

MITCHELL UNIT 1 FORCED OUTAGE FINAL REPORT

July 28, 2012- August 6, 2012

SUMMARY

The following documents the work performed during the Mitchell Unit 1 Forced Outage. The unit was removed from service on 7/27 due to a spike in vibration. Later found to have been caused by a blade failure on the TE of LPA turbine. The work scope consisted of the evaluation of rotor blade damages, inspections and repairs needed to return the unit to service without disassembly.

The inspections and repair work was performed by RSO and CMS personnel. After a repair scope was received from Engineering, and CMS personnel arrived on site, a 2-10 hr shift was worked to complete repairs. Dayshift RSO supervisor, with a crew of 8, was Mitch Kalinowski. Nightshift RSO supervisor, with a crew of 6, was Pat Westfall. The Turbine coordinator was John Powell. The plant contacts were Jack Huggins on days and Kevin Sparks on nights.

The repairs were charged to WO# 41903121. The work was completed and the unit released on 8/4.

SAFETY

- No issues to report during this outage
- Site specific eye, ear, and hand protection PPE policies were followed

LP TURBINE

- Scaffold platforms were erected to access the condenser steam side exhaust hood doors.
- The steam side exhaust hood access doors were opened and air movers installed to aid in cooling.
- The initial inspection revealed that an L-0 blade tip on the TE of the LPA rotor that broken off damaging the next 31 blades.
- CMS personnel performed NDE inspections on the L-0 blades on both LPA and LPB rotors.
- CMS NDE reported no additional cracked blades found. Cracked lashing lugs were found in the following locations: LPA TE – 3, LPA GE – 1, LPB GE – 6.
- Columbus Engineering was contacted with as found information and replied with an approved repair scope.
- Information sent to Engineering included: There are a total of 120 L-0 blades on each end of the rotor. The broken blade is #91. The blade at 180° from #91 is #31. The blades are welded in groups of 5. #91 and #31 are both leading blades in their groups. All cracked lashing lugs were in the inner row.
- The Engineering repair scope called for removal of the remaining cracked blade back to 3” from the inner lashing lug. Removal back to the same location of the blade located 180° from the broken blade. Full weld repair of the cracked lashing lugs. The bent blades will be left as found, this rotor is scheduled to be replaced during a spring 2013 outage.

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- CMS personnel reported to site to complete the cutting of blades and welding of the cracked lashing lugs.
- Prior to the condenser air test, a total of 56 right side condenser tubes were plugged due to damage from the broken blade.
- A support brace that was completely penetrated by the broken blade was repaired by installing and welding a split sleeve over the holes.
- A hood spray nozzle was found broken off. A new section of pipe and coupling were used to make these repairs.
- A flow guide bolt locking sleeve was found broke off. It was welded back in place.
- An NDE check of the flow guide bolts was performed and 1 bolt was found that appeared to be broken. Upon removal, this bolt was found to have been cut-off to a shorter length than the rest. It was re-installed, tightened and the locking ring welded back in place.
- CMS personnel ground and blended impact areas on blade #53 and #66 and also smoothed some damaged blade tip with minimum removal of material.
- CMS provided NDE reports for LP L-0 blades and flow guide bolts.
- When the condenser air test was performed, 1 additional leak was found in the right side water box and 1 in the left side water box. The total condenser tubes plugged prior to and after this test was 58.
- Summit was used to vacuum the contaminated water from both LP hotwell areas.
- Both LP rupture diaphragms that were removed to help vent the heat from the condenser were replaced during reassembly.
- While operations were in the process of unit start-up, they found that the hotwell conductivity was high, adding an anti-leak agent did not correct the problem was the condenser was tagged back out to inspect for more leaks.
- The second condenser air test found 8 more tubes that needed plugged, only one of these was found by using soapy water, all other were found with the aid of the sonic ears. These tubes were plugged and the condenser was again released for unit start-up.
- The remaining broken blade end was sent to Columbus Engineering for examination. They determined that initial crack was started by an impact to the leading edge of the #91 blade which lead to its eventual liberation. The last two pictures in the following pages show this impact area.

BOILER FEED PUMP TURBINE

- The aux-condenser was opened and scaffolding built for the inspection of the last stage blades.
- A last stage blade inspection was performed on the turbine rotor by CMS NDE personnel, no issues were found. NDE report written and received.
- The aux-condenser scaffolding was removed and the access door closed.

MISC

- Cleaned-up work areas and returned tooling after completion of repairs.

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START-UP

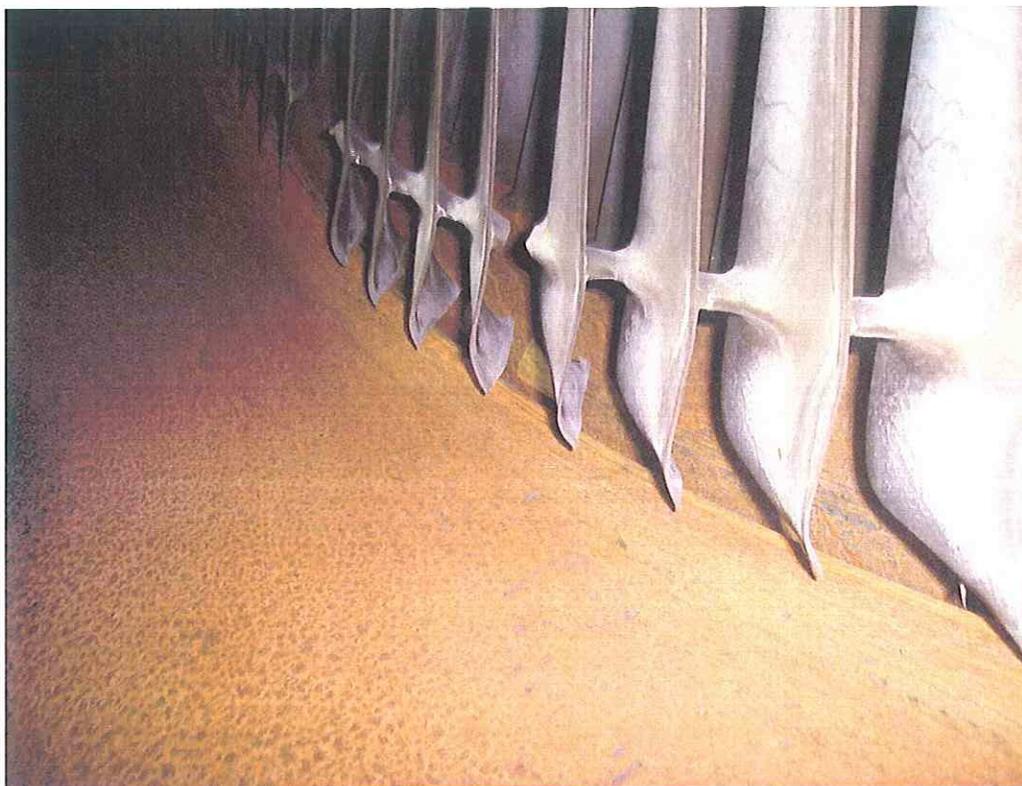
- Turbine Coordinator reported to site around 8:00PM on 8/5/12. RSO supervisor Kalinowski and 2 mechanics on site working a 7PM to 7AM shift.
- The unit was reset at 8:30PM, the turbine rolled off on steam leaking thru the valves.
- At 8:42PM the unit reached 1000 rpm's with no vibration issues other than normal generator critical speed that put the exciter bearing #11 in to alarm. Vibration level went back down as speed increased.
- At 8:52PM the unit reached 2160 rpm's for the start of 4hr heat soak.
- Vibration levels at 9:15PM: T1-1.5, T2-4.4, T3-3.0, T4-3.4, T5-1.8, T6-2.3, T7-0.7, T8-2.3, T9-1.6, T10-1.5, T11-2.0, @ 2160 rpm.
- At 1:40AM on 8/6, the heat soak was ended and the unit was ramped to 3600 rpm's then paralleled to the system at 2:10AM.
- Turbine Coordination called Jim Cable to pass Operations concern of the T5 bearing having 6 mils of vibration. Jim reported that he was OK with the 6 mils but did not want to see 7 mils. This information was relayed to Operations and unit start-up was continued.
- Vibration levels at 2:32AM: T1-1.2, T2-8.1, T3-1.2, T4-5.5, T5-5.6, T6-2.6, T7-1.2, T8-2.8, T9-1.2, T10-2.4, T11-1.4, @ 15.4 mw.
- Vibration levels at 6:00AM: T1-2.1, T2-8.1, T3-1.6, T4-5.8, T5-4.6, T6-2.3, T7-1.3, T8-2.7, T9-1.1, T10-2.5, T11-1.7, @ 92.4 mw.
- At 6:40AM on 8/6, Turbine Coordination was released from the site. Later in the day the unit was able to reach full load with no vibration issues.

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As Found Damage- Broken Blade #91



As Found Damage- Bend Blade Tips

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As Found Blade Tip Damage



As Found Blade Tip Damage

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Sample Piece Cut-off for Failure Analysis Testing- Impact Damage on Leading Edge (LS)



Close-up of Leading Edge Impact Damaged Area from Sample

MAGNETIC PARTICLE AND VISUAL INSPECTION REPORT

AMERICAN ELECTRIC POWER
Central Machine Shop
3100 MacCorkle Avenue, Building 309
South Charleston, West Virginia 25303

Page ____ of ____
 in Shop
 in Plant

IDENTIFICATION

CMS Number: _____ Date: 8-1-12 W/O #: _____
Facility/Unit: MITCHELL U-1 Description: LP A-B L-O BLADES
S/N: _____

TECHNIQUE:

Dry Powder Wet Fluorescent Non Fluorescent

EQUIPMENT:

Coil Prods Yoke Clamps

CURRENT TYPE: AC DC AMP TURNS: 2500

INSPECTION PROCEDURE: MI 1-5-2-3

INSPECTION SPECIFICATIONS: _____

INSPECTION RESULTS / DETAILS: List according to components section per example below

Example: Stage 1

- MAG Results =
- Visual Results = > CRACKS

Note: For each indication list the type (Crack, Linear Surface, Linear subsurface, Undercut, Non-Relevant)

A MT/VT INSPECTION OF THE L-O BLADES
ON LP A-B WAS PERFORMED NOTED IS THE
FOLLOWING.

LPA T/E - (3) BROKE LUGS (2 INNER 1 OUTER)

LPA G/E - (1) BROKE LUG (INNER)

LPB G/E - (6) BROKE LUGS (6 INNER)

LPB T/E - OK

(SEE LIQUID PEN. SHEET FOR LUG REPAIR)

(Continued on back of sheet)

INSPECTION PERFORMED BY: (AEP Level II MT Inspector)

Signature KYLE STRICKLAND DATE 8-1-12

APPROVED BY: (NDE Supervisor)

Signature _____ DATE _____

ULTRASONIC TEST REPORT
AMERICAN ELECTRIC POWER
CENTRAL MACHINE SHOP
3100 MacCorkle Avenue, Building 309
South Charleston, WV 25303

WORK ORDER NO. _____ DATE 8-1-12

1. IDENTIFICATION:

Facility MITCHELL U-1 Item LPA-B FLOW GUIDE BOLTS
PC/SN _____

2. TECHNIQUE:

Straight Beam Angle Beam Frequency - 1 MH 2.25 MH 5 MH
 Search Angle - 90° 45° 60° Single Transducer Dual Transducer

Type of Couplant EXOSON Test Unit GE

3. CALIBRATION - REFLECTOR TYPE: Drilled Hole V. Notch IIW Block Other _____

4. INSPECTION PROCEDURE: MI 1-5-2-4

5. INSPECTION SPECIFICATIONS: _____

6. TYPE OF INDICATION:

1. Crack 2. Lamination 3. Corrosion/Erosion 4. Internal Voids 5. Linear

7. SKETCH/DESCRIPTION:

A UT INSPECTION OF THE
FOLLOWING FLOW GUIDE BOLTS WAS
PERFORMED NOTED IS THE FOLLOWING.

LPA^{T/E} - OK
LPA^{G/E} - OK
LPB^{T/E} - OK
LPB^{G/E} - OK

8. INSPECTION PERFORMED BY: (AEP Level II UT Inspector)

Signature KYLE STRICKLAND DATE 8-1-12

9. APPROVED BY: (NDE Supervisor)

Signature _____ DATE _____

LIQUID PENETRANT AND VISUAL INSPECTION REPORT

AMERICAN ELECTRIC POWER
Central Machine Shop
3100 MacCorkle Avenue, Building 309
South Charleston, West Virginia 25303

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in Shop
 in Plant

IDENTIFICATION

CMS Number: _____ Date: 8-1-12 W/O #: _____
Facility/Unit: MITCHELL U-1 Description: LPA-B L-O LUGS
S/N: _____

TECHNIQUE:

Visible Dye Water Washable Fluorescent

MATERIAL:

Ferrous Nonferrous

INSPECTION PROCEDURE: MI 1-5-2-2

INSPECTION SPECIFICATION: _____

TYPE OF INDICATION: Crack Linear Inline Porosity Rounded Other: _____

INSPECTION RESULTS / DETAILS: List according to components section per example below

Example: Stage 1

- P / T Results = 7OK
- Visual Results = 7OK

Note: For each indication list the type (Crack, Linear Surface, Linear subsurface, Undercut, Non-Relevant)

A PT/VT INSPECTION OF THE LUG
WELD REPAIRS WAS PERFORMED ON THE
FOLLOWING L-O BLADES ON LPA-B.

LPA^{T/E} - 3 LUG REPAIRS -OK

LPA^{G/E} - 1 LUG REPAIR -OK

LPB^{G/E} - 6 LUG REPAIRS -OK

(Continued on back of sheet)

INSPECTION PERFORMED BY: (AEP Level II MT Inspector)

Signature KYLE STRICKLAND DATE 8-1-12

APPROVED BY: (NDE Supervisor)

Signature _____ DATE _____

MAGNETIC PARTICLE AND VISUAL INSPECTION REPORT

AMERICAN ELECTRIC POWER
Central Machine Shop
3100 MacCorkle Avenue, Building 309
South Charleston, West Virginia 25303

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 in Shop
 in Plant

IDENTIFICATION

CMS Number: _____ Date: 8-1-12 W/O #: _____
Facility/Unit: MITCHELL U-1 Description: BEPT L-O BLADE
S/N: _____

TECHNIQUE:

Dry Powder Wet Fluorescent Non Fluorescent

EQUIPMENT:

Coil Prods Yoke Clamps

CURRENT TYPE: AC DC AMP TURNS: PARKER PROBE

INSPECTION PROCEDURE: MI 1-5-2-3

INSPECTION SPECIFICATIONS: _____

INSPECTION RESULTS / DETAILS: *List according to components section per example below*

Example: Stage 1

- MAG Results = > OK
- Visual Results = > OK

Note: For each indication list the type (Crack, Linear Surface, Linear subsurface, Undercut, Non-Relevant)

A MT/VT INSPECTION OF THE BEPT
L-O BLADES WAS PERFORMED.

NO CRACKS NOTED

(Continued on back of sheet)

INSPECTION PERFORMED BY: (AEP Level II MT Inspector)

Signature KYLE STRICKLAND DATE 8-1-12

APPROVED BY: (NDE Supervisor)

Signature _____ DATE _____

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Date	Information
7/29/12 Days	Received call from Steve Snell asking to report to Mitchell on the 30 th AM. LPA GVN lost 8-10 inches of an L-0 blade tip and bent the tips of the next 31 blades.
7/30/12 Days	Drove in to CV to pick-up computer at 6:00 am. Left CV at 7:05AM to drive to ML. Arrived at ML at 8:45AM.
	CMS Kyle Strickland on site to perform NDE inspections on LPA and B L-0 blades and flow guide bolting.
	RSO Mitch Kalinowski supervising RSO crew.
	Called Jeremy Boles to request assistance with LPA rotor repairs, per Jack's direction. CMS agreed to sent 2 bladers and 2 welders, to work 1 ea. per 10 hr shift starting at 7:00AM on the 31 st .
	CMS completed NDE of LPA TE blades, 3 cracked lashing lugs found.
	Called Jeremy again at 01:50PM to inform him that Kyle is not feeling well and to get directions on cutting-off a section of the damaged blade to send to Dolan Lab for failure analysis.
	Sent bent blade picture to Alex Manukian, called and left him message to get information on cut line for blade piece to send to Dolan Lab.
	Called Jeremy to request a replacement NDE person for dayshift tomorrow.
	Jeremy called back to tell me that Jackie Cobb will leave at 5:00AM tomorrow morning to travel to ML, should arrive around 8:00AM.
	RSO cut the remaining 4" from the blade that broke. This piece will be sent to Dolan Lab in the morning. This leaves about 5" of blade length back to the next lashing lug.
	Had not received a return call from Alex, left 2 nd message at 03:35PM.
	RSO will start 2-10 hr shifts tomorrow. Pat Westfall will cover the second shift.
	<p>RSO Log Kalinowski Days:</p> <ul style="list-style-type: none"> • Signed onto clearances • 2012-1841-01 • 2012-1842-01 • 2012-1843-01 • 2012-1844-01 • 2012-1845-01 • 2012-1846-01 • Scaffold was built inside of condenser to reach last stage blades • All doors were cleaned , water box, condenser and rupture disk cover • Assisted CMS with their NDE inspections • Removed a portion of the damaged blade to be sent out to be analyzed
	Alex returned my call after I got to the hotel at 05:02PM. He will talk with Cable tomorrow about a plan to repair the bent blades.
7/31/12 Days	CMS welder (Francisco), blader (Gunnoe), and Supervisor (Moblely) on site for blade repairs.
	Kyle back on site this morning after leaving sick yesterday.
	Jackie Cobb, CMS NDE, on site to replace Strickland if he did not return.

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7/31/12 Days cont	RSO assisted CMS with unloading equipment from their trucks.
	Jack held safety briefing with CMS personnel and had them sign-on clearances.
	Entered LPA TE to collect information for Turbine Engineering
	Sent the following information in a note to Turbine Engineering: There are 120 total blades on the wheel. The blades are all in groups of 5. The broken blade is #91, the leading blade of the group. Cracked inner lashing lug on blade #7, trailing blade in the group. Cracked inner lashing lug on blade #19, 3rd back from leading blade. Cracked inner lashing lug on blade #107, trailing blade in the group. Blade #31 is 180 deg from broken #91. #31 is a leading blade. The length from blade tip to the center of the outer lashing lug is 3 1/2".
	Sent note, with pictures, to Cable for damaged support brace repairs.
	Reply received from Alex with repair scope: "I understand that the failed blade samples are being delivered by a carrier to Gary Wood today. I will support Gary in his failure investigation. With respect to the repair of the LPA rotor , we recommend cutting off the failed blade 3" above the lower lashing lug and cut off and removing the tip of blade number 31(180 degrees away) in the same location, to balance the rotor. Also, any cracked lashing lugs you find needs to be weld repaired before returning the unit to service."
	Forwarded the information from both mentioned notes above to Jeremy Boles and Steve Stotts at CMS.
	CMS NDE has found one cracked flow guide bolt; need to remove cracked bolt to order to locate a replacement from stock. Jack may send it to Shutlers to have replacements fabricated.
	CMS NDE completed inspection of LPA, 3 cracked lashing lugs on TE, 1 on GE, 1 cracked flow guide bolt on GE.
	CMD NDE has found 6 cracked lashing lugs on the GE of LPB.
	Cable approved repairing the damaged support bracket with a split carbon steel pipe sleeve
	CMS cut back damaged blade #91 to 3" from inner lashing lug.
	CMS cut blade #31 (180° from damaged blade) to match #91 to balance rotating mass.
	RSO Log Kalinowski Days: <ul style="list-style-type: none"> • Assisted CMS with checking LPB blades for cracks and also the cone ext bolts for cracks • There were six more lugs that were cracked on LPB Gen end of rotor • Started to repair the structural pipe inside of condenser • Scaffold was built to reach the cone ext bolt that is cracked on LPA Gen end R/S • The damaged blade and the blade that is 180 degrees opp have been cut to length and they have started to do weld repairs on the lugs on LPA (CMS) • The asp air covers have been installed • All doors have been cleaned • The square door gaskets and the o-rings for the water box doors and the plugs for the tubes are located by the front standard
	RSO Pat Westfall supervising RSO nightshift crew.
	*CMS welder (F), blader (G) on site for nightshift blade repairs.

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7/31/12 Nights	<p>RSO Log Westfall Nights:</p> <ul style="list-style-type: none"> ● Removed cracked flow guide bolt (Bolt appears to be cut or broken off, from washers out it is approx. 4 " long & bolt-hole is approx 5 " deep). Looked in bolt hole with mirror and there is nothing in it but a little dirt. ● Cleaned hole out & ran tap in it, tap would not go all the way in. Will probably have to cut new bolt off. Old bolt & locking ring on table in office. ● Finished plugging tubes in right side inlet end. Moved to right side outlet end & used rest of plugs ● Assisted CMS on repairs, finished LPA repairs moved to LPB & started Gen. end ...made 4 repairs. Rotor will need rolled to the other repairs ● Cleaned LPA rupture diaphragm flange Installed blocking on 2 rupture diaphragms for air test
8/1/12 Days	<p>The decision was made to perform last stage blade inspection on the boiler feed pump turbine rotor.</p> <p>CMS completed remaining lashing lug welds (2) on the GE of LPB.</p> <p>Clearances were hung on the BFPT and aux condenser so a last stage blade inspection could be performed.</p> <p>NDE of repaired lashing lugs was completed with no indications found.</p> <p>Engineering has determined that the blade failure was caused by past impact damage to the leading edge of the failed blade.</p> <p>Recorded more pictures of the blade impacts and tip damage and forwarded to Engineering.</p> <p>Talked with Alex about impact and tip damage of LPA TE blades.</p> <p>CMS inspected LPA TE to determine if any blade tips or impact areas needed further grinding and/or blending. They completed with minimal grinding per Alex.</p> <p>Info: damaged blades are #91 - #59, also found small impacts on #53 about 8" from tip, and #66 at the outer lashing lug.</p> <p>Note from Alex: Gentlemen, Here are some pictures of the Mitchell 1 L-0 blade tip that was cut off the failed blade. The sample has a very clear fracture surface. The leading edge of the blade vane (on the right sides of the pictures) has a notch from previous impact damage. A fatigue crack started and propagated toward the trailing edge. At the mid point of the vane the blade tip then ruptured from overload. The plant has been asked to look sings of old impact damage on adjacent blades. The object that caused the impact damage most likely came from upstream stages sometime in the past. The notch (impact) damage is on the left side of the pictures and the discharge side of the vane is on the right sides of the pictures. This sample will be sent to Gary Wood for more detailed investigation.</p> <p>Held call about rotor repairs with Dan Moyer on phone, Huggins, Gwinn, Mobley, Kalinowski & Powell on site.</p>
	<p>RSO Log Kalinowski Days:</p> <ul style="list-style-type: none"> ● Assisted CMS with their welding and with their NDE ● CMS checked the cone ext bolt that was taken out of the LPA GE R/S, it was OK to reuse ● Installed this bolt and torqued to 500 ft lbs ● Welded the locking ring to cone ext at LPA GE R/S ● Welded the locking ring to cone ext at LPA TE R/S ● Welded the new spray piping on

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	<ul style="list-style-type: none"> • Finished welding the support pipe • Cleaned all of the rupture diaphragm bolts • Walked down BFPT clearance (2012-1886) and the aux condenser clearance (2012-1887) • Cleaned the area at the aux cond door • Opened the aux door
8/1/12 Nights	<p>RSO Log Westfall Nights:</p> <ul style="list-style-type: none"> • Finished plugging condenser tubes in right side outlet end water box • Cleaned debris out of right side water boxes • Installed rupture diaphragms & blocking for air test • Assisted CMS on BFPT last stage blade inspection. Inspection was good (Kyle will be by in the morning with the report). • Cleaned aux. condenser door & made new gasket (hanging on cart by ladder) • Pulled weld lead out of LPA right side
	CMS NDE found no issues during BFPT last stage blade inspection.
8/2/12 Days	CMS welder and blader signed-off clearance and loaded out to return to the shop.
	Summit continues vacuuming in condenser, Brand removing scaffold from aux-condenser.
	Received reports from CMS NDE, loaded out to return to shop.
	Closed access door to aux-condenser
	Closed condenser steam side access doors on both LP's
	Started condenser air test, RS completed
	<p>RSO Log Kalinowski Days:</p> <ul style="list-style-type: none"> • Loaded CMS's truck • Closed the aux door • Took the balance port covers off and made new gaskets and installed • Closed all of the condenser doors • Set up PTTO for air test • Did the air test on the R/S water box, found only two more tubes that needed plugged • Signed off of various clearances
8/2/12 Nights	<p>RSO Log Westfall Nights:</p> <ul style="list-style-type: none"> • Did air test & checked tubes in left side water box , 2 leaks found & plugged • Resealed 3 door gaskets , both left side & right side outlet • Removed blocking from all rupture diaphragms • Removed aspirators / installed covers • Worked on clean up • Tool boxes to Conesville are in U-2 turb bay • Signed off of all clearances (released condenser steam side after repairs were made)
8/3/12 Days	Turbine Coordinator released from site @ 10AM. Will return for start-up on Sunday the 5 th .
	Brand removed scaffolding from water boxes.
	RSO had water box doors closed by 9AM.

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<p>8/3/12 Days cont</p>	<p>RSO Log Kalinowski Days:</p> <ul style="list-style-type: none"> • Scaffold was removed from the four water boxes • We closed all eight of the water box doors • Released the rest of the clearances • Cleaned up tools and various parts of the turbine floor
<p>8/3/12 10:10AM</p>	<p>Note sent by Jack Huggins: Here is a short summary of what was completed on the turbine during this outage. A complete detailed report will be placed in the regular outage report. CMS completed a complete NDE inspection of LPA, LPB and BFPT rotors last stage blades and flow guide bolting. CMS welders and bladers were on site working 2 shifts and completed repairs to items found by NDE inspection.</p> <p><u>LPA turbine end -</u> CMS - NDE inspection. - Removed additional section of broken blade #91 per Engineering recommendation for a total of 11". - Removed 11" from turbine blade #31, 180 degrees from blade #91 to correct balance. - Dressed up 2 additional impact damage areas on leading edges of blades #53 and 66. - Weld repaired 3 cracked lashing lugs (located during NDE inspection) - Lightly dressed tips on several of the bent blades.</p> <p>RSO - Reinstalled spray nozzle that had broken off top of flow guide. - Weld repaired damaged support strut that blade damaged. - Reinstalled 1 flow guide bolt lock plate.</p> <p>Summit - Vacuumed contaminated water from LPA hotwell areas, left and right side.</p> <p><u>LPA Generator end -</u> CMS - NDE inspection - Weld repaired 1 cracked lashing lug (located during NDE inspection)</p> <p>RSO - Removed 1 flow guide bolt identified as broken during NDE inspection, bolt was found to be 3/8" shorter than the others and was not broken. Bolt was reinstalled. - Installed new rupture diaphragm on hood.</p> <p><u>LPB Generator end -</u> CMS - NDE inspection - Weld repaired 6 cracked lashing lugs (located during NDE inspection)</p> <p>RSO -- Installed new rupture diaphragm on hood.</p> <p>Summit - Vacuumed contaminated water from LPB hotwell areas, left and right side.</p> <p><u>LPB turbine end -</u> CMS</p>

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	<p>- NDE inspection, no issues found.</p> <p><u>Main Condenser waterbox (Right)</u> RSO - Completed condenser air test and plugged 56 total tubes. 27 holes from impact, 28 hits (dents) from impact and 1 unrelated from blade damage.</p> <p><u>Main Condenser waterbox (Left)</u> RSO - Completed condenser air test and plugged 2 tubes unrelated from blade damage.</p> <p><u>BFPT Last stage blades</u> CMS - NDE inspection, no issues found</p>
8/4/12	<p>Kevin Sparks note sent 7:27AM: Operations began unit start-up last night and while doing so discovered that the Hotwell conductivity was high. Anti leak agent was added but it did not resolve the issue. From the readings that operations took it looks like we may still have some tubes leaking in the right side of the water box. Circ water and condenser steam side clearances have been hung and accepted. We are going to put on another air test to check for leaks after the lab treats the water boxes and scaffold is built. I will keep you updated on what is found.</p>
	<p>Kevin Sparks note sent 6:21PM: MLU1 Right Condenser The leaks plugged today are: Right Side - Bottom Bundle - "B" side (plug was in on "A" side) 11 tube down 3rd tube in, East side of tube sheet. Right Side - Bottom Bundle - East end Looking South Very Bottom (2nd tube up, 2nd tube in) Top side of Bottom Bundle - 23rd column #1 tube The tube leak in the "B" side was found with air and soap. The other 7 were found with the aid of the sonic ears. The tube sheets were soaped twice and checked by two different crews. I used the sonic ears and checked the tube sheet with the air on it. I have asked for the PTTTO to be removed and the clearance set back to red tags. Brand has been notified that the scaffold will be available for removal soon and they are on their way back in. The doors will be cleaned and prepped for closing. New gaskets will be installed. The air ports will be removed and covers installed. Manometer has been removed and stored (valves closed). Clearances will be released.</p>
	<p>Kevin Sparks note sent 10:30PM: Lighting and scaffold was removed from the water boxes. Doors were cleaned, new o-rings and RTV installed and closed. Aspirating ports were removed and inner and outer covers were installed. Steam side clearance was released. Signed off of the water side clearance. I will be out in the morning for RSO (if all goes well I will assign jobs and leave). RSO is also set-up to come out tomorrow evening with Mitch. At this time, the turbine is expected to roll up around 20:00 tomorrow evening.</p>
8/5/12	<p>Kevin Sparks note sent 8:36AM: I spoke with TK and the conductivity is good, they are coming ahead on the start-up.</p>

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	<p>The water box doors were checked and I did not see any leaks. Two RSO employees are out for start-up support. We have reviewed their JSA and they have been assigned their task. They are available for Plant Support as needed. I am leaving at this time but also available for start-up support as needed. Mitch Kalinowski and a small crew of RSO will be out this evening for start-up support. John Powell will call in and be available as needed should we need to install a balance shot. If the Turbine experiences excessive vibration during start-up, please print out the 1x vibration and phase angle on the right and left probes. This information will need to be provided to Jim Cable so that a balance shot can be calculated.</p>
8/5/12 Start-up	Turbine Coordinator reported to site around 8:00PM. RSO supervisor Kalinowski and 2 mechanics on site.
8:30PM	Operations reset turbine and the unit rolled off
8:42PM	Unit reaches 1000 rpm with no vibration issues other than normal generator critical speed put exciter bearing #11 in to alarm. Vibration level went back down as speed increased.
8:52PM	Unit reached 2160 rpm for start of 4hr soak.
9:06PM	Called Jim Cable to inform him that the unit was rolling at 2160 rpm for heat soak and would go to running speed around 1:00AM.
8/5/12 9:15PM	Vibration levels: T1-1.5, T2-4.4, T3-3.0, T4-3.4, T5-1.8, T6-2.3, T7-0.7, T8-2.3, T9-1.6, T10-1.5, T11-2.0, @ 2160 rpm
	Compared present vibration levels with start-up on 6/6/12, very little difference.
8/6/12	1:40AM Completed soak, started ramp to 3600 rpm
2:00AM	Reached 3600 rpm
2:10AM	Paralleled to system
2:16AM	Called Jim Cable to give him vibration levels, operations had some concern with T5 bearing being at 6 mils. Cable says to load it up, OK with 6 mils but not 7 mils.
2:32AM	Vibration levels: T1-1.2, T2-8.1, T3-1.2, T4-5.5, T5-5.6, T6-2.6, T7-1.2, T8-2.8, T9-1.2, T10-2.4, T11-1.4, @ 15.4 mw
4:30AM	Vibration levels: T1-1.4, T2-7.4, T3-1.4, T4-5.7, T5-4.9, T6-2.5, T7-1.3, T8-2.9, T9-1.2, T10-2.4, T11-1.6, @ 94.6 mw
6:00AM	Vibration levels: T1-2.1, T2-8.1, T3-1.6, T4-5.8, T5-4.6, T6-2.3, T7-1.3, T8-2.7, T9-1.1, T10-2.5, T11-1.7, @ 92.4 mw
6:40AM	Turbine Coordinator left site.
	<p>RSO Kalinowski 8/5 7PM – 8/6 7AM</p> <ul style="list-style-type: none"> • Assisted with unit one's start up • Unit was run up to around 90 megawatts and was held there • Brg #2 was still at 8.0 mils, John checked the last start up and this is where this brg was running, brg # 4 and brg#5 vibration was coming down when unit was going up on megawatts, so far all looks good