

Alcoa of Australia Ltd
Electricity Generation Licence
(EGL14)
2010 Asset Management System
Review
January 2011

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Nick Eaton
Procurement Specialist – Energy
Alcoa of Australia Ltd
PO Box 252
Applecross WA 6953

19 January 2011

Dear Mr Eaton

2010 Asset Management System Review - Electricity Generation Licence EGL14

We have completed the Asset Management System Review for Alcoa of Australia Ltd for the period 1 July 2008 to 30 June 2010 and are pleased to submit our report to you.

I confirm that this report is an accurate presentation of the findings and conclusions from our review procedures.

If you have any questions or wish to discuss anything raised in the report, please contact me on 9365 7024.

Yours sincerely

Richard Thomas
Partner

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1 Independent Reviewer's Report

With the Authority's approval, Deloitte Touche Tohmatsu (**Deloitte**) was engaged to conduct a limited assurance review of Alcoa of Australia Ltd's (**Alcoa**) Electricity Generation Licence (**Licence**) asset management system. Deloitte engaged KT & Sai Associates Pty Ltd (**KT & Sai**) to provide advice where technical expertise was required.

The review was conducted in accordance with the specific requirements of the Licence and the August 2010 issue of the *Audit Guidelines: Electricity, Gas and Water Licences* issued by the Authority (**Audit Guidelines**) for the period 1 July 2008 to 30 June 2010.

Alcoa's responsibility for maintaining an effective asset management system

Alcoa is responsible for putting in place policies, procedures and controls, which are designed to provide for an effective asset management system for assets subject to the Licences.

Our responsibility

Our responsibility is to express a conclusion on the effectiveness of Alcoa's asset management systems to meet Licence requirements based on our procedures. We conducted our engagement in accordance with Australian Standard on Assurance Engagements *ASAE 3500 Performance Engagements* issued by the Australian Auditing and Assurance Standards Board and the Audit Guidelines, in order to state whether, based on the procedures performed, anything has come to our attention that causes us to believe that Alcoa's asset management system has not been operating effectively, in all material respects, in accordance with the Audit Guidelines. Our engagement provides limited assurance as defined in ASAE 3500.

Our procedures were set out in the Review Plan reviewed and agreed with by the Authority on 23 August 2010, and set out in Appendix A.

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Inherent limitations

A limited assurance engagement is substantially less in scope than a reasonable assurance engagement conducted in accordance with ASAE 3500 and consequently does not allow us to obtain assurance that we would become aware of all significant matters that might be identified in a reasonable assurance engagement. Accordingly, we will not express an opinion providing reasonable assurance.

We cannot, in practice, examine every activity and procedure, nor can we be a substitute for management's responsibility to maintain adequate controls over all levels of operations and its responsibility to prevent and detect irregularities, including fraud. Accordingly, readers of our reports should not rely on the report to identify all potential instances of non-compliance which may occur.

Any projection of the evaluation of the level of compliance to future periods is subject to the risk that the systems may become inadequate because of changes in conditions, or that the degree of compliance with management procedures may deteriorate.

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Independence

In conducting our engagement, we have complied with the independence requirements of the Australian professional accounting bodies.

Conclusion

Based on our work described in this report, nothing has come to our attention to indicate that Alcoa had not established and maintained an effective asset management system for assets subject to the Licence and in operation during the period 1 July 2008 to 30 June 2010.

Table 3 of this report provides effectiveness ratings for each of the 12 key processes in the asset management life-cycle. For those aspects of Alcoa's asset management system that were assessed as having opportunities for improvement, relevant observations, recommendations and post review implementation plans are summarised at section 2.4 of this report and detailed at section 4 of this report.

DELOITTE TOUCHE TOHMATSU

Richard Thomas

Partner

Perth, 19 January 2011

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2 Executive Summary

2.1 Introduction and background

The Economic Regulation Authority (**the Authority**) has under the provisions of the *Electricity Industry Act 2004* (the **Act**), issued Alcoa of Australia Ltd (**Alcoa**) an Electricity Generation Licence (EGL14) (**the Licence**).

The licence relates to Alcoa's operation of generating works at its Kwinana, Pinjarra and Wagerup facilities. Those works are managed by Alcoa's WA Powerhouse Operations, within the Alcoa WA Operations (**WAO**) business unit.

Section 14 of the Act requires Alcoa to provide to the Authority with an asset management system review (the **review**) conducted by an independent expert acceptable to the Authority not less than once in every 24 month period.

2.2 Findings

In considering Alcoa's internal control procedures, structure and environment, its compliance culture and its information systems specifically relevant to those effectiveness criteria subject to review, we observed that Alcoa has:

- Maintained consistent procedures and controls designed to provide for an effective asset management system
- Demonstrated a continuously improving awareness of and commitment to regulatory compliance
- Regularly assessed the effectiveness of the asset management system, by way of self assessment, against the 12 effectiveness criteria, the results of which are then used to report to the Authority.

Specific assessments for each criterion are summarised at **Table 3** in the "Summary of findings" section of this report.

Detailed findings, including relevant observations, recommendations and action plans are located in section 4 "Detailed findings, recommendations and action plans" of this report.

2.3 Alcoa's response to previous review recommendations

This review considered how Alcoa has progressed against the six action plans detailed in the 2008 asset management system review report.

Our assessment of Alcoa's progress is that all of the 2008 action plans have been completed.

Refer to section 5 of this report for further detail.

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2.4 Recommendations and post review implementation plans

For explanation of the below ratings, please refer to Section 3 of this report.

AMS Key Process and Effectiveness Criteria	Definition adequacy	Performance rating	Issue 1/10
<p>Asset planning 1(h) Plans are regularly reviewed and updated</p> <p>Review of AMS 12(a) A review process is in place to ensure that the asset management plan and the asset management system described therein are kept current</p>	Requires some improvement (B)	Performing effectively (1)	At the time of our review, the Asset Strategy documents, which describe the asset management plan for each of Alcoa's three powerhouses, were still in draft and had not been formally approved.
<p>Recommendation 1/10 Alcoa finalise and formally approve the Asset Strategies for its Powerhouse assets.</p>		<p>Post Review Implementation Plan 1/10 Alcoa will finalise and formally approve the Asset Strategies for its Powerhouse assets. Responsible Person: Principal Mechanical Engineer – WAO Powerhouse Target Date: 31 August 2011</p>	

AMS Key Process and Effectiveness Criteria	Definition adequacy	Performance rating	Issue 2/10
<p>Asset disposal 3(d) There is a replacement strategy for assets</p>	Requires some improvement (B)	Performing effectively (1)	At the time of our review, the Asset Strategy documents for each of Alcoa's three powerhouses do not contain relevant asset replacement strategies.
<p>Recommendation 2/10 Alcoa update the Asset Strategies for each of its powerhouses incorporating relevant replacement strategies commensurate with section 3(d) of the asset management effectiveness criteria.</p>		<p>Post Review Implementation Plan 2/10 Alcoa will update the Asset Strategies for each of its powerhouses to incorporate relevant replacement strategies commensurate with section 3(d) of the asset management effectiveness criteria. Responsible Person: Principal Mechanical Engineer – WAO Powerhouse Target Date: 31 August 2011</p>	

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AMS Key Process and Effectiveness Criteria	Definition adequacy	Performance rating	Issue 3/10
<p>Capital expenditure</p> <p>11(c) The capital expenditure plan is consistent with the asset life and condition identified in the asset management plan</p>	<p>Requires some improvement (B)</p>	<p>Opportunity for improvement (2)</p>	<p>At the time of our review, the Asset Strategy documents for each of Alcoa's powerhouse assets did not document the powerhouse assets useful life.</p>
<p>Recommendation 3/10</p> <p>Alcoa update the Asset Strategies for each of its powerhouses:</p> <ul style="list-style-type: none"> To incorporate the relevant asset useful life details to facilitate effective monitoring Align the Asset Strategy plans to capital expenditure plans to ensure consistency between approved capital programs and expected asset life. 		<p>Post Review Implementation Plan 3/10</p> <p>Alcoa will develop an appropriate document that will link to the Asset Strategies for each of its powerhouse, which will:</p> <ul style="list-style-type: none"> Incorporate the relevant asset useful life details Align the Asset Strategy plans to its capital expenditure plans. <p>Responsible Person: Principal Mechanical Engineer – WAO Powerhouse</p> <p>Target Date: 31 August 2011</p>	

AMS Key Process and Effectiveness Criteria	Definition adequacy	Performance rating	Issue 4/10
<p>Review of AMS</p> <p>12(b) Independent reviews (e.g. internal audit) are performed of the asset management system</p>	<p>Adequately defined (A)</p>	<p>Opportunity for improvement (2)</p>	<p>Section 12(b) requires independent reviews to be performed of the asset management system. Currently, Alcoa's process provides for the responsible person for the AMS to also be the person conducting the ASAT. A separate independent review has not been performed or scheduled.</p>
<p>Recommendation 4/10</p> <p>Alcoa either assign the responsibility for performing the ASAT to an Alcoa staff member independent of the Asset Management System, or engage an external reviewer.</p>		<p>Post Review Implementation Plan 4/10</p> <p>Alcoa will either assign the responsibility for performing the ASAT to an Alcoa staff member independent of the Asset Management System, or engage an external reviewer.</p> <p>Responsible Person: Procurement Specialist - Energy</p> <p>Target Date: 30 June 2011</p>	

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2.5 Scope and objectives

The objective of the review was to independently examine the effectiveness and performance of the asset management system established for Alcoa's assets subject to Alcoa's electricity generation licence for the period 1 July 2008 to 30 June 2010.

In accordance with the Audit Guidelines, the review considered the effectiveness of Alcoa's existing control procedures within the following 12 key processes in the asset management life-cycle.

#	Key processes	Effectiveness criteria
1	Asset planning	<ul style="list-style-type: none"> (a) Planning processes and objectives reflect the needs of all stakeholders and is integrated with business planning (b) Service levels are defined (c) Non-asset operations (e.g. demand management) are considered (d) Lifecycle costs of owning and operating assets are assessed (e) Funding options are evaluated (f) Costs are justified and cost drivers identified (g) Likelihood and consequences of asset failure are predicted (h) Plans are regularly reviewed and updated.
2	Asset creation and acquisition	<ul style="list-style-type: none"> (a) Full project evaluations are undertaken for new assets, including comparative assessment of non-asset solutions (b) Evaluations include all life-cycle costs (c) Projects reflect sound engineering and business decisions (d) Commissioning tests are documented and completed (e) Ongoing legal/environmental/safety obligations of the asset owner are assigned and understood.
3	Asset disposal	<ul style="list-style-type: none"> (a) Underutilised and underperforming assets are identified as part of a regular systematic review process (b) The reasons for under-utilisation or poor performance are critically examined and corrective action or disposal undertaken (c) Disposal alternatives are evaluated (d) There is a replacement strategy for assets.
4	Environmental analysis (all external factors that affect the system)	<ul style="list-style-type: none"> (a) Opportunities and threats in the system environment are assessed (b) Performance standards (availability of service, capacity, continuity, emergency response, etc) are measured and achieved (c) Compliance with statutory and regulatory requirements (d) Achievement of customer service levels.
5	Asset operations	<ul style="list-style-type: none"> (a) Operational policies and procedures are documented and linked to service levels required (b) Risk management is applied to priorities operations tasks (c) 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 (d) Operational costs are measured and monitored (e) Staff receive training commensurate with their responsibilities.

