Q. To the extent any maintenance plans associated with the Holyrood Plant or the combustion turbines are directly driven by the conclusions reached in formal condition assessments, please provide the resulting action plans or other recommended maintenance actions.

A. Hydro has completed condition assessments of the Holyrood Thermal Generating Station (HTGS) and each of the Hardwoods and Stephenville Gas Turbine stations. The results of these condition assessments have been used to determine the capital refurbishment requirements required at the plants, the adjustments to maintenance practices and ongoing condition monitoring. The following outlines the actions taken and planned to be taken for each of these facilities.

Holyrood Thermal Generating Station:

A comprehensive condition assessment and life extension study of the complete Holyrood Thermal Generating Station was performed by AMEC in 2010 using the Electrical Power Research Institute (EPRI) Standard for condition assessment. The AMEC Level 1 condition assessment study identified a list of equipment and systems that required a Level 2 condition assessment and also laid out a five and 20 year capital expenditure plan for HTGS. Hydro reviewed the list and, through consultation with AMEC, targeted select items that formed the basis for an extensive three-year program to perform Level 2 condition assessments on those assets identified as having a higher risk of failure in the near term. The three-year program started in 2012 and is currently in its third and final year. The scope of the work consists of an engineering study with detailed inspection results that assesses the condition of HTGS assets and makes recommendations for work that is required

to ensure reliable safe operation as a thermal generating station through 2020 and as a single unit synchronous condensing facility to 2041.

Because the Level 2 condition assessment work is intrusive and requires strip down of the equipment, every attempt was made to correct any findings at that time. The Level 2 assessment has confirmed the need for the capital projects identified in the 2010 study but some adjustments were made to timing and value based on Hydro's internal prioritization process.

Please see PUB-NLH-225 Attachment 1 for the complete list of recommendations and status for the condition assessment reports completed for the HTGS in 2010, 2012, 2013, and to date in 2014.

Hardwoods and Stephenville Gas Turbine Plants:
A condition assessment was completed on the Stephenville and Hardwoods Gas Turbine plans by Stantec in 2007.

The refurbishment action plan which resulted from the condition assessment work conducted in 2007 began in 2009 and will continue to 2016. The refurbishment of the Hardwoods Gas Turbine was completed over the period 2009 to 2013, and the refurbishment of the Stephenville Gas Turbine is beginning in 2014 and is scheduled to be complete in 2016. The refurbishment work will be done outside of the high demand winter period during periods approved by the System Operations department.

In addition to the recommendations arising from the Stantec review, Hydro has identified refurbishment activities based on its own facilities assessment. The list of refurbishment activities to be completed on the Stephenville Gas Turbine in 2014,

2015 and 2016 is provided in PUB-NLH-225 Attachment 2. The list indicates whether they are the result of the Stantec assessment or internal assessment and whether they provide reliability or other benefits. The refurbishment work has been prioritized to address most of the reliability based refurbishment activities in 2014.

The following tables show the status of all recommended actions resulting from the 2010, 2012, 2013 and 2014 condition assessments.

Recommendations and Status from 2010 Level 1 Condition Assessment	
Recommendation	**Status**
Implement the recommended Level 1 and 2 condition assessment tasks, including augmented steam turbine and generator overhauls at their next normal overhaul date to the extent economically practical.	Implemented.
Retain the nine year major inspection/overhaul interval and minor three year valve outage timing for the steam turbines, subject to any unexpected changes in conditions found at their inspection/overhauls and, in particular, at their next inspection/overhaul. Undertake the steam turbine pre-outage activities as existing.	Implemented.
Modify the generator inspection and overhaul interval back to every six years.	Implemented.
Perform in 2011 limited generator testing, with rotor in and on all units but particularly on Unit 1, to the extent safe and economically practical to obtain baseline data. Undertake work needed to scope out the details of the inspection/testing and stator rewind during the 2012 Unit 1 outage.	Complete.
In 2011 and 2012, carry out a detailed condition assessment of high pressure and temperature feedwater and steam lines on all units as a very high priority safety and reliability due diligence task. Plan and implement an extensive high pressure and temperature pipe hanger inspection program as part of the plant's PM, safety, and reliability due diligence programs.	Complete.

