PowerWater

Mervyn Davies' Enquiry: Power and Water's Fourth Progress Report

Summary

March 2010

Power and Water Corporation

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Overview

Power and Water is committed to implementing the Mervyn Davies Report recommendations and is working systematically to improve network reliability.

This is the fourth quarterly report detailing progress on the 37 major milestones to fulfil Mervyn Davies' recommendations. This document provides a transparent report to stakeholders, including the Government, the Utilities Commission and the wider community. It has been audited by an independent third party.

Over the past three months significant progress on replacing the failed 11kV switchboard from Casuarina Zone Substation has been made. Two new permanent switchboards have been installed in the building and should be fully operational mid 2010.

The original switchboard has been removed and taken to Power and Water's workshop for comprehensive testing. This has confirmed initial findings and Power and Water is confident that the Remedial Asset Management Program and replacement of oil-filled circuit breakers will minimise the risk of a similar incident elsewhere.

As the Remedial Asset Management Program team continues to assess the condition of each asset and gains a better understanding of the required remedial and ongoing maintenance, this work is being carried out and documented.

This testing process has shown that the 11kV switchboard and most of the oil-filled components at Snell Street Zone Substation, near Darwin city, should also be replaced.

This work is scheduled to start near the end of this quarter, when new switchboard components should arrive. A temporary outdoor arrangement - a Noja Farm - has been put in place to reduce load on the ageing 11kV switchboard.

It is expected to take until December 2010 to complete the Remedial Works Plan. Progress has been consistent on each recommendation:

- Condition-based maintenance has been carried out on all zone substation assets where appropriate.
- Training has been completed on new test gear and technically expert training managers have been appointed.
- A wide-ranging restructure of the Power Networks' business has continued and key roles have been filled.
- A leadership program and regular staff forums have commenced in Power Networks to improve collaboration with the workforce.
- A condition assessment and remedial program is well advanced, with crews on many occasions working through the night to access equipment safely and with minimum disruption to customers.

The Power and Water team is determined to complete the plans outlined in this report safely and with minimum disruption to customers.

Work has progressed consistently and timelines, as well as the scope of works, continue to change so the best solutions are implemented.

On completion, Power and Water will offer a more reliable service, with a well-funded, well-trained and well-led workforce.

This will ultimately benefit all Power and Water's customers.

Restoring Casuarina

Mervyn Davies' preliminary report recommended that the entire 11kV switchboard at Casuarina Zone Substation be replaced. The original equipment was oil-insulated, giving rise to the risk of widespread damage from a significant fault. More modern equipment uses vacuum or gas technology which, among other things, limits the extent of any damage even if the circuit breaker fails in service.

The permanent replacement of the 11kV switchboard is well underway.

Two temporary switchboards are installed to support Casuarina Zone Substation, allowing the decommissioning of the existing switchboard.

The new permanent switchboard has been installed and is currently being wired for protection systems. Completion of installation is on track for June 2010.

A number of other remedial works have been carried out at Casuarina since early October 2008, including thermal scanning and refurbishment of some equipment. The remaining 66kV OCBs, CTs and VTs have been assessed in accordance with the priorities established in the Remedial Works Program. The 66kV equipment was tested during the 2009 Dry Season.

The following actions remain:

- commission the new switchboard;
- decommission temporary switchboards; and
- restore substation to normal operation.

It is then intended to replace and refurbish 66kV/11kV Transformer 1 at Casuarina.

Substation assessment

Recommendation 11 of the Mervyn Davies Report included a rigorous condition assessment of all zone substation equipment.

The Remedial Works Plan scheduled condition testing at 20 zone substations and switching stations for OCBs, CTs and VTs operating at 66kV, 22kV and 11kV.

Timing is based on a preliminary risk assessment as recommended.

Substantial refurbishment has taken and is taking place at a number of sites. This has taken longer than forecast as improved condition assessment techniques and procedures have provided a better understanding of the condition and subsequent operating performance has helped identify more remedial work to be completed. The Remedial Asset Management Program team is still predicting completion of condition testing and remedial maintenance work on the higher risk equipment by the end of 2010.