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#	Key processes	Effectiveness criteria
6	Asset maintenance	<ul style="list-style-type: none"> (a) Maintenance policies and procedures are documented and linked to service levels required (b) Regular inspections are undertaken of asset performance and condition (c) Maintenance plans (emergency, corrective and preventative) are documented and completed on schedule (d) Failures are analysed and operational/maintenance plans adjusted where necessary (e) Risk management is applied to prioritise maintenance tasks (f) Maintenance costs are measured and monitored.
7	Asset management information system	<ul style="list-style-type: none"> (a) Adequate system documentation for users and IT operators (b) Input controls include appropriate verification and validation of data entered into the system (c) Logical security access controls appears adequate, such as passwords (d) Physical security access controls appear adequate (e) Data back-up procedures appear adequate (f) Key computations related to licensee performance reporting are materially accurate (g) Management reports appear adequate for the licensee to monitor licence obligations.
8	Risk management	<ul style="list-style-type: none"> (a) Risk management policies and procedures exist and are being applied to minimise internal and external risks associated with the asset management system (b) Risks are documented in a risk register and treatment plans are actioned and monitored (c) The probability and consequences of asset failure are regularly assessed.
9	Contingency planning	Contingency plans are documented, understood and tested to confirm their operability and to cover higher risks
10	Financial planning	<ul style="list-style-type: none"> (a) The financial plan states the financial objectives and strategies and actions to achieve the objectives (b) The financial plan identifies the source of funds for capital expenditure and recurrent costs (c) The financial plan provides projections of operating statements (profit and loss) and statement of financial position (balance sheets) (d) The financial plan provide firm predictions on income for the next five years and reasonable indicative predictions beyond this period (e) The financial plan provides for the operations and maintenance, administration and capital expenditure requirements of the services (f) Significant variances in actual/budget income and expenses are identified and corrective action taken where necessary.
11	Capital expenditure planning	<ul style="list-style-type: none"> (a) There is a capital expenditure plan that covers issues to be addressed, actions proposed, responsibilities and dates (b) The plan provide reasons for capital expenditure and timing of expenditure (c) The capital expenditure plan is consistent with the asset life and condition identified in the asset management plan (d) There is an adequate process to ensure that the capital expenditure plan is regularly updated and actioned.

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#	Key processes	Effectiveness criteria
12	Review of Asset Management System	(a) A review process is in place to ensure that the asset management plan and the asset management system described therein are kept current (b) Independent reviews (e.g. internal audit) are performed of the asset management system.

Each key process and effectiveness criteria is applicable to Alcoa's Licence and as such were individually considered as part of the review. The Review Plan set out at Appendix A details the risk assessments made for and review priority assigned to each key process and effectiveness criteria.

2.6 Approach

Our approach for this review involved the following activities, which were undertaken during the period August to November 2010:

- Utilising the Audit Guidelines and Reporting Manual as a guide, development of a risk assessment which involved discussions with key staff and document review to assess relevant controls
- Development of a Review Plan (see **Appendix A**) for approval by the Authority
- Interviews with Alcoa staff to gain understanding of process controls in functions such as planning, asset operations, finance, internal audit and capital expenditure planning (see **Appendix B** for staff involved)
- Visited the Alcoa powerhouses at Pinjarra, Wagerup and Kwinana with a focus on understanding the installation, its function and normal modes of operation, its age and an assessment of the installation against the asset management system review criteria
- Review of documents, processes and controls to assess the overall effectiveness of Alcoa's asset management systems (see **Appendix B** for reference listing)
- Reporting of findings to Alcoa for review and response.

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3 Summary of findings

In accordance with the Audit Guidelines, the assessment of both the process and policy definition rating (refer to **Table 1**) and the performance rating (refer to **Table 2**) for each of the key asset management system processes is performed using the below ratings.

For the avoidance of doubt, these ratings do not provide reasonable assurance. Please refer to Section 1 of this report, specifically Inherent Limitations.

Table 1: Asset management process and policy definition adequacy ratings

Rating	Description	Criteria
A	Adequately defined	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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 enough The asset management information system(s) require minor improvements (taking into consideration the assets that are being managed).
C	Requires significant improvement	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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).

Table 2: Asset management performance ratings

Rating	Description	Criteria
1	Performing effectively	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Process is not performed, or the performance is so poor that the process is considered to be ineffective.

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This report provides:

- A breakdown of each function of the asset management system into sub-components as described in the Audit Guidelines. This approach is taken to enable a more thorough review of key processes where individual components within a larger process can be of greater risk to the business therefore requiring different review treatment
- A summary of the ratings applied by the review (**Table 3**) for each of:
 - Asset management process and policy definition adequacy (**definition adequacy rating**)
 - Asset management performance (**performance rating**).
- Detailed findings, including relevant observations, recommendations and post review implementation plans (**Section 4**).

Note that:

- The risk assessment that was presented in the Review Plan remains unchanged as no issues or concerns were identified that would indicate a need to modify the nature and levels of testing
- For a number of the asset management system functions, Alcoa's operations apply the Alcoa group business wide policies, procedures and practices.

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Table 3: Asset management system effectiveness summary

Refer to Detailed Findings at section 4 and Review Plan at Appendix A for descriptions of the effectiveness criteria.

Criteria	Consequence	Likelihood	Inherent Risk	Control Risk	Review Priority	Ratings	
						Definition adequacy	Performance
1. Asset planning						A	1
1(a)	Minor	Probable	Low	Strong	Priority 5	A	1
1(b)	Minor	Probable	Low	Strong	Priority 5	A	1
1(c)	Minor	Probable	Low	Moderate	Priority 5	A	1
1(d)	Moderate	Probable	Medium	Moderate	Priority 4	A	1
1(e)	Minor	Probable	Low	Moderate	Priority 5	A	1
1(f)	Moderate	Unlikely	Medium	Moderate	Priority 4	A	1
1(g)	Major	Probable	High	Strong	Priority 2	A	1
1(h)	Minor	Unlikely	Low	Strong	Priority 5	B	1
2. Asset creation and acquisition						A	1
2(a)	Moderate	Unlikely	Medium	Moderate	Priority 4	A	1
2(b)	Moderate	Probable	Medium	Moderate	Priority 4	A	1
2(c)	Moderate	Unlikely	Medium	Moderate	Priority 4	A	1
2(d)	Moderate	Unlikely	Medium	Moderate	Priority 4	A	1
2(e)	Major	Unlikely	High	Strong	Priority 2	A	1
3. Asset disposal						A	1
3(a)	Minor	Unlikely	Low	Moderate	Priority 5	A	1
3(b)	Minor	Probable	Low	Moderate	Priority 5	A	1
3(c)	Minor	Probable	Low	Moderate	Priority 5	A	1
3(d)	Moderate	Unlikely	Medium	Moderate	Priority 4	B	1
4. Environmental analysis						A	1
4(a)	Moderate	Unlikely	Medium	Strong	Priority 4	A	1
4(b)	Moderate	Probable	Medium	Strong	Priority 4	A	1
4(c)	Moderate	Unlikely	Medium	Strong	Priority 4	A	1
4(d)	Moderate	Probable	Medium	Moderate	Priority 4	A	1
5. Asset operations						A	1
5(a)	Moderate	Probable	Medium	Strong	Priority 4	A	1
5(b)	Moderate	Probable	Medium	Strong	Priority 4	A	1
5(c)	Moderate	Unlikely	Medium	Moderate	Priority 4	A	1
5(d)	Moderate	Unlikely	Medium	Moderate	Priority 4	A	1
5(e)	Moderate	Unlikely	Medium	Strong	Priority 4	A	1
6. Asset maintenance						A	1
6(a)	Moderate	Probable	Medium	Strong	Priority 4	A	1
6(b)	Moderate	Unlikely	Medium	Strong	Priority 4	A	1

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						Ratings	
Criteria	Consequence	Likelihood	Inherent Risk	Control Risk	Review Priority	Definition adequacy	Performance
6(c)	Moderate	Probable	Medium	Moderate	Priority 4	A	1
6(d)	Moderate	Unlikely	Medium	Strong	Priority 4	A	1
6(e)	Minor	Probable	Low	Strong	Priority 5	A	1
6(f)	Moderate	Unlikely	Medium	Moderate	Priority 4	A	1
7. Asset management information system						A	1
7(a)	Minor	Probable	Low	Strong	Priority 5	A	1
7(b)	Minor	Probable	Low	Strong	Priority 5	A	1
7(c)	Minor	Probable	Low	Strong	Priority 5	A	1
7(d)	Minor	Unlikely	Low	Moderate	Priority 5	A	1
7(e)	Moderate	Unlikely	Medium	Strong	Priority 4	A	1
7(f)	Minor	Probable	Low	Moderate	Priority 5	Not rated	Not rated
7(g)	Minor	Probable	Low	Weak	Priority 5	A	1
8. Risk management						A	1
8(a)	Major	Probable	High	Strong	Priority 2	A	1
8(b)	Moderate	Probable	Medium	Strong	Priority 4	A	1
8(c)	Moderate	Probable	Medium	Strong	Priority 4	A	1
9. Contingency planning						A	1
9(a)	Major	Probable	High	Moderate	Priority 2	A	1
10. Financial planning						A	1
10(a)	Minor	Unlikely	Low	Strong	Priority 5	A	1
10(b)	Minor	Probable	Low	Strong	Priority 5	A	1
10(c)	Minor	Unlikely	Low	Strong	Priority 5	A	1
10(d)	Minor	Probable	Low	Strong	Priority 5	A	1
10(e)	Minor	Unlikely	Low	Strong	Priority 5	A	1
10(f)	Moderate	Unlikely	Medium	Strong	Priority 4	A	1
11. Capital expenditure planning						A	1
11(a)	Moderate	Probable	Medium	Strong	Priority 4	A	1
11(b)	Minor	Probable	Low	Strong	Priority 5	A	1
11(c)	Moderate	Probable	Medium	Moderate	Priority 4	B	2
11(d)	Minor	Unlikely	Low	Strong	Priority 5	A	1
12. Review of AMS						B	2
12(a)	Moderate	Probable	Medium	Weak	Priority 3	B	1
12(b)	Minor	Probable	Low	Weak	Priority 5	A	2

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4 Detailed findings, recommendations and action plans

Summary of generation works subject to this review

Pinjarra Powerhouse

The Alcoa Pinjarra plant is located within Alcoa's Alumina Refinery Facilities at Pinjarra. The plant is comprised of four generators, which were commissioned between 1971 and 1977. Key details relating to Alcoa's Pinjarra operations are:

- Turbo Alternator (TA) units two, three and four each have a generation capacity of 20MW. Unit five (TA#5) has a generating capacity of 38.5MW
- The Alcoa Pinjarra Powerhouse has six boilers and additional steam is supplied from the Alinta Cogeneration units. The boilers produce steam for use in the refinery process
- Under normal operating circumstances, with the refinery and all major equipment in operation, the refinery is expected to import approximately 35MW of power from two Western Power tie transformers. The tie transformers operate in parallel supplied from the Western Power Pinjarra 132kV switchyard
- Major items of equipment are approaching the end of normal design life. Management, refurbishment and replacement of equipment at end of life is an important consideration for Alcoa Pinjarra.

A loss of Alcoa's generation capability has the following effect:

- May directly impact refinery production. As the cost impact of lost production is significant, Alcoa demands high availability and reliability of major steam and electrical equipment
- In the event that Pinjarra Powerhouse equipment fails and electricity supply from the grid is inadequate, Alcoa's Pinjarra operations are impacted. There is no impact on the external grid.