Recommendations and Status from 2010 Level 1 Condition Assessment	
Recommendation	**Status**
Carry out Level 2 inspections and testing in 2012, 2013, and 2014 for Units 1, 2, and 3 respectively on boiler components as identified through Level 1 condition assessment.	Complete.
Carry out Level 2 inspections and testing in 2012, 2013, and 2014 for Units 1, 2, and 3 respectively on high pressure heater components as identified through Level 1 condition assessment.	Online condition monitoring has not yet indicated the need to undertake this work.
Carry out Level 2 inspections and testing in 2012, 2013, and 2014 for Units 1, 2, and 3 respectively on deaerator components as identified through Level 1 condition assessment.	Planned for 2014.
Carry out Level 2 inspections and testing on low pressure heaters in 2011 for Units 1, 2, and 3.	Online condition monitoring has not yet indicated the need to undertake this work.
Maintain existing programs for major equipment, pumps, and motor inspection scheduling and overall PM process.	Implemented.
Procure one spare 4 kV motor for each of the boiler feedwater pumps, the forced draft fans, condensate extraction pumps, and the cooling water pumps – primarily designed for Units 1 and 2, but with plans on how to use them with Unit 3 as necessary.	Planned for 2014. It has been determined to be impractical to purchase motors which can be used on Units 1 and 2 which will fit on Unit 3 because of differences in horsepower and frame requirements. Nine motors will be required to provide spares for 4 kV motors.

Recommendations and Status from 2010 Level 1 Condition Assessment	
Recommendation	**Status**
Develop and implement an optimized plan for station switchgear (all units, common facilities), primarily breakers and motor control centres, addressing a combination of extensive replacement and sparing to maintain station reliability without interrupting normal unit operation.	Refurbishment/replacement plan developed and implemented. Enhanced PM being executed.
Inspect all condensate polishers in 2011. Replace Units 1 and 2 remaining enunciator panels (Unit 3 enunciator panel was replaced in 2007). Assess the cost-benefit of replacing polisher control panels on all units considered obsolete in light of generation end of service timeline.	Ongoing.
Negotiate to have the plant access road repaired to reduce probability of future accident.	Despite continued dialogue establishing the priority of major repairs to this road, which is owned by the Province, funding and repairs have not been executed to date.
Develop an onsite road replacement/refurbishment plan in 2011 addressing issues over next five years.	Further condition assessment work ongoing with consultants.
Close and manage existing on-site landfill in parallel with opening of a new on-site facility or expansion of the current one.	Not required because lower ash content has reduced volumes.
Replace the electric heat tracing for the heavy fuel oil transfer pipe line from the off loading dock to the main storage tanks in 2010 or early 2011.	Completed.
Internally inspect the heavy oil day tank in 2011 for regulatory purposes.	Completed.

Recommendations and Status from 2010 Level 1 Condition Assessment	
Recommendation	**Status**
Perform transformer oil gas analyses in 2010 and 2011 and complete the Hydro transformer electrical testing as per the schedule.	Including rectifier transformers, there are 18 transformers at Holyrood. Transformer oil gas analysis has been on going The electrical testing has also been on going with catch-up planned in 2014 on five transformers. A total of six transformers are planned in 2014. The remainder are either complete or on schedule to be completed in accordance with the AMEC schedule.
Perform underwater inspections on circulating water intake and discharge structures and piping in 2011. Perform walk down or remote integrity inspections of the large concrete pipes from the pump houses to the condensers and to the discharge siphon pits and inspect the stop log structure in 2011.	Concerns were raised from Hydro's Civil Engineering Department regarding de-watering this equipment and so underwater remote operated vehicles have been used to execute these inspections. In 2014, it is planned to de-water and inspect Unit 2.
Develop a program to assess the condition of underground services (raw water, fire water, grounding, waste water piping, and lighting) as the current condition is not clear.	Complete.
Undertake Level 2 integrity inspections of single contingency failure candidates including the dam at Quarry Brook, the raw water supply line from the dam site to the Stage 1 pumphouse, and the original water treatment plant clarifier, sand filters, and clearwell.	Inspections are planned for 2014 but there has been a backup system installed for the raw water line and the clarifier in the event of failure.
Develop a powerhouse and pumphouse roof replacement plan.	Complete.