Aside from the priority sites described above, Power and Water has also completed remedial works at:

- Batchelor 132kV Zone Substation
- Brewer Substation
- Brocks Creek Substation
- Casuarina Zone Substation 11kV Switchroom
- Casuarina Zone Substation 66kV Switchyard
- Casuarina Substation Temporary Switchroom
- Channel Island Power Station
- Channel Island Switchyard
- Cosmo Howley Substation
- Frances Bay Zone Substation
- Jabiru Substation
- Katherine 132kV Substation
- Katherine Power Station 22kV Substation
- Lovegrove 22/11kV Zone Substation
- Mandorah Centre Yard Substation
- Manton 132kV Terminal Station
- Manton 22kV Zone Substation
- McMinns Water Pumping Station
- Mitchell Street Switching Station
- Ranger Substation
- Sadadeen Substation 22kV Switchroom
- Tennant Creek Switchyard
- Tindal Substation
- Weddell Zone Substation
- West Bennett 11kV Switching Station
- Union Reef Substation

Meeting major milestones

This document summarises progress made on the Mervyn Davies Report Recommendations so far. As the scope of each task has been carefully assessed and analysed Power and Water has revised some of the tight timelines initially set.

It has been possible to bring some target dates forward, however it has also been recognised that some original target dates could not be met due to the much larger scope of work required.

These latter dates have been amended and are also reported against.

Appendix D to the full technical report provides details as assessed by external auditor AECOM Australia Pty Ltd. The technical report has also been audited and the auditor's letter is attached to that report at Appendix F.

Milestone 1: The completion of the initial risk assessment recommended by the Mervyn Davies Preliminary Report to be noted by the Board by February 2009. **Completed**

Milestone 2: The approval of the Remedial Works Plan by the Managing Director by April 2009. **Completed**

Milestone 3: The completion of roughly a third of the Remedial Works Plan, and the consequent formal review of progress and lessons learnt, by July 2009. **Completed**

Milestone 4: The clearance of each substation as scheduled, following testing and remediation as required, with all substations cleared by September 2010. **On track**

Milestone 5: The General Manager Remedial Asset Management Program to approve a final Project Execution Plan and detailed installation plan by the end of June 2009. **Completed**

Milestone 6: The General Manager Remedial Asset Management Program to accept the new Casuarina switchboard for service by December 2009. **Completed**

Milestone 7: The General Manager Remedial Asset Management Program to accept the new transformer for service during the third quarter of 2010. **On track**

Recommendation 1 – Move to condition-based maintenance

Power and Water is shifting to condition-based maintenance, training in and using a wider variety of testing methods before taking equipment out of service for maintenance.

Milestone 8: The first draft Power Networks Five-Year Business Plan and 20-Year Outlook maintenance forecasts include a summary of planned maintenance as well as costs based on a condition-based maintenance approach by August 2009. **Completed**

Recommendation 2 – Implement condition-based maintenance in substations as quickly as possible

Milestone 9: Source external assistance from another utility to aid with maintenance training and support by February 2009. **Completed**

Milestone 10: Complete agreements with workforce to ensure that Job Model and Remuneration arrangements support condition-based maintenance by June 2010. **On track**

Recommendation 3 – Bed down organisational changes

Milestone 11: Appoint the Manager Strategy and Planning and the Manager Capital and Maintenance Delivery by May 2009. **Completed**

Milestone 12: Confirm appointment of new trades positions by May 2009. **Completed**

Milestone 13: Appoint the next level of management by July 2009 (noting that this level of management would be unaffected by Recommendation 3.2). All but two positions have been filled, these have progressed to a specialist recruitment process. **In progress**

Milestone 14: The Managing Director to approve a revised organisational structure for Power Networks (following discussion with Mervyn Davies on Recommendation 3.2) by July 2009. **Complete**

Recommendation 4 – Deliver improved systems and processes

The now established Asset Management Capability (AMC) Project will help every unit within Power and Water identify, prioritise and conduct maintenance.

Milestone 15: Identify process owners and ensure they have sufficient time to contribute to the AMC Project by May 2009. **Completed**

Milestone 16: Confirm that the Future State Design under the AMC Project does, in fact, address the requirements of Recommendation 4.2 by December 2009. **Revised to June 2011**

Milestone 17: Confirm that the AMC Project as implemented does, in fact, address the requirements of Recommendation 4.2 by December 2010. **Revised to June 2011**

Recommendation 5 – Enhance policies and policy documentation

Power and Water's substation maintenance policies are being updated to reflect the 'condition-based maintenance' approach.

