all. • Process improvement opportunities are not actioned.
4	Serious action required	• Process is not performed, or the performance is so poor that the process is considered to be ineffective.

The overall effectiveness rating for asset management process is based on a combination of the process and policy adequacy rating and the performance rating.

The summary table used to report effectiveness in asset management review reports is shown below.

Asset management effectiveness summary

ASSET MANAGEMENT SYSTEM	Asset management process and policy definition adequacy rating	Asset management performance rating
Asset planning	B	2
Asset creation/ acquisition	Not Rated	Not Rated
Asset disposal	B	Not Rated
Environmental analysis	A	1
Asset operations	A	1
Asset maintenance	A	1
Asset Management Information System	A	1
Risk Management	B	2
Contingency planning	A	1
Financial planning	A	1
Capital expenditure planning	A	1
Review of AMS	B	2

It is not implied that any assessment at “A” or “1” means that there is not scope for continuous improvement, rather that no recommendations for improvement have been recommended in this report.

ASSET MANAGEMENT SYSTEM REVIEW

ASSET MANAGEMENT SYSTEM REVIEW OBJECTIVES

Under the *Electricity Industry Act 2004* (the Act) section 14, a generation Licensee must develop and maintain an asset management system to manage the significant asset base for ongoing service delivery to its customers. The Act requires a review of the asset management system every two years (or other time approved by the *Authority).*

This report is an impartial review of the Licensee's asset management effectiveness under the ERA guidelines.

The review conducted between August and September 2010 examined the asset management processes used by the Licensee in delivering the services to its customers. These services include lifecycle processes for:

- Asset planning;
- Asset creation/acquisition;
- Asset disposal;
- Environmental analysis;
- Asset operations;
- Asset maintenance;
- Asset management information system (AMIS);
- Risk management;
- Contingency planning;
- Financial planning;
- Capital expenditure planning; and
- Review of the asset management system.

As well as the processes, the asset management supporting systems were tested as to their use and effectiveness. Data used by the Licensee was also examined with respect to its effectiveness for asset management and the delivery of outcomes.

Tests were undertaken through interviews and investigation of the processes to assess whether they were being performed as documented.

The Licensee appointed McGill Engineering Services Pty Ltd to conduct the review of its Generation Licence with approval from the Authority. A preliminary assessment was conducted with the Licensee's management to determine the inherent risk and the state of control for each compliance element of the Licence obligation. McGill Engineering Services Pty Ltd then prioritised the audit coverage based on the risk profile of the Licensee with an emphasis on providing greater focus and depth of testing for areas of higher risk to provide reasonable assurance that the Licensee had complied with the standards, outputs and outcomes under the Licence obligations.

The audit was conducted in a manner consistent with Australian Auditing Standards (AUS) 808 “Planning Performance Audits” and AUS 806 “Performance Auditing”. McGill Engineering Services Pty Ltd evaluated the adequacy and effectiveness of the controls and performance by the Licensee relative to the standards referred in the Generation Licence through a combination of enquiries, examination of documents and detailed testing for Electricity Generation Licence EGL 12 for the Licensee.

REVIEW (AUDIT) PERIOD

The review (audit) period is 1 July 2008 to 30 June 2010.

SCOPE LIMITATION

The review was undertaken by examination of documents, interviews with key persons and observations and is not a detailed inspection of physical items.

Assessment of accuracy of computations is limited to inspection of spreadsheets and the like with an overview of the calculations and random inspection of formulae. Because of the nature of this type of inspection no conclusion can be made that all calculations are correct nor can assurance that data entry errors have not occurred be drawn. The form and nature of financial statements have been examined but no detailed examination of the calculations therein.

ACTIONS FROM LAST REVIEW

The actions to follow up are:

Asset Management Item	**Recommendation**	**Actions Taken** **Further Action Required**
	Recommendation 1	
	Consideration is given to implementing a formal asset planning process consistent with the required generation plant outcomes.	Asset planning is included as a necessary component of the wider planning for Alumina. No further action required.
Risk Management	**Recommendation 1**	
	Label the 132kv cable tray High Voltage.	Completed No further action required.
AMS review	**Recommendation 1**	
	A process be implemented that schedules regular review of the asset	Asset planning is included as a necessary component of the wider planning for Alumina.

	management system.	These plans are routinely reviewed. But there is no reviews of the other components of an Asset Management System
		Implement a review of the broader AMS.

