



Mervyn Davies' Inquiry: Power and Water's Fifth Progress Report

Summary

July 2010

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1 Background

In September and October 2008 a number of electrical equipment failures at Casuarina Zone Substation resulted in widespread disruption to Darwin's northern suburbs. Consequently, the Northern Territory Government established an independent inquiry headed by Mervyn Davies to investigate these events, Power and Water's operational response and electrical substation maintenance practices in Darwin.

The principal recommendations were that Power and Water should:

- Implement condition-based maintenance in substations as quickly as possible by acquiring information, support and clarifying accountabilities.
- Bed down organisational changes.
- Deliver improved systems and processes, including supporting policies and policy documentation.
- Develop substations maintenance planning and works program.
- Report on maintenance delivery, asset condition, risks and failures.
- Enhance workforce capability, training, numbers and equipment.
- Review incident management and investigations, and complete some outstanding investigations.
- Undertake an overall remedial program, including taking immediate action to replace the Casuarina Zone Substation 11kV switchboard.

The Mervyn Davies Recommendations can be seen in full on the Power and Water website at powerwater.com.au.

It is now over a year since the Davies Report was finalised, and Power and Water has been working systematically to implement these recommendations and improve network reliability. This is the fifth report detailing progress on the 37 major milestones to fulfil Mervyn Davies' recommendations.

2 Progress

2.1 Overview

The Remedial Works Plan is progressing in line with the Davies Report recommendations:

- 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; and
- Two temporary switchboards have been installed and energised at Casuarina to restore the substation to its original capacity and the project for its permanent replacement is well advanced.

2.2 Progress in the last quarter

In the past quarter, progress has continued as outlined below:

- Two temporary switchboards were installed at Casuarina Zone Substation (CAZSS) in June 2009. Two of the three permanent boards were installed in June 2010, with the third to be completed in August 2010;
- The accelerated replacement of the failing Pine Creek 132/66kV transformer, which was completed in early June 2010;
- The remediation of the 132kV Circuit Breakers at Pine Creek continued, which is scheduled to be completed in July 2010;
- The accelerated remediation of the failed Batchelor 66/22kV transformer and the subsequent discovery of the 22kV switchboard abnormal cable termination and bus bar insulation were completed in March 2010; and
- The installation of a 22kV capacitor to relieve Generation operations at Katherine continued, and will be completed in July 2010.

In the next quarter, work will focus on:

- The redevelopment of the switch room building at CASZZ, which is scheduled for September 2010;
- The replacement of Transformer 1 CASZZ which is scheduled for November 2010;
- The development and installation of a NOJA Farm to by-pass the failing 11kV switchboard at Snell Street Zone Substation;
- The project management and installation of the new replacement Snell Street Zone Substation (scheduled to be completed March 2011);
- The replacement of the failing 11kV Transformer cables at City Zone Substation (scheduled for Dry Season 2010 once system loads allow network access);
- The accelerated installation of the by-pass and new 22kV Switchboard at Katherine to allow the existing failing 22kV Switchboard to be taken out of service (scheduled for completion September 2010);
- The investigation and remediation of 19 Power Transformers tested and showing high moisture content. (Scheduled into the Substation Maintenance five year cycle).

2.3 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, with final commissioning scheduled for August 2010.

A number of other remedial works has also been carried out at Casuarina, 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 (scheduled for August 2010);
- Decommission temporary switchboards (scheduled for end of July 2010); and
- Restore substation to normal operation (scheduled for September 2010).

It is then intended to replace and refurbish 66kV/11kV Transformer 1 at Casuarina. This is scheduled for November 2010.

2.4 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.

3 Overall milestone progress

The following table summarises progress made on the Davies Report Recommendations. As the scope of each task has been carefully assessed and analysed Power and Water has revised some the initial milestone dates. 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.

| Milestone | Initial target date | Revised target date | Status |
|--|---------------------|---------------------|--|
| 1 Completion of the initial risk assessment recommended by the Mervyn Davies Preliminary Report to be noted by the Board | Feb 2009 | | Complete |
| 2 Approval of the Remedial Works Plan by the Managing Director | Apr 2009 | | Complete |
| 3 Completion of roughly a third of the Remedial Works Plan, and the consequent formal review of progress and lessons learnt | Jul 2009 | | Complete |
| 4 Clearance of each substation as scheduled, following testing and remediation as required | Sep 2010 | | On Track |
| 5 General Manager Remedial Asset Management Program to approve a final Project Execution Plan and detailed installation plan | Jun 2009 | | Complete |
| 6 General Manager Remedial Asset Management Program to accept the new Casuarina switchboard for service | Dec 2009 | | Complete |
| 7 General Manager Remedial Asset Management Program to accept the new transformer for service | Q3 2010 | | On Track |
| Recommendation 1 – Move to condition-based maintenance | | | |
| 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 | Aug 2009 | | Complete |
| Recommendation 2 – Implement condition-based maintenance in substations | | | |
| 9 Source external assistance from another utility to aid with maintenance training and support | Feb 2009 | | Complete |
| 10 Complete agreements with workforce to ensure that Job Model and Remuneration arrangements support condition based maintenance | Jun 2010 | | On Track, but tied to EBA negotiations |
| Recommendation 3 – Bed down organisational changes | | | |
| 11 Appoint the Manager Strategy and Planning and the Manager Capital and Maintenance Delivery | May 2009 | | Complete |
| 12 Confirm appointment of new trades positions | Jul 2009 | | Complete |
| 13 Appoint the next level of management | Jul 2009 | | Complete |
| 14 Managing Director to approve a revised organisational structure for Power Networks | Jul 2009 | | Complete |

| Milestone | Initial target date | Revised target date | Status |
|---|---------------------|---------------------|----------|
| Recommendation 4 – Deliver improved systems and processes | | | |
| 15 Identify process owners and ensure they have sufficient time to contribute to the AMC Project | May 2009 | | Complete |
| 16 Confirm that the Future State Design under the AMC Project does, in fact, address the requirements of Recommendation 4.2 | Dec 2009 | Jun 2011 | On Track |
| 17 Confirm that the AMC Project as implemented does, in fact, address the requirements of Recommendation 4.2 | Dec 2010 | Jun 2011 | On Track |
| Recommendation 5 – Enhance policies and policy documentation | | | |
| 18 A revised Maintenance Policy based on 'condition-based maintenance' will be approved by the General Manager Power Networks | Aug 2009 | | Complete |
| 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 | Sep 2009 | Dec 2010 | On Track |
| 20 A review of high priority work instructions, including detailed consultation with the workforce, will result in a revised set of maintenance policies | Jun 2010 | Dec 2010 | On Track |
| Recommendation 6 – Develop substation maintenance planning and works program | | | |
| 21 Set high-level and detailed five-year quantum plans for substation maintenance | Dec 2009 | | Complete |
| Recommendation 7 – Report on maintenance delivery, asset condition, risks and failures | | | |
| 22 Provide example maintenance delivery and asset condition report to the Board for five asset classes | Feb 2009 | | Complete |
| 23 Provide full maintenance delivery and asset condition reporting to the Board | Aug 2009 | | Complete |
| Recommendation 8 – Enhance workforce capability | | | |
| 24 Appoint a Training Manager to Remedial Asset Management Program with strong technical knowledge | May 2009 | | Complete |
| 25 Appoint a Training Manager in Power Networks with strong technical knowledge | Jun 2009 | | Complete |
| 26 Confirm coordinators' development needs during the MyPlan Performance Review | Jul 2009 | | On-going |
| Recommendation 9 – Implement a staff development program | | | |
| 27 Improved supervisory training will be provided to all coordinators | Nov 2009 | | Complete |
| 28 Approve a revised framework for trades and technical training | Oct 2010 | | On Track |
| 29 Commence first steps in Leadership Development | May 2009 | | Complete |
| 30 Individual development plans will be formulated for each manager, which align with and contribute to their current performance development plans | Jul 2009 | | Complete |

| Milestone | Initial target date | Revised target date | Status |
|--|----------------------------|----------------------------|---------------|
| 31 Suitable external leadership development opportunities will be assigned to each person | Jul 2009 | | On-going |
| 32 Commence development courses | Aug 2009 | | Complete |
| 33 All relevant managers receiving at least one session of development | Dec 2009 | | Complete |
| Recommendation 10 – Review incident management and investigations | | | |
| 34 Complete RISQ Investigation 1768 | Apr 2009 | | Complete |
| 35 Commence ameliorative action in light of Manton investigation and further information on Yorkshire switchboards | Jul 2009 | | Complete |
| 36 Review incident management procedures and approve resulting Work Instruction | Aug 2009 | | Dec 2010 |
| 37 Complete investigation into Casuarina events on access to the old switchboard | Sep 2009 | | Complete |

4 Summary

Most of the Mervyn Davies Report recommendations relate to improving Power and Water's maintenance operations in the longer term. Power and Water has prepared a Long Term Action plan to ensure these recommendations are diligently implemented and to provide clear direction for its leaders and workforce. The Long Term Action Plan covers:

- The maintenance cycle and move towards condition-based maintenance;
- Accountability and organisational structural changes;
- Documentation of policy, procedures, and work instructions;
- Reporting of maintenance activity and asset condition;
- Training and development of Power Networks staff; and
- Incorporating improvements into the Power Networks Business Plan.

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 the longer-term improvements 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 |