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

September 2009

PowerWater

Executive summary

In September and October 2008, failures at Casuarina zone substation resulted in power outages to Darwin's Northern suburbs.

Following this, the Northern Territory Government commissioned independent expert Mervyn Davies to investigate what led to these failures.

Power and Water worked with Mr Davies extensively to prepare his report and has embraced his recommendations to compliment ongoing efforts to build the security of services into the future.

The Corporation had earlier developed the Asset Management Capability Project, and almost immediately established the Remedial Asset Management Program (RAMP).

RAMP was charged with ensuring safe access to substations, carrying out remedial works and replacing the Casuarina Zone Substation 11kV switchboard.

The Long Term Action Plan (LTAP) ensures Power and Water has embedded the changes recommended in the Mervyn Davies Report and is increasingly well-placed to meet the Northern Territory's growing and changing needs.

Power and Water's first progress report, released in June this year, outlined the operational and organisational changes adopted as a result of Mr Davies' enquiry.

Since then, the Corporation has taken a number of further steps to increase its capacity to provide reliable power to the growing Territory population.

At Casuarina Zone Substation, two temporary switchboards are in place so the permanent switchboard can be decommissioned and rebuilt.

The new permanent switchboard is scheduled for installation and commissioning in early 2010.

Preparing for this has taken time as all associated infrastructure has been tested, reinforced and repaired where necessary to minimise the risk of disruption to customers and give crews a safe working environment.

Over the past three months Power and Water has continued inspecting, testing and repairing its other zone substations. As a result, need for maintenance work has been identified and taken place at a number of sites.

By the end of the 2008 - 2009 financial year, Power and Water had invested more than $1m in training for its power networks staff and employed another six people in this field.

Staff have been trained to use infra red and thermal equipment to identify sooner when equipment is at risk of failure and are now prioritising future maintenance and replacement programs.

This testing has helped the RAMP team to revise their maintenance schedule. It has identified a number of sites requiring work but staff do anticipate completing work as scheduled by the end of 2010.

Power and Water's plans in response to the Mervyn Davies Report are realistic but do require continued investment and diligence. There is a lot of work to do and we are committed to meeting the milestones specified in the reports in the coming year.

Major milestones

The charts at Appendices D and E illustrate the major milestones for each of Mervyn Davies' Recommendations, grouped under the headings and the progress made to date.

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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

1 Introduction

This is the Power and Water Corporation's second Progress Report on the Northern Territory Government's independent enquiry into electrical equipment failures at Casuarina Zone Substation and general asset maintenance practices.1

This summarises Power and Water's actions to:

- ensure that the condition of Power and Water's electrical equipment meets established industry standards;
- improve maintenance practice and performance; and so
- fulfil all the Enquiry's recommendations.

Our goal is to provide a reliable electricity supply to customers. To do this we must ensure that all Power and Water's electrical assets meet and operate at established industry standards. We are changing our maintenance practices, training, leadership and culture to achieve this.

1.1 Background

In September and October 2008, a number of electrical equipment failures resulted in electricity supply disruption to Darwin's Northern suburbs. As a result, the Northern Territory Government established an independent enquiry headed by Mervyn Davies into these events, Power and Water's operational response and electrical substation maintenance practices in Darwin.

The Enquiry's principal recommendations were that Power and Water should:

- Move its maintenance approach to 'condition based maintenance.'
- 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.
- Enhance 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.
- Implement a development program, with the objective of a more collaborative leadership style, improved communication and individual accountability.
- Review incident management and investigations, and complete some outstanding investigations.

[1] Independent Enquiry into Casuarina Zone Substation Events and Substation Maintenance Across Darwin, Final Report. Chairman: Mervyn Davies. 26 January 2009.

- Undertake an overall remedial program.
- Take immediate action to replace the Casuarina Zone Substation 11kV switchboard.

The full Davies' recommendations are provided in Appendix A.

1.2 Report structure

Power and Water's progress in meeting these recommendations follows:

- A summary of remedial works and the reform of substation maintenance operations, in Section 2.
- An extensive program of equipment condition monitoring in Section 3.
- Longer term measures to bring the standard of substation maintenance to established industry practice in its circumstances in Section 4.
- The effect on customers of these activities, both in the short and longer term in Section 5.

Each of the principal recommendations and associated timelines is presented in Appendix B.

1.3 Future reports

Power and Water will report quarterly to stakeholders (including the Board, Utilities Commission, NT Government and the wider community) for the life of this project.

Feedback would be welcomed. This report will be subject to an independent audit, an example scope of which is provided in Appendix C.

2 Progress

As can be seen from the table, some of this work began before the Casuarina incident and some began immediately after, where it was urgent or obviously had merit.

Ref	Recommendation summary	Start date	Target completion	On track
1	Move maintenance approach to 'condition-based maintenance.'	02/09	06/14	Yes
2	Implement 'condition based maintenance' in substations as quickly as possible by acquiring information, support and clarifying accountabilities.	11/08	06/10	Largely
3	Bed down organisational changes.	02/09	07/09	Largely
4	Deliver improved systems and processes.	02/08	12/10	Yes
5	Enhance policies and policy documentation.	11/08	06/10	Largely
6	Develop substation maintenance planning and works program.	02/09	12/09	Yes
7	Report on maintenance delivery, asset condition, risks and failures.	11/08	08/09	Largely
8	Enhance workforce capability, training, numbers and equipment.	12/08	02/10	Largely
9	Implement a development program, with the objective of a more collaborative leadership style, improved communication & individual accountability.	02/09	02/11	Yes
10	Review incident management and investigations, and complete some outstanding investigations.	02/09	12/09	Yes
11	Undertake Remedial Programs	11/08	09/10	Yes
11.3	Take immediate action to replace the Casuarina Zone Substation 11kV switchboard.	10/08	11/09	Yes

The remainder of this section highlights the most significant areas where progress has been made.

2.1 Apply 'objective need' to maintenance

Power and Water's first Progress Report outlined our shift to the "objective need, capacity to deliver" approach from the previous "constrained" approach.

Revisions of Power Networks planning criteria are ongoing and will be submitted to the Utilities Commission for approval.