The report to the Licensee and the *Authority* clearly expresses the opinion of the reviewer in respect of the findings of the review.

The key contacts were:

- Licensee
    - David Schmidt Commercial Analyst Worsley Alumina, Gail Godenzi Operations Coordination Worsley Alumina, Tony Mills Maintenance Superintendant Worsley Alumina, Steve Thomas Powerhouse Shutdown Coordinator Worsley Alumina, Tony Minards, BHP Billiton Worsley Alumina, Lead Engineer Power House;
- McGill Engineering Services Pty Ltd
    - Kevan McGill, John McLoughlin

The audit was conducted during August and September 2010. Kevan McGill took 90 hours and John McLoughlin 6 hours on the review.

\Stage	**Auditor**	**Standard**
1. Risk & Materiality Assessment Outcome - Operational/ Performance Audit Plan	K McGill	ASA 300 Planning ASA 315: Risk Assessments and Internal Controls AUS 808: Planning Performance Audits AS/NZS 4360:2004: Risk Management ERA Guidelines
2. System Analysis	K McGill	AUS 810: Special Purpose Reports on Effectiveness of Control Procedures
3. Fieldwork Assessment and testing of; • The control environment • Information system • Compliance procedures • Compliance attitude	K McGill John McLoughlin	AUS 502: Audit Evidence AUS 806: Performance Auditing
4. Reporting	K McGill	ASA 300 Planning AUS 806: Performance Auditing

STATEMENT OF INDEPENDENCE

To the best of my knowledge and belief, there is no basis for contraventions of any professional code of conduct in respect of the audit.

I have not done or contemplate undertaking any other work with the Licensee.

There are no independence threats due to:

- self-interest – as the audit company or a member of the audit team have no financial or non-financial interests in the Licensee or a related entity;
- self-review – no circumstance has occurred where:
    - the audit company or a member of the audit team has undertaken other non-audit work for the Licensee that is being evaluated in relation to the audit/review; or
    - when a member of the audit team was previously an officer or director of the Licensee; or
    - where a member of the audit team was previously an employee of the Licensee who was in a position to exert direct influence over material that will be subject to audit during an audit/review.

There is no risk of a self-review threat as:

- no work has been
    - undertaken by the auditor, or a member of the audit/review team, for the Licensee within the previous 24 months; or
    - the auditor is currently undertaking for the Licensee; or
    - the auditor has submitted an offer, or intends to submit an offer, to undertake for the Licensee within the next 6 months; and
- familiarity – there is no close family relationship with a Licensee, its directors, officers or employees,
- and is not nor is perceived to be too sympathetic to the Licensee's interests.

RECOMMENDATIONS

The recommendations for further action are below. The Licensee only exports a very small amount and may wish to consider exporting through either of the other 2 licences on site and as a consequence of then being self supply would not require a licence.

Risk management	**Process/Policy rating** B	**Effectiveness rating** 2
8. Risk management Risk management involves the identification of risks and their management within an acceptable level of risk.		

Recommendation
Implement procedures to ensure risk assessment tools are used with self assessment of controls and risk control audit processes completed. (non mandatory recommendation audit guidelines 11.4)

Review of AMS	**Process/Policy rating** B	**Effectiveness rating** 2
12. Review of AMS The asset management system is regularly reviewed and updated.		
Recommendation		
Implement a review of the broader AMS including reviewing key operating and maintenance procedures to ensure the generating plant meets the life requirements of the refinery. Any risks arising from the reviews should be developed along with the consequent contingency plans.		

REVIEW EVIDENCE

The following evidence was considered.