Milestone 18: A revised Maintenance Policy based on 'condition-based maintenance' will be approved by the General Manager Power Networks by August 2009. **Complete**

Milestone 19: A review of high priority maintenance procedures, including detailed consultation with the workforce, resulting in a revised set of maintenance policies to be completed by September 2009. **In progress, revised to December 2010**

Milestone 20: A review of high priority work instructions, including detailed consultation with the workforce, will result in a revised set of maintenance policies by June 2010. **In progress, revised to December 2010**

Recommendation 6 – Develop substation maintenance planning and works program

Maintenance policy and procedures are being developed. A works program will follow.

Milestone 21: Set high-level and detailed quantum plans for substation maintenance for 2010 and the following five years by December 2009. **Revised to June 2010**

Recommendation 7 – Report on maintenance delivery, asset condition, risks and failures

Milestone 22: Provide example maintenance delivery and asset condition report to the Board for five asset classes by February 2009. **Completed**

Milestone 23: Provide full maintenance delivery and asset condition reporting to the Board by August 2009. **Completed**

Milestone 24: Appoint a Training Manager to Remedial Asset Management Program with strong technical knowledge by May 2009. **Completed**

Milestone 25: Appoint a Training Manager in Power Networks with strong technical knowledge by June 2009. **Completed**

Milestone 26: Coordinators' development needs will be confirmed during the MyPlan Performance Review by July 2009. **Ongoing**

Milestone 27: Improved supervisory training will be provided to all coordinators from November 2009. **Ongoing**

Milestone 28: A revised framework for trades and technical training will be approved by October 2010. **On track**

Milestone 29: Commence first steps in Leadership Development by May 2009. **Completed**

Milestone 30: Individual development plans will be formulated for each manager, which align with and contribute to their current performance development plans by July 2009. **Completed**

Milestone 31: Suitable external leadership development opportunities will be assigned to each person by August 2009. **Ongoing**

Milestone 32: Development courses will commence by September 2009. **Completed**

Milestone 33: All relevant managers receiving at least one session of development by December 2009. **Completed**

Milestone 34: Complete RISQ Investigation 1768 by April 2009. **Completed**

Milestone 35: Commence ameliorative action in light of Manton investigation and further information on Yorkshire switchboards by July 2009. **Completed**

Remedial Asset Management Program investigations are complete and the recommendation is to replace all Yorkshire switchboards. Power and Water has four Yorkshire switchboards which will be replaced with more modern technology as priority dictates.

Milestone 36: Review incident management procedures and approve resulting Work Instruction by August 2009. **In progress**

Milestone 37: Complete investigation into Casuarina events on access to the old switchboard by September 2009. **Completed**

What it means for customers

Power and Water has taken more equipment out of service than normal as part of the Remedial Asset Management Program. This has increased the number of planned customer outages. Every effort has been made to minimise these disruptions with a significant amount of work carried out at night.

We have committed to:

- Avoid outages for our customers whenever possible.
- Where a planned outage is unavoidable, notify affected customers using letterbox leaflets, website, newspaper or radio advertising at least seven days in advance.
- Where maintenance activity increases the risk that equipment cannot be returned to service within a reasonable period, we will make arrangements to limit the impact on customers. Week night and weekend work will reduce the need for planned outages during weekdays.

Long term, reliability will improve

In the longer term, customers will benefit from a more reliable electricity supply. With reliable switchgear outages are less likely and - when they occur - they affect customers for a shorter time.

The emphasis on:

- education for trades people, technicians, supervisors and the management team;
- a streamlined maintenance cycle;
- increased accountability of maintenance activities;
- improvements in maintenance documentation;
- increased resources to perform the work; and
- specific requirements for reporting maintenance performance to the Board and executive management;

will ensure that maintenance practices, in line with established industry asset management practices, are kept up to date and plant failures minimised.

The costs of these improvements will be far outweighed by the community benefits of a more secure and reliable electricity supply.

Glossary

AMC	Asset Management Capability
CAIDI	Customer Average Interruption Duration Index (a measure of reliability)
CB	Circuit breaker
CT	Current transformer
DAR	Defective Apparatus Record
EMC	Executive Management Committee
FIS	Facilities Information System
HV	High voltage
LTAP	Long Term Action Plan
MMS	Maintenance Management System
OCB	Oil circuit breaker
PEP	Project Execution Plan
RAMP	Remedial Asset Management Program
RISQ	Risk, Investigation, Safety and Quality – Power and Water's hazard investigation database, among other things
RWP	Remedial Works Plan
SAIDI	System Average Interruption Duration Index (a measure of reliability)
SAIFI	Customer Average Interruption Frequency Index (a measure of reliability)
SCADA	System Control and Data Acquisition
VT	Voltage transformer
WIMS	Works Implementation Management System

Appendix A: Mervyn Davies' recommendations in full

1 Substation maintenance approach

1.1 Accelerate the implementation of its documented planning intention of adopting a "framework of objective need" as the basis for maintenance, progressively implement systemic and rigorous condition monitoring, and adopt asset condition as the prime basis for determining "objective need".

1.2 Take into account the circumstances of size, remoteness, climate and the lasting effects of past legacies when implementing this, its new condition based approach, and not attempt to emulate too closely the maintenance arrangements implemented in the much larger distribution businesses elsewhere in Australia.

2 Strategy for implementing condition-based maintenance - in the Power and Water substations context

2.1 Negotiate and implement arrangements with one or more of the larger distribution businesses in Australia to be supplied with access to "failure mode" data, inspection and test regimes, conditional failure criteria, and requirements for corrective action. In selecting a partner choose a distributor who is well advanced in the implementation of condition based maintenance, and has the best matched asset set.

2.2 Develop the "in house" maintenance policy resource to be a pragmatic adopter of what other distributors are doing. Adapt what other distributors are doing, to the specific environmental conditions and asset set of PAWC, with the minimum sufficient resort to analysis.

2.3 Specialise in monitoring and diagnostics. Develop the "in house" maintenance delivery resource to be a specialist in monitoring, testing and diagnostics.

2.4 Utilise the "in house" maintenance delivery resource for most routine preventative tasks and common corrective tasks, but engage outside resources for specialist and uncommonly needed skills, (as is currently done for tap changer maintenance). Negotiate and implement arrangements with external providers to undertake the highly specialised tasks, within appropriate time frames. Either as "fly in fly out "contractors or by shipping to other parts of Australia.

2.5 Foster a culture of local ownership by:

- Providing an appropriate level of autonomy and status to the Maintenance Supervisor.
- Providing adequate resourcing, and placing the responsibility and accountability for: the delivery of the substation maintenance works programme and; for maintenance task outcomes, with the Maintenance Delivery section.
    - Enforcing accountability through measurement and reporting.
- Routinely involving the delivery team in the maintenance policy decision process. (By systemically seeking feedback regarding failure modes and the effectiveness of corrective actions.)
-

- Placing responsibility and accountability for asset condition and performance with the Asset Management section.
    - Enforcing accountability through measurement and reporting.

2.6 Implement its new condition based approach at the maximum possible pace, consistent with circumstances, and prioritise implementation to address areas of greatest benefit first.

3 Organisation

3.1 In implementing the organisational changes, currently underway, ensure the following outcomes, or alternatively make changes which do:

- Work priorities are managed so as to ensure continuity of an adequate resource allocation to routine substation maintenance.
- The Maintenance Delivery group, are empowered by providing them with a sense of control and an environment which ensures a sense of ownership, pride in the assets and their performance.
- The Asset Management group, are able to focus on asset management, without becoming embroiled in works and resource management issues. Ensure that this group can focus on integrating policies for the "what" of maintenance with replacement/ refurbishment and whole of life cycle cost optimisation.
- Works management and scheduling are kept simple.
- Seamless integration of the routine condition based substation maintenance activity with the test activity is achieved.
- System access for routine maintenance and protection testing is optimally coordinated.

3.2 Consider making the following changes to the organisational arrangements, currently in the course of implementation:

- Establish "Substation Maintenance, Protection and Test" as a separate dedicated resource with direct reporting responsibility to the General Manager Power Networks.
- Operate "Substation Maintenance" and "Protection and Test" as two separate sections, within that accountability.
- Place responsibility for routine testing with the Substation Maintenance Section and upskill the workers in the Section. Advanced diagnostic testing (partial discharge, dielectric dissipation factor and high voltage withstand) should remain with the Protection and Test Section.
- Place the responsibility for works planning as well as scheduling with the Substation Maintenance, Protection and Test Section.

4 Systems and processes

4.1 Ensure that the next phase of the AMC project, does as it is expected to do, and:

- Deliver outcomes that are in keeping with Power and Water's size, and so far as possible, avoids complexity.
- Embrace the possibility of a continuing role for suitably controlled local PC systems and avoids the pedantic pursuit of a single enterprise system.
- Address the disempowering aspects of the current WIMS system.

4.2 Ensure that the systems and processes delivered by the AMC, do as they are expected to do and, provide capabilities for substation maintenance management and asset condition management, that support the recommendations of this report regarding:

- Substation Asset condition recording.
- Substation maintenance planning and program works development.
- Substation maintenance works program reporting.
- Substation asset condition reporting.

And incorporate:

- Condition as well as time based triggers.
- Enforcement of condition reporting and other job closure procedures.

5 Policies and policy documentation

5.1 Adopt a three tier approach to substation maintenance policy documentation, as described in Technical Appendix T2.2 Evaluation of Policies.

5.2 Either renegotiate the arrangements with ETSA, for the acquisition of a set of documentation that is more suitable to Power and Water's requirements, or negotiate to acquire a set from another Australian distributor. Such negotiations should make provision for the routine updating of the documentation.

5.3 Adapt the acquired documentation to the Power and Water environment and asset set.

6 Substations maintenance planning and works program development

6.1 Ensure that quantum planning is separate from delivery planning.

6.2 Set quantum plans for substation maintenance on a one and five year basis and resource to deliver:

- Ensure that firm preventative maintenance and condition monitoring programs are set annually
- Ensure that the plan makes adequate provision for corrective tasks, based on expected conditional failure rates.
- Ensure that the plan makes adequate provision for "breakdown maintenance" tasks, based on historical breakdown rates and trends.
- Ensure that the planning process makes adequate provision for resourcing and that the assessment of resource requirements is informed by industry benchmarks and past reporting of task times.
- Five year plans should be set on an indicative basis, suitable for use in forecasting and workforce planning.
- In the longer term (five to ten years) introduce 15 year planning as well.

7 Reporting systems

7.1 Substations maintenance works program reporting

- Develop simple multi level reporting of work delivery targets and delivery progress against targets. (Three levels of reporting are suggested – supervisor/ coordinator; Management and Board).
- Report quantum (as well as dollars) progressively aggregated over tasks for the higher level upstream reporting.
- Report risk consequences of backlogs, monthly.

7.2 Substations asset condition reporting

- Systematize condition data recording:
- Maintain condition data records at the individual asset level.
- Analyse and summarise the data by asset class.
- Develop simple multi level reporting of asset class condition, structured by asset class and reporting level (three levels of reporting are suggested – asset planners; Management and Board).
- Make reports available to the Maintenance Delivery Section, as well as the Asset Management Section.
- Report key condition measures and risks, suitably aggregated or truncated for different reporting levels. For the higher level reports, highlight trends and forecast the outcomes of remediation programs.
- Incorporate asset failure reporting, at all reporting levels. Board level reporting of all failures involving risk to personnel and public safety is suggested.

7.3 Reporting medium

- Implement ad hoc paper/PC based reporting systems, in the interim, before new AMC systems and reporting capability is developed.

8 Resources

8.1 Workforce capabilities - Training and development

- Provide training to refresh the craft skills of the current substation maintenance personnel. Engage an industry training provider to undertake a training needs analysis and provide tailored training.
- Provide training to refresh the testing skills of the current Protection and Test personnel. Provide specific training in the operation of all new test equipment and in the interpretation of results. Negotiate with other Australian distributors and test equipment suppliers, for assistance with the provision of such training.
- Provide specific condition monitoring training. Negotiate with other Australian distributors for assistance with the provision of such training.
- Provide generic Supervision training to supervisors (Coordinators).
- Negotiate opportunities for employee exchanges or secondments with the other Australian distributors, for trades worker, apprentices and engineering staff.
- Provide opportunities for ongoing participation by engineering staff, in relevant industry forums.

8.2 Workforce levels

Initially recruit an additional six electrically trades qualified personnel. (Ideally such additional recruits would be experienced in condition monitoring techniques.)

Annually review the five year forecast of substation maintenance requirements and reassess the manning level required to deliver the program. Implement appropriate manpower planning (a mix of recruitment and apprentice intake) to ensure the sustained level of manning required to match the forecast works program.