2.2 Bed down organisational changes

The first Progress Report diagrammed the new Power Networks organisational structure, which is now in place. Power and Water continues to recruit – and has appointed – suitably experienced managers to fill key positions.

The restructure separated accountability for the performance of maintenance into a 'planning' team and a 'delivery' team. This will better support the workforce with planning advice, technical knowledge, and documentation (in the form of policies, procedures, work instructions and technical specifications).

2.3 Deliver improved systems and processes

In early 2008, Power and Water's Board approved a reform of the Corporation's asset management practice. The resulting Asset Management Capability project (AMC) will upgrade asset related systems, policies, procedures and culture and ultimately drive better plant and network reliability and more efficient maintenance.

The AMC project is on track to roll out to the electricity generation unit for the start of 2010 and other business units are scheduled each quarter after that. Power Networks is scheduled for 2011. A successful AMC project will go a long way to support the intent of the Davies' Enquiry.

2.4 Enhance workforce training, numbers and equipment

Mervyn Davies identified a number of areas where training should be improved, workforce numbers increased and equipment upgraded. Power and Water invested just under $1M in training in Power Networks in the 2008/09 financial year, including a greater level of craft-based training.

The first progress report outlined the revitalisation of our training program to June 2009.

Since then, training to support condition monitoring of substation assets has expanded. Staff have now completed Partial Discharge training, Infra Red Thermography and HV Insulation Training. Power and Water brought in experts in these fields and contextualised this with input from our own technical staff. Low Voltage, High Current Ductor training and Circuit Breaker Timing Training are scheduled for this quarter.

To ensure Power and Water's customers see the benefits of this long term we have:

- Enrolled five staff in the Advanced Diploma of Power Systems with the University of Southern Queensland (USQ). This starts on 28 September 2009.
- Started rotating RAMP staff to other distributors with visits to ETSA, Energy Australia and TransGrid. Future visits are planned to SP AusNet, Country Energy, Ergon, ENERGEX and Western Power.

To identify all our training needs, Power and Water is developing a detailed task analysis of all activities associated with substations. The results will be mapped to national qualifications.

To ensure the relevance and currency of training, Power and Water is participating in a number of national forums. Our Training Manager is a member of the ESI National Training Advisory Group and is chair of the Substations, National Training Advisory Committee. Representation at these forums has ensured the latest training practices and delivery methods.

The Mervyn Davies' Enquiry identified a need to upgrade some test equipment to allow more effective monitoring of asset condition. Power and Water has made a simple commitment to its workforce: if equipment is needed to work safely and effectively, it will be provided. More than $250,000 of state of the art test equipment has been purchased.

2.5 Remedial works - Immediate priorities after Casuarina

As outlined in our first progress report, Power and Water is continuing to use thermal technology to inspect indoor switchboards for overheating.

Following Casuarina, Power and Water identified a number of sites as priorities for assessment based on their contribution to system security and asset type.

Work at City zone substation, Snell Street zone substation, McMinns 66/22kV zone substation, Berrimah 66/11kV zone substation and Katherine power station 22kV assets was completed in mid-August. Details can be found in our first progress report.

As testing has progressed the RAMP team has become more aware of the extent of the work needed to secure each of the substations. In early inspections about half the infrastructure tested required at least some maintenance before being returned to service. More recently, several assets have required substantial refurbishment. The RAMP team has revised their works timetable to carry this work out and anticipates completing all condition testing and remedial maintenance work on the higher risk equipment by the end of 2010.

As well as the priority sites described above, Power and Water has carried out works at:

- West Bennett 11kV switching station
- Humpty Doo 66/22kV zone substation
- Tindal 22/11kV zone substation
- Tennant Creek 22kV zone substation

- Wood Street 11kV zone substation (indoor only)
- Lovegrove 22/11kV zone substation
- Cox Peninsular centre Yard 66/11kV Section
- Mott Street 11kV zone substation

2.6 Casuarina 11kV switchboard

Mervyn Davies' Preliminary Report recommended that the entire 11kV switchboard be replaced. The existing equipment is oil-insulated, more modern equipment uses vacuum or gas technology which limits damage even if the circuit breaker fails in service.

This quarter we have built a second temporary switchboard adjacent to the substation building and installed new circuit breaker equipment in that switchboard.

With the substation running off the two temporary switchboards, the entire existing 11kV Casuarina switchroom can be removed from service and replaced. This installation plan is designed to minimise the risk of customer outages and ensure staff safety.

The following actions remain:

- decommission the existing switchboard;
- build a new switchboard on the site of the deconstructed switchboard;
- install vacuum circuit breakers in the new switchboard;
- 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.

2.7 Condition assessment and remedial works

The Remedial Works Plan, as detailed in our report of June 2009, addresses recommendations 11.1, 11.2 and 11.4 from the Davies Enquiry, the need for urgent action in zone and distribution substations, and on busbar protection. It requires Power and Water to prioritise safety, minimise customer outages, ensure staff are trained and record the results of all equipment condition checks.

Major milestones

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

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

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. **COMPLETE**

Milestone 4: The clearance of each substation in line with attached schedule, following testing and remediation as required, with all substations cleared by September 2010. **ON TRACK**

Milestone 5: The GM-RAMP to approve a final Project Execution Plan and detailed installation plan by the end of June 2009. **COMPLETE**

Milestone 6: The General Manager RAMP to accept the new switchboard for service during the fourth quarter of 2009. **ON TRACK**

Milestone 7: The General Manager RAMP to accept the new transformer for service during the third quarter of 2010.

Refer to Appendix F for the Remedial Asset Plan.

3 Long term action plan

Most of Mervyn Davies' recommendations relate to improving Power and Water's maintenance operations for the long term. Power and Water is making the new practices part of operations, giving clear direction for its leaders and workforce.

The more detailed action plan can be reviewed in our first progress report.

3.1 Adopting condition-based maintenance

Recommendation 1 - Move to condition-based maintenance

A condition-based maintenance approach means intrusive work on switchgear is only performed when testing indicates that it is required.

Power Networks staff are now trained in a number of new technologies that allow non-intrusive monitoring and will incorporate this in their business plan, informed by the findings from the testing and remediation program.