- Generation Licence
- Accounting Standards
- Obligations to comply with legal/environmental/safety obligations
- Energy Supply Risk analysis
- Demonstration of maintenance and planning IT systems
- Demonstration of risk registers.
- BHP Billiton Worsley Alumina 5 Year plan contents
- Licence invoices/receipts
- Contract document requirements
- Powerhouse performance obligations
- Risk analyses

ASSET MANAGEMENT SYSTEM REVIEW RESULTS AND RECOMMENDATIONS

Asset Planning	**Process/Policy rating** B	**Effectiveness rating** 2

1. *Asset planning*

Asset planning strategies are focused on meeting customer needs in the most effective and efficient manner (delivering the right service at the right price).

Observations

Asset Planning Process/Plan and its currency
The Licensee has 3 steam generators that are 27 years old and one that is 10 years old. There is no formalised asset planning for the generation plant in isolation from the Alumina plant. The organisation has committed to a major extension of the Alumina plant (with separate generation) including a major strategic planning process. The procurement processes include justification supporting the recommended action with appropriate management delegation for approval. There is no formal asset plan for the licensed assets but is part of a larger asset plan (Worsley Alumina 5 year plan).

The Licensee is independently quality assessed to AS 9001.

Allocation of responsibilities / statutory obligations
The organisational arrangements clearly allocate responsibilities and there are well documented obligations of the Licensee and their employees to comply with statutory obligations.

Evaluation Criteria summary

- Planning process and objectives reflect the needs of all stakeholders and is integrated with business planning

Response: The planning for electricity generation is not done independently from the planning for Alumina production. The levels of steam and electricity generated are determined by Alumina process needs and not by the electricity market. The Licensee has a 5 year planning process that sets out the strategic direction. This plan sets out strategy, performance review, actions, outcomes, risks and contingencies.

- Service levels are defined

Response: There are a set of KPIs for the licensed plant that are monitored routinely. These are displayed in the powerhouse conference room.

- Non-asset options (e.g. demand management) are considered

Response: The Licensee is responsible for the utilisation of the existing plant which is high with the refinery need for steam. There is unlikely to be a non asset solution that does not involve steam generation for the refinery needs.

- Lifecycle costs of owning and operating assets are assessed

Response: The lifecycle costs of owning and operating assets are monitored routinely.

- Funding options are evaluated

Response: The current plant will not be extended The 5 year plan does not contemplate another expansion.

- Costs are justified and cost drivers identified

Response: Costs of the plant are monitored and costs are justified and cost drivers are routinely identified for the licensed plant.

- Likelihood and consequences of asset failure are predicted

Response: The Licensee has reliability engineer specifically responsible for these issues.

- Plans are regularly reviewed and updated

Response: The performance of the plant is reviewed weekly. The Alumina plans are reviewed routinely.

Asset management process and policy definition

Process	☑	Policy	☑	

Evidence: interviewed David Schmidt and listed staff on site. Inspected site. Documents: Include BHP Billiton Worsley 5 year plan.

Asset management performance

Process	☑	Documentation	☑	Availability	☑	Use	☑

Issues

The Licensee is unlikely to make significant alterations to the licensed plant in the near future and contracted for another Licensee (WR Carpenter) to construct generating plant for the extension to the refinery. The Licensee conducts the shorter timeframe asset management elements (operations, maintenance, risk and contingency planning and financial planning) for the licensed plant consistent with its Alumina planning needs. There will be no planning for generation that is outside the needs of the refinery for steam or electricity. The Licensee performs the strategic roles but within the constraints of planning for the Alumina business. There is no business case for planning for a role (electricity generation) alone that does not have an independent function outside alumina refining. The asset management planning functions for electricity generation are carried out as part of broader planning.

Recommendation

None.

Asset Creation	**Process/Policy rating** Not Rated	**Effectiveness rating** Not Rated

2 Asset creation and acquisition

Asset creation/acquisition means the provision or improvement of an asset where the outlay can be expected to provide benefits beyond the year of outlay.

Observations

Policies and procedures for asset creation / sample creation activities
There has been no asset creation of the generation plant in the audit period.

Meeting statutory obligations
There are documents requiring employees and contractors to meet statutory obligations.

Evaluation Criteria summary

- Full project evaluations are undertaken for new assets, including comparative assessment of non-asset solutions

Response: There has been no asset creation in the audit period for this licence. The Licensee has contracted another Licensee to create additional generation. There are appropriate procurement standards should any work be required under this licence. As the electricity requirements are driven by the refinery process needs a non asset solution is unlikely.

- Evaluations include all life-cycle costs

Response: Procurement of new assets is very unlikely and the life of the plant is tied to the life of the refinery and will be maintained but replacement is unlikely.

- Projects reflect sound engineering and business decisions

Response: There will be no asset creation under this licence, but there are sound procurement standards should asset creation be contemplated.

- Commissioning tests are documented and completed

Response: There has been no commissioning under this licence in the audit period and asset creation is unlikely.

- Ongoing legal/environmental/safety obligations of the asset owner are assigned and understood

Response: Employees and contractors are bound to meet legal/environmental/safety obligations.

Asset management process and policy definition

Process	☐	Policy	☐	

Evidence: interviewed David Schmidt and listed staff on site. Inspected site.
Documents: Include BHP Billiton Supply “Source to Contract” Management Standard.

Asset management performance

Process	☐	Documentation	☐	Availability	☐	Use	☐

Issues

There has been no asset creation and none is forecast under this licence in the near

future. The extension of generation plant is being carried out under another licence.
Recommendation
None.

Asset Disposal	**Process/Policy rating** B	**Effectiveness rating** Not Rated

3. Asset disposal

Effective asset disposal frameworks incorporate consideration of alternatives for the disposal of surplus, obsolete, under-performing or unserviceable assets. Alternatives are evaluated in cost-benefit terms.

Observations

Policies and procedures for asset disposal / sample disposal activities
There is no disposal action in the audit period and none are contemplated. Removing the generation plant is unlikely during the life of the Alumina plant.

The disposal processes are well documented and defined. There are obligations on staff to identify materials that may suitable for disposal. There are no significant items covered by the licence identified for disposal.

Meeting statutory obligations
There are documented obligations of the Licensee's employees to comply with statutory obligations.

Evaluation Criteria summary

- Under-utilised and under-performing assets are identified as part of a regular systematic review process

Response: The performance of the plant is routinely monitored and KPIs tracked.

- The reasons for under-utilisation or poor performance are critically examined and corrective action or disposal undertaken

Response: The performance of the plant is routinely monitored and KPIs tracked.

- Disposal alternatives are evaluated

Response: There is no likelihood of disposal of the plant outside that for the Alumina refinery.

- There is a replacement strategy for assets

Response: There is a reliability engineer specifically responsible for this function.

Asset management process and policy definition

Process	☐	Policy	☐	

Evidence: interviewed David Schmidt and listed staff on site. Inspected site. Documents: KPI charts.

Asset management performance

Process	☐	Documentation	☐	Availability	☐	Use	☐

Issues

There has been no asset disposal activity in the review period.

Recommendation
None -

Environmental analysis	**Process/Policy rating** A	**Effectiveness rating** 1

4. Environmental analysis

Environmental analysis examines the asset system environment and assesses all external factors affecting the asset system.

Observations

Standards / monitoring / reporting / breaches
There are no environmental non-compliances reported.

There are contingency plans for fuel availability. Coal stockpiles are on site for delays in coal availability. The Alumina plant can operate with reduced capacity on coal when gas is short (with the corresponding reduction in steam requirements and the related electricity requirements). Verve has also sold gas to Worsley by substituting liquids. The Licensee must have steam for process and enough gas for calcination of the Alumina.

The generating assets are coal based and not affected by gas shortages. A separate licence provides 25% of the steam generation from a gas fired cogeneration plant and this is also used to generate electricity. A third licence is used to build the generation for the refinery extension.
The Alumina plant has the environmental licences.

Evaluation Criteria summary

- Opportunities and threats in the system environment are assessed

Response: Environmental issues are routinely monitored. External issues such as fuel supply are closely assessed.

- Performance standards (availability of service, capacity, continuity, emergency response, etc) are measured and achieved

Response: KPIs are routinely monitored.

- Compliance with statutory and regulatory requirements

Response: The site is required to comply with the Mines Safety Inspection Act. The Environmental Protection requirements have to be satisfied.

- Achievement of customer service levels.

Response: The plant meets the customer (the refinery dominantly) needs with high availability. Any electricity spill to the SWIS is secondary to meeting the internal refinery needs.