Recommendations and Status from 2010 Level 1 Condition Assessment	
Recommendation	**Status**
Improve, refurbish or replace CEM systems, waste water basin discharge treatment systems, oil filled exciter transformers (if and when new PCB regulations are implemented), and the oily water separator and pipes.	Condition assessment work for 2014.
Develop a plan for a new building heating system (auxiliary boiler/steam or electric) needed after 2015. Assess and replace existing steam fed unit heaters and piping systems that are in poor condition.	Ongoing - aux boiler to be installed in 2017 to align with Muskrat Falls timeline.
Refurbish or replace the existing powerhouse elevator in the 2012 to 2015 period, and assess the timing requirements for a new administration building elevator.	Scheduled for 2014.
Repair the waste water basin building to address current corrosion, safe egress, and ventilation needs in 2012.	Ongoing 2014/2015.
Replace in 2011 the diesel fire pump, which is at end of life, in order to match the capacity requirements of the new fire protection system. Replace the electric firewater pump if capacity is less than the new requirement.	Completed.
Replace the Stage 2 diesel generator in or about 2014.	Planned for 2017. Hydro assessed the risk of a failure of these diesels and with the availability of the Stage 1 diesels and black start generation this replacement was deferred and scheduled for 2017.
Replace the Stage 1 air compressors that are near their end of life in 2014 and 2015.	Ongoing.

Recommendations and Status from 2010 Level 1 Condition Assessment	
Recommendation	**Status**
Unit 1	
Undertake a Unit 1 generator stator rewind as part of the 2012 generator overhaul. Initiate planning early in 2011. Undertake the generator actions list in 2010 and 2011.	Generator not to be converted to synchronous condenser and therefore not to be rewound. Significant testing analyzed by a third party expert established that the generator stator is in acceptable condition to operate reliably and safely through 2020.
Address Unit 1 issues and action with steam turbine, including work on main and intercept valve issues, stud bolt issues, and turning gear issues as per sections 8, 9, and 10 of this report.	Complete.
Refurbish Unit 1 stack breeching per current plans.	Complete.
If economically feasible for Unit 1, addition of reheat boiler tubes to improve reheat steam conditions and cycle efficiency.	Discussions have been ongoing with major service providers but it is generally felt that, given the limited remaining life of Holyrood operating as a generating station, this initiative is not feasible and further study would not be good value.
Repair of previously damaged (but not fully repaired) Unit 1 steam turbine elements or upgrading existing elements with more efficient designs.	Repairs executed in 2012/2013.
Unit 2	
Undertake a Unit 2 generator stator rewind as part of the 2014 generator overhaul. Initiate planning early in 2011. Undertake the generator actions list in 2010 and 2011.	Generator not to be converted to synchronous condenser and therefore not to be rewound. Significant testing analyzed by a third party expert established that the generator stator is in acceptable condition to operate reliably through 2020.