Major milestones

Milestone 8: The first draft Power Networks 2010-11 Five-Year Business Plan and 20-Year Outlook maintenance forecasts to include a summary of planned maintenance as well as costs, based on a condition-based maintenance approach by August 2009. **COMPLETE**

Recommendation 2 - Implement in substations as quickly as possible

Since Casuarina, Power and Water has acquired more modern test equipment and provided training to its workforce on its use. It is basing its day-to-day maintenance on test results.

Switchgear testing being carried out on Power and Water equipment includes:

- Thermal cameras – provide an indication of where overheating is occurring. This test must be carried out with the equipment in service and carrying load current, so there is no disruption to customers.
- Insulation resistance – indicates the quality of the equipment's insulation to earth. If insulation resistance is relatively low, it indicates that there is a higher probability of insulation breakdown and subsequent failure.
- Contact resistance –provides an indication of the quality of the equipment's current path. If contact resistance is relatively high, it causes overheating in the equipment.

Major milestones

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

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

Recommendation 3 - Bed down organisational changes

Power Networks is in the process of appointing experienced advisors to positions that have either been vacant or been held on a temporary basis. This is enabling further recommendations from the Davies Report to be implemented.

Major milestones

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

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

Milestone 13: Appoint the next level of management by July 2009 (noting that this level of management would be unaffected by Recommendation 3.2). **PROGRESSING**

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

As acknowledged in the Davies' Report, the Asset Management Capability project will support wider changes in the business.

Major milestones

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

Milestone 16: Confirm that the Future State Design does, in fact, address the requirements of Recommendation 4.2 by December 2009.

Milestone 17: Confirm that the AMC as implemented does, in fact, address the requirements of Recommendation 4.2 by December 2010.

Recommendation 5 - Enhance policies and policy documentation

Senior staff have been appointed to ensure that substation maintenance policies are revised to reflect the new practices, checked by the workforce, embedded in training programs and reported upon.

Major milestones

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

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

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.

Recommendation 6 - Develop substations maintenance planning and works program

As recommended by Davies, the new structure separates decisions on "how much maintenance" from scheduling decisions. This will be reflected in maintenance plans and schedules, once the maintenance policy and procedure work described above is completed.

Major milestones

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

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

Reporting of maintenance delivery and asset condition will ensure that Power and Water is in good operational and asset health. If a backlog of maintenance develops the Board can intervene to ensure that adequate resources and leadership are deployed.

This gap was recognised by Power and Water as it developed the AMC project. The events at Casuarina increased its urgency. In November 2008 Power and Water started work on a maintenance delivery and condition reporting framework. The Board received an example report in February on five priority asset classes. This reporting will be extended to all asset classes.

Major milestones

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

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

3.2 Leadership and development

Recommendation 8 - Enhance workforce training, numbers and equipment

Power and Water is improving its training, recruiting more staff and obtaining better equipment for its workforce. As discussed in Section 2, there has been good progress already. Management will formalise these approaches to ensure this best practice continues.

Major milestones

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

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

Milestone 26: Coordinators' development needs will be confirmed during the My Plan Performance review by July 2009. **ONGOING**

As the management restructure is finalised, development needs for each coordinator will be identified.

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

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

Recommendation 9 - Improved leadership and communication

The Enquiry recommended Power Networks improve its leadership style, specifically:

- Improve communication and interpersonal skills for all personnel (structured to their role).
- Provide specific leadership, mentoring programs and personal development for those in 'people management' roles.
- Clarify role and job requirements.

Power Networks has started leadership communication forums that bring together the wider leadership team once every two months. A leadership development program is providing training and development to improve the skills of its leaders.

Major milestones

Milestone 29: Commence first steps in leadership development by May 2009. **COMPLETE**

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. **COMPLETE**

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. **COMPLETE**

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

Recommendation 10 - Review incident management and outstanding investigations

Davies recommended that Power and Water review its incident management procedure and complete a number of its outstanding investigations. The review of incident management procedures has been included in the Long Term Action Plan and accountabilities for incident investigation have been identified.

Two of the three outstanding investigations have been progressed. As recognised by Davies, the completion of the investigation into the Casuarina events will only be possible once the remaining Casuarina switchboard has been decommissioned.

Major milestones

Milestone 34: Complete Risk, Insurance, Safety and Quality Investigation 1768 by April 2009. **COMPLETE**

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

Remedial Asset Management Plan 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. **PROGRESSING**

Milestone 37: Complete investigation into Casuarina events on access to the old switchboard by September 2009. This will take place when the board is removed from Casuarina in the final quarter of 2009.

4 What it means for customers

Power and Water has ramped up its maintenance schedule, which means more equipment than usual will be taken out of service for testing and repair. Every protection measure is in place, but as we progress this project, there is an increased risk of customer outages.

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.

4.1 There may be some interruptions

RAMP is driving significant maintenance activity. Power and Water is planning work carefully to minimise the risk of outages and doing work at night to minimise inconvenience should an outage occur.

We have committed to:

- Avoid outages for our customers whenever possible.
- Where a planned outage is unavoidable, notify affected customers using letterbox leaflets, 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.

4.2 Long term, reliability will improve

This increased maintenance will provide customers with more reliable electricity supply as Darwin's population continues to increase. 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 benefits of a more secure and reliable electricity supply.

Appendix A: 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 PWC 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 PWC, 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 program 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 PWC'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
- Maintenance planning and program works development
- Maintenance works program reporting
- 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 PWC'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 PWC 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 6 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 PWC 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 PWC 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 CB 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 PWC 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		Current practice, have let specialist service contracts.

Ref	Recommendation	Plan ref	Owner	Target date	Progress
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.
3	**Bed down organisational changes.**	**LTAP**	**GM-PN**	**07/09**	**Service Agreement between Strategy& Planning and Capital & 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**	**12/10**	**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.

Ref	Recommendation	Plan ref	Owner	Target date	Progress
5	**Enhance policies and policy documentation.**	**LTAP**	**GM-PN**	**06/10**	**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 PWC environment and asset set.	LTAP	M-AM		Resource identified to develop PWC maintenance instructions.
6	**Develop substations maintenance planning and works program.**	**LTAP**	**GM-PN**	**12/09**	**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.
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**	**08/09**	**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.