Asset management process and policy definition

Process	☑	Policy	☑	

Evidence: interviewed David Schmidt and listed staff on site. Inspected site.
Documents: Include KPI Charts.

Asset management performance

Process	☑	Documentation	☑	Availability	☑	Use	☑

Issues
None.
Recommendation
None

Asset operations	Process/Policy rating A	Effectiveness rating 1

5. Asset operations

Operations functions relate to the day-to-day running of assets and directly affect service levels and costs.

Observations

Policies and procedures for asset operation / sample activities

The Licensee has 3 steam generators that are 27 years old and one 10 years old. The plant operates in base load mode which is a low thermal cycling mode with reduced stresses. The demands of the Alumina process dictate continuous generation with Verve taking any excess and alternatively providing support when the plant requires maintenance. The Licensee does not have to provide a sent out capacity to the IMO or system management but indicates when they will be taking plant off line and will be importing power. (A Generation licence is only required if exporting as no licence is required to be load (importing power)).

The steam capacity of the boilers has been increased from 197 tons/hr to 227 tons/hr (15%) with the appropriate modifications to valves.

The assets include 55km of 66kv overhead transmission line. This line supplies the Licensee's loads and therefore is covered by the exemption order as self supply and a licence is not required. The line is constructed to appropriate standards.

The asset register is part of the Licensee's maintenance IT system (SAP). Shutdowns are scheduled well in advance. There are more than 300 items listed for the major shutdowns.

The response to exceptions arising while operating the gas turbine (not part of this licence) has been changed to observe vibration alarms.

Training/ resources / exceptions

The Licensee operates the plant. The resourcing is appropriate and ongoing training is evident as are the operating procedures and practices. Plant operation and related maintenance appears to take due allowance of any exceptions in the licensed steam plant. The Licensee does not record plant starts as they start infrequently.

Evaluation Criteria summary

- Operational policies and procedures are documented and linked to service levels required

Response: Service standards are defined and routinely monitored. Operational procedures are documented.

- Risk management is applied to prioritise operations tasks

Response: Operations (maintenance predominantly) is based on risk assessment. The plant operates consistent with the manufacturers requirements

- Assets are documented in an Asset Register including asset type, location, material, plans of components, an assessment of assets' physical/structural condition and accounting data

Response: Asset registers are contained with the appropriate information in the IT

system. The Licensee operates a customised version of SAP and will convert to the enterprise standard 1SAP soon.

- Operational costs are measured and monitored

Response: Operational costs – equipment, fuel, staffing, contracts and materials are measured and monitored.

- Staff receive training commensurate with their responsibilities

Response: Staff receive training commensurate with their responsibilities

- Performance measures such as unplanned outages

Response: Outage statistics are monitored.

Asset management process and policy definition

Process	☑	Policy	☑	Documentation	☑	

Evidence: interviewed David Schmidt and listed staff on site. Inspected site.
Documents: KPI Charts, operational procedures.

Asset management performance

Process	☑	Documentation	☑	Availability	☑	Use	☑

Issues

None.

Recommendation

None

Asset Maintenance	Process/Policy rating A	Effectiveness rating 1
6. Asset maintenance Maintenance functions relate to the upkeep of assets and directly affect service levels and costs.		
Observations		
Policies and procedures for asset maintenance / sample activities Maintenance is controlled by an IT system that coordinates tasks, incorporates condition, risk, breakdown and time based maintenance. Maintenance jobs are standardised which gives a quality and safety assurance and change management where by changing the standard job specification the work process is changed. Spare parts required for standard jobs and inventories are also contained in the system. The German business software SAP is used and has been well tailored to the Licensee's specific maintenance needs. The Licensee operates a customised version of SAP (V3) and will convert to the enterprise standard 1SAP soon. The Licensee provides first line maintenance and contracts to suppliers such as Siemens to service their major maintenance outages. The generation plant was manufactured by Mitsubishi but is a clone of GE plant for which Siemens is the local agent. The transmission line is maintained for supply continuity. The Licensee employs a specialist HV maintenance team who carry out planned maintenance activities. In some cases specialist contractors, such as Western Power, are used to carry out maintenance activities. Training / resources / exceptions Maintenance is scheduled well into the future and these actions appear appropriate for the type of equipment. The resourcing is appropriate and ongoing training is evident as are the operating procedures and practices. Plant maintenance appears to take due allowance of any exceptions in the licensed steam plant. *Evaluation Criteria summary* • Maintenance policies and procedures are documented and linked to service levels required Response: Service standards are defined and monitored. Policies and procedures are documented. • Regular inspections are undertaken of asset performance and condition Response: Inspections are undertaken as part of manufacturer's maintenance conditions. • Maintenance plans (emergency, corrective and preventative) are documented and completed on schedule Response: Maintenance plans are documented and completed on schedule. The equipment manufacturer requires maintenance to their standard and frequency to validate warrantee conditions. • Failures are analysed and operational/maintenance plans adjusted where necessary Response: Failures are analysed and adjustments made where necessary. There is a reliability engineer responsible for this function.		

- Risk management is applied to prioritise maintenance tasks

Response: Risk management is the key method of prioritising maintenance tasks. Examples include Boiler BMS upgrades.

- Maintenance costs are measured and monitored

Response: Maintenance costs are measured and monitored.

- System maintenance strategy, including the methodology used to maintain the system and frequency of maintenance activities.

Response: Maintenance strategies are defined with some equipment requiring time or condition based maintenance and other equipment run to failure.

- Performance measures such as unplanned outages

Response: Outage statistics are monitored.

Asset management process and policy definition

Process	☑	Policy	☑	Documentation	☑	

Evidence: interviewed David Schmidt and listed staff on site. Inspected site, saw demonstration of maintenance IT processes. Documents: KPI charts.

Asset management performance

Process	☑	Documentation	☑	Availability	☑	Use	☑

Issues

None

Recommendation

None

Asset Management Information System	Process/Policy rating A	Effectiveness rating 1

7. Asset Management Information System (MIS)

An asset management information system is a combination of processes, data and software that support the asset management functions.

Observations

Policies and procedures

The Licensee has a competent asset management information system with a number of elements. The German business software SAP is used and has been well tailored to the Licensees specific maintenance needs. The Licensee operates a customised version of SAP (V3) and will convert to the enterprise standard 1SAP soon.

It has complex spreadsheets managing expenditure and a dedicated maintenance management database to control a complex list of items. The maintenance system links project management to scheduled tasks to standard work plans (assisting with safety and change management), asset register and parts inventory. The system generates work orders in response to time or condition based items (exceptions). Spreadsheets are used for outage scheduled work, MS project is used for equipment planning (+10 years ahead) and SAP covers work orders linked to standard work instructions / parts inventory.

Access to write to the database is controlled (passwords) and changes are tracked. There is good documentation for data recovery procedures and the systems are backed up regularly to ensure data integrity.

Exceptions

The Licensee is audited for compliance with AS9001 which gives confidence that exceptions are followed up. In any case the reliability of the plant is evidence of good maintenances practices.

Evaluation Criteria summary

- Adequate system documentation for users and IT operators

Response: The SAP system is sufficiently documented. It is easy to use and reasonably intuitive, there are user manuals.

- Input controls include appropriate verification and validation of data entered into the system

Response: The system is easy to use with a maintenance focus rather than a database focus and includes appropriate verification and validation of data entered into the system.

- Logical security access controls appear adequate, such as passwords

Response: Logical control is adequate with hierarchical access by password.

- Physical security access controls appear adequate

Response: Physical security is adequate with the system on access controlled generation site.

- Data backup procedures appear adequate

Response: Data backup is robust.

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- Key computations related to Licensee performance reporting are materially accurate

Response: Key computations related to Licensee performance reporting are materially accurate, to the extent possible to assess with visual inspection consistent with scope limitation.

- Management reports appear adequate for the Licensee to monitor licence obligations

Response: Management reports appear adequate for the Licensee to monitor licence obligations to the extent possible to assess with visual inspection consistent with scope limitation. Sighted operation of maintenance systems on line.

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<tr><td colspan="8">Asset management process and policy definition</td></tr>
<tr><td>Process</td><td>☑</td><td>Policy</td><td>☑</td><td>Documentation</td><td>☑</td><td colspan="2"></td></tr>
<tr><td colspan="8">Evidence: interviewed David Schmidt and listed staff on site. Inspected site. Witness IT systems on line. Documents: None - processes on line.</td></tr>
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Risk management	**Process/Policy rating** B	**Effectiveness rating** 2

8. Risk management

Risk management involves the identification of risks and their management within an acceptable level of risk.

Observations

Policies and procedures
The Licensee has a good documented risk management system and there is evidence that risk based approaches is being used e.g. for environmental management of greenhouse and particulate emissions, bottom ash and fly ash, water, and noise.

Training
There is evidence of training and awareness by staff of risk based approaches particularly in approaches to tasks where JSA (Job Safety Analysis) are prepared for all work.

Evaluation Criteria summary

- Risk management policies and procedures exist and are being applied to minimise internal and external risks associated with the asset management system

Response: Risks are assessed and drive maintenance in particular.

- Risks are documented in a risk register and treatment plans are actioned and monitored

Response: There a number of risk registers including fuel and plant items. The plant items include a good risk assessment procedure but it has not been completed.

- The probability and consequences of asset failure are regularly assessed

Response: The AMS meets this criterion. The probability and consequences of asset failure are regularly assessed. There is a reliability engineer responsible for this issue.

Asset management process and policy definition

Process	☑	Policy	☑	Documentation	☑	

Evidence: interviewed David Schmidt and listed staff on site. Inspected site.
Documents: Include Worsley 5 year plan, Fuel risk register, plant risk registers.

Asset management performance

Process	☑	Documentation	☑	Availability	☑	Use	☑

Issues

While risk assessments are carried out they did not show that the tools in the template had been used. Procedures for risk assessment should be utilized to improve controls of risk management.

Recommendation
Implement procedures to ensure risk assessment tools are used with self assessment of controls and risk control audit processes completed. (non mandatory recommendation audit guidelines 11.4)

Contingency planning	Process/Policy rating A	Effectiveness rating 1

9. Contingency planning

Contingency plans document the steps to deal with the unexpected failure of an asset.

Observations

Development of contingency plans / currency
The Licensee has good documentation of its data recovery plans.

The Licensee has an arrangement with Verve to import electricity when required and has package steam generators for back up steam.

Fuel contingencies are provided with local stockpiles of coal and fuel oil. An inventory of spare parts is kept.

Testing of contingency plans

The Varanus gas shortage exercised the use of fuel contingencies. The Licensee tests safety systems on the boilers and turbines routinely.

The Licensee conducts major incident training and there is high level asset protection policy.

The Licensee has detailed maintenance scheduled out for several years, with minor and major shutdowns allowed to deal with potential issues. Maintenance is partly conducted on condition based maintenance which monitors critical items for indicators of future failures. The asset management plans for each power station have detailed critiques of the units with detected issues to be managed and potential failure modes considered.

The plant operates in base load mode which is a low thermal cycling mode with reduced stresses. The maintenance regime is geared to keeping the plant operational without forced outages.

Evaluation Criteria summary

- Contingency plans are documented, understood and tested to confirm their operability and to cover higher risks

Response: There are contingency plans in the 5 year Alumina plan.

Asset management process and policy definition

Process	☑	Policy	☑	Documentation	☑	

Evidence: interviewed David Schmidt and listed staff on site. Inspected site. Documents: Include Worsley 5 year plan.

Asset management performance

Process	☑	Documentation	☑	Availability	☑	Use	☑

Issues
None
Recommendations
None

Financial planning	Process/Policy rating A	Effectiveness rating 1

10. Financial planning

The financial planning component of the asset management plan brings together the financial elements of the service delivery to ensure its financial viability over the long term.

Observations

Financial planning process / plans
The Licensee has financial plans, budgeting and monitoring processes. These are on an annual basis and upgraded year by year.

Evaluation Criteria summary

- The financial plan states the financial objectives and strategies and actions to achieve the objectives

Response: The powerhouse budget states the financial objectives and strategies and actions to achieve the objectives.