8.3 Equipment

Upgrade and progressively acquire additional new condition monitoring equipment, as required to keep pace with the progress in implementing condition monitoring techniques and matched to the particular techniques adopted. Make a thorough review, of the equipment available and of the equipment in use in other distribution business around Australia. Undertake the review with the involvement of personnel who are to use the equipment, after they have received the specific training in condition monitoring techniques recommended in 8.1.

9 Human resources development

Devise and implement a human resources development program incorporating the following key elements:

- Communication and Interpersonal skills development training, for all personnel, (structured to their role).
- Specific Leadership and/or mentoring programs for those in "people management" roles.
- Personal development opportunities for those in key roles.
- Role and job requirements clarification.

And having the objective of delivering the following outcomes:

- A more inclusive and collaborative supervision and leadership style.
- Improved communication and collaboration between functional areas, and up and down the responsibility hierarchy.
- Strong personal ownership of roles and Power and Water initiatives.
- All personnel are confident in their role and in their personal authority within the role.
- Acceptance of individual accountability.
- Improved performance measurement and recognition.
- All personnel are all in jobs which match their individual skills sets and personal relationship styles.

10 Miscellaneous

10.1 Incident Management System and Accountabilities

Review the current incident management arrangements to ensure that the system of incident management provides for:

- Incident organisational and accountability structures. Intelligence gathering, consolidation and reporting arrangements.
- Escalation procedures.
- Resourcing flexibility.
- Stakeholder communication procedures.
- Procedures for coordinating with the Territory's other Emergency Management Agencies.
- Formal documentation.

That will provide Power and Water with the credibility to manage its own system incidents.

10.2 Asset Failure Investigation Accountabilities

- Assign responsibility for investigating asset failure incidents as follows:
- Asset Management be assigned accountability for deciding what incidents to investigate, for coordinating the investigation, and for "close out" and reporting. (Oversight by the "Power Technical Committee" would also be appropriate.)
- Assessment and diagnoses of the incident be assigned to the testing accountability of the Protection and Test Section.
- Assessment of OH&S issues be assigned to Employee and Organisation Services.

10.3 The Manton Investigation

Pursue further the Manton Investigation, and undertake investigation work in an attempt to establish the root cause of the failure and to assess whether better environmental controls would help to mitigate the risk of further failures.

10.4 Residual Casuarina Incidents Investigation

As soon as access conditions at Casuarina permit, perform the access dependent residual outstanding investigation work and attempt to resolve the outstanding aspects of the failure investigations.

10.5 RISQ Hazard/Incident Report System

- Complete the investigation of Hazard/Incident No 1768, without further delay.
- Implement a system of routine monthly reporting of the number of incidents logged and resolved and of backlogs of outstanding Hazard/ Incidents.

11 Remedial programs

11.1 Initiate a program of rigorous condition assessment of all Zone Substation equipment immediately. Undertake a high level risk analysis to determine program priorities and set a timetable.

11.2 Implement a program to verify the efficacy of all frame leakage protection systems (or other high speed busbar protection systems) and remediate, if necessary. Also review the associated earthing system designs, to verify their adequacy under all feasible fault conditions.

11.3 Take immediate action to replace the Casuarina Zone Substation 11kV switchboard.

11.4 Undertake a rigorous condition assessment of all Distribution Substation Equipment.

Appendix B: Recommendations, timelines and progress

Ref	Recommendation	Plan ref	Owner	Target date	Progress
1	**Move maintenance approach to 'condition based maintenance.'**	**LTAP**	**GM-PN**	**06/14**	**Condition based maintenance commenced, Maintenance Policy document to reflect new maintenance regime**
2	**Implement 'condition based maintenance' in substations as quickly as possible by acquiring information, support and clarifying accountabilities.**	**LTAP**	**GM-PN**	**06/10**	**Substation condition-based maintenance implemented.**
2.1	Negotiate and implement arrangements to access data.	LTAP	M-AM		Obtained ETSA & EA Maintenance instructions that were developed using failure mode analysis
2.2	Be a pragmatic adopter of what other distributors are doing on maintenance.	LTAP	M-AM		Resource identified to develop Power and Water maintenance instructions
2.3	Develop 'in house' maintenance delivery team to be specialist in monitoring, testing and diagnostics.	LTAP	M-C&MD		Training resources identified, substation maintenance resource on deck.
2.4	Use 'in house' maintenance delivery team for routine preventative tasks and common corrective tasks/Use outside resources for specialist and uncommonly needed skills.	LTAP	M-C&MD		This is Power and Water's current practice, specialist service contracts have been let
2.5	Foster a culture of local ownership.	LTAP	M-C&MD		Maintenance instructions to be developed with trades staff
2.6	Implement its new condition based approach at the maximum possible pace, consistent with circumstances, and prioritise implementation to address areas of greatest benefit first.	LTAP	GM-PN		Remedial Asset Management Program Documented in accordance with this.

Ref	Recommendation	Plan ref	Owner	Target date	Progress
3	**Bed down organisational changes.**	**LTAP**	**GM-PN**	**06/10**	**Service Agreement between Strategy& Planning and Capital and Maintenance Delivery completes this.**
3.1	In implementing organisational changes, ensure good maintenance outcomes.	LTAP	GM-PN		Maintenance Cycle process flow completed with responsibilities agreed
3.2	Consider making the changes to the organisational arrangements.	LTAP	MD		Still being considered
4	**Deliver improved systems and processes.**	**AMC**	**PD-AMC**	**06/11**	**Implementation of AMC will complete this Recommendation**
4.1	Ensure the next phase of the AMC project, does as expected, and addresses disempowering aspects of the WIMS system.	AMC	PD-AMC		Key personnel including process owners identified and allocated to AMC project development and implementation
4.2	Ensure that the systems and processes delivered by the AMC, do as expected and support the Davies' recommendations.	AMC	PD-AMC		Long Term Action Plan addresses all recommendations
5	**Enhance policies and policy documentation.**	**LTAP**	**GM-PN**	**12/10**	**Production of maintenance procedures and implementation of staff training program will continue till target date.**
5.1	Adopt a three tier approach to substation maintenance policy documentation.	LTAP	M-AM		Adopted
5.2	Acquire a set of maintenance documentation from another Australian distributor.	LTAP	M-AM		Obtained ETSA & EA Maintenance instructions that were developed using failure mode analysis
5.3	Adapt the acquired documentation to the Power and Water environment and asset set.	LTAP	M-AM		Resource identified to develop Power and Water maintenance instructions
6	**Develop substations maintenance planning and works program.**	**LTAP**	**GM-PN**	**03/10**	**Maintenance Policy will drive one and five-year programs**
6.1	Ensure that quantum planning is separate from delivery planning.	LTAP	M-S&P		Strategic planners identified in AM and JDs reflect role as opposed to works planners

Ref	Recommendation	Plan ref	Owner	Target date	Progress
6.2	Set quantum plans for substation maintenance on a one and five year basis and resource to deliver.	LTAP	M-S&P		Maintenance policy first, manual programming next then eventually AMC solution
7	**Report on maintenance delivery, asset condition, risks and failures.**	**LTAP**	**GM-PN**	**12/11**	**Progressively implemented through to August**
7.1	Develop simple multi level reporting of work delivery targets, delivery progress and risks against targets.	LTAP	M-AM		Reporting framework complete
7.2	Develop simple multi level reporting of asset class condition, risks, and asset failure reporting.	LTAP	M-AM		Condition based index reporting complete, risk based started.
7.3	Implement ad hoc paper/ PC based reporting systems, in the interim, before new AMC systems and reporting capability is developed.	LTAP	M-AM		Consultants engaged and paper-based system developed.
8	**Enhance workforce capability, training, numbers and equipment.**	**LTAP**	**GM-PN**	**07/10**	**Effective development and implementation of workforce training and development program**
8.1	Provide workforce and supervisor training and development.	LTAP	M-TPN		Two Power Networks-based training managers identified, first one commenced with RAMP team.
8.2	Recruit an additional six electrically trades qualified personnel experienced in condition monitoring techniques and annually review need.	LTAP	M-C&MD		Complete.
8.3	Upgrade and progressively acquire additional new condition monitoring equipment.	LTAP	GM-RAMP		Majority of this equipment is in use, the last of this will arrive first quarter 2010.
9	**Implement a development program, with the objective of a more collaborative leadership style, improved communication and individual accountability.**	**LTAP**	**GM-PN**	**06/10**	**Leadership program initiated.**

Ref	Recommendation	Plan ref	Owner	Target date	Progress
10	**Review incident management and investigations, and complete some outstanding investigations.**	**LTAP**	**GM-PN**	**12/09**	
10.1	Review the current incident management arrangements, including escalation procedures.	LTAP	M-SC		Identified separately in LTAP
10.2	Assign clear asset failure investigation accountabilities.	LTAP	GM-PN		Identified separately in LTAP
10.3	Pursue further the Manton Investigation, and undertake investigation work in an attempt to establish the root cause of the failure	LTAP	C-PTC		Identified design issue with YSF6 gear and need to replace all three units.
10.4	Complete the residual Casuarina incidents' investigation.	LTAP	GM-RAMP		Investigation into the failure is complete, the cause has been confirmed and recommendations implemented.
10.5	Complete the investigation of Hazard/Incident No 1768, without further delay.	LTAP	GM-RAMP		Completed.
11	**Undertake Remedial Programs**	**RAMP**	**GM-RAMP**	**09/10**	**Completion of RAMP Program**
11.1	Initiate a program of rigorous condition assessment of all Zone Substation equipment.	RWP	M-RWP		Commenced, includes immediate remediation of assets in unsatisfactory condition
11.2	Implement a program to verify the efficacy of all frame leakage protection systems.	RAMP	M-RWP		Commenced, included in RAMP
11.4	Undertake a rigorous condition assessment of all Distribution Substation Equipment.	RAMP	M-RWP		Commenced, RAMP managing
11.3	Take immediate action to replace the Casuarina Zone Substation 11kV switchboard.	PEP	PM-C		The new permanent switchboard is currently being installed. Once complete, changeover from the two temporary boards will commence with completion expected June 2010.

Key to people:

C-PTC	Chairman - Power Technical Committee	M-RWP	Manager Remedial Works Plan
GM-PN	General Manager Power Networks	M-S&P	Manager Strategy & Planning
GM-RAMP	General Manager RAMP	M-SC	Manager System Control
M-AM	Manager - Asset Management	M-TPN	Manager Training, Power Networks
M-C&MD	Manager Capital & Maintenance Delivery	PD-AMC	Project Director AMC
MD	Managing Director	PM-C	Project Manager Casuarina

Appendix C: Scope of audit

The following indicative scope of work is for the procurement of an independent auditor to enable the Power and Water Board to enforce compliance with the controls it has established in response to the recommendations of the Mervyn Davies' Enquiry for the short term and long term improvement in network maintenance activities:

B.1 Introduction

The Power and Water Corporation (Power and Water) is an entity owned by the Northern Territory Government. Power and Water operates four business units, being Generation (of electricity), Power Networks, Retail (of electricity), Water Services (including sewage services) and Remote Operations.

In the Power Networks business unit, asset management covers construction activities, response to emergency events, and network maintenance activities. The need for improvements in the undertaking of network maintenance has been a focus of the business unit for several years, including actions to review all processes in an Asset Management Capability project that commenced in late 2006 and will be progressively implemented across the organisation in 2010 and 2011. In 2008 a restructure of the Power Networks business unit was undertaken to improve the focus on network maintenance delivery. Also in 2008, and due to an interruption at a substation in the suburbs of Darwin, the reform of maintenance activities has accelerated through recommendations arising from the Mervyn Davies' Enquiry, which was hand down in January 2009.

To understand the extent of compliance of the network maintenance activity with corporate controls, the Board of Power and Water require an independent auditor to undertake an audit of the maintenance activities of the Power Networks business unit.

B.2 Audit objective

The objective of the Power Networks maintenance audit is to provide an opinion on the extent of compliance of the maintenance activity against the:

- Major Milestones specified in the Power and Water's First Progress Report on the Mervyn Davies' Enquiry; and
- Maintenance Policy, Maintenance Procedures and Maintenance Work Instructions that have been established and revised to control the maintenance activity.

B.3 Audit frequency and duration

The audit is to be conducted on an annual basis, and are to be based on a sample of activities that represent high or medium risk to the organisation. Twenty days of audit work are to be allocated to this task annually.

B.4 Audit report

The auditor is required to provide a report to the Audit and Risk Sub-committee in accordance with an agreed work plan which will be confirmed at the commencement of the audit. The structure of the audit report is to be agreed at the commencement of the audit, and would be expected to provide an opportunity for management to respond to any audit findings.

The auditor is to provide in the report a review opinion (to the level of negative assurance) on compliance with the nominated controls (including specified Major Milestones) established by the Board.