Ref	Recommendation	Plan ref	Owner	Target date	Progress
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 to develop.
8	**Enhance workforce capability, training, numbers and equipment.**	**LTAP**	**GM-PN**	**02/10**	**Effective development and implementation of Workforce Training and development program**
8.1	Provide workforce and supervisor training and development.	LTAP	M-TPN		2 Power Network based training managers identified, first one commenced within RAMP team.
8.2	Recruit an additional 6 electrically trades qualified personnel experienced in condition monitoring techniques.) and annually review need.	LTAP	M-C&MD		Commenced.
8.3	Upgrade and progressively acquire additional new condition monitoring equipment.	LTAP	GM-RAMP		All equipment either arrived or on order.

Ref	Recommendation	Plan ref	Owner	Target date	Progress
9	**Implement a development program, with the objective of a more collaborative leadership style, improved communication and individual accountability.**	**LTAP**	**GM-PN**	**02/11**	**Leadership Program initiated. PN has also commenced regular leadership forums.**
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		Progressing.
10.2	Assign clear asset failure investigation accountabilities.	LTAP	GM-PN		Progressing.
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 examples.
10.4	Complete the residual Casuarina incidents' investigation.	LTAP	GM-RAMP		Will be completed as the existing switchboard is decommissioned.
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.

Ref	Recommendation	Plan ref	Owner	Target date	Progress
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		Switchboard ordered, completion expected first quarter 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

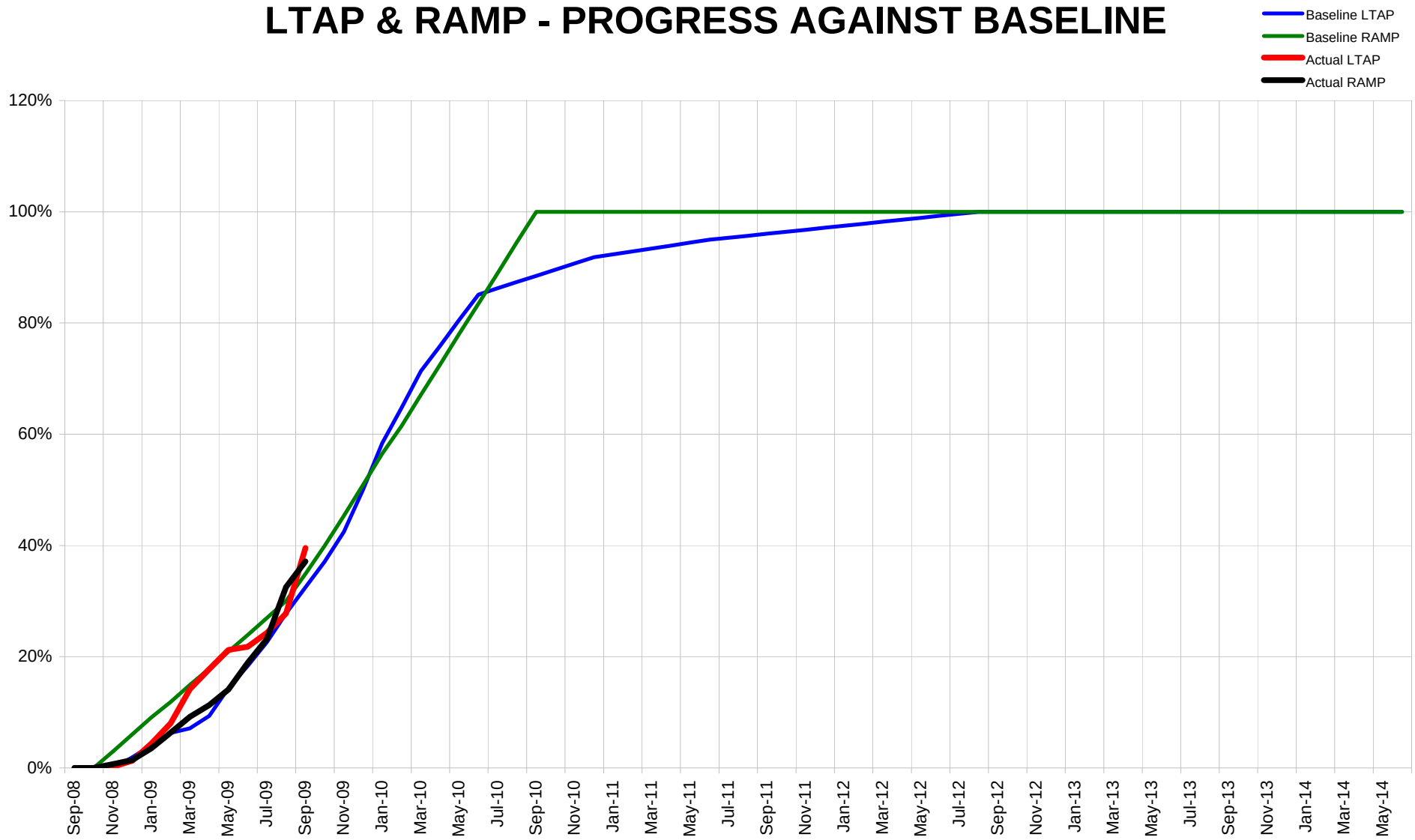
The audit is to be conducted on an annual basis, and are to be based on a sample of activities that represent high or medium risk to the organisation. Twenty days of audit work are to be allocated to this task annually.