Wagerup Powerhouse

The Alcoa Wagerup plant is located within Alcoa's Alumina Refinery Facilities at Wagerup. The plant comprises three steam turbine generators, which were commissioned between 1981 and 1992. Key details relating to Alcoa's Wagerup operations are:

- Units two (TA#2) and three (TA#3) each have a generation capacity of 20MW. Unit one (TA#1) has a generating capacity of 25MW
- The Alcoa Wagerup Powerhouse has three Babcock boilers. The boilers produce steam for generating power through steam turbines and for use in the refinery process. Boilers were installed between 1981 and 1994. A gas turbine with Heat Recovery Steam Generator, rated at 38MW was installed in 1998
- Under normal operating circumstances with the refinery and all major equipment in operation, the refinery is expected to export approximately 20MW of power via a single Western Power tie transformer. The tie transformer is connected to the Western Power Wagerup 132kV switchyard

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- Major items of equipment are mid life. Asset Management and maintenance strategies are an important consideration for Alcoa Wagerup.

A loss of Alcoa's generation capability has the following effect:

- May directly impact refinery production. As the cost impact of lost production is significant, Alcoa demands high availability and reliability of major steam and electrical equipment
- In the event that Alcoa Wagerup equipment fails, and electricity supply from the grid is inadequate, then Alcoa's Wagerup operations are impacted. There is a potential loss of approximately 20MW generation on the external grid.

Kwinana Powerhouse

The Alcoa Kwinana plant is located within Alcoa's Alumina Refinery Facilities at Kwinana. The plant comprises six generators, five of which were commissioned between 1962 and 1976 with the sixth in 1998. Key details relating to Alcoa's Wagerup operations are:

- The six generators have a total installed generation capacity of 66MW
- The Kwinana Powerhouse has eight boilers, which produce steam for use in the refinery process. The boilers produce 770 tonnes of steam per hour. Boilers were installed between 1962 and 1976
- Under normal operating circumstances with the refinery and all major equipment in operation, the refinery is expected to import approximately 8MW of power from a Western Power tie transformer. The Kwinana Powerhouse supplies an average of 59MW to the Refinery. Total refinery use is approximately 67MW. The tie transformer 27MVA is supplied from a Western Power 132kV switchyard
- Major items of equipment are approaching the end of normal design life. Management, refurbishment and replacement of equipment at end of life are an important consideration for Alcoa Kwinana. Alcoa Kwinana's major expenditure forecasts and 5 year plan demonstrate the fact that these issues are being addressed by management and there are a number of projects for replacing equipment that have been identified in the 5 year plan.

A loss of Alcoa's generation capability has the following effect:

- Maximum steam capacity does not meet the projected refinery steam requirements beyond 2007. Loss of Kwinana Powerhouse generation capacity or steam capacity may directly impact refinery production. Because the cost impact of lost production is significant, Alcoa demands high availability and reliability of major steam and electrical equipment
- In the event that Kwinana Powerhouse equipment fails and electricity supply from the grid is inadequate, then Alcoa's Kwinana operations are impacted. There is no impact on the external grid.

The following tables contain:

- **Findings:** the reviewer's understanding of the process and any issues that have been identified during the review
- **Recommendations:** recommendations for improvement or enhancement of the process or control
- **Action plans:** Alcoa's formal response to review recommendations, providing details of action to be implemented to address the specific issue raised by the review.

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4.1 Asset planning

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

Expected outcome: Integration of asset strategies into operational or business plans will establish a framework for existing and new assets to be effectively utilised and their service potential optimised.

Planning processes applied for the WA Powerhouse Operations are accommodated through the Alcoa WA Operations business and strategic planning mechanism.

No	Effectiveness criteria	Findings
1(a)	Planning process and objectives reflect the needs of all stakeholders and is integrated with business planning	<p>Through discussions with the Principal Mechanical Engineer WAO Powerhouse and the Senior Business Advisor and consideration of Alcoa's planning processes, we determined that:</p> <ul style="list-style-type: none"> Strategic planning is performed at the business unit level (i.e. WA Operations) with a 3 to 5 year horizon The plan is developed and communicated to individual departments (e.g. WAO Powerhouses) to facilitate departmental operational planning The Powerhouse Supervisors for each of Alcoa's sites are responsible for developing the operational plans. The Powerhouse Supervisors liaise with the Alcoa staff (e.g. engineers, operational and maintenance staff) An operational plan is developed for each powerhouse. <p>Examination of the strategic plans for the WA operational plans indicates that the powerhouse operational plans are aligned to Alcoa's vision and mission and corporate business objectives.</p>
		<p>Adequacy Rating: Adequately defined (A) Performance Rating: Performing effectively (1)</p>
1(b)	Service levels are defined	<p>Through discussions with the Principal Mechanical Engineer WAO Powerhouse and the Senior Business Advisor and examination of the rolling five year plans prepared for each of Alcoa's powerhouses, we determined that:</p> <ul style="list-style-type: none"> The Western Australian management group determines refinery targets for the coming year, which in turn sets the service levels for each of the powerhouses. The plans and targets require approval from Australian operations management and ultimately Alcoa's global management The plans provide considerable detail for the planning aspects of the respective powerhouse assets, including production capacity/historical results, per Alcoa's operational requirements Asset strategies for each of Alcoa's facilities are also designed to specify the required service levels of the respective powerhouse assets.
		<p>Adequacy Rating: Adequately defined (A) Performance Rating: Performing effectively (1)</p>

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No	Effectiveness criteria	Findings	
1(c)	Non-asset options (e.g. demand management) are considered	<p>Alcoa has developed an Expenditure Approval Policy and Procedure, which outlines the requirement for project evaluations to be undertaken when a project is deemed to have measurable financial benefits to Alcoa's business. As part of the process, Alcoa requires the following to be completed:</p> <ul style="list-style-type: none"> • Alcoa WA Operations' Request for Approval (RfA) template outlines the considerations for instigating new projects including environmental considerations, asset alternatives, the approval requirements, financial and capital requirements, current state assessment and timeline • A standard economic evaluation model to support the RfA template which is developed utilising a standard set of high level economic assumptions (published on a quarterly basis by Alcoa). <p>Through discussion with the Principal Mechanical Engineer WAO Powerhouse and consideration of Alcoa's planning processes, we determined that it is a formal requirement for non-asset options to be considered when purchasing powerhouse assets. However, due to the importance of the powerhouses to Alcoa's refinery operations, such non-asset operations are typically not actioned.</p>	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)
1(d)	Lifecycle costs of owning and operating assets are assessed	<p>Through discussions with the Principal Mechanical Engineer WAO Powerhouse and examination of the Expenditure Approval Policy and Procedure and associated forms and templates, we determined that Alcoa has the following process in place to assess lifecycle costs of owning and operating assets during the asset planning phase:</p> <ul style="list-style-type: none"> • Assessments of lifecycle costs of owning and operating assets are undertaken using the economic evaluation template • Project evaluations are conducted with both engineering and finance personnel input and with evaluation results detailed and approved by relevant personnel to ensure all engineering, finance, environmental, health and safety aspects are addressed • Economic measures that are taken into account within WA Operations project evaluations are: <ul style="list-style-type: none"> ○ Internal rate of return ○ Discounted and undiscounted payback period ○ Net present value. • For those capital projects where the value is greater than A\$1 million, the project evaluation is also required to show the impact of the project on individual locations (including powerhouses). 	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)

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No	Effectiveness criteria	Findings	
1(e)	Funding options are evaluated	<p>Through discussions with the Senior Business Advisor and consideration of Alcoa's asset planning processes, we determined that the RfA template is used to evaluate funding options by:</p> <ul style="list-style-type: none"> • Requiring the sources of funds to be outlined as either Alcoa capital expenditure or partner share (e.g. joint venture) • Breaking down the total of the capital expenditure requirements for establishing a new asset for submission to Alcoa for funds allocation. 	
Adequacy Rating: Adequately defined (A)		Performance Rating: Performing effectively (1)	
1(f)	Costs are justified and cost drivers identified	<p>Through discussions with the Senior Business Advisor and consideration of Alcoa's asset planning processes, we determined that the RfA process and template requires the costs and cost drivers (in the form of a business case) to be identified.</p>	
Adequacy Rating: Adequately defined (A)		Performance Rating: Performing effectively (1)	
1(g)	Likelihood and consequences of asset failure are predicted	<p>Through discussion with the Principal Mechanical Engineer WAO Powerhouse and review of relevant supporting documentation, we observed that Alcoa has applied the following mechanisms for identifying consequence and likelihood of powerhouse asset failure:</p> <ul style="list-style-type: none"> • Asset integrity audits, which are completed on a five yearly basis. Audit findings are maintained in a database and tracked through to completion • Other audits (e.g. ASAT), which feed results into Alcoa's Business Improvement System. Similarly, audit findings are stored and tracked for completion • Loss prevention inspections, as a major aspect of Alcoa's risk management activities directed at powerhouse operations • Classified plant inspections, which are conducted as per statutory requirements. Inspection results are documented within record books and where deficiencies are noted the asset owner is notified. Notices which are not addressed are escalated to more senior managers for consideration and action. • Alcoa has implemented ASAT audits to consider the asset management system effectiveness criteria outlined by the Audit Guidelines. Such audits are designed to ensure that all obligations are considered and reviewed on an at least annual basis. <p>We examined the following documents evidencing Alcoa's actions to predict likelihood and consequence of asset failure:</p> <ul style="list-style-type: none"> • Insurance loss prevention inspections (machinery breakdown and fire) for each of Alcoa's powerhouses • Asset integrity audits and life assessment reports for each powerhouse • The August 2009 and August 2010 ASATs for the asset management system. 	
Adequacy Rating: Adequately defined (A)		Performance Rating: Performing effectively (1)	

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No	Effectiveness criteria	Findings	
1(h)	Plans are regularly reviewed and updated	<p>Through discussions with the Principal Mechanical Engineer WAO Powerhouse and examination of asset strategies for Pinjarra, Wagerup and Kwinana Powerhouses, we observed that site level plans:</p> <ul style="list-style-type: none"> • Are prepared on an annual basis, including a rolling five year forecast • Provide a commentary on past successes and weaknesses, market trends, major expenditure, and the top five focus areas • Have been developed to ensure long term utilisation of the powerhouse assets and outline major equipment, customer, maintenance and environmental considerations. <p>However, the Asset Strategy documents for each of the three powerhouses are still in draft and have not yet been formally approved and accepted by the business.</p>	
		Adequacy Rating: Requires some improvement (B)	Performance Rating: Performing effectively (1)
<p>Recommendation 1/10</p> <p>Alcoa finalise and formally approve the Asset Strategies for its Powerhouse assets.</p>		<p>Action plan 1/10</p> <p>Alcoa will finalise and formally approve the Asset Strategies for its Powerhouse assets.</p> <p>Responsible Person: Principal Mechanical Engineer – WAO Powerhouse</p> <p>Target Date: 31 August 2011</p>	

4.2 Asset creation and acquisition

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

Expected outcome: A more economic, efficient and cost-effective asset acquisition framework which will reduce demand for new assets, lower service costs and improve service delivery.

Asset creation and acquisition processes applied for Alcoa's WA Powerhouse operations are accommodated through established WAO project evaluation and expenditure mechanisms.

No	Effectiveness criteria	Findings
2(a)	Full project evaluations are undertaken for new assets, including comparative assessment of non-asset solutions	Through discussions with the Senior Business Advisor and consideration of Alcoa's documented procedures, we determined that Alcoa has the following procedures in place to manage project evaluations (consistent with asset planning item 1(c) above): <ul style="list-style-type: none"> Alcoa's Expenditure Approval Policy and Procedure outline the requirement for project evaluations to be undertaken when a project is deemed to have measurable financial benefits to Alcoa's business Alcoa WA Operations' RfA template outlines the considerations for instigating new projects including environmental considerations, asset alternatives, approval requirements, financial and capital requirements, current state assessment and timeline A standard economic evaluation model to support the RfA template, which is developed utilising a standard set of high level economic assumptions (published on a quarterly basis by Alcoa) Consideration of non-asset options when purchasing powerhouse assets. However, due to the importance of the powerhouses to Alcoa's refinery operations, such non-asset operations are typically not actioned.
		<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">Adequacy Rating: Adequately defined (A)</td> <td style="width: 50%;">Performance Rating: Performing effectively (1)</td> </tr> </table>
Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)	
2(b)	Evaluations include all life-cycle costs	Through discussions with the Principal Mechanical Engineer WAO Powerhouse and consideration of Alcoa's documented procedures, we determined that Alcoa has the following procedures in place to manage the evaluation of life-cycle costs (consistent with asset planning item 1(d) above): <ul style="list-style-type: none"> Assessments of lifecycle costs of owning and operating assets are undertaken using the economic evaluation template These project evaluations provide for estimates of the amount of investment required from the global organisation and Alcoa Australia as well as identifying the source of funds.
		<table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">Adequacy Rating: Adequately defined (A)</td> <td style="width: 50%;">Performance Rating: Performing effectively (1)</td> </tr> </table>
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No	Effectiveness criteria	Findings	
2(c)	Projects reflect sound engineering and business decisions	<p>Through discussions with the Principal Mechanical Engineer WAO Powerhouse and consideration of Alcoa's documented procedures, we determined that Alcoa has the following processes in place to manage the assessment of projects (consistent with asset planning item 1(d) above):</p> <ul style="list-style-type: none"> • Project evaluations are conducted with both engineering and finance personnel input and with evaluation results detailed and approved by relevant personnel to ensure all engineering, finance, environmental, health and safety aspects are addressed • The impact of the project on individual locations is to be assessed for those capital projects with a value greater than A\$1 million. 	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)
2(d)	Commissioning tests are documented and completed	<p>Through discussions with the Principal Mechanical Engineer WAO Powerhouse and consideration of Alcoa's commissioning procedures, we observed that those procedures are designed to comply with AS/NZS 3788:2006, including the requirement for completion and full documentation of commissioning tests for all components added to Alcoa's refinery assets, including Alcoa powerhouses.</p>	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)
2(e)	Ongoing legal/environmental/safety obligations of the asset owner are assigned and understood	<p>Through discussions with the Principal Mechanical Engineer WAO Powerhouse, and examination of Alcoa's documented policies and procedures and operating systems, we determined that Alcoa has the following processes in place to manage legal, environmental and safety obligations:</p> <ul style="list-style-type: none"> • Alcoa's RfA template outlines the considerations for instigating a new capital project, including environmental considerations, asset alternatives, the approval history, financial and capital requirements, current state assessment and timeline • Alcoa's environmental obligations relevant to its WA Powerhouse operations are comprehensively identified and managed by the Environmental Team and recorded on an Environmental Obligations Register • Alcoa's safety obligations relevant to its WA Powerhouse operations are rated as high risk areas within Alcoa's operations. We observed that Alcoa addresses safety issues at the point of employee induction, through specific and ongoing training, formal assignment of responsibilities to supervisory staff within the three powerhouses and use of the Access Hazardous Materials Database. Powerhouse equipment is included in Alcoa's major hazard control and management systems • Alcoa's legal obligations relevant to its WA Powerhouse operations primarily relate to environmental and safety matters. Other legal obligations are specifically addressed either directly via Alcoa's in house legal counsel or with the assistance of external legal advisors. 	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)

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4.3 Asset disposal

Key process: 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.

Expected outcome: Effective management of the disposal process will minimise holdings of surplus and under-performing assets and will lower service costs.

Asset disposal processes applied for Alcoa's WA Powerhouse operations are accommodated through established WAO disposal mechanisms and Powerhouse plans.

During the period 1 July 2008 to 30 June 2010, Alcoa did not dispose of or decommission any major powerhouse plant, other than replacement of obsolete equipment.

No	Effectiveness Criteria	Findings		
3(a)	Under-utilised and under-performing assets are identified as part of a regular systematic review process	<p>Through discussions with the Principal Mechanical Engineer WAO Powerhouse and examination of relevant supporting documentation, we observed that Alcoa has applied the following mechanisms for identifying under-utilised and under-performing assets:</p> <ul style="list-style-type: none"> Asset integrity audits, which are completed on a five yearly basis in accordance with the Alcoa Worldwide Alumina Powerhouse & Plant Utilities Asset Integrity Assessment Protocol. Such audits are designed to determine whether major items of equipment continue to function adequately and where not, to offer recommendations for alternative action Asset life assessments, which are completed on a systematic basis Loss prevention inspections, as a major aspect of Alcoa's risk management activities directed at powerhouse operations Classified plant inspections, which are conducted as per statutory requirements. <p>Results of these assessments and inspections are included in the rolling 5 year plans established for each powerhouse.</p>		
		<table border="1"> <tr> <td>Adequacy Rating: Adequately defined (A)</td> <td>Performance Rating: Performing effectively (1)</td> </tr> </table>	Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)
Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)			
3(b)	The reasons for under-utilisation or poor performance are critically examined and corrective action or disposal undertaken	<p>Through discussions with the Principal Mechanical Engineer WAO Powerhouse and examination of relevant supporting documentation, we observed that Alcoa has applied the mechanisms described at item 3(a) above to facilitate the examination of under-utilised and under-performing assets by:</p> <ul style="list-style-type: none"> Collecting relevant data and information to enable assessment of the root cause of any under utilisation or poor performance of powerhouse assets Assessments are incorporated into the rolling 5 year plans established for each powerhouse, which detail the major projects planned for the coming financial year, including any equipment refurbishment, upgrade or replacement As part of the capital expenditure process, the RfA requires the requestor to present a business case, which requires details of why the upgrade/purchase of equipment is important to the condition of the asset. 		
		<table border="1"> <tr> <td>Adequacy Rating: Adequately defined (A)</td> <td>Performance Rating: Performing effectively (1)</td> </tr> </table>	Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)
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No	Effectiveness Criteria	Findings	
3(c)	Disposal alternatives are evaluated	Through discussions with the Principal Mechanical Engineer WAO Powerhouse and examination of the Alcoa WAO Decommission Classified Plant protocol, we determined that Alcoa's processes require: <ul style="list-style-type: none"> Addressing alternatives for decommissioning, removal or storage of key plant The rolling 5 year plans established for each powerhouse to detail the major projects planned for the coming financial year, including any equipment replacement requirements. 	
		Adequacy rating: Adequately defined (A)	Performance Rating: Performing effectively (1)
3(d)	There is a replacement strategy for assets	Through discussions with the Principal Mechanical Engineer WAO Powerhouse and from examination of the Asset Strategies for each of Alcoa's powerhouses, we determined that: <ul style="list-style-type: none"> The replacement strategies established for Alcoa's powerhouse assets are reflected in Alcoa's rolling 5 year plans established for each powerhouse Alcoa's Powerhouse Asset Strategies do not provide sufficient detail on the actual strategy and process for initiation and implementation of the strategy in relation to asset replacement. 	
		Adequacy Rating: Requires some improvement (B)	Performance Rating: Performing effectively (1)
Recommendation 2/10 Alcoa update the Asset Strategies for each of its powerhouses incorporating relevant replacement strategies commensurate with section 3(d) of the asset management effectiveness criteria.		Action plan 2/10 Alcoa will update the Asset Strategies for each of its powerhouses to incorporate relevant replacement strategies commensurate with section 3(d) of the asset management effectiveness criteria. Responsible Person: Principal Mechanical Engineer – WAO Powerhouse Target Date: 31 August 2011	

4.4 Environmental analysis

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

Expected outcome: The asset management system regularly assesses external opportunities and threats and takes corrective action to maintain performance requirements.

Environmental matters relevant to Alcoa's WA Powerhouse operations are accommodated through established WAO environmental management mechanisms, which demand powerhouse specific environmental issues to be identified and fully managed.

No	Effectiveness Criteria	Findings
4(a)	Opportunities and threats in the system environment are assessed	<p>Through discussions with the Environmental Scientist and examination of applicable procedures, we determined that Alcoa has developed a risk based management system to identify and assess opportunities and threats to the system environment for its powerhouses. Alcoa has developed an Environmental Aspects and Impacts procedure, which:</p> <ul style="list-style-type: none"> • Applies to all of Alcoa's refineries and operational aspects within the refinery • Facilitates the identification and assessment of risks associated with Alcoa's operations (including the powerhouse operations) • Ensures systematic review of environmental aspects and impacts • Aligns to ISO 14001, Dangerous Goods regulations and health and safety requirements • Outlines the method of logging, maintaining and reporting on environmental aspects and associated impacts. <p>Through discussions with the Environmental Scientist and consideration of the aspects and impacts procedure, we determined that:</p> <ul style="list-style-type: none"> • An aspects and impacts register has been developed to identify all activities of its powerhouses and associated risks. The risks are then assessed by the site Environmental Team. This assessment leads to a focused plan for monitoring circumstances, which is reviewed annually • The register is designed to record relevant information relating to the perceived risks including the process (e.g. boiler), the activity (e.g. generation of steam), environmental aspect of operations (e.g. using gas, using large turbines), environmental impact of operations (e.g. noise, depletion of a finite resource), environmental materials, emergency potential (either Yes or No), risk rating with and without controls, corrective action plan, responsible person and the due date • Risks and incidents can be logged by any Alcoa employee/contractor onto the Environmental, Health and Safety Incident Management System (EHSIMS) 'environmental incident' system, which are then assessed by the Environmental Team • Incidents logged via the EHSIMS are reviewed at daily Powerhouse and refinery meetings for each site.
		<p>Adequacy Rating: Adequately defined (A)</p> <p>Performance Rating: Performing effectively (1)</p>

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No	Effectiveness Criteria	Findings	
4(b)	Performance standards (availability of service, capacity, continuity, emergency response, etc) are measured and achieved	<p>Through discussions with the Environmental Scientist and the Principal Mechanical Engineer WAO Powerhouse, we determined that Alcoa has established the following processes and systems to ensure that performance standards are measured and achieved:</p> <ul style="list-style-type: none"> • Performance indicators are captured on Alcoa’s Equipment Integrity Dashboard (the dashboard). The purpose of the dashboard is to monitor the integrity and capacity of the powerhouse equipment. It does this by a combination of indicators, with predetermined threshold values for red (poor), yellow (fair), and green (OK). The dashboard: <ul style="list-style-type: none"> ○ Includes: <ul style="list-style-type: none"> ▪ Leading indicators, which are parameters that may affect equipment integrity, such as outstanding items from Asset Integrity audits, an obsolescence index and useful life (e.g. due to high temperature service, fatigue or corrosion) ▪ Lagging indicators, which provide information on availability and production losses due to equipment failures or limitations ▪ Capacity indicators, which provide an indication of refinery demand and capacity ○ Indicators are weighted and tallied to provide a total score, which is used as a high level summary of asset performance. This summary is reported to the relevant global personnel in the quarterly AWA Global Refining Power report ○ Is updated on a monthly basis and reported quarterly to Alcoa’s Manufacturing and Technology Council. • Performance of the powerhouse is also measured via maintenance metrics. The principal metrics are: <ul style="list-style-type: none"> ○ Planned work ratio, which measures how much of the total week is spent on planned work ○ Planned work complete, which measures how much of the work that was planned for the week actually was completed • Alcoa has developed a series of system recovery plans, including black/brown start procedures for each powerhouse, in the event of a major failure of site assets or key systems. System recovery plans are subject to a detailed review when triggered by a major equipment change or reconfiguration, and otherwise subject to high level review through the bi-annual Loss Prevention inspection process. Where relevant and possible, system recovery plans are subject to testing in accordance with timeframes specified in the relevant plan (consistent with Contingency Planning 9(a)) • Establishing an ASAT tool, which is used in assessing performance, by outlining specific areas that are to be audited and tested • Engaging specialist third-party consultants to assist in monitoring aspects of Alcoa’s operations, for example assessment of site emissions against expected performance. 	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)

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No	Effectiveness Criteria	Findings	
4(c)	Compliance with statutory and regulatory requirements	<p>Alcoa has established the procedure “Evaluation of Compliance with Environmental Legislation and Regulations (WAO)”, which requires the periodic evaluation of compliance with relevant environmental legislation and regulations. To facilitate monitoring of regulatory and legislative requirements, Alcoa has engaged Freehills to monitor environmental legislative updates. An update report is produced on a quarterly basis and sent to Alcoa to communicate any changes in legislation. These changes are then incorporated onto a compliance list that details all of Alcoa's obligations.</p> <p>Alcoa maintains ISO-14001 standard and as such is required to maintain an effective Environmental Management System (EMS) that monitors all obligations that have an environmental focus. To ensure that Alcoa is performing appropriately against the legislative requirements, there are three different types of audits conducted:</p> <ul style="list-style-type: none"> • Internal audit process conducted by a contractor who visits each department/operational unit and audits against the ISO standard. The findings are placed on an audit action plan on the Business Improvement System • For Alcoa to maintain its ISO status, it is required to be re-certified every three years via a full audit conducted by an external practitioner. Alcoa’s three sites were re-certified in 2010. A surveillance audit/monitoring action is also completed every year • ASAT (as described elsewhere). <p>Alcoa also operates and monitors its operations in accordance with the following statutory legislation and licences:</p> <ul style="list-style-type: none"> • Environmental Operating Licence • Mines Safety and Inspection Regulations • WA Gas Standards (Gas fitting & Consumer Gas Installations) Regulations 1999 • NOx emissions: There is currently no license requirement for the powerhouse for NOx emissions however as part of the PEU project, the refinery was not to increase current emissions to the air shed. On a monthly basis measurements are taken from the boiler stacks by an independent organisation. Annual measurements and estimates are made for reporting the total site emission to the National Pollutant Inventory • Greenhouse Gases: Measurements from the powerhouse and Cogen stack emissions are used to calculate the refineries’ greenhouse gas intensity. Economisers have been fitted to all boilers, to maximise efficiency and reduce greenhouse intensity • Environmental Noise Regulations licence: Specifies maximum night and day noise level as measured at the boundary • Water/liquid discharge: All reject condensate and spills are directed to the internal stormwater discharge system, then to the Stormwater Lake, for re-use by the refinery. 	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)
4(d)	Achievement of customer service levels	<p>As Alcoa is both a generator and consumer of power, it does not have specific customer service levels to attain in relation to its power operations. In the context of its obligations to the community, Alcoa operates and monitors its operations in accordance with the statutory legislation and licences detailed at 4(c) above.</p>	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)

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4.5 Asset operations

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

Expected outcome: Operations plans adequately document the processes and knowledge of staff in the operation of assets so that service levels can be consistently achieved.

Alcoa has applied consistent asset operations strategies to each of its Powerhouses, essentially in line with the asset management strategies employed across the WA Operations business.

No	Effectiveness Criteria	Findings
5(a)	Operational policies and procedures are documented and linked to service levels required	Through discussions with the Principal Mechanical Engineer WAO Powerhouse and examination of documented policies, procedures and protocols, we observed that Alcoa has: <ul style="list-style-type: none"> Comprehensively documented policies, procedures and protocols for each of its powerhouse sites designed to facilitate the effective operation of its assets. All powerhouse related policies, procedures and protocols are documented within the Alcoa WAO Performance Support System Developed procedures which specifically refer to required service levels (where appropriate) for the operation of the specific item of equipment, or specific electrical or mechanical procedures Developed control plans for major items of plant, including boilers, generators and the deaerator for each powerhouse.
		<table border="1"> <tr> <td>Adequacy Rating: Adequately defined (A)</td> <td>Performance Rating: Performing effectively (1)</td> </tr> </table>
Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)	
5(b)	Risk management is applied to prioritise operations tasks	Alcoa applies risk management practices with regards to asset operations. Through discussions with the Principal Mechanical Engineer WAO Powerhouse and consideration of Alcoa's risk management practices and operational activities, we determined that Alcoa's operational methodology is designed to: <ul style="list-style-type: none"> Use risk based processes to manage its powerhouse assets Perform maintenance tasks in sequence of task priorities, being people and safety first, followed by environment, then customer. These processes are further described at "8. Risk Management" below.
		<table border="1"> <tr> <td>Adequacy Rating: Adequately defined (A)</td> <td>Performance Rating: Performing effectively (1)</td> </tr> </table>
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No	Effectiveness Criteria	Findings	
5(c)	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	<p>Alcoa manages powerhouse equipment through its online Alcoa wide electronic asset maintenance system, eAM. The eAM system contains the following information for major equipment:</p> <ul style="list-style-type: none"> • Unique asset identification (asset ID) • Equipment details (including type, location, components, operational capacity, age, expected life) • Equipment history, including condition • Maintenance procedures • Maintenance intervals • Purchase cost, depreciation rates and net book value. 	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)
5(d)	Operational costs are measured and monitored	<p>Through discussion with the Senior Business Advisor and examination of Alcoa's reporting processes, we determined that:</p> <ul style="list-style-type: none"> • Expense Control Reports (ECRs) are produced on a monthly basis for each site • Alcoa's reporting processes compare actual powerhouse performance against budgeted expenditure • Monthly management reporting and financial analysis compares powerhouse actual expenditure to budgeted expenditure. Reasons for significant variances at the cost centre level are examined and scrutinised by Alcoa's management. 	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)
5(e)	Staff receive training commensurate with their responsibilities	<p>Alcoa utilises a WAO Operator Traineeship Program to ensure its powerhouse operators are fully trained in all key aspects of powerhouse operations (relevant to each individual's position).</p> <p>We observed the use of staff training registers maintained by powerhouse supervisors to keep training and operator tickets of all staff valid and relevant to their responsibilities.</p>	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)

4.6 Asset maintenance

Key process: Maintenance functions relate to the upkeep of assets and directly affect service levels and costs.

Expected outcome: Maintenance plans cover the scheduling and resourcing of the maintenance tasks so that work can be done on time and on cost.

Alcoa has applied consistent asset maintenance strategies to each of its powerhouses' mechanical, electrical and control protection systems and major equipment, in line with the asset management strategies employed across the WA Operations business. Alcoa's eAM system is designed to facilitate its asset maintenance strategies and compliance with statutory requirements.

No	Effectiveness Criteria	Findings	
6(a)	Maintenance policies and procedures are documented and linked to service levels required	Through discussions with the Principal Mechanical Engineer WAO Powerhouse and examination of documented policies, procedures and protocols, we observed that Alcoa has:	
		<ul style="list-style-type: none"> Comprehensively documented policies, procedures and protocols for each of its powerhouse sites designed to facilitate maintenance of Alcoa's assets All powerhouse related maintenance policies, procedures and protocols are documented within the Alcoa WAO Performance Support System. The eAM incorporates major equipment maintenance procedures, equipment details, maintenance intervals, costs and equipment history Developed procedures which specifically refer to required service levels (where appropriate) for the operation of the specific item of equipment, or specific electrical or mechanical procedures. 	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)
6(b)	Regular inspections are undertaken of asset performance and condition	Through discussion with Principal Mechanical Engineer WAO Powerhouse and examination of written procedures and reports, we observed that:	
		<ul style="list-style-type: none"> A structured program is in place for key mechanical and electrical assets (such as turbines, feedwater pumps, transformers, generators, switchgear) to be condition monitored using online vibration monitoring devices and for earthing systems and protection relays to be regularly tested (including partial discharge) to avoid unplanned outages or failures Equipment assessment and inspection reports are generated and made available to staff and management requiring information on equipment condition and performance. <p>We examined inspection reports performed for each of Alcoa's facilities, which indicate that the above maintenance processes are operational.</p>	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)

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No	Effectiveness Criteria	Findings	
6(c)	Maintenance plans (emergency, corrective and preventative) are documented and completed on schedule	<p>Through discussion with WAO Powerhouse Operations staff and examination of Alcoa's eAM system, we observed that:</p> <ul style="list-style-type: none"> • For each facilities' major equipment, the eAM system contains plans for scheduled maintenance as well as required emergency and corrective works • All maintenance work undertaken is recorded in the eAM system • Alcoa's operational requirements lead to emergency and corrective works having the highest priority due to the impact on refinery production • Maintenance schedules are monitored. 	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)
6(d)	Failures are analysed and operational/maintenance plans adjusted where necessary	<p>Through discussion with WAO Powerhouse Operations staff and walkthrough of Alcoa's Powerhouse operations and maintenance procedures, we observed that those procedures provide for equipment failures to be investigated and where necessary, associated systems to be modified or corrected to reduce the likelihood of the failure to be repeated.</p>	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)
6(e)	Risk management is applied to prioritise maintenance tasks	<p>Alcoa applies risk management practices with regards to asset operations. Through discussions with the Principal Mechanical Engineer WAO Powerhouse and consideration of Alcoa's risk management practices and operational activities, we determined that Alcoa's operational methodology is designed to:</p> <ul style="list-style-type: none"> • Use risk based processes to manage its powerhouse assets • Perform maintenance tasks in accordance with the sequence of maintenance task priorities being people & safety first, followed by environment, then customer. These processes are further described at "8. Risk Management" below. 	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)
6(f)	Maintenance costs are measured and monitored	<p>Through discussion with the Senior Business Advisor and examination of Alcoa's reporting processes, we determined that:</p> <ul style="list-style-type: none"> • Expense Control Reports (ECRs) are produced on a monthly basis for each site • Alcoa's reporting processes compare actual powerhouse performance against budgeted expenditure • Monthly management reporting and financial analysis compares powerhouse actual expenditure to budgeted expenditure. Reasons for significant variances at the cost centre level are examined and scrutinised by Alcoa's management. 	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)

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4.7 Asset management information system

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

Expected outcome: The asset management information system provides authorised, complete and accurate information for the day-to-date running of the asset management system. The focus of the review is the accuracy of performance information used by the licensee to monitor and report on service standards.

Alcoa's Asset Management Information System is predominantly comprised of the eAM system, with some information also being held in Alcoa's Microsoft Office software (documents, spreadsheets etc.).

No	Effectiveness Criteria	Findings	
7(a)	Adequate system documentation for users and IT operators	Through discussion with the Manager – Regional IS Australia and consideration of Alcoa's Oracle support arrangement with its Global Support Centre (GSC), we observed that:	
		<ul style="list-style-type: none"> • Technical documentation for Oracle application systems, which includes eAM, are managed and maintained by GSC • A service level agreement is in place to cover the services provided by GSC to Alcoa • User guides are kept up to date by the Functional Support Representative and key users • Documents are stored in the Alcoa Performance Support System (APSS) to provide document version control. 	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)
7(b)	Input controls include appropriate verification and validation of data entered into the system	Through discussion with the Manager – Regional IS Australia and consideration of Alcoa's ASAT testing of controls over its information systems interfaces, we observed that:	
		<ul style="list-style-type: none"> • Input controls are managed through built-in checks in Oracle 11i and manual processes. The eAM system is part of the Oracle E-Business Suite (EBS) • Processes are in place to verify and validate data entered into the eAM system, including data reconciliation between old and new systems, checking data transferred between one system to another is accurate, timely and complete and validating data as close as possible to the point of origin, which includes the ability to trace data back to the source document. 	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)

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No	Effectiveness Criteria	Findings	
7(c)	Logical security access controls appear adequate, such as passwords	<p>Through discussions with the Manager – Regional IS Australia and consideration of Alcoa’s security policies, we observed that:</p> <ul style="list-style-type: none"> Alcoa’s processes and procedures provide for all users to be assigned a unique user account and passwords that adhere to Alcoa's Security Standards. Account password requires a minimum of 7 characters with a mixture of alphabets and numerical characters Passwords for the Oracle environment, to which eAM belongs, is synchronised to the Windows environment using a password management tool The Security Access Permissions documents the standards, which defines how access is granted and permissions are managed. <p>The standards mentioned above are based on Alcoa’s Security Access Policy (Australia).</p>	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)
7(d)	Physical security access controls appear adequate	<p>Through discussions with the Manager – Regional IS Australia and consideration of Alcoa’s security policies and results of Alcoa’s ASAT testing of physical security controls, we observed that:</p> <ul style="list-style-type: none"> Physical access to the data centre is restricted and logged through the use of swipe cards Access cards are returned to Building Management and access is revoked on the termination of an employee Access to the data centre is reviewed on a quarterly basis by the Data Centre Manager Contractors are always accompanied by appropriate IT personnel when entering the data centre. <p>We noted that Alcoa has instigated precautions to contain fire and other damaging events in its Data Centre. There are fire extinguishers located within as well as nearby the data centre. Temperature, humidity and flood sensors can be found in the room and notification is sent to the building facility management if any of the sensors are triggered. A VESDA system, which provides advance fire warning and detection to avoid suppression release, is installed for the room and is connected to the main building control panel.</p>	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)
7(e)	Data backup procedures appear adequate	<p>Through discussions with the Manager – Regional IS Australia and consideration of Alcoa’s backup and recovery procedures, we observed that:</p> <ul style="list-style-type: none"> Backups of production data occurs on a daily basis EBS data, which includes eAM, is mirrored to another set of disks before being transferred to backup tapes overnight Backup tapes are collected and stored off-site by Recall The data restoration from the previous annual disaster recovery exercise was conducted successfully where data was recovered from backup tapes to a development environment in Pinjarra Alcoa’s ASAT testing for backup processes is now managed by the Pittsburgh office. 	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)

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No	Effectiveness Criteria	Findings	
7(f)	Key computations related to licensee performance reporting are materially accurate	For the purpose of Alcoa's licence performance reporting to the Authority in accordance with its Licence requirements, Alcoa does not directly extract data from the eAM system and is not directly reliant on computations from that system.	
		Adequacy Rating: Not rated	Performance Rating: Not rated
7(g)	Management reports appear adequate for the licensee to monitor licence obligations	<p>Through discussions with the Principal Mechanical Engineer WAO Powerhouse and examination of the Pinjarra, Wagerup and Kwinana Asset Strategies, we determined that Alcoa has the following processes to monitor licence obligations (consistent with AMS review item 12(a) below):</p> <ul style="list-style-type: none"> Principal Mechanical Engineer WAO Powerhouse is responsible for monitoring the asset management system and performing a review of the asset management plan on a bi-annual basis The Procurement Specialist – Energy is designated as responsible person for monitoring compliance with regulatory requirements Alcoa has implemented ASATs specifically tailored to address the individual obligations of the performance audit and asset management system review. ASATs are completed on an annual basis. 	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)

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4.8 Risk management

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

Expected outcome from asset planning strategies: An effective risk management framework is applied to manage risks related to the maintenance of service standards.

Risk management processes applied to Alcoa's WA Powerhouse operations are accommodated by established WAO risk management mechanisms.

Alcoa uses well documented, risk-based processes to manage its powerhouse assets, with the sequence of maintenance task priorities being people & safety as the highest followed by environment, then customer.

No	Effectiveness Criteria	Findings		
8(a)	Risk management policies and procedures exist and are being applied to minimise internal and external risks associated with the asset management system.	<p>Through discussions with the Principal Mechanical Engineer WAO Powerhouse and examination of Alcoa's risk management practices, we observed that:</p> <ul style="list-style-type: none"> • Alcoa's vision is to integrate world's best practice in risk management to support and enhance business activities in all areas of its operations. Within the application of the Alcoa Business System, Alcoa intends to ensure risk management is a fundamental aspect of its decision-making processes • Alcoa has developed risk management policies and procedures designed to align the Standard AS/NZS 4360:2004. The policy outlines the criteria for risk assessments and the steps in the risk management process. The process specifically steps through: <ul style="list-style-type: none"> ○ Establishing the context ○ Identifying risks ○ Examining controls ○ Evaluating the risk ○ Establishment of risk treatment plans ○ Monitor and review of risks on a periodic basis. • Risk Management is the overall responsibility of the Corporate Risk Manager and the Assistant Risk Manager • For all Major Hazard equipment at each refinery site (including powerhouse boilers, turbine alternators, deaerator, Cogen units), there are Major Hazard equipment single point accountability personnel (SPAs) in the areas of Operations, Maintenance and Engineering. These personnel, delegated by the WAO Powerhouse Manager, are jointly responsible for managing the critical controls surrounding Major Hazard equipment (including Change Control procedures) • Alcoa has implemented ASAT audits to consider the asset management system effectiveness criteria outlined by the Audit Guidelines. Such audits are designed to ensure that all obligations are considered and reviewed on an at least annual basis. The August 2009 and August 2010 ASATs for the asset management system did not identify any issues. <p>We observed evidence of risk management activities being applied to WAO Powerhouse planning and management activities. We examined the aspects and impacts register for each of Alcoa's powerhouses, ASATs and insurance loss prevention reviews and associated recommendations.</p> <table border="1"> <tr> <td>Adequacy Rating: Adequately defined (A)</td> <td>Performance Rating: Performing effectively (1)</td> </tr> </table>	Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)
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No	Effectiveness Criteria	Findings	
8(b)	Risks are documented in a risk register and treatment plans are actioned and monitored	<p>Through discussion with the Principal Mechanical Engineer WAO Powerhouse and examination of the risk management procedure, we determined that:</p> <ul style="list-style-type: none"> • The primary tool used by WAO Powerhouse operations to capture risks related to its powerhouses is the insurance loss prevention reviews and associated recommendation summaries prepared for each powerhouse • The risk management process provides a methodology to assess and mitigate risks identified in Alcoa's operating environment • Those recommendation summaries are compiled to represent a live risk register for each site, with the recommendation assigned to a responsible person with the status expected to be reviewed and updated every three to four months • Alcoa has developed an aspects and impacts register, which specifically documents risks relating to environment health and safety concerns of the Powerhouse operations. 	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)
8(c)	The probability and consequences of asset failure are regularly assessed.	<p>Through discussion with the Principal Mechanical Engineer WAO Powerhouse and review of relevant supporting documentation, we observed that Alcoa has applied the following mechanisms for identifying consequence and likelihood of powerhouse asset failure (as per Asset Planning item1(g) of this report):</p> <ul style="list-style-type: none"> • Asset integrity audits, which are completed on a five yearly basis, per the Powerhouse & Plant Utilities Asset Integrity Assessment Protocol. The next integrity audit is scheduled for late 2011 • Other audits (e.g. ASAT), which feed results into Alcoa's Business Improvement System • Loss prevention inspections, as a major aspect of Alcoa's risk management activities directed at powerhouse operations • Classified plant inspections, which are conducted as per statutory requirements. 	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)

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4.9 Contingency planning

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

Expected outcome: Contingency plans have been developed and tested to minimise any significant disruptions to service standards.

Under normal operating circumstances, Kwinana and Pinjarra operations are net importers of power from the SWIS and Wagerup operations is a net exporter of power to the SWIS. In the event that Alcoa's equipment fails at one of its facilities and electricity supply from the grid is inadequate, then Alcoa's refinery operations are impacted. There is a potential loss of about 20MW generation on the external grid.

No	Effectiveness Criteria	Findings
9(a)	Contingency plans are documented, understood and tested to confirm their operability and to cover higher risks.	<p>Through discussion with the Principal Mechanical Engineer WAO Powerhouse and examination of relevant supporting documentation, we observed that:</p> <ul style="list-style-type: none"> As part of Alcoa's overall business continuity management framework, Alcoa has developed a series of system recovery plans, including black/brown start procedures for each powerhouse, in the event of a major failure of site assets or key systems Alcoa's business continuity plans include: <ul style="list-style-type: none"> Mechanical Engineering contingency plan (June 2009) Operations resources contingency plan, including a resourced roster for each site to enable the continuation of operations in the event of any industrial action System recovery plans are subject to a detailed review when triggered by a major equipment change or reconfiguration, and otherwise subject to high level review through the bi-annual Loss Prevention inspection process. Where relevant and possible, system recovery plans are subject to testing in accordance with timeframes specified in the relevant plan Alcoa's powerhouse workforce is specifically resourced and trained to respond to powerhouse equipment losses, to minimise the interruption to operations. <p>We observed evidence of Alcoa's review and testing of system recovery and restart plans.</p>
		<p>Adequacy Rating: Adequately defined (A)</p> <p>Performance Rating: Performing effectively (1)</p>

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4.10 Financial planning

Key process: 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.

Expected outcome: A financial plan that is reliable and provides for the long-term financial viability of the services.

Financial planning processes applied for the WA Powerhouse Operations are accommodated through the Alcoa WA Operations financial planning mechanism.

No	Effectiveness Criteria	Findings	
10(a)	The financial plan states the financial objectives and strategies and actions to achieve the objectives	Through discussion with the Senior Business Advisor and consideration of Alcoa's financial planning mechanisms, we observed that: <ul style="list-style-type: none"> The financial objectives and strategies of the WA Operations business are driven by Alcoa's overall corporate objectives set by the global organisation and cascaded down through the business units WAO powerhouses are required to submit a plan and budget that cover labour requirements, maintenance requirements and other operational costs. The maintenance plan is determined based on scheduled work for major items plus base workload. Data is sourced from the maintenance system with reference to the five year plan for each powerhouse WAO powerhouse plans also take account of required powerhouse output to support the refinery i.e. required levels of steam and electric power generation. 	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)
10(b)	The financial plan identifies the source of funds for capital expenditure and recurrent costs	Through discussion with the Senior Business Advisor and consideration of Alcoa's financial planning mechanisms, we observed that: <ul style="list-style-type: none"> Any application for funds made by Alcoa WA Operations is not required to identify the specific source of funds Individual powerhouse plans form part of the site level plan, which is rolled up into the WA Operations, then to Alcoa Australia and ultimately to Alcoa US for final sign-off Financial plans are submitted to the Alcoa global organisation for interrogation to determine viability and appropriateness of the request. The plan is then approved by the Alcoa global organisation if it is considered appropriate. 	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)

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No	Effectiveness Criteria	Findings	
10(c)	The financial plan provides projections of operating statements (profit and loss) and statement of financial position (balance sheets)	<p>Through discussions with the Senior Business Advisor and consideration of Alcoa's financial planning mechanisms, we observed that:</p> <ul style="list-style-type: none"> Although projections of operating statements and statement of financial position do not occur specifically at the powerhouse level, those projections take account of powerhouse operations as part of the entire WA Operations business projections Budgets and management reporting is broken down to the powerhouse level. Primarily, reporting to the powerhouse is in relation to costs utilising expense control reports Projections of operating statements and statements of financial position are submitted at a detailed level for the next year, with higher level projections for a further two years also submitted. 	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)
10(d)	The financial plan provides firm predictions on income for the next five years and reasonable indicative predictions beyond this period	<p>Through discussions with the Senior Business Advisor and consideration of Alcoa's financial planning mechanisms, we observed:</p> <ul style="list-style-type: none"> Three year financial plans are developed at a high level Capital funding plans are developed for periods of up to 10 years. <p>We note that the financial plan does not provide detail of each powerhouse's revenue and therefore impact on financial objectives and strategies as the output of the powerhouses is not intended as a main income source, rather a bi-product of supporting refinery operations.</p>	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)
10(e)	The financial plan provides for the operations and maintenance, administration and capital expenditure requirements of the services	<p>Through discussions with the Senior Business Advisor and Principal Mechanical Engineer WAO Powerhouse, and examination of an extract from the 2011 financial plans, we determined that:</p> <ul style="list-style-type: none"> Each powerhouse is required to submit a plan that covers labour requirements, maintenance requirements and other operational costs The financial plan for the WA operations considers staffing, resource and maintenance requirements. The plan is supported by the capital expenditure plan which outlines projects and associated expenditure over a ten year timeframe The maintenance plan is determined based on scheduled work for major items plus base workload. The data is sourced from the maintenance system and with reference to the five year plan for each powerhouse Plans also take account of required powerhouse output to support the refinery i.e. required levels of steam and electric power generation (the service standard) The financial plan does not provide firm predictions of income for any period greater than the financial year that it is intended. 	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)

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No	Effectiveness Criteria	Findings	
10(f)	Significant variances in actual/budget income and expenses are identified and corrective action taken where necessary	<p>Through discussions with the Senior Business Advisor and Principal Mechanical Engineer WAO Powerhouse and examination of an Expense Control Report and Operational and Maintenance Cost Reports, we observed:</p> <ul style="list-style-type: none"> • Operational and maintenance cost reports are produced on a daily basis • Expense Control Reports are produced on a monthly basis for each site, enabling management to specifically assess powerhouse actual v budgeted expenditure, identify cost centres that are over budget or problematic and to determine necessary corrective action • The WAO Powerhouse group meets every week, of which one meeting per month is set aside as a formal cost review. Actual performance against plan is reviewed in addition to the expected year end outcome. Each month there is a formal process to reforecast the rest of year expenditure to determine the full year position. 	
		Adequacy Rating: Adequately defined (A)	Performance Rating: Performing effectively (1)

4.11 Capital expenditure planning

Key process: 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.

Expected outcome: A capital expenditure plan that provides reliable forward estimates of capital expenditure and asset disposal income, supported by documentation of the reasons for the decisions and evaluation of alternatives and options.

Capital expenditure planning processes applied for the WA Powerhouse Operations are accommodated through the Alcoa WA Operations capital expenditure planning mechanism.

No	Effectiveness Criteria	Findings
11(a)	There is a capital expenditure plan that covers issues to be addressed, actions proposed, responsibilities and dates	<p>Through discussions with the Senior Business Advisor and consideration of Alcoa's capital planning procedures, we determined that:</p> <ul style="list-style-type: none"> The Alcoa global organisation prepares rolling 3 and 10 year capital plans that are reviewed by all levels of regional management to enable an annual allocation of funds. The capital plan process commences in July, with full delivery of the annual plan by November of that year The Engineering and Maintenance Manager is accountable for the plan setting process and subsequent product RfA templates and procedures are used to identify capital expenditure amounts required for a particular period. The RfA amounts form part of the capital plans and facilitate the update of the full year forecasts All projects above A\$250k are specifically identified, require specific justification and appropriate approval. As projects are identified by location, responsibilities for progression are clear. As part of a project's justification, there is linkage to the location's and region's strategic plan, which includes asset replacement and cost reduction strategies. <p>Examination of an extract from the capital expenditure plan detailing projects related to the Alcoa Powerhouses indicated that the requirements of 11(a) are maintained within the plan.</p>
		<p>Adequacy Rating: Adequately documented (A)</p> <p>Performance Rating: Performing effectively (1)</p>

No	Effectiveness Criteria	Findings	
11(b)	The plan provides reasons for capital expenditure and timing of expenditure	<p>Through discussions with the Senior Business Advisor, consideration of Alcoa's capital planning procedures and examination of the capital expenditure plan for Alcoa's powerhouse assets, we determined that:</p> <ul style="list-style-type: none"> • The capital expenditure plan outlines individual capital projects by site and area (e.g. powerhouse) detailing the period in which an expenditure amount is planned and reasons for the expenditure by code (e.g. tactical maintenance, health and safety, cost reductions). The capital expenditure plans also highlight the project objectives and benefits of completing the project • As part of the RfA process, the following are elements that are required to be identified, which support the reasoning and timing of the expenditure: <ul style="list-style-type: none"> ○ The reasons for instigating new projects (e.g. environmental considerations) i.e. the business case ○ Financial and capital requirements ○ Current state assessment and timeline for the project and expected expenditure timing. • RfA templates are used as the supporting documentation (once approved) that feed into the capital plan for site operations • Expenditure Approval Policy and Procedures outline the requirement for project evaluations to be undertaken when a project is deemed to have measurable financial benefits to Alcoa's business. Alcoa uses a standard economic evaluation model for these evaluations, as well as a standard set of high level economic assumptions that are published on a quarterly basis. 	
		Adequacy Rating: Adequately documented (A)	Performance Rating: Performing effectively (1)
11(c)	The capital expenditure plan is consistent with the asset life and condition identified in the asset management plan	<p>Through discussions with the Principal Mechanical Engineer WAO Powerhouse and Senior Business Advisor and consideration of WAO project evaluation processes, we observed that:</p> <ul style="list-style-type: none"> • Alcoa's procedures address the requirement for life cycle costs of powerhouse assets to be assessed and recorded in formal project evaluations • Alcoa's procedures address the requirement for investment and capital expenditure estimates to be calculated and disclosed within the project evaluation phase • Alcoa's rolling 3 year and 10 year capital expenditure plans accommodate capital projects identified through the business's strategic, business and location/facility planning. <p>An examination of Alcoa's asset strategy documents indicates that asset life is not a specific element included.</p>	
		Adequacy Rating: Requires some improvement (B)	Performance Rating: Opportunity for improvement (2)

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No	Effectiveness Criteria	Findings	
	<p>Recommendation 3/10</p> <p>Alcoa update the Asset Strategies for each of its powerhouses:</p> <ul style="list-style-type: none"> To incorporate the relevant asset useful life details to facilitate effective monitoring Align the Asset Strategy plans to capital expenditure plans to ensure consistency between approved capital programs and expected asset life. 	<p>Action plan 3/10</p> <p>Alcoa will develop an appropriate document that will link to the Asset Strategies for each of its powerhouse, which will:</p> <ul style="list-style-type: none"> Incorporate the relevant asset useful life details Align the Asset Strategy plans to its capital expenditure plans. <p>Responsible Person: Principal Mechanical Engineer – WAO Powerhouse</p> <p>Target Date: 31 August 2011</p>	
11(d)	<p>There is an adequate process to ensure that the capital expenditure plan is regularly updated and actioned</p>	<p>Through discussion with the Senior Business Advisor, consideration of Alcoa’s capital planning processes and examination of the , we determined that:</p> <ul style="list-style-type: none"> Each year (and on a project by project basis), the capital plan is reviewed to ensure consistent alignment with current business and strategic plans On a monthly basis, regional management reviews the progress of the capital program, with updated forecast to project and year end When projects are completed they are reviewed against the approved criteria to test whether the project objectives were met. <p>Adequacy Rating: Adequately documented (A)</p> <p>Performance Rating: Performing effectively (1)</p>	

4.12 Review of Asset Management System

Key process: The asset management system is regularly reviewed and updated.

Expected outcome: Review of the Asset Management System to ensure the effectiveness of the integration of its components and their currency.

No	Effectiveness Criteria	Findings	
12(a)	A review process is in place to ensure that the asset management plan and the asset management system described therein are kept current	<p>Through discussions with the Principal Mechanical Engineer WAO Powerhouse and examination of the Pinjarra, Wagerup and Kwinana Asset strategies, we determined that Alcoa has the following processes in place to review the asset management plan and system:</p> <ul style="list-style-type: none"> • The Principal Mechanical Engineer WAO Powerhouse is responsible for monitoring the asset management system and performing a review of the asset management plan on a bi-annual basis • The Procurement Specialist – Energy designated as responsible person for monitoring compliance with regulatory requirements • Alcoa has implemented ASATs specifically tailored to address the individual obligations of the performance audit and asset management system review, which are completed on an annual basis <p>Alcoa's Asset Strategies for each of its sites are still in draft form. <i>Refer to issue 1/10 above relating to the formalisation and approval of Asset Strategies for each site.</i></p>	
		Adequacy Rating: Requires some improvement (B)	Performance Rating: Performing effectively (1)

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No	Effectiveness Criteria	Findings	
12(b)	Independent reviews (e.g. internal audit) are performed of the asset management system	<p>Through discussions with the Procurement Specialist – Energy and the Principal Mechanical Engineer WAO Powerhouse and examination of Alcoa’s ASATs we determined that:</p> <ul style="list-style-type: none"> Alcoa has implemented ASATs specifically tailored to address the individual obligations of the performance audit and asset management system review, which are completed on an annual basis The Principal Mechanical Engineer WAO Powerhouse is responsible for performing the ASAT of the asset management system ASATs are reported to both the Procurement Specialist – Energy and the Powerhouse Manager ASATs are used to inform the Procurement Specialist – Energy’s report to the Authority reporting instances of breach during the period subject to consideration. <p>Section 12(b) requires independent reviews to be performed of the asset management system. Currently, Alcoa’s process provides for the responsible person for the AMS to also be the person conducting the ASAT. A separate, independent review has not been performed or scheduled.</p>	
		Adequacy Rating: Adequately documented (A)	Performance Rating: Opportunity for improvement (2)
<p>Recommendation 4/10</p> <p>Alcoa either assign the responsibility for performing the ASAT to an Alcoa staff member independent of the Asset Management System, or engage an external reviewer.</p>		<p>Action plan 4/10</p> <p>Alcoa will either assign the responsibility for performing the ASAT to an Alcoa staff member independent of the Asset Management System, or engage an external reviewer.</p> <p>Responsible Person: Procurement Specialist - Energy</p> <p>Target Date: 30 June 2011</p>	