Recommendations and Status from 2010 Level 1 Condition Assessment	
Recommendation	**Status**
Address Unit 2 issues and action with steam turbine, including work on main and intercept valve issues, stud bolt issues, and turning gear issues as per sections 8, 9, and 10 of this report.	Complete.
Refurbish Unit 2 stack breeching per current plans.	Complete.
If economically feasible, for Unit 2 addition of reheat boiler tubes to improve reheat steam conditions and cycle efficiency.	Discussions have been ongoing with major service providers but it is generally felt that, given the limited remaining life of Holyrood operating as a generating station, this initiative is not feasible and further study would not be good value.
Repair of previously damaged (but not fully repaired) Unit 2 steam turbine elements or upgrading existing elements with more efficient designs.	Repairs scheduled for 2014.
Unit 3	
Undertake a Unit 3 generator rotor rewind at the next generator overhaul in 2016 or, with some additional reliability risk, between 2020 and 2022 subject to the findings of the 2016 inspection.	Planning ongoing.
Address issues and actions with the Unit 3 steam turbine, including work on main and intercept valve issues, and stud bolt issues.	Planned for 2016.
Assess the cost-benefit of replacing the existing steam turbine mechanical governor system in 2011 for implementation during the 2013 minor valve outage.	Discussions have been ongoing with major service providers but it is generally felt that, given the limited remaining life of Holyrood operating as a generating station, this initiative is not feasible and further study would not be good value.

Recommendations and Status from 2010 Level 1 Condition Assessment	
Recommendation	**Status**
Refurbish Unit 3 stack breeching per current plans.	Further condition assessment work ongoing with consultants.
For safety reasons, replace the Unit 3 control room relay panels as soon as practical to accommodate the current and required wiring.	Complete.
Implement Unit 3 generator thrust bearing retrofit to address lateral movement during synchronous generator operation to eliminate long term vibration and damage.	Complete.
Gas Turbine	
In 2010 inspect/assess the power turbine, gas turbine, gearbox, and generator without removing the unit to confirm major inspection/overhaul requirement.	Completed in 2011.
Complete 2010 boroscope inspections on gas and power turbine, combustor, and gearbox.	Completed in 2011.
Inspect and assess in 2010 the air intake and exhaust stack structure.	Completed in 2011.
Undertake in 2010 off-site overhaul of power turbine and gas turbine, and on-site or off-site gear-box inspection and gearbox seal replacement.	2011 condition assessment and cost benefit analysis lead to decision to discontinue use of the gas turbine in 2012.
Undertake in 2011 detailed inspection/testing of generator and electrical auxiliaries.	Completed in 2011.
Develop a design and implement the replacement the fuel handling and lube oil coolers inside an enclosure.	Completed in 2011.
Assess in 2010 the alternative of replacing the black start generator with a new or refurbished unit.	Completed in 2012.

Recommendations and Status from 2010 Level 1 Condition Assessment	
Recommendation	**Status**
<u>Management</u>	
Upgrade the existing document management procedures, systems, and resources at the plant.	Ongoing – Asset Management practices improved with creation of asset registry database.
Implement current station staffing plan, including some moderate additions in operational, on-site engineering support. Develop and implement a succession planning process.	Ongoing – two new Plant Engineers hired with minimum two-year commitment contracts.

Recommendations and Status from 2012 Level 2 Condition Assessment	
Recommendation	**Status**
The planned Phase 2 boiler and high-energy piping scope of work needs to be completed. The scope can be adjusted to account for the work completed in 2012 inspections including repeat wall thickness measurements on high temperature headers and piping and waterwall corrosion fatigue in Unit 3 waterwall tubing.	Completed.
Inspect Unit 1 steam drum at the downcomer nozzles.	Completed.
Inspect Unit 1 Superheat Header 6 (SH6) header at the east and west outlet nozzles.	Completed.
Inspect stub tube to header welds on the Unit 1 SH6 header.	Completed.
Inspect Unit 2 SH6 header east and west outlet nozzles to confirm no recurring damage accumulation.	Completed.
A critical surface defect size assessment be conducted for the Units 1 and 2 economiser inlet headers (one assessment covering both units) as a basis for continued operation without repair, and to define end of life.	Scheduled 2014 (Both Units 1 and 2).
A review of unit start operating practices be conducted to ensure measures to limit thermal cycles impacts are being effectively implemented.	Engage consultant operations technical representative in Fall 2014 to upgrade and review existing start up practices.
A review of unit lay-up practices be conducted to ensure measures to limit corrosion and pitting of boiler and piping components are being effectively implemented.	Completed.