B.4 Audit report

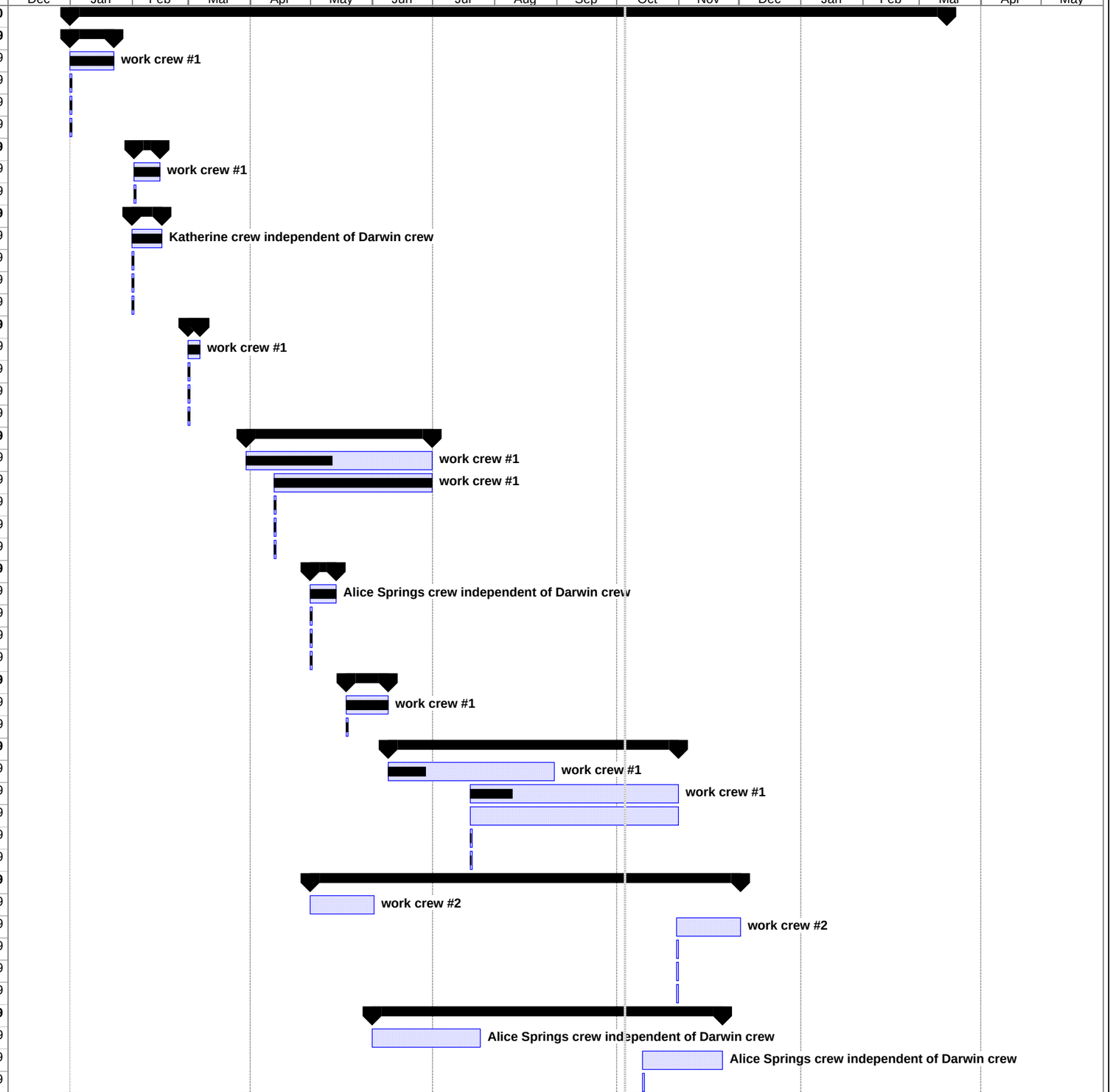
The auditor is required to provide a report to the Audit and Risk Sub-committee in accordance with an agreed work plan which will be confirmed at the commencement of the audit. The structure of the audit report is to be agreed at the commencement of the audit, and would be expected to provide an opportunity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

The auditor is to provide in the report a review opinion on compliance with the nominated controls (including specified major milestones) established by the Board.