5 Follow-up of previous review action plans

Rec. No	Ref	Recommendation	Previous Review Action Plan	Status	Revised action plan (if applicable)
1/08	All	Powerhouse Asset Strategies be amended to: <ul style="list-style-type: none"> Accommodate each of the 12 key processes in the asset management life-cycle Refer to Alcoa WA Operations' existing asset planning and management processes and procedures, as they apply to powerhouse assets. 	The WAO Principal Mechanical Engineer will build the 12 key processes required for the Electricity Generation Licence compliance directly into Alcoa's asset planning and management processes and procedures. Responsible Person: WAO Principal Mechanical Engineer Target Date: 31 July 2009	Complete The 12 key asset management system processes have been built into the Asset Strategy documents for each of Alcoa's powerhouses. We note that the Asset strategy documents are currently in draft format. Refer to issue 1/10 of this report.	N/A
2/08	All	The ongoing drive for further improvement in Alcoa's asset management strategies, documentation and systems be continued and completed through the development of finalised asset strategies for each powerhouse.	The WAO Principal Mechanical Engineer will build the 12 key processes required for the Electricity Generation Licence compliance directly into Alcoa's asset planning and management processes and procedures. Responsible Person: WAO Principal Mechanical Engineer Target Date: 31 July 2009	Complete The 12 key asset management system processes have been built into the Asset Strategy documents for each of Alcoa's powerhouses. We note that the Asset strategy documents are currently in draft format. Refer to issue 1/10 of this report.	N/A
3/08	Various	Clearly prioritise those projects identified in Alcoa Powerhouse 5 year plans, which require attention from an electricity licence compliance perspective	The WAO Principal Mechanical Engineer will review the Alcoa Powerhouse 5 year plans, and clearly prioritise the projects in these plans with linkage to the electricity licence compliance requirements. Responsible Person: WAO Principal Mechanical Engineer Target Date: 31 July 2009	Complete Asset plans have been developed and submitted to Alcoa management for approval. Project requirements have been included in the plans.	N/A

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Rec. No	Ref	Recommendation	Previous Review Action Plan	Status	Revised action plan (if applicable)
4/08	7(g)	<p>(a) Establish a mechanism, which enables Alcoa to effectively and continuously monitor its performance against Licence obligations</p> <p>(b) Consider incorporating licence obligations and asset effectiveness indicators into ASAT.</p>	<p>The Procurement Specialist – Energy and Principal Mechanical Engineer WAO Powerhouse in conjunction with the Audit Manager will develop an ASAT to ensure that licence obligations form part of the powerhouse strategy. This ASAT will be continually monitored and reviewed. This ASAT will be completed annually to meet this end.</p> <p>Responsible Person: Procurement Specialist - Energy</p> <p>Target Date: 31 July 2009</p>	<p>Complete</p> <p>Alcoa has developed an ASAT which is completed on an annual basis. The ASAT considers all elements of the asset management system.</p> <p>Examination of the ASATs performed for the 2009 and 2010 financial years indicate consideration of all elements of the asset management system.</p>	N/A
5/08	9(a)	<p>(a) Formally document existing contingency planning strategies and practices in the event of unexpected and unrecoverable powerhouse asset failure. Where appropriate, powerhouse and site specific contingency plans should be developed and documented</p> <p>(b) Implement a review and where appropriate, testing strategy for all system recovery and contingency plans</p> <p>(c) Assign roles and responsibilities for reviewing, testing and implementing contingency plans.</p>	<p>The WAO Principal Mechanical Engineer will ensure:</p> <p>(a) Documentation exists defining our contingency planning strategies and that this documentation is captured in the Alcoa document storage system</p> <p>(b) A process is in place to annually review the aforementioned contingency plans and keep these current.</p> <p>(c) The people responsible for these reviews of contingency plans are assigned and documented.</p> <p>Responsible Person: WAO Principal Mechanical Engineer</p> <p>Target Date: 31 July 2009</p>	<p>(a) Complete</p> <p>Alcoa has developed documentation which defines Alcoa's contingency planning strategies</p> <p>(b) Complete</p> <p>Alcoa has developed an ASAT which is completed on an annual basis. The ASAT considers all elements of the asset management system.</p> <p>Examination of the ASATs performed for the 2009 and 2010 financial years indicate consideration of all elements of the asset management system.</p> <p>(c) Complete</p> <p>As above.</p>	N/A

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Rec. No	Ref	Recommendation	Previous Review Action Plan	Status	Revised action plan (if applicable)
6/08	12(a) 12(b)	<p>(a) Develop and implement a structured review program, which explicitly accommodates Alcoa's powerhouse asset management systems</p> <p>(b) Consideration be given to:</p> <ul style="list-style-type: none"> ▪ Incorporating Licence obligations into ASAT so that they become part of a regular review process ▪ Conducting an independent review of the contractual arrangement between Alcoa and Western Power. 	<p>The Procurement Specialist – Energy and Principal Mechanical Engineer WAO Powerhouse in conjunction with the Audit Manager will develop an ASAT to comply with Licence requirements to review and keep current Asset Management Plans and to assess the adequacy of arrangements between Alcoa and Western Power. This ASAT will be completed annually to meet this end.</p> <p>Responsible Person: Procurement Specialist Energy</p> <p>Target Date: 31 July 2009</p>	<p>Complete</p> <p>Alcoa has developed an ASAT which is completed on an annual basis. The ASAT considers all elements of the asset management system.</p> <p>Examination of the ASATs performed for the 2009 and 2010 financial years indicate consideration of all elements of the asset management system.</p>	N/A

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Appendix A – Review plan

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Appendix B – References

Alcoa staff participating in the review

- Procurement Specialist - Energy
- Principal Mechanical Engineer WAO Powerhouse
- Senior Business Advisor
- Australian Financial Accounting Manager
- Principal Electrical Engineer WAO Powerhouse
- Environmental Scientist
- Powerhouse Supervisor - Pinjarra
- Powerhouse Supervisor - Wagerup
- Powerhouse Supervisor - Kwinana
- Manager – Regional IS Australia

Deloitte staff participating in the review

Name	Position	Hours
• Richard Thomas	Partner	5.5
• Andrew Baldwin	Account Director	20
• Ben Fountain	Senior Analyst	77
• Jin Sua	Senior Analyst – IT	5
• Michael Genever	Analyst	23
• Matt Thomson	Partner - QA Review	1
• Don Gillespie	Account Director – QA Review	0.5

KT & Sai staff participating in the review

Name	Position	Hours
• Tanuja Sanders	Principal Engineer & Director	47
• Keith Sanders	Principal Engineer & Director	22.5
• Clive Lancaster	KT & Sai Consultant	14.5

Key documents and other information sources examined

Organisation references

- Annual Capital Plan Process Flowpath
- Annual Capital Plan Process
- Asset Integrity Assessment Protocol
- Expense Approval Guide
- Sample of Expense Control Reports (ECRs)
- Request for Approval Example
- Computing Disaster Recovery Strategy
- Daily Tape Management – Procedures and Standards
- Data Conversion Considerations Guidelines
- Dealing with a disaster or crisis at an Alcoa operating Location
- EBS Backups for all Environments Overview
- Evaluation of Compliance with Environmental Obligations (WAO)

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- Expenditure Approval Policy and Procedures
- Management Systems Manual (WAO)
- Post Project Review Process
- Post Project Review Template and Guidelines (WAO)
- WA Powerhouse Organisation Structure
- Powerhouse Asset Integrity Assessment Protocol
- Project Management Approval Guidelines
- Reporting Procedure (ERA)
- Risk Classifications Report, August 2009
- Risk Management Overview
- Risk Management Policy
- Security Access Account Management
- Security Access Permissions
- WA Powerhouse Shutdown Planner
- Powerhouse Mechanical Engineering Contingency Plan (WAO)
- Sample of Freehills legislative updates
- Evaluation of compliance with environmental obligations policy
- Sample of complete RfAs
- Economic Evaluation Model
- Asset disposal protocol WAO Powerhouses
- Excerpts from WA Operations Financial Plan relating to powerhouse assets
- Letters to ERA re status of 2008 review findings
- Alcoa ASATs for 2008/09 and 2009/10 periods
- Planning and Scheduling of Equipment Management Activities
- Commissioning and handover procedure (including manual).

Pinjarra references

- Pinjarra Powerhouse Asset Strategy
- Aspects and Impacts Register - Pinjarra
- Targets and service levels
- Pinjarra Refinery Organisation Structure.
- Monthly gas emissions testing and reports
- Sample of weekly maintenance plans
- Sample of boiler inspections
- Sample of loss prevention inspections.

Wagerup references

- Wagerup Powerhouse Asset Strategy
- Aspects and Impacts Register – Wagerup
- Wagerup Refinery Organisation Structure
- Equipment planning schedule
- Sample of boiler inspections
- Sample of loss prevention inspections.

Kwinana references

- Kwinana Powerhouse Asset Strategy
- Aspects and Impacts Register – Kwinana
- Kwinana 5 Year Plan

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- Boiler 4 Commissioning sheet
- Kwinana Refinery Organisation Structure
- Sample of boiler inspections.
- Sample of loss prevention inspections.

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Appendix C – Post Review Implementation Plan

Issue 1/10

Asset planning 1(h) Plans are regularly reviewed and updated

Review of AMS 12(a) A review process is in place to ensure that the asset management plan and the asset management system described therein are kept current

At the time of our review, the Asset Strategy documents, which describe the asset management plan for each of Alcoa's three powerhouses, were still in draft and had not been formally approved.

Recommendation 1/10

Alcoa finalise and formally approve the Asset Strategies for its Powerhouse assets.

Action Plan 1/10

Alcoa will finalise and formally approve the Asset Strategies for its Powerhouse assets.

Responsible Person:

Principal Mechanical Engineer – WAO Powerhouse

Target Date: 31 August 2011

Issue 2/10

Asset disposal 3(d) There is a replacement strategy for assets

At the time of our review, the Asset Strategy documents for each of Alcoa's three powerhouses do not contain relevant asset replacement strategies.

Recommendation 2/10

Alcoa update the Asset Strategies for each of its powerhouses incorporating relevant replacement strategies commensurate with section 3(d) of the asset management effectiveness criteria.

Action Plan 2/10

Alcoa will update the Asset Strategies for each of its powerhouses to incorporate relevant replacement strategies commensurate with section 3(d) of the asset management effectiveness criteria.

Responsible Person:

Principal Mechanical Engineer – WAO Powerhouse

Target Date: 31 August 2011

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<p>Issue 3/10</p> <p><i>Capital expenditure 11(c) The capital expenditure plan is consistent with the asset life and condition identified in the asset management plan</i></p> <p>At the time of our review, the Asset Strategy documents for each of Alcoa’s powerhouse assets do not document the powerhouse assets useful life.</p>	
<p>Recommendation 3/10</p> <p>Alcoa update the Asset Strategies for each of its powerhouses:</p> <ul style="list-style-type: none"> To incorporate the relevant asset useful life details to facilitate effective monitoring Align the Asset Strategy plans to capital expenditure plans to ensure consistency between approved capital programs and expected asset life. 	<p>Action Plan 3/10</p> <p>Alcoa will develop an appropriate document that will link to the Asset Strategies for each of its powerhouse, which will:</p> <ul style="list-style-type: none"> Incorporate the relevant asset useful life details Align the Asset Strategy plans to its capital expenditure plans. <p>Responsible Person: Principal Mechanical Engineer – WAO Powerhouse</p> <p>Target Date: 31 August 2011</p>
<p>Issue 4/10</p> <p><i>Review of AMS 12(b) Independent reviews (e.g. internal audit) are performed of the asset management system</i></p> <p>Section 12(b) requires independent reviews to be performed of the asset management system. Currently, Alcoa’s process provide for the responsible person for the AMS to also be the person conducting the ASAT.</p> <p>A separate independent review has not been performed or scheduled.</p>	
<p>Recommendation 4/10</p> <p>Alcoa either assign the responsibility for performing the ASAT to an Alcoa staff member independent of the Asset Management System, or engage an external reviewer.</p>	<p>Action Plan 4/10</p> <p>Alcoa will either assign the responsibility for performing the ASAT to an Alcoa staff member independent of the Asset Management System, or engage an external reviewer.</p> <p>Responsible Person: Procurement Specialist - Energy</p> <p>Target Date: 30 June 2011</p>