- The financial plan identifies the source of funds for capital expenditure and recurrent costs

Response: The financial plan is aligned with Alumina expenditure.

- The financial plan provides projections of operating statements (profit and loss) and statement of financial position (balance sheets)

Response: The financial plan provides projections of operating statements (profit and loss) and statement of financial position (balance sheets).

- The financial plan provide firm predictions on income for the next five years and reasonable indicative predictions beyond this period

Response: The financial plan provides predictions on income for the next five years and indicative predictions beyond this period.

- The financial plan provides for the operations and maintenance, administration and capital expenditure requirements of the services

Response: The financial plan provides for the operations and maintenance, administration and capital expenditure requirements of the services.

- Significant variances in actual/budget income and expenses are identified and corrective action taken where necessary

Response: Significant variances in actual/budget income and expenses are identified and corrective action taken where necessary.

Asset management process and policy definition

Process	☑	Policy	☑	Documentation	☑	

Evidence: interviewed David Schmidt and listed staff on site. Documents: Include TBA

Asset management performance

Process	☑	Documentation	☑	Availability	☑	Use	☑

Issues
None
Recommendation
None

Capital expenditure planning	Process/Policy rating A	Effectiveness rating 1

11. Capital expenditure planning

The capital expenditure plan provides a schedule of new works, rehabilitation and replacement works, together with estimated annual expenditure on each over the next five or more years.

Since capital investments tend to be large and lumpy, projections would normally be expected to cover at least 10 years, preferably longer. Projections over the next five years would usually be based on firm estimates.

Observations

Capital expenditure process / plans
The Licensee has a well defined capital investment process covering small (<$5m) to very large projects (>$100m).The process covers concept to post implementation review. These are appropriate for the business. There are rolling 5 year plans and longer range forecasts.

Evaluation Criteria summary

- There is a capital expenditure plan that covers issues to be addressed, actions proposed, responsibilities and dates

Response: The expenditure is that required to maintain to the manufacturer's requirements or any breakdowns is scheduled.

- The plan provide reasons for capital expenditure and timing of expenditure

Response: Capital expenditure is scheduled according to the service frequency as required by the manufacturer.

- The capital expenditure plan is consistent with the asset life and condition identified in the asset management plan

Response: The local AMS meets the obligations. Capital expenditure is that required to maintain to the manufacturer's requirements or any breakdowns.

- There is an adequate process to ensure that the capital expenditure plan is regularly updated and actioned

Response: Capital expenditure plan is updated annually.

Asset management process and policy definition

Process	☑	Policy	☑	Documentation	☑	

Evidence: interviewed David Schmidt and listed staff on site. Documents: None available

Asset management performance

Process	☑	Documentation	☑	Availability	☑	Use	☑

Issues

None.

Recommendation
None

Review of AMS	Process/Policy rating B	Effectiveness rating 2

12. Review of AMS

The asset management system is regularly reviewed and updated.

Observations

A more formal processes to trigger reviews of the AMS should be put in place rather than rely on implied causes to bring about change

Evaluation Criteria summary

- A review process is in place to ensure that the asset management plan and the asset management system described therein are kept current

Response: There is a review process in the Worsley 5 year plan. However there is no review of the other components of an AMS.

- Independent reviews (e.g. internal audit) are performed of the asset management system

Response: The plant is routinely monitored for KPIs and the Alumina strategic [plan is reviewed internally.

Asset management process and policy definition

Process	☑	Policy	☑	Documentation	☑	

Evidence: interviewed David Schmidt and listed staff on site. Documents: Include TBA

Asset management performance

Process	☑	Documentation	☒	Availability	☑	Use	☑

Issues

The high level planning review necessarily includes generation as it is required for the production of Alumina. While the operating and maintenance procedures are in accordance with the manufacturer's requirements the key procedures should be reviewed to ensure that the generating plan will meet the life requirements of the refinery. Any risks relating to the reviews should be developed along with the consequent contingency plans.

Recommendation

Implement a review of the broader AMS including reviewing key operating and maintenance procedures to ensure the generating plant meets the life requirements of the refinery. Any risks arising from the reviews should be developed along with the consequent contingency plans.