LTAP & RAMP - PROGRESS AGAINST BASELINE



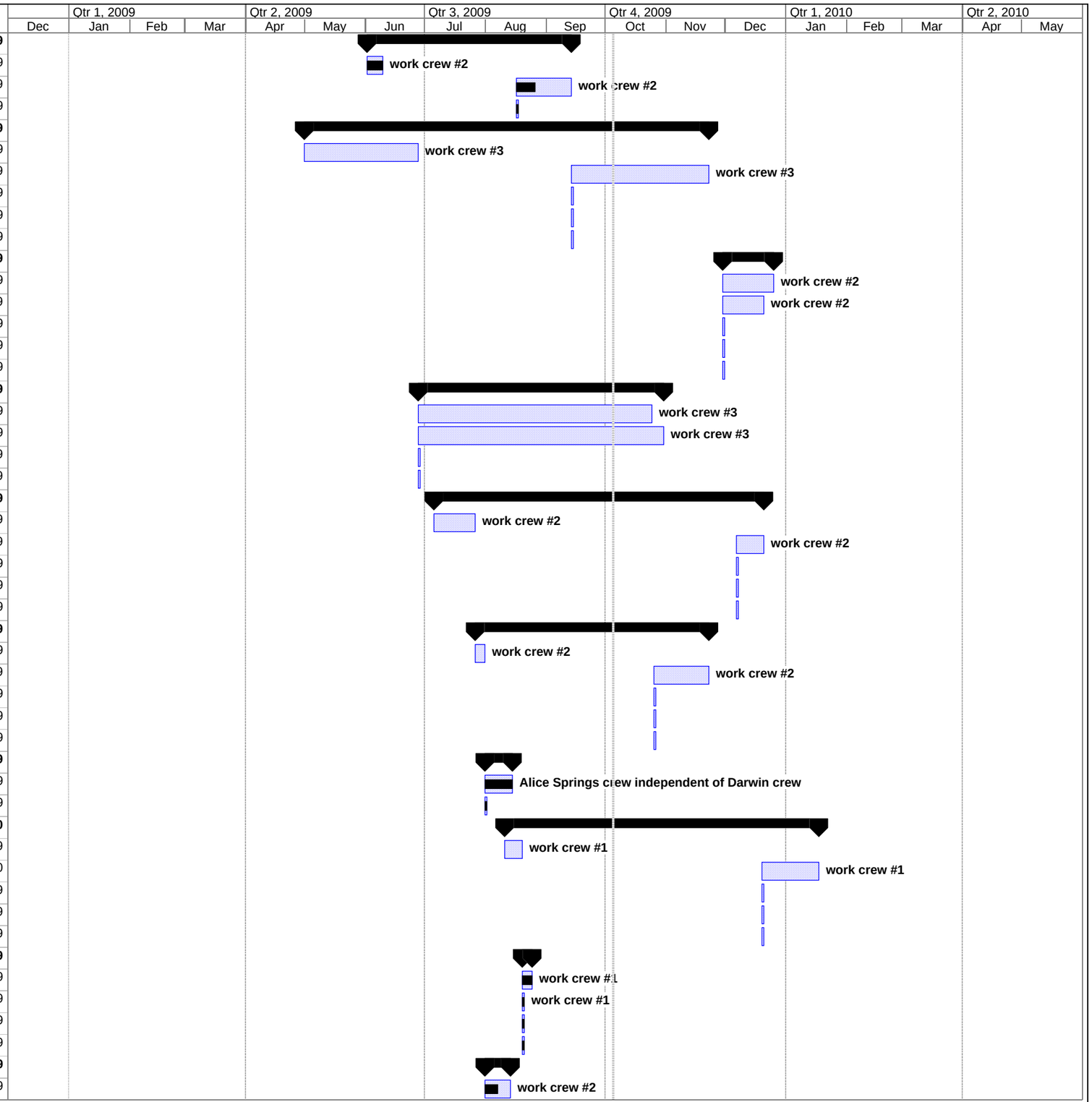
ID	Task Name	Duration	Start	% Complete	Finish
1	**RAMP Plan**	**438 days?**	**Thu 01/01/09**	**26%**	**Sun 14/03/10**
2	**McMinns 66/22 kV SS**	**22 days?**	**Thu 01/01/09**	**100%**	**Thu 22/01/09**
3	RAMP Plan	22 days	Thu 01/01/09	100%	Thu 22/01/09
4	OCB	1 day?	Thu 01/01/09	100%	Thu 01/01/09
5	CT	1 day?	Thu 01/01/09	100%	Thu 01/01/09
6	VT	1 day?	Thu 01/01/09	100%	Thu 01/01/09
7	**West Bennett St 11 kV Sw St**	**13 days?**	**Mon 02/02/09**	**100%**	**Sat 14/02/09**
8	RAMP Plan	13 days	Mon 02/02/09	100%	Sat 14/02/09
9	OCB	1 day?	Mon 02/02/09	100%	Mon 02/02/09
10	**Katherine 132/22 kV SS**	**15 days?**	**Sun 01/02/09**	**100%**	**Sun 15/02/09**
11	RAMP Plan	15 days	Sun 01/02/09	100%	Sun 15/02/09
12	OCB	1 day?	Sun 01/02/09	100%	Sun 01/02/09
13	CT	1 day?	Sun 01/02/09	100%	Sun 01/02/09
14	VT	1 day?	Sun 01/02/09	100%	Sun 01/02/09
15	**Humpty Doo 66/22 kV SS**	**6 days?**	**Sun 01/03/09**	**100%**	**Fri 06/03/09**
16	RAMP Plan	6 days	Sun 01/03/09	100%	Fri 06/03/09
17	OCB	1 day?	Sun 01/03/09	100%	Sun 01/03/09
18	CT	1 day?	Sun 01/03/09	100%	Sun 01/03/09
19	VT	1 day?	Sun 01/03/09	100%	Sun 01/03/09
20	**City Zone 66kV**	**93 days?**	**Mon 30/03/09**	**71%**	**Tue 30/06/09**
21	RAMP Plan	93 days	Mon 30/03/09	46%	Tue 30/06/09
22	Actual/Revised Plan	79 days?	Mon 13/04/09	100%	Tue 30/06/09
23	OCB	1 day?	Mon 13/04/09	100%	Mon 13/04/09
24	CT	1 day?	Mon 13/04/09	86%	Mon 13/04/09
25	VT	1 day?	Mon 13/04/09	86%	Mon 13/04/09
26	**Tennant Creek 22kV**	**13 days?**	**Fri 01/05/09**	**100%**	**Wed 13/05/09**
27	RAMP Plan	13 days	Fri 01/05/09	100%	Wed 13/05/09
28	OCB	1 day?	Fri 01/05/09	100%	Fri 01/05/09
29	CT	1 day?	Fri 01/05/09	100%	Fri 01/05/09
30	VT	1 day?	Fri 01/05/09	100%	Fri 01/05/09
31	**City Zone 11kV**	**21 days?**	**Tue 19/05/09**	**100%**	**Mon 08/06/09**
32	RAMP Plan	21 days	Tue 19/05/09	100%	Mon 08/06/09
33	OCB	1 day?	Tue 19/05/09	100%	Tue 19/05/09
34	**Snell St 66kV**	**145 days?**	**Tue 09/06/09**	**14%**	**Sat 31/10/09**
35	RAMP Plan	83 days?	Tue 09/06/09	23%	Sun 30/08/09
36	Actual/Revised Plan	104 days	Mon 20/07/09	20%	Sat 31/10/09
37	OCB	104 days?	Mon 20/07/09	0%	Sat 31/10/09
38	CT	1 day?	Mon 20/07/09	30%	Mon 20/07/09
39	VT	1 day?	Mon 20/07/09	30%	Mon 20/07/09
40	**Hudson Creek 132/66 kV SS**	**215 days?**	**Fri 01/05/09**	**0%**	**Tue 01/12/09**
41	RAMP Plan	32 days?	Fri 01/05/09	0%	Mon 01/06/09
42	Actual/Revised Plan	32 days	Sat 31/10/09	0%	Tue 01/12/09
43	OCB	1 day?	Sat 31/10/09	0%	Sat 31/10/09
44	CT	1 day?	Sat 31/10/09	0%	Sat 31/10/09
45	VT	1 day?	Sat 31/10/09	0%	Sat 31/10/09
46	**Sadadeen 22/11kV**	**175 days?**	**Mon 01/06/09**	**0%**	**Sun 22/11/09**
47	RAMP Plan	54 days?	Mon 01/06/09	0%	Fri 24/07/09
48	Actual/Revised Plan	40 days	Wed 14/10/09	0%	Sun 22/11/09
49	OCB	1 day?	Wed 14/10/09	0%	Wed 14/10/09