Recommendations and Status from 2012 Level 2 Condition Assessment	
Recommendation	**Status**
A Flow Accelerated Corrosion (FAC) susceptibility analysis and management program is recommended to assess the full scope of FAC in the Holyrood units and opportunities to mitigate damage accumulation. This analysis can also include a review of cycle water chemistry control practices.	Additional locations to be added to HTGS boiler inspection and test plan based on external consultant recommendations.
A hanger inspection and high-energy steam piping program be developed and implemented to monitor damage accumulation and to identify and implement corrective actions.	Completed.
Results of the Level II assessment and life management strategies be integrated with the annual boiler and high-energy piping maintenance program.	Implemented.
Recommendation from Alstom/B&W: Replace Unit 2 lower reheater.	A run to failure philosophy has been adopted recognising that the tube wear rate is beyond end of life of the boiler based on the failure mechanism. Critical spare tubes/bends procured and on site.

Recommendations and Status from 2013 Level 2 Condition Assessment	
Recommendation	**Status**
Inspect Unit 1 and 2 economizer inlet headers. An engineering analysis to define critical surface defect size and growth rate is recommended for the Units 1 and 2 economiser inlet headers (one assessment covering both units) as a basis for continued operation without repair, and to define end of life. The need for similar analysis for Unit 3 will depend on the inspection results.	Scheduled to be completed in 2014 (Both Units).
Inspect Unit 1 or 2 boiler superheat crossover piping.	Complete.
Inspect Unit 1 or 2 SH4 girth weld and internal visual inspection.	Scheduled to be completed in 2014 (Unit 2).
Sample reheat tubing Dissimilar Metal Weld (DMW).	Not required (AMEC recommendation – sample when tubing is replaced).
Inspection of the Unit 3 economiser link piping supports.	Complete.
Unit 3 Steam drum inspection.	Complete.
Circumferential etch of the SH6, RH2 headers and the superheat link piping for evidence of a seam weld microstructure, on either Unit 1 or Unit 2.	Complete.
Unit 2 SH6 header east and west outlet nozzles are to be inspected for surface defects in 2013 to confirm no recurring damage accumulation.	Scheduled to be completed in 2014.

Recommendations and Status from 2013 Level 2 Condition Assessment	
Recommendation	**Status**
Routine inspection of the SH6 nozzle welds for creep damage is to be conducted on each of Unit 1 and Unit 2 every six years on both units alternating between units starting on Unit 2 in 2015. The next inspection would be conducted in Unit 1 in 2018, or 2017 given the possible operating hours in present operating plan. The inspections are expected to include wall thickness measurements to detect any impacts of corrosion.	Ongoing.
Unit 2 main steam piping east turbine flange weld at 6 year intervals. The inspection methods are to include replica, Phased Array Ultrasonic Testing (PAUT) and Magnetic Particle Inspection (MPI), starting in 2015.	Ongoing.
A sample of riser tubes is to be inspected on either Unit 1 or 2 to assess severity of pitting and potential axial cracking before 2015.	Scheduled to be completed in 2014 (Unit 2).
Re-inspect one of either the east or west Main Steam Valve (MSV) outlet welds, and Combined Stop Valve (CSV) outlet welds every three years for accelerated creep damage due to plastic strains created by the trip event. Consideration should be given to installing removable insulation on the selected locations to facilitate access to the welds.	Ongoing.
Periodic inspection of a downcomer nozzle inside the steam drum needs to be implemented. One end (one downcomer) every three years, alternating ends is recommended for both Units 1 and 2, starting with Unit 2 in 2015.	Ongoing.

Recommendations and Status from 2013 Level 2 Condition Assessment	
Recommendation	**Status**
A review of unit start operating practices is recommended to ensure measures to limit thermal cycles are being effectively implemented.	Ongoing.
A review of unit lay-up practices is recommended to ensure measures to limit corrosion and pitting of boiler and piping components are being effectively implemented.	Complete.
A FAC susceptibility analysis and management program consistent with industry practice is recommended to assess the full scope of FAC in the Holyrood units, to identify opportunities to mitigate damage accumulation, and to manage integrity implications. The susceptibility analysis can also include a review of cycle water chemistry control practices.	Cost benefit analysis being developed.
A hanger inspection and high-energy steam piping management program is recommended to monitor damage accumulation in the piping and condition of the supports to manage steam piping performance over the desired remaining life of the units. The inspections would include wall thickness measurements to assess wall loss due to high temperature corrosion, in 2015.	Ongoing.
Results of the Level II assessment and life management strategies be integrated with the annual boiler and high-energy piping maintenance program.	Implemented.
Review and corrective action is recommended to address minor mechanical issues and to balance loads on the trapeze hangers.	Scheduled for 2015.

Recommendations and Status from 2013 Level 2 Condition Assessment	
Recommendation	**Status**
Monitor pipe hangers in the topped or bottomed out condition, or showing no movement. Conditions where multiple pipe hangers in a system are either topped or bottomed out should be considered for analysis to determine impact on the system piping stresses and load distribution, and on the other pipe hangers. In addition, manufacturer specifications for the pipe hanger should be consulted.	Repairs made, analysis scheduled for 2015.
Periodic (three year) removal of waterwall tube samples from high heat flux elevations needs to be part of the on-going boiler management program.	Ongoing.
Repair the indicated BUR (Built-Up Roofing) and IRMA (Inverted Roofing Membrane Assembly) roofs. Assess the soft, unknown material on the powerhouse roofs. Carry out yearly inspections on the roof to monitor degradation and plan maintenance where necessary.	Three year capital upgrade plan starting 2015.
Repair the indicated overhead doors to restore functionality and safety. Carry out yearly inspections and maintenance.	Complete.
No immediate actions are required for the underground drainage pipelines but the recommendation is to re-inspect and re-assess the pipelines every five years to monitor for actionable issues.	Ongoing.
Replace access ladder and pipe supports in continuous basin.	2015 Capital.
Reapply sealant to the vertical cracks in the concrete in continuous basin.	2015 Capital.
Repair the membrane where it is peeling from the concrete in continuous basin.	2015 Capital.

Recommendations and Status from 2013 Level 2 Condition Assessment	
Recommendation	**Status**
Remove the obsolete piping from above the sump pit in continuous basin.	2015 Capital.
Based on a review of the Unit 3 generator inspection results, the generator should be overhauled in 2016, as is planned. Rewind of the generator stator and rotor will be required to achieve reliable synchronous condenser operation to 2041. It is recommended the rewind of both the rotor and stator be executed in the 2016 outage. Planning should commence several years in advance of the overhaul activities.	Planning for 2016 ongoing. Testing for 2014 is complete.
The waste water basin building requires mould remediation, insulation replacement and siding repairs.	2015 Capital.
Replace faulty or degraded electrical equipment (e.g. junction boxes, pull boxes, lighting fixtures, etc.) in waste water treatment building.	2015 Capital.
Undertake a study to resolve humidity issues causing mould, structural steel elements require remediation or replacement, replace cold-formed sills in waste water treatment building.	2015 Capital.
Perform structural assessment of existing monorail or replace with new monorail in waste water treatment building.	2015 Capital.
Recommendation from Alstom/B&W: Replace Unit 1 lower reheater.	A run to failure philosophy has been adopted recognising that the tube wear rate is beyond end of life of the boiler based on the failure mechanism. Critical spare tubes/bends procured and on site.

2014 Condition Assessment Work and Current Status	Status
Main Steam Piping	
East Boiler Link and gamma plug and safety valve nozzle.	Complete.
Boiler Stop Valve outlet, Upper Y West Leg and crotch, hanger lugs and drain and gamma plug.	Complete.
West Main Stop Valve Inlet, gamma plug, drain, thermal well and instrument connection.	Complete.
West Upper Turbine Terminal, flange weld.	Complete.
Hot Reheat Piping	
East Boiler Link and gamma plug and safety valve nozzle.	Complete.
Lower Y, inlet, hanger lugs and gamma plug.	Complete.
West combined stop valve inlet, gamma plug, drain and instrument connection.	Complete.
East Turbine Terminal, flange weld.	Complete.
Cold Reheat Piping	
West Boiler link.	Complete.
East horizontal run upstream of the check valves - for pitting.	Complete.
Drain and instrument connections below turbine, east side.	Complete.
Feedwater Piping	
Boiler feed pump 1 (west) discharge piping, thermal wells and elbows.	Complete.
Superheat attemperator station and bypass (8th floor, west side of boiler).	Complete.
Elbow before economizer.	Complete.
#6 HP Feedwater Heater Discharge piping from iso valve to downstream of tee.	Complete.
Low load discharge tee and downstream elbow.	Complete.
Boiler Internal/External Inspections and Testing (Unit 2)	
Superheater 3 to superheater 4 link piping.	Scheduled.
Riser tubes (10 locations).	Scheduled.
High pressure heater #5 outlet full flow tee.	Scheduled.
Economizer inlet header and economizer link piping supports	
Header Internal.	Complete.
Header Supports.	Complete.

Header Nipples.	Complete.
Economizer Recirculation Line (connection to east downcomer).	Complete.
Header Inlet Elbow.	Complete.
High Temperature Superheater Front Horizontal Spaced Inlet Header (Cold Reheat)	
Header Internal.	Complete.
Header Perforated areas.	Complete.
Header Supports.	Complete.
Header Nipples.	Complete.
Vents and Drains.	Complete.
High Temperature Superheater Front Horizontal Spaced Outlet Header (Main Steam)	
Header Internal.	Complete.
Header Wall.	Complete.
Header Supports.	Complete.
Header Circumferential Seams.	Complete.
Header Nipples.	Complete.
Header Outlet Nozzles.	Complete.
Header End Caps.	Complete.
Vents and Drains.	Complete.
HT Reheater Outlet Header (Hot Reheat)	
Header Wall.	Complete.
Header Supports.	Complete.
Header Circumferential Seams.	Complete.
Header Nipples.	Complete.
Header End Caps.	Complete.
Safety Valve Nozzle.	Complete.
Header Outlet Tees.	Complete.
Header Outlet Tee Welds.	Complete.
Vents and Drains.	Complete.
Superheat Attemperator/Reheat Vertical Header Feeder Piping.	Complete.
Primary SH outlet welds to vertical atteperator header.	Complete.
SH Attem Feeder welds to Secondary Superheater Inlet Hdr.	Complete.

Penthouse Riser Tubes	
Riser straight runs.	Complete.
Feeder Tubes from Downcomers to Waterwall Lower Headers.	Complete.
Steam Drum	
Drum Internals.	Complete.
Drum Seams.	Complete.
Feedwater Nozzles.	Complete.
Drum Head Penetrations.	Complete.
Steam Cooled Roof hanger lug attachments (sample).	Complete.
Lower waterwall header (front wall and side wall).	Complete.
Lower downcomer header.	Complete.
Generator Testing	
Unit 1.	Scheduled.
Unit 3.	Complete.
Civil Inspections	
Boiler Stacks (All three Units).	Pending Outage.
Raw Water Line Inspection.	Scheduled.
Powerhouse Siding Inspection.	Complete.
Electrical Inspections	
IR Testing on electrical equipment.	Scheduled.

Stephenville Gas Turbine Refurbishment Activities 2014 to 2016

Table 1. 2014 Planned Activities

Recommendation Description	Recommendation Source	Category
Engine overhaul, Serial number 202204	External Condition assessment	Reliability/Life extension
Inspect/refurbish power turbine assemblies	External Condition assessment	Reliability/Life extension
Replace ignition exciters	External Condition assessment	Reliability/Life extension
Replace fuel valve actuators	External Condition assessment	Reliability/Life extension
Upgrade engine air start system	Internal assessment/operating experience	Reliability/Life extension
Upgrade compressor room ventilation system	Internal assessment/operating experience	Reliability/Life extension
Procure replacement main lube oil, glycol, and dc oil pumps and motors	Internal assessment/operating experience	Reliability/Life extension
Redesign deflector rings	Internal assessment/operating experience	Reliability

Table 2. 2015 Planned Activities

Recommendation Description	Recommendation Source	Category
Inspect and overhaul the power turbine clutches	External Condition assessment	Reliability/Life extension
Replace the 15 kV power cable supplying the station service transformer	External Condition assessment	Reliability/Life extension
Replace select items in the control and instrumentation systems	External Condition assessment	Reliability/Life extension
Complete design and detailed engineering to replace the main glycol cooler	External Condition assessment	Reliability/Life extension
Complete design and detailed engineering to install an Inergen fire suppression system in the control building	External Condition assessment	Fire protection
Electrical system upgrades	Internal assessment/operating experience	Reliability/Life extension
Control and instrumentation system upgrades	Internal assessment/operating experience	Reliability/Life Extension
Inspection, clean and refurbish fuel heater	Internal assessment/operating experience	Life Extension
Install main lube oil, glycol, and dc oil pumps and motors	Internal assessment/operating experience	Reliability/Life Extension
Upgrade the DCS system	Internal assessment/operating experience	Life Extension
Replace engines air start system piping	Internal assessment/operating experience	Life Extension
Inspect compressed air receivers	Internal assessment/operating experience	Life Extension
Replace glycol system expansion joints	Internal assessment/operating experience	Life Extension
Complete detailed inspection of exhaust stacks and prepare specification for repair	Internal assessment/operating experience	Life Extension
Complete design and detailed engineering to install an Inergen fire suppression system in the alternator enclosure	Internal assessment/operating experience	Fire protection
Complete design and detailed engineering and procurement of a new MLO glycol pump and associated piping	Internal assessment/operating experience	Reliability/Life extension
Complete design and detailed engineering to install MLO heat exchanger and surge piping	Internal assessment/operating experience	Reliability/Life extension

Table 3. 2016 Planned Activities

Recommendation Description	Recommendation Source	Category
Inlet Air Systems A and B: cleaning/coating, rubber sealing, and upgrading of grating and handrails	External Condition assessment	Infrastructure refurbishment
Exhaust Stacks A and B: upgrade handrails, grating, man doors, platforms, and ladders	External Condition assessment	Infrastructure refurbishment
Alternator Enclosure: handrail modifications and new inspection window installation in man doors	External Condition assessment	Infrastructure refurbishment
Fuel Oil System: welding/coating at the top of the ladder on storage tank 35b, add access stairs and raise the top of the north dyke wall	External Condition assessment	Infrastructure refurbishment
Repair of alternator compartment side doors including the installation of new hinges	External Condition assessment	Infrastructure refurbishment
Gas Generator/Power Turbine Enclosures A and B: cleaning/coating, handrail modifications and inspection window installations	External Condition assessment	Infrastructure refurbishment
Install new glycol cooler for MLO and replace associated piping	External Condition assessment	Reliability/Life Extension
Install Inergen fire suppression system in the control building	External Condition assessment	Fire protection
Install ventilation modifications for the new Inergen system in the control building	External Condition assessment	Fire protection
Upgrade cladding, roofing, windows, air intake louvres/ducting, shingles, doors, ladders and steel structures on buildings	External Condition assessment	Infrastructure refurbishment
Provide new oil storage containment dyke area	External Condition assessment	Infrastructure refurbishment
Complete exhaust stacks repair based on the inspection and repair scope prepared in 2015	Internal assessment/operating experience	Infrastructure refurbishment
Install new redundant MLO glycol pump with the associated piping/skid	Internal assessment/operating experience	Reliability enhancement
Install Inergen fire suppression system for the alternator enclosure	Internal assessment/operating experience	Fire protection
Install new MLO heat exchanger (oil/glycol)	Internal assessment/operating experience	Equipment replacement
Install new waste oil storage tank	Internal assessment/operating experience	Equipment Addition