Project: RAMP Plan - 1stdraft
Date: Mon 05/10/09

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

ID	Task Name	Duration	Start	% Complete	Finish
50	**Snell St 11kV**	**104 days?**	**Tue 02/06/09**	**50%**	**Sun 13/09/09**
51	RAMP Plan	8 days?	Tue 02/06/09	100%	Tue 09/06/09
52	Actual/Revised Plan	28 days	Mon 17/08/09	34%	Sun 13/09/09
53	OCB	1 day?	Mon 17/08/09	100%	Mon 17/08/09
54	**Hudson Creek 132/66 kV SS**	**206 days?**	**Fri 01/05/09**	**0%**	**Sun 22/11/09**
55	RAMP Plan	58 days?	Fri 01/05/09	0%	Sat 27/06/09
56	Actual/Revised Plan	70 days	Mon 14/09/09	0%	Sun 22/11/09
57	OCB	1 day?	Mon 14/09/09	0%	Mon 14/09/09
58	CT	1 day?	Mon 14/09/09	0%	Mon 14/09/09
59	VT	1 day?	Mon 14/09/09	0%	Mon 14/09/09
60	**Berrimah 66kV**	**26 days?**	**Mon 30/11/09**	**0%**	**Fri 25/12/09**
61	RAMP Plan	26 days?	Mon 30/11/09	0%	Fri 25/12/09
62	Actual/Revised Plan	21 days	Mon 30/11/09	0%	Sun 20/12/09
63	OCB	1 day?	Mon 30/11/09	0%	Mon 30/11/09
64	CT	1 day?	Mon 30/11/09	0%	Mon 30/11/09
65	VT	1 day?	Mon 30/11/09	0%	Mon 30/11/09
66	**Berrimah 11 kV Retrofit**	**125 days?**	**Sun 28/06/09**	**0%**	**Fri 30/10/09**
67	RAMP Plan	119 days?	Sun 28/06/09	0%	Sat 24/10/09
68	Actual/Revised Plan	125 days	Sun 28/06/09	0%	Fri 30/10/09
69	OCB	1 day?	Sun 28/06/09	0%	Sun 28/06/09
70	Retrofit VCB	1 day?	Sun 28/06/09	0%	Sun 28/06/09
71	**Palmerston 66 &22kV**	**168 days?**	**Mon 06/07/09**	**0%**	**Sun 20/12/09**
72	RAMP Plan	21 days?	Mon 06/07/09	0%	Sun 26/07/09
73	Actual/Revised Plan	14 days?	Mon 07/12/09	0%	Sun 20/12/09
74	OCB	1 day?	Mon 07/12/09	0%	Mon 07/12/09
75	CT	1 day?	Mon 07/12/09	0%	Mon 07/12/09
76	VT	1 day?	Mon 07/12/09	0%	Mon 07/12/09
77	**Mary River 66/22 kV SS**	**119 days?**	**Mon 27/07/09**	**0%**	**Sun 22/11/09**
78	RAMP Plan	5 days?	Mon 27/07/09	0%	Fri 31/07/09
79	Actual/Revised Plan	28 days?	Mon 26/10/09	0%	Sun 22/11/09
80	OCB	1 day?	Mon 26/10/09	0%	Mon 26/10/09
81	CT	1 day?	Mon 26/10/09	0%	Mon 26/10/09
82	VT	1 day?	Mon 26/10/09	0%	Mon 26/10/09
83	**Lovegrove 22/11kV**	**14 days?**	**Sat 01/08/09**	**100%**	**Fri 14/08/09**
84	RAMP Plan	14 days?	Sat 01/08/09	100%	Fri 14/08/09
85	OCB	1 day?	Sat 01/08/09	100%	Sat 01/08/09
86	**Cox Pen. Transmitter 66/11 k**	**160 days?**	**Tue 11/08/09**	**0%**	**Sun 17/01/10**
87	RAMP Plan	9 days?	Tue 11/08/09	0%	Wed 19/08/09
88	Actual/Revised Plan	29 days?	Sun 20/12/09	0%	Sun 17/01/10
89	OCB	1 day?	Sun 20/12/09	0%	Sun 20/12/09
90	CT	1 day?	Sun 20/12/09	0%	Sun 20/12/09
91	VT	1 day?	Sun 20/12/09	0%	Sun 20/12/09
92	**Cox Pen. Centre Yard 66/11 k**	**5 days?**	**Thu 20/08/09**	**100%**	**Mon 24/08/09**
93	RAMP Plan	5 days?	Thu 20/08/09	100%	Mon 24/08/09
94	OCB	1 day?	Thu 20/08/09	100%	Thu 20/08/09
95	CT	1 day?	Thu 20/08/09	100%	Thu 20/08/09
96	VT	1 day?	Thu 20/08/09	100%	Thu 20/08/09
97	**Wood St 11 kV Sw St**	**13 days?**	**Sat 01/08/09**	**50%**	**Thu 13/08/09**
98	RAMP Plan	13 days?	Sat 01/08/09	50%	Thu 13/08/09



Project: RAMP Plan - 1stdraft
Date: Mon 05/10/09

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

ID	Task Name	Duration	Start	% Complete	Finish
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100	**Pine Creek 132/66 kV TS**	**48 days?**	**Tue 25/08/09**	**0%**	**Sun 11/10/09**
101	RAMP Plan	6 days?	Tue 25/08/09	0%	Sun 30/08/09
102	Actual/Revised Plan	28 days?	Mon 14/09/09	0%	Sun 11/10/09
103	OCB	1 day?	Mon 14/09/09	0%	Mon 14/09/09
104	CT	1 day?	Mon 14/09/09	0%	Mon 14/09/09
105	VT	1 day?	Mon 14/09/09	0%	Mon 14/09/09
106	**Austin Knuckey 11 kV Sw St**	**54 days?**	**Tue 01/09/09**	**100%**	**Sat 24/10/09**
107	RAMP Plan	13 days?	Tue 01/09/09	100%	Sun 13/09/09
108	Actual/Revised Plan	13 days?	Mon 12/10/09	100%	Sat 24/10/09
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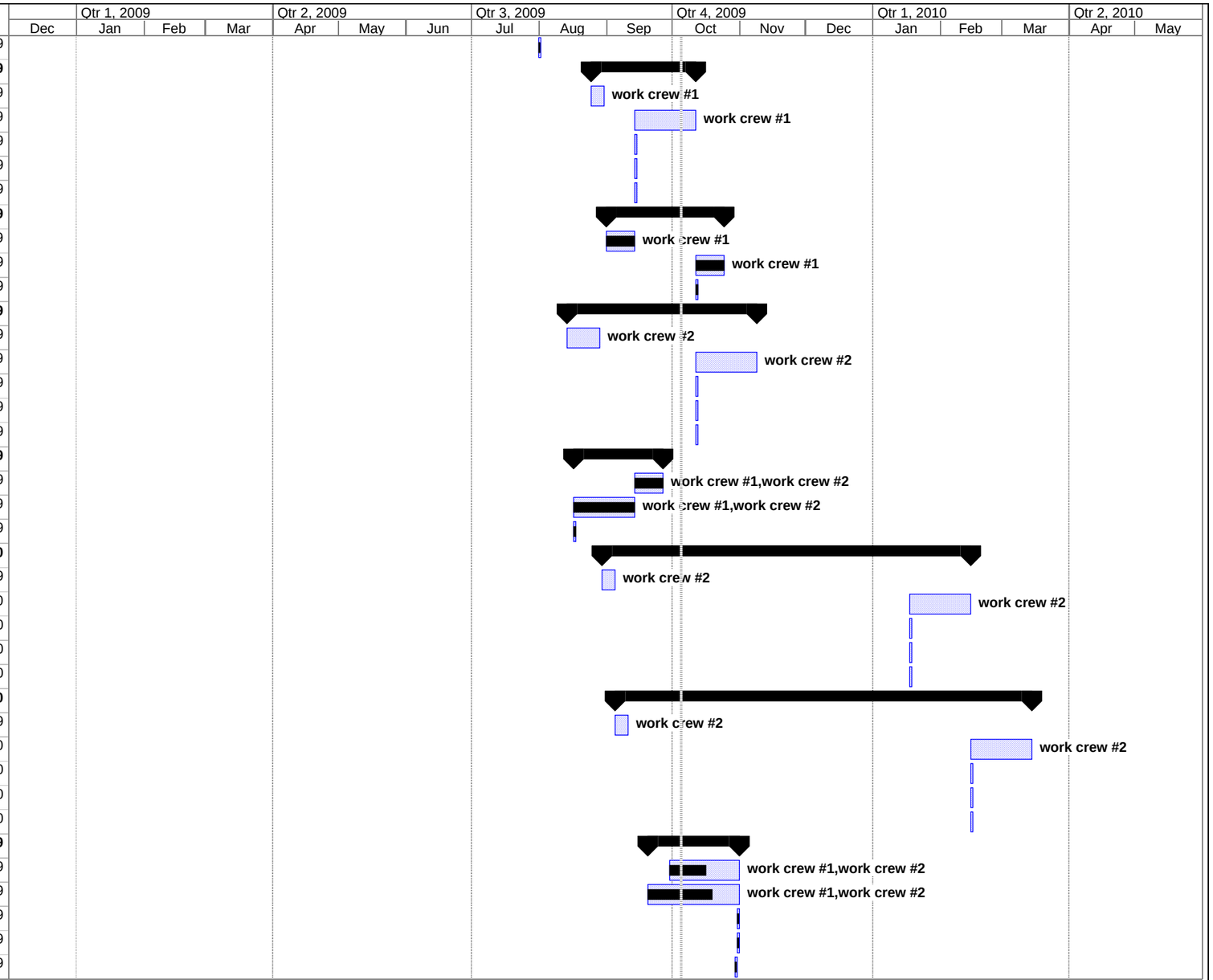
110	**Pine Creek 66/22 kV PS**	**87 days?**	**Fri 14/08/09**	**0%**	**Sun 08/11/09**
111	RAMP Plan	15 days?	Fri 14/08/09	0%	Fri 28/08/09
112	Actual/Revised Plan	28 days?	Mon 12/10/09	0%	Sun 08/11/09
113	OCB	1 day?	Mon 12/10/09	0%	Mon 12/10/09
114	CT	1 day?	Mon 12/10/09	0%	Mon 12/10/09
115	VT	1 day?	Mon 12/10/09	0%	Mon 12/10/09
116	**Mott St 11 kV Sw St**	**41 days?**	**Mon 17/08/09**	**100%**	**Sat 26/09/09**
117	RAMP Plan	13 days?	Mon 14/09/09	100%	Sat 26/09/09
118	Actual/Revised Plan	28 days?	Mon 17/08/09	100%	Sun 13/09/09
119	OCB	1 day?	Mon 17/08/09	100%	Mon 17/08/09
120	**Brocks Creek 66/11 kV SS**	**169 days?**	**Sun 30/08/09**	**0%**	**Sun 14/02/10**
121	RAMP Plan	6 days?	Sun 30/08/09	0%	Fri 04/09/09
122	Actual/Revised Plan	28 days?	Mon 18/01/10	0%	Sun 14/02/10
123	OCB	1 day?	Mon 18/01/10	0%	Mon 18/01/10
124	CT	1 day?	Mon 18/01/10	0%	Mon 18/01/10
125	VT	1 day?	Mon 18/01/10	0%	Mon 18/01/10
126	**Cosmo Howley 66/11 kV SS**	**191 days?**	**Sat 05/09/09**	**0%**	**Sun 14/03/10**
127	RAMP Plan	6 days?	Sat 05/09/09	0%	Thu 10/09/09
128	Actual/Revised Plan	28 days?	Mon 15/02/10	0%	Sun 14/03/10
129	OCB	1 day?	Mon 15/02/10	0%	Mon 15/02/10
130	CT	1 day?	Mon 15/02/10	0%	Mon 15/02/10
131	VT	1 day?	Mon 15/02/10	0%	Mon 15/02/10
132	**Casuarina 66/11 kV SS**	**42 days?**	**Sun 20/09/09**	**63%**	**Sat 31/10/09**
133	RAMP Plan	32 days?	Wed 30/09/09	53%	Sat 31/10/09
134	Actual/Revised Plan	42 days?	Sun 20/09/09	70%	Sat 31/10/09
135	OCB	1 day?	Sat 31/10/09	70%	Sat 31/10/09
136	CT	1 day?	Sat 31/10/09	80%	Sat 31/10/09
137	VT	1 day?	Fri 30/10/09	80%	Fri 30/10/09



Project: RAMP Plan - 1stdraft
Date: Mon 05/10/09

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone