

# Appendix A

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Consistent with Commission Order No. 25,815 dated September 18, 2015 in Docket No. DE 14-120 and Item II. C. Hazard Tree Removal in the associated Settlement Agreement dated July 9, 2015.

**Recommendation** - the continuation of hazard tree assessment within Eversource's rights of way, and the trimming or removal of those trees which pose a threat to equipment. The company committed to continue this work and provide information regarding the work performed in reconciliation dockets for years 2014, 2015 and 2016. At the end of that time the distribution and transmission systems will have completed their on-going 5-year vegetation management cycles.

## 2015 NH Transmission

Hazard trees removed:	9,708 trees
2015 Budget:	\$2,000,000
Actual Expended:	\$1,508,802

## 2015 NH Distribution

Hazard trees removed:	11,695 roadside trees 624 off-easement trees
2015 Budget <sup>1</sup> :	\$3,000,000
Actual Expended:	\$4,067,892 (roadside) \$92,300 (off-easement)

<sup>1</sup> 2015 hazard tree budget (goal) = 8,500 trees

## Exhibit 3 - EHT Testimony

### Attachment EHT-1

#### Eversource Generation

#### Unit Outage Lists

**Merrimack 1**

01/01/15 through 12/31/15

<u>OUTAGE</u>	<u>START</u>	<u>END</u>	<u>OUTAGE CAUSE DESCRIPTION</u>	<u>DURATION HOURS</u>
A	01/03/2015 01:14	01/03/2015 14:45	FORCED DRAFT FAN	13.52
B	02/06/2015 20:00	02/06/2015 21:41	BOILER CONTROL - FURNACE PRESSURE	1.68
C	03/02/2015 01:04	03/02/2015 03:04	INSTRUMENT AIR COMPRESSOR- CONTROL AIR	2.00
D	04/03/2015 00:01	06/04/2015 14:28	MAJOR TURBINE OVERHAUL	1.502.45
E	06/04/2015 17:04	06/04/2015 22:05	MAJOR TURBINE OVERHAUL -POST OUTAGE TESTING	5.02
F	06/04/2015 22:28	06/04/2015 22:55	MAJOR TURBINE OVERHAUL -POST OUTAGE TESTING	0.45
G	06/05/2015 04:16	06/05/2015 07:56	MAJOR TURBINE OVERHAUL -POST OUTAGE TESTING	3.67
H	06/05/2015 13:36	06/05/2015 17:41	MAJOR TURBINE OVERHAUL -POST OUTAGE TESTING	4.08
I	06/06/2015 01:48	06/06/2015 04:17	MAJOR TURBINE OVERHAUL -POST OUTAGE TESTING	2.48
J	06/06/2015 12:50	06/08/2015 21:39	MAJOR TURBINE OVERHAUL -POST OUTAGE TESTING	56.82
K	06/15/2015 07:00	06/22/2015 14:17	TURBINE VALVE FLANGE LEAK	175.28
L	07/29/2015 08:45	07/29/2015 09:34	TURBINE VACUUM TRIP	0.82
M	09/23/2015 07:00	09/25/2015 12:35	FGD DCS - UPGRADE	53.58
N	10/08/2015 08:00	10/08/2015 15:46	FEEDWATER VALVES- BOILER FEED PUMP	7.77
O	11/09/2015 07:00	11/10/2015 14:54	DEAERATOR BLOCK VALUE	31.90

**Merrimack 2**

01/01/15 through 12/31/15

<u>OUTAGE</u>	<u>START</u>	<u>END</u>	<u>OUTAGE CAUSE DESCRIPTION</u>	<u>DURATION HOURS</u>
A	03/02/2015 00:52	03/02/2015 13:00	BOILER CONTROL & INSTRUMENTATION- FURNANCE PRESSURE	12.13
B	03/05/2015 23:30	03/11/2015 01:28	BOILER TUBE LEAKS	120.97
C	04/27/2015 00:01	05/19/2015 23:30	WET SCRUBBER INSPECTION/PENTHOUSE REPAIRS	551.48
D	09/08/2015 08:10	09/08/2015 09:26	TURBINE INLET STEAM TEMPERATURE	1.27
E	09/14/2015 07:00	11/27/2015 15:34	MAJOR OVERHAUL	1,785.57

**Merrimack CT 1**

01/01/15 through 12/31/15

<u>OUTAGE</u>	<u>START</u>	<u>END</u>	<u>OUTAGE CAUSE DESCRIPTION</u>	<u>DURATION HOURS</u>
A	01/21/2015 09:15	01/21/2015 11:51	GT BATTERY AND CHARGER SYSTEM	2.60
B	02/03/2015 12:45	02/03/2015 14:57	COMPRESSOR PROBLEMS	2.20
C	02/24/2015 10:55	02/24/2015 12:05	GT ATOMIZING AIR SYSTEM	1.17
D	05/04/2015 08:00	05/07/2015 16:36	GENERATOR INSPECTION	80.60
E	10/23/2015 11:07	10/23/2015 15:17	GT FUEL FILTERS	4.17
F	10/27/2015 06:30	10/27/2015 20:00	GENERATOR METER DEVICES/TRANSMISSION SYSTEM	26.50

**Merrimack CT 2**

01/01/15 through 12/31/15

<u>OUTAGE</u>	<u>START</u>	<u>END</u>	<u>OUTAGE CAUSE DESCRIPTION</u>	<u>DURATION HOURS</u>
A	02/06/2015 15:45	02/06/2015 15:57	GENERATOR BEARINGS AND LUBE OIL SYSTEM	0.20
B	02/13/2015 11:30	02/13/2015 12:07	GENERATOR CONTROLS AND METERING PROBLEMS	0.62
C	05/05/2015 07:00	05/12/2015 14:40	GENERATOR INSPECTION	175.67
D	10/23/2015 11:07	10/23/2015 15:17	JE FUEL FILTERS	4.17
E	10/29/2015 07:00	10/29/2015 16:07	GENERATOR METERING DEVICES	9.12
F	12/21/2015 17:25	12/21/2015 17:45	JET ENGINE FUEL SYSTEM PROBLEMS	0.33

**Newinaton 1**

01/01/15 through 12/31/15

<u>OUTAGE</u>	<u>START</u>	<u>END</u>	<u>OUTAGE CAUSE DESCRIPTION</u>	<u>DURATION HOURS</u>
A	03/02/2015 16:00	03/02/2015 17:15	OPACITY STACK EMISSIONS - FOSSIL STEAM UNITS	1.25
B	03/06/2015 04:30	03/06/2015 05:53	FEEDWATER CONTROLS	1.38
C	03/10/2015 09:06	03/11/2015 16:35	WATERWALL (FURNANCE WALL) LEAKS	31.48
D	03/30/2015 06:00	04/10/2015 17:32	PLANNED MAINTENANCE OVERHAUL	275.53
E	09/12/2015 06:00	11/21/2015 20:45	GENERATOR INSPECTION	1,695.75
F	11/22/2015 11:19	11/22/2015 19:45	BURNER MANAGEMENT SYSTEM	8.43

**Schiller 4**

01/01/15 through 12/31/15

<u>OUTAGE</u>	<u>START</u>	<u>END</u>	OUTAGE CAUSE DESCRIPTION	DURATION HOURS
A	03/08/2015 17:19	03/08/2015 18:12	BOILER, MISCELLANEOUS	0.88
B	05/05/2015 04:45	05/05/2015 05:25	OTHER MISCELLANEOUS STEAM TURBINE PROBLEMS	0.67
C	05/15/2015 07:00	05/15/2015 16:00	TRANSMISSION SYSTEM	9.00
D	05/16/2015 07:00	05/16/2015 16:00	TRANSMISSION SYSTEM	9.00
E	05/17/2015 07:00	05/17/2015 14:00	TRANSMISSION SYSTEM	7.00
F	07/06/2015 09:44	07/06/2015 10:15	FEEDWATER CONTROLS	0.52
G	07/17/2015 08:00	07/18/2015 03:55	BOILER, MISCELLANEOUS	19.92
H	07/20/2015 22:00	07/21/2015 17:40	BOILER, MISCELLANEOUS	19.67
I	08/02/2015 13:20	08/03/2015 15:44	WATERWALL (FURNACE WALL) LEAKS	26.40
J	08/20/2015 08:04	08/20/2015 08:50	GENERATOR METERING DEVICES	0.77
K	09/18/2015 11:03	09/18/2015 11:30	OTHER BOILER CONTROL AND INSTRUMENTATION PROBLEMS	0.45
L	11/01/2015 12:50	11/03/2015 16:00	ECONOMIZER LEAKS	51.17
M	12/15/2015 11:00	12/16/2015 16:47	ECONOMIZER LEAKS	29.78



**Schiller 5**

01/01/15 through 12/31/15

<u>OUTAGE</u>	<u>START</u>	<u>END</u>	<u>OUTAGE CAUSE DESCRIPTION</u>	<u>DURATION HOURS</u>
A	01/01/2015 00:00	01/01/2015 08:17	BOILER. MISCELLANEOUS	8.28
B	02/01/2015 00:29	02/02/2015 21:56	AIR SUPPLY PROBLEMS	45.45
C	02/09/2015 02:35	02/09/2015 21:56	MISCELLANEOUS BALANCE OF PLANT PROBLEMS	19.35
D	02/21/2015 10:00	02/25/2015 09:35	BOILER TUBE LEAKS	95.58
E	03/28/2015 11:30	04/18/2015 09:17	SCHEDULED MAINTENANCE OVERHAUL	501.78
F	04/21/2015 18:20	04/24/2015 15:20	TURBINE GOVERNING SYSTEM	69.00
G	08/06/2015 13:55	08/13/2015 02:09	ECONOMIZER LEAK	156.23
H	09/05/2015 15:40	09/10/2015 05:30	FLUIDIZED IN-BED TUBE LEAK	109.83
I	11/03/2015 10:12	11/09/2015 23:45	RELIABILITY MAINTENANCE OUTAGE	157.55

**Schiller 6**

01/01/15 through 12/31/15

<u>OUTAGE</u>	<u>START</u>	<u>END</u>	<u>OUTAGE CAUSE DESCRIPTION</u>	<u>DURATION HOURS</u>
A	03/04/2015 15:20	03/06/2015 21:15	WATER WALL (FURNACE WALL) LEAKS	53.92
B	05/15/2015 07:00	05/15/2015 16:00	TRANSMISSION SYSTEM	9.00
C	05/16/2015 07:00	05/16/2015 16:00	TRANSMISSION SYSTEM	9.00
D	05/17/2015 07:00	05/17/2015 14:00	TRANSMISSION SYSTEM	7.00
E	06/21/2015 10:15	06/21/2015 13:00	BOILER. MISCELLANEOUS	2.75
F	07/17/2015 08:00	07/18/2015 03:55	BOILER. MISCELLANEOUS	19.92
G	09/07/2015 00:01	10/23/2015 19:45	MAJOR OVERHAUL - TURBINE INSPECTION	1.123.73
H	11/14/2015 13:35	11/14/2015 14:20	BOILER. MISCELLANEOUS	0.75
I	12/08/2015 07:00	12/08/2015 16:25	OTHER MISCELLANEOUS STEAM TURBINE PROBLEMS	9.42

**Schiller CT 1**

01/01/15 through 12/31/15

<u>OUTAGE</u>	<u>START</u>	<u>END</u>	OUTAGE CAUSE DESCRIPTION	DURATION HOURS
A	05/15/2015 07:00	05/15/2015 16:00	TRANSMISSION SYSTEM	9.00
B	05/16/2015 07:00	05/16/2015 16:00	TRANSMISSION SYSTEM	9.00
C	05/17/2015 07:00	05/17/2015 14:00	TRANSMISSION SYSTEM	7.00
D	10/19/2015 07:00	10/23/2015 16:55	GENERAL JET ENGINE UNIT INSPECTION	105.92

**Wyman**

01/01/15 through 12/31/15

<u>OUTAGE</u>	<u>START</u>	<u>END</u>	<u>OUTAGE CAUSE DESCRIPTION</u>	<u>DURATION HOURS</u>
A	01/17/2015 4:00	01/17/2015 6:45	LATE START - SYNCHRONOUS RELAY	2.75
B	02/05/2015 15:35	02/07/2015 2:00	CONDENSER TUBE PLUG FAILURE	34.42
C	02/07/2015 2:00	02/07/2015 18:20	MAINTENANCE OUTAGE- CIRCULATING WATER PIPING LEAK	16.33
D	04/27/2015 0:00	05/08/2015 0:00	MAINTENANCE OUTAGE- ID FAN SERVO REPLACEMENT	264.00
E	05/08/2015 0:00	05/22/2015 5:15	MAINTENANCE OUTAGE- SUPERHEATER TUBE LEAK	341.25
F	05/23/2015 0:01	06/01/2015 14:53	MAINTENANCE OUTAGE- ID FAN SERVO ADJUSTMENT	230.87
G	06/22/2015 0:01	06/25/2015 20:00	MAINTENANCE OUTAGE- CONDENSER TUBE PLUG REPLACEMENTS	91.98
H	10/25/2015 0:01	11/23/2015 15:57	ANNUAL OUTAGE - BOILER INSPECTION	712.93

outage	Site	Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Lost Generation (Y or N)	Outage Type	Cause of Outage
A	Amoskeag	1	3/9/15 7:42	3/13/15 10:31	98.82	N	AI	Annual Inspection
B	Amoskeag	1	9/8/15 12:16	9/8/15 13:01	0.75	N		Voltage matching issue
A	Amoskeag	2	2/2/15 7:36	2/17/15 15:20	367.73	N	AI	Annual Inspection
B	Amoskeag	2	2/26/15 8:39	2/26/15 8:48	0.15	N	EMO	Voltage Regulator Unresponsive
A	Amoskeag	3	2/23/15 7:33	2/27/15 13:10	101.62	N	AI	Annual Inspection
B	Amoskeag	3	11/25/15 7:37	11/25/15 8:30	0.88	N	EMO	Oil leak

outage	Site	Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Lost Generation (Y or N)	Outage Type	Cause of Outage
A	Ayers Island	1	3/16/15 7:51	3/20/15 15:01	103.17	N	AI	Annual Inspection
B	Ayers Island	1	8/31/15 9:45	8/31/15 12:11	2.43	Y	EMO	Diver Safety-G2 headgate inspection
C	Ayers Island	1	9/1/15 15:34	11/9/15 16:38	1657.07	Y	EMO	Leaking penstock
A	Ayers Island	2	4/7/15 9:25	4/7/15 10:01	0.60	N	EMO	Worn exciter brushes.
B	Ayers Island	2	8/17/15 8:27	8/28/15 13:10	268.72	Y	AI	Annual Inspection
C	Ayers Island	2	8/28/15 13:10	9/29/15 11:17	766.12	Y	EMO	Broken headgate cable
D	Ayers Island	2	9/29/15 11:17	9/29/15 14:40	3.38	Y	TRIP	Bad PLC card
A	Ayers Island	3	3/23/15 7:44	3/27/15 16:00	104.27	Y	AI	Annual Inspection
B	Ayers Island	3	3/27/15 16:00	4/6/15 18:18	242.30	Y	EMO	Generator issues
C	Ayers Island	3	6/12/15 7:43	9/21/15 15:35	2431.87		UO	Generator issues
D	Ayers Island	3	9/23/15 13:31	9/23/15 16:07	2.60	Y	EMO	Low oil level in lower guide bearing reservoir
E	Ayers Island	3	9/28/15 8:45	10/7/15 16:08	223.38	Y	EMO	Repair lower guide bearing pump

outage	Site	Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Lost Generation (Y or N)	Outage Type	Cause of Outage
A	Canaan	1	3/24/15 10:00	3/24/15 10:01	0.02	Y	TRIP	Operator Error
B	Canaan	1	4/20/15 23:42	4/21/15 4:29	4.78	Y	T/D	355 line fault
C	Canaan	1	6/23/15 17:15	6/23/15 20:20	3.08	Y	T/D	355 line fault
D	Canaan	1	10/13/15 7:54	10/16/15 10:19	74.42		AI	Annual Inspection
E	Canaan	1	10/30/15 6:43	10/30/15 9:50	3.12	Y	T/D	355 line fault / mechanical timer failure

outage	Site	Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Lost Generation (Y or N)	Outage Type	Cause of Outage
A	Eastman	S	5/5/15 12:54	5/5/15 13:44	0.83	Y	T/D	Voltage reduction test.
B	Eastman	S	6/9/15 12:50	6/9/15 14:17	1.45	Y	T/D	Voltage reduction RETEST.
A	Eastman	1	1/1/15 0:00	1/5/15 11:30	107.50	Y	EMO	Governor speeder spring motor failure.
B	Eastman	1	1/19/15 20:12	1/19/15 21:08	0.93	N	TRIP	Incomplete sequence.
C	Eastman	1	4/15/15 8:17	4/15/15 8:39	0.37	Y	TRIP	Plugged cooling water strainer.
D	Eastman	1	7/13/15 8:22	7/17/15 13:48	101.43	N	AI	Annual Inspection
E	Eastman	1	7/20/15 13:52	7/20/15 13:58	0.10	Y	TRIP	Trip on high oil temp.
F	Eastman	1	8/11/15 15:43	8/12/15 11:28	19.75			Distributive Control System (DCS) process computer
A	Eastman	2	1/7/15 7:33	1/12/15 14:56	127.38	Y	EMO	Oil Seal Repair
B	Eastman	2	5/5/15 13:44	5/5/15 17:30	3.77	Y	TRIP	PLC Logic Issue.
C	Eastman	2	7/2/15 8:44	7/2/15 10:12	1.47	Y	TRIP	Head Gate Closure
D	Eastman	2	7/2/15 15:50	7/2/15 20:14	4.40	Y	TRIP	Head Gate Closure
E	Eastman	2	7/4/15 2:00	7/4/15 10:23	8.38	Y	TRIP	Head Gate Closure
F	Eastman	2	7/4/15 15:50	7/4/15 20:14	4.40	Y	TRIP	Head Gate Closure
G	Eastman	2	8/26/15 7:54	9/10/15 9:15	361.35	N	EMO	Broken guide rails
H	Eastman	2	10/27/15 13:51	10/27/15 14:49	0.97	Y	T/D	Voltage reduction test.
I	Eastman	2	10/27/15 14:51	10/27/15 15:46	0.92	Y	TRIP	Manual unit trip



outage	Site	Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Lost Generation (Y or N)	Outage Type	Cause of Outage
A	Garvins	S	5/27/15 9:41	5/27/15 14:26	4.75	Y	EMO	Fish equipment installation.
A	Garvins	1	1/19/15 21:32	1/20/15 7:37	10.08	Y	TRIP	Failed Start Attempt
B	Garvins	1	3/2/15 2:10	3/2/15 3:25	1.25	Y	TRIP	Failed Start Attempt
C	Garvins	1	3/10/15 8:15	3/10/15 11:30	3.25	N	EMO	Actuator Servo Piston Head oil leak.
D	Garvins	1	5/12/15 0:57	5/12/15 3:27	2.50	Y	TRIP	Hydraulic unit low oil and pressure.
E	Garvins	1	6/1/15 8:34	6/24/15 13:21	556.78	Y	AI	Annual Inspection
F	Garvins	1	12/5/15 8:20	12/5/15 10:03	1.72	Y	T/D	396 & 375 line fault
G	Garvins	1	12/28/15 6:44	12/28/15 7:44	1.00	Y		Unknown
A	Garvins	2	2/21/15 7:48	2/21/15 23:57	16.15	N	TRIP	Actuator not in start position.
B	Garvins	2	3/2/15 1:37	3/2/15 3:25	1.80	N	TRIP	Actuator not in start position.
C	Garvins	2	4/8/15 12:42	4/8/15 14:38	1.93	Y	EMO	63Q2 oil pressure switch leaking oil
D	Garvins	2	6/1/15 22:15	6/2/15 2:45	4.50	Y	TRIP	Breaker Auxiliary Switch Linkage
E	Garvins	2	6/2/15 11:16	6/2/15 12:41	1.42	Y	EMO	Diver Safety
F	Garvins	2	8/3/15 8:21	8/28/15 13:32	605.18		AI	Annual Inspection
G	Garvins	2	9/30/15 19:00	9/30/15 20:55	1.92	Y		Unknown
A	Garvins	3	2/21/15 20:36	2/23/15 9:37	37.02	Y	TRIP	Incomplete Sequence.
B	Garvins	3	3/2/15 1:37	3/2/15 3:47	2.17	Y	TRIP	synchronizing relay or voltage matching issue
C	Garvins	3	3/11/15 23:30	3/12/15 1:36	2.10	Y	TRIP	synchronizing relay or voltage matching issue
D	Garvins	3	3/27/15 6:00	3/27/15 7:04	1.07	Y	TRIP	synchronizing relay or voltage matching issue
E	Garvins	3	5/26/15 10:22	5/26/15 10:26	0.07	Y	TRIP	PLC Issue/ Control Error
F	Garvins	3	8/4/15 12:19	8/4/15 12:24	0.08	Y	EMO	Planned Testing
G	Garvins	3	8/6/15 11:36	8/6/15 11:42	0.10	Y	TRIP	High Oil Level in lower guide reservoir
H	Garvins	3	8/20/15 12:37	8/20/15 13:27	0.83	Y	TRIP	Failed Pump Relay
A	Garvins	4	7/13/15 8:22	7/31/15 14:56	438.57	N	AI	Annual Inspection

outage	Site	Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Lost Generation (Y or N)	Outage Type	Cause of Outage
B	Garvins	4	8/31/15 7:00	9/4/15 12:55	101.92	N	EMO	Oil leaking from pump reservoir
C	Garvins	4	11/14/15 15:09	11/14/15 20:27	5.30	Y	TRIP	Problem with voltage regulator
D	Garvins	4	12/19/15 5:49	12/19/15 8:11	2.37	Y	TRIP	Dispatch Error

outage	Site	Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Lost Generation (Y or N)	Outage Type	Cause of Outage
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A	Gorham	1	1/5/15 12:25	1/5/15 12:35	0.17	Y	TRIP	Low Governor Oil Pressure.
B	Gorham	1	3/23/15 12:35	3/24/15 7:41	19.10	N	TRIP	Oil Flow Switch
C	Gorham	1	6/1/15 9:10	6/1/15 10:44	1.57	Y	TRIP	Oil Flow Switch
D	Gorham	1	8/3/15 11:40	8/10/15 7:24	163.73	N	AI	Annual Inspection
A	Gorham	2	8/3/15 11:40	8/10/15 7:23	163.72	N	AI	Annual Inspection
A	Gorham	3	8/10/15 9:27	8/13/15 10:53	73.43	N	AI	Annual Inspection
A	Gorham	4	8/17/15 8:00	8/21/15 7:16	95.27	N	AI	Annual Inspection
B	Gorham	4	9/22/15 1:46	9/22/15 8:30	6.73	N	TRIP	Blown fuse

outage	Site	Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Lost Generation (Y or N)	Outage Type	Cause of Outage
A	Hooksett	1	2/4/15 8:10	2/4/15 8:27	0.28	Y	EMO	Exciter brush maintenance.
B	Hooksett	1	2/26/15 2:09	2/26/15 3:39	1.50	Y	T/D	332/335 Transient fault.
C	Hooksett	1	4/10/15 13:05	4/10/15 15:04	1.98	Y	TRIP	Governor Speeder Spring Motor
D	Hooksett	1	7/1/15 8:01	7/1/15 8:29	0.47	Y	T/D	T/D Fault from Garvins
E	Hooksett	1	9/28/15 8:27	10/2/15 13:45	101.30	N	AI	Annual Inspection
F	Hooksett	1	12/5/15 8:21	12/5/15 13:15	4.90	Y	T/D	line fault on 396 / 375 lines

outage	Site	Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Lost Generation (Y or N)	Outage Type	Cause of Outage
A	Jackman	1	6/30/15 16:07	6/30/15 17:03	0.93	N	TRIP	Dirty Contacts on Relay
B	Jackman	1	9/19/15 9:56	9/22/15 9:40	71.73	N	TRIP	Burnt coil
C	Jackman	1	12/3/15 7:51	12/3/15 9:39	1.80	N	TRIP	Contacts failed to close
D	Jackman	1	12/18/15 9:37	12/18/15 9:56	0.32	Y	EMO	Exciter brushes arcing

outage	Site	Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Lost Generation (Y or N)	Outage Type	Cause of Outage
A	Lost Nation	1	2/21/15 6:02	2/21/15 11:31	5.48	N	EMO	Maintenance
B	Lost Nation	1	2/24/15 5:54	2/24/15 8:34	2.67	Y	TRIP	Failed Flame Detector.
C	Lost Nation	1	2/24/15 9:21	2/24/15 9:43	0.37	N	EMO	Trouble Shoot Trip and alarms.
D	Lost Nation	1	2/24/15 11:43	2/24/15 17:08	5.42	N	EMO	Trouble Shoot Trip and alarms.
E	Lost Nation	1	2/25/15 11:09	2/25/15 14:48	3.65	N	TRIP	Flame Detector wiring issue.
F	Lost Nation	1	5/30/15 6:00	5/30/15 14:41	8.68	N	EMO	Trouble Shoot Trip Free Events.
G	Lost Nation	1	10/5/15 9:29	10/9/15 13:35	100.10	N	AI	Annual Inspection
H	Lost Nation	1	12/21/15 17:22	12/21/15 18:44	1.37	Y	TRIP	Failed relay

outage	Site	Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Lost Generation (Y or N)	Outage Type	Cause of Outage
A	Smith	1	1/7/15 6:02	1/7/15 8:12	2.17	Y	T/D	Over voltage indicated on one of the phases.
B	Smith	1	9/12/15 7:23	9/22/15 17:00	249.62	Y	AI	Annual Inspection
C	Smith	1	9/25/15 9:18	9/25/15 9:26	0.13	Y	TRIP	Unit tripped while making PLC changes
D	Smith	1	9/25/15 9:56	9/25/15 10:08	0.20	Y	TRIP	Unit tripped while making PLC changes
E	Smith	1	11/11/15 3:52	11/11/15 13:06	9.23	Y	TRIP	Failed coil

outage	Site	Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Lost Generation (Y or N)	Outage Type	Cause of Outage
A	White Lake	1	2/24/15 5:46	2/24/15 9:34	3.80	Y	TRIP	Cold Fuel
B	White Lake	1	2/26/15 7:44	2/26/15 8:42	0.97		EMO	Install emiss. test probe
C	White Lake	1	2/26/15 13:35	2/26/15 13:49	0.23		EMO	Remove emiss. test probe
D	White Lake	1	4/20/15 7:17	4/24/15 14:04	102.78	N	AI	Annual Inspection



# Exhibit 3 - EHT Testimony

## Attachment EHT-2

### Eversource Generation

### Unit Outage Reports

## **NH GENERATION**

### **STEAM STATION OUTAGE REPORT**

**PUC Outage Report No.:** OR-2015-01

**Station/Unit:** Merrimack Station, Unit 2

**Dates:** March 5 – March 11, 2015

**Duration:** 5.0 Days

**Immediate Cause:** Cyclone Tube Leaks and Penthouse Repairs

**Discussion/Remedy:** Unit 2 had been operating for 66 days. The unit was taken off line due to excessive water usage and a necessary repair of a south vertical buckstay and penthouse seal. A boiler inspection was performed and tube leaks were found in cyclones 2C, 2G, and 2F.

Cyclone tube leaks were identified in 2C, 2G and 2F. 2C cyclone had one leak on the re-entrant throat at the 12 o'clock position; two additional leaks were on the neck tubes. One leak was at the 7:30 position looking out of the cyclone, and the other leak was at the 8:00 position under the knuckle studs. 2F cyclone also had two tube leaks. One leak was at the 2:30 position looking into the cyclone. The second tube leak was five feet in from the neck at the 11:00 position. Four tubes were padded, 18" to 22" from the neck. 2G cyclone had multiple leaks. One leak was at the 1 o'clock position looking into the cyclone which was repaired with one 3" pad weld. A second leak was at the 3 o'clock position repaired with three 3" pad welds. Additional leaks were found at the 3:30 position and repaired with three 3" pad welds. And at the 4 o'clock position, five tubes were repaired with 6" pad welds.

All tubes in the cyclones were pad welded back to original wall thickness. New studs were welded on the cyclone tubes and refractory was reinstalled once all the tube leaks were repaired. A final boiler pressure test was performed, and there were no other waterside leaks found.

There were also repairs made to a mechanical attachment on elevation 345'. A series of these mechanical attachments, called buckstays, are arranged around the furnace to provide the support system to hold the boiler walls in place. Metal plates that were part of the attachment failed allowing the walls to move out of position and as a result caused the penthouse seal to leak. Staging was installed on the 7 ½ elevation, lagging and insulation removed from the exterior of the walls, and rigging installed to move the walls back into place. Four slots were cut into the membrane to allow rigging devices to be attached and pull the walls into place. An interim repair was made by re-welding the support ties and repairing the mechanical

attachment. The insulation and lagging was re-installed. Additional jobs from the outage backlog were also completed.

Other work performed during the outage included jobs that were in the priority outage backlog, jobs that were found during the boiler inspection that was completed at the beginning of the outage and other corrective and preventive work.

#### **Maintenance Department:**

- Opened and closed boiler doors.
- Replaced 2<sup>nd</sup> point high pressure feedwater heater safety valve.
- Replaced heavy duty operator gearbox on the SCR by-pass damper.
- Replaced a slag tank nozzles, (on the north side) the holder and the 300# flange.
- Inspected and cleared slag tank of build-up.
- Rebuilt slag tank gate.
- Replaced slag tank sensing line for the sluice line.
- Replaced 2-B circulating water pump gland water piping.
- Repaired 3<sup>rd</sup> point extraction safety valve.
- Repacked LCV-106.
- Replaced PSH inlet header drain valve.
- Repacked 2-C ignitor piston assembly.
- Replaced flyash reinjection line elbow.
- Repaired #8 flyash hopper in the original precipitator.
- Repaired 2D coal downcomer.
- Replaced all door gaskets on the 2-A forced draft fan outlet duct.
- Repacked TCV-3B SSH attenuator spray control valve.
- Replaced 2-C coal feeder gearbox seal.
- Cleaned and serviced 2-D and 2-G coal feeder.

#### **Electrical Department:**

- Repaired right hand upper intercept valve limit switch.

#### **I&C Department:**

- Replaced probe for #3 east and #3 west rosemount excess oxygen analyzer.

#### **North American Industrial Services:**

- Vacuumed gas recirculation duct.
- Vacuumed tempering duct.
- Vacuumed D-01, D-02, ducts and economizer hoppers.

#### **Boiler Work:**

- Repaired casing leaks on several elevations.

## **NH GENERATION**

### **STEAM STATION OUTAGE REPORT**

**PUC Outage Report No.:** OR-2015-02

**Station/Unit:** Merrimack Station, Unit 2

**Dates:** April 27 – May 19, 2015

**Duration:** 23.0 Days

**Immediate Cause:** Maintenance Outage – Penthouse Repairs and FGD Inspection

**Discussion/Remedy:** The primary task for this outage was to complete the final repair on the south (right sidewall) vertical buckstay. An initial repair was made to address the mechanical attachment and penthouse area during an outage on the unit that occurred from March 5 – March 11 (see OR-2015-01). Due to the critical nature of the repair, a B&W service rep was on-site during this outage to oversee the project. The area around the buckstay was staged, insulation and lagging was removed and the penthouse was vacuumed of ash. Slots were cut in the membrane on each sidewall, north and south, and “T” pad eyes were inserted through the membrane to attach the 5 ton com-a-longs used for pulling the walls back in position. The steel on the right hand sidewall that attaches to the vertical column was replaced. The casing was seal welded and the insulation and lagging was reinstalled.

A complete boiler inspection was performed. Boiler casing leaks were repaired in the northwest, southwest and southeast areas of the windbox. Tube leaks in 2B, 2C, 2F and 2G cyclones were padwelded to bring metal back to original thickness.

A complete inspection of the FGD (scrubber) vessel was performed as well as maintenance completed on the mist eliminators, trays, nozzles, agitators and the PAP system.

Other work performed during the outage included jobs that were in the priority outage backlog, jobs that were found during the boiler inspection that was completed at the beginning of the outage and other corrective and preventive work.

#### **Maintenance Department:**

- Opened and closed boiler doors.
- Rebuilt 210 turbine main steam drain.
- Replaced #6 primary superheater bottle drain valve.
- Replaced 2-B deaerator pump with spare.
- Inspected slag tank overflow and warm up piping
- Rebuilt slag tank sluice gate.

**I&C Department:**

- Replaced 3E 02 probe.
- Repaired LS 119 DA storage tank for the high level alarm.

**North American Industrial Services:**

- Vacuumed penthouse
- Vacuumed economizer hoppers and ductwork.

## **NH GENERATION**

### **STEAM STATION OUTAGE REPORT**

**PUC Outage Report No.:** OR-2015-03

**Station/Unit:** Merrimack Station, Unit 1

**Dates:** June 6 – June 8, 2015

**Duration:** 2.4 Days

**Immediate Cause:** Post-Outage Turbine Testing and Balancing

**Discussion/Remedy:** This outage was part of a series of short outages necessary to complete turbine testing and balancing at the end of the planned maintenance overhaul.

Note that this outage exceeded 48 hours, not due to a long critical path, but rather due to delaying some of the final work to Monday to avoid premium costs associated with weekend work.

The Unit 1 planned maintenance overhaul had involved the complete disassembly and inspection of the high pressure, intermediate pressure and low pressure (HP/IP/LP) turbine components as well as the generator. Multiple turbine blade rows were replaced during the outage and repairs were completed on other blade rows.

At the completion of this extensive outage work, post-outage turbine testing and balancing was anticipated and proved to be required to reduce vibration to acceptable levels. Multiple “balance moves” were completed during this time, where small balance weights are screwed into specific threaded balance holes in the rotor assembly. For each balance move, the unit must be taken off-line and the rotor fully stopped to install or remove the applicable weight, then the unit restarted and taken through various load conditions to collect vibration data.

One of these balance moves and subsequent data collection runs was completed on Saturday morning, June 6<sup>th</sup>, with data indicating another minor weight adjustment was needed. During this run a small steam leak on a leak-off check valve bonnet under the turbine belly was also noted. Because energy demand and prices were very low, the unit remained off line and cooling. The small leak was available for repair on Monday. The decision was also made to suspend balancing work for the remainder of the weekend and avoid unnecessary weekend premium costs.

All work and additional testing was completed on Monday and the unit, in reserve status, was released to ISO at 21:39 that evening.

## **NH GENERATION**

### **STEAM STATION OUTAGE REPORT**

**PUC Outage Report No.:** OR-2015-04

**Station/Unit:** Merrimack Station, Unit 1

**Dates:** June 15 – June 22, 2015

**Duration:** 7.3 Days

**Immediate Cause:** Maintenance Outage - Turbine Throttle Valve Flange Leak

#### **Discussion/Remedy:**

During post outage turbine testing and balancing efforts, a steam leak developed at the right (east) side throttle valve body flange. This leak was identified when the unit ran on Wednesday, June 10. With testing completed, the unit off-line in reserve status and energy demand and prices low, a maintenance outage was scheduled with ISO to make the necessary valve flange repairs. Material was ordered to fabricate valve body studs if any replacements were found to be necessary.

With the start of the outage on Monday, June 15 the throttle valve was disassembled. During disassembly of the valve and through subsequent testing, three of the valve body studs were reviewed and inspected further; and it was decided to replace all three studs. These existing, original studs were drilled out and new stud material installed.

This valve had been disassembled for inspection as part of the turbine work during the recent overhaul. During that inspection the studs were hammer tested and found to have proper integrity for continued operation. However, the unit experienced a number of start-ups and shutdowns during the post outage balancing; and it was suspected that these original bolts were thermally stressed during the start-ups and shutdowns associated with this balancing and testing effort.

With the new studs in place, the valve was reassembled and the unit was released to ISO in reserve status.

## **NH GENERATION**

### **STEAM STATION OUTAGE REPORT**

**PUC Outage Report No.:** OR-2015-05

**Station/Unit:** Schiller Station, Unit No. 5

**Dates:** August 6 – August 13, 2015

**Duration:** 6.5 Days

**Unit Status Prior:** Online

**Immediate Cause:** Economizer Tube Leak

**Discussion/Remedy:** The unit was online when a tube leak occurred. High water usage indicated a tube leak which was suspected of being in the economizer section of the boiler. This area is in the back pass area of the boiler. The Unit was taken offline for inspection and repairs.

Outside contractor, O'Connor Constructors was onsite preparing for upcoming work at the station. Boilermakers were mobilized immediately to support this forced outage. Moran Environmental Recovery (MER), a vacuum contractor, was also notified and requested onsite to perform the vacuuming and clean out of the unit's bed material and back pass area. O'Connor removed the boiler cyclone separator covers to inspect the cyclones and remove pluggage, as necessary.

The initial work was performed on a 24 hour schedule for critical path items. An inspection of the boiler was completed. A tube leak was found at elevation 40 in the northeast corner in the first tube. Outage repairs began Saturday morning. The casing was removed to provide access to the leak. Theilsch, a material testing and inspection contractor, completed additional inspection and tube thickness testing. Two tube sections identified with tube thinning and the failed section were removed and dutchman were installed to complete the repair.

During the boiler inspection, in-bed tube leaks were also identified in the fluidized bed area of the boiler. Repairs were made with 6 areas of padwelding and the installation of two dutchman.

Slide gate/ air style ash hopper removal systems in the economizer and back pass area of the boiler were replaced with auger type systems.

The six boiler cyclone separators were cleaned. Cyclones #1 & #4 were found plugged. Cyclone #3 was found clean. Cyclones #2, #5 and # 6 had some build up that was also cleaned.



Tuyeres, which provide directional air flow distribution in the bed area of the boiler, were vacuumed and cleaned. An inspection of the tuyeres was completed. They were found in good condition and none were replaced.

RPS Associates, the baghouse vendor performed an inspection of the baghouse and replaced a total of 71 bags in the eight modules.

A successful hydro was completed after tube repairs were finalized.

The unit phased at 02:09 on Thursday August 13th ending the forced outage.

Other work performed during the outage included jobs that were in the outage backlog, as well as other corrective and preventive work. Specific additional work completed during the Outage included:

- Replaced DA tank hi/lo level issue/ isolation valves
- Installed new drain valve on inlet to 10<sup>th</sup> stage heater for future isolation purposes
- Modified deflector in wood yard tripper car

## **NH GENERATION**

### **STEAM STATION OUTAGE REPORT**

**PUC Outage Report No.:** OR-2015-06

**Station/Unit:** Schiller Station, Unit 5

**Dates:** September 5 – September 10, 2015

**Duration:** 4.6 Days

**Immediate Cause:** In-Bed Boiler Tube Leak

**Discussion/Remedy:** Unit 5 was online when high water usage indicated a tube leak. It was suspected to be in the boiler floor area in the fluidized bed section. Unit was taken offline for inspection and repairs.

Outside contractor, O'Connor Constructors was contacted to mobilize boilermakers to assist with outage work. Moran Environmental Recovery (MER), a vacuum contractor, was also notified and requested onsite to perform the vacuuming and clean out of the unit's bed material and back pass area.

A boiler inspection was performed and found tube leaks in the in-bed tube section in the floor area of the boiler. Because the cyclones had been cleaned during the recent August outage (OR-2105-05 - tube leak in the economizer section of the backpass), critical path for this outage was the in-bed tube leak repairs. This repair required cooling of the furnace, evacuating the sand/ash mixture and making the repair to the tube leaks and adjacent in-bed tubes, as necessary. Other balance of plant work was completed within the critical path.

The inspection found a failed tube in bank #11 and in bank #10. The first leak was found in bank #11, tube #1 in the top, south side of the 2<sup>nd</sup> loop. This leak caused the failure in bank #10, tube #14 in both the upper and lower loops. The failed tube sections were removed and dutchman were installed to complete repairs.

Tuyeres, which provide directional air flow distribution in the bed area of the boiler, were vacuumed and cleaned. An inspection of the tuyeres was completed. They were found in good condition and none were replaced.

Other work performed during the outage included jobs that were in the outage backlog and other corrective and preventive work.

Upon completion of repairs a successful hydro was completed. The unit phased on September 10<sup>th</sup> at 05:30 ending the forced outage.

**NH GENERATION**

**FOSSIL STATION OUTAGE REPORT**

**PUC Outage Report No.:** OR-2015-07

**Station/Unit:** Merrimack Station, Unit 1

**Dates:** September 23 – September 25, 2015

**Duration:** 2.2 Days

**Immediate Cause:** FGD (scrubber) Control System Upgrade

**Discussion/Remedy:** Unit 1 was in reserve status. With power prices and demand low, Unit 1 was removed from service to coincide with the on-going Unit 2 planned outage to complete an upgrade to the FGD (scrubber) control system.

During the Unit 2 scheduled maintenance outage which began on September 14, a major upgrade/revision of the Emerson Ovation FGD Distributed Control System (DCS) was planned and completed. To facilitate the revision, all “nodes” of the DCS had to be powered down including those from Unit 1. The new software was installed and reprogrammed, sections at a time. During this period of software installation and programming, the entire FGD control system was unavailable, effectively rendering the FGD equipment and therefore Unit 1 out of service. Unit 2 was already out of service for its maintenance outage.

The work was planned and coordinated with the bidding and scheduling group for a time of low energy demand and prices, when the unit was in reserve status, and therefore no replacement power costs.

The work was completed successfully and the Unit returned to service in reserve status at 12:35 on September 25th.

## **NH GENERATION**

### **STEAM STATION OUTAGE REPORT**

**PUC Outage Report No.:** OR-2015-08

**Station/Unit:** Schiller Station, Unit 5

**Dates:** November 3 – November 9, 2015

**Duration:** 6.6 Days

**Immediate Cause:** Reliability Outage – Cyclones and PB-1 replacement

**Discussion/Remedy:** Unit 5 was taken offline due to a multi-day capacitor bank tie-in, a transmission and distribution project on Bus 2 in the station high yard which required Unit 5 to be off line. This outage provided an opportunity to inspect the unit and target preventive and corrective measures to improve reliability during the higher demand of the upcoming winter period. The unit was removed from service on Tuesday, November 3 at 1012 and had a planned return to service date of November 10th at 2300.

The critical path work for this reliability outage included a full inspection and cleaning of all six boiler cyclone separators, a boiler inspection, inspections of key valves, and a baghouse inspection. Also the replacement of the ash removal drag chain and the wood yard bucket conveyor was completed.

Vendors brought in to support the outage included O'Connor boiler makers, Alstom boiler engineers, Theilsch inspection services, Moran Environmental Recovery (MER) vacuum services, and RPS Associates to complete bag house inspection and any necessary bag repairs. Initial activities included: opening the boiler doors; removing bed material into the bed material silo, vacuuming remaining bed material; removing all cyclone covers.

When all maintenance work was completed, the unit was turned over to operations. The unit phased November 9 at 2345.

Outage activities completed included the following:

#### **Cyclone Separator Area:**

The cyclones were inspected and cleaned. Cyclone conditions as noted.

- Cyclone 1: Plugged above cone
- Cyclone 2: Cylindrical cavity to dip leg, build-up on sides
- Cyclone 3: Slight build-up in lower cone
- Cyclone 4: Plugged above cone
- Cyclone 5: Cylindrical cavity to dip leg; build up on sides and lower con
- Cyclone 6: Build up on one side of lower cone

Furnace Area:

Furnace was cooled, bed material removed, and In-bed tube inspections performed.

In bed tube inspections conducted by Thielsch, assisted by O'Connor

- 14 tube repairs were required.
- Alstom engineers were on site to assist with inspections
- Tuyere inspection completed, 7 tuyeres replaced (south end).

Baghouse Area:

Replaced the ash removal drag chain

Cleaned the baghouse hopper area by MER vacuuming

RPS Associates inspected bags in all baghouse modules

Results of the inspection and bag replacements: (8 modules, 360 bags per module)

- Module 1 - 30 bags
- Module 2 - 16 bags
- Module 3 - 16 bags
- Module 4 - 34 bags
- Module 5 - 28 bags
- Module 6 - 23 bags
- Module 7 - 2 bags
- Module 8 - 62 bags

Other:

Millennium Valve performed -

- hot well valve inspection
- other miscellaneous valve inspections

I&C performed preventive maintenance for stack and CEMS shelter

Cianbro and QBM replaced PB1 wood yard bucket conveyor including-

- head roller removal and reinstallation
- splicing of the new belt
- replaced 12 full length support rolls
- replaced 18 stub rollers

Inspected previous economizer repairs and additional shielding - no additional repairs were required in this area

Replaced wood yard hog hammers

# Exhibit 3 - EHT Testimony

## Attachment EHT-3

### Eversource Steam Units'

#### Availability and Performance

**EVERSOURCE Generating Steam Unit  
Equivalent Availability Factor (EAF)  
January 2015 through December 2015**

	<b>Merrimack Unit 1</b>	<b>Merrimack Unit 2</b>	<b>Newington Unit 1</b>	<b>Schiller Unit 4</b>	<b>Schiller Unit 5</b>	<b>Schiller Unit 6</b>
January	98.0	99.9	99.8	100.0	98.6	98.4
February	98.9	97.8	98.6	99.5	76.1	99.0
March	98.3	81.7	89.7	99.7	88.6	90.3
April	6.7	86.7	67.5	100.0	28.9	99.0
May	0.0	38.8	100.0	96.3	100.0	95.6
June	51.7	100.0	100.0	100.0	99.9	98.6
July	99.8	100.0	99.8	94.6	100.0	96.3
August	100.0	100.0	99.9	95.9	79.0	99.0
September	92.5	44.1	37.5	99.9	84.7	19.8
October	98.7	0.0	0.0	100.0	100.0	26.1
November	95.6	11.2	29.23	92.8	78.1	98.9
December	100.0	100.0	99.95	96.0	100.0	97.7
Annual	78.4%	71.7%	76.8%	97.9%	86.2%	84.9%

**Planned Maintenance Outages  
January 2015 through December 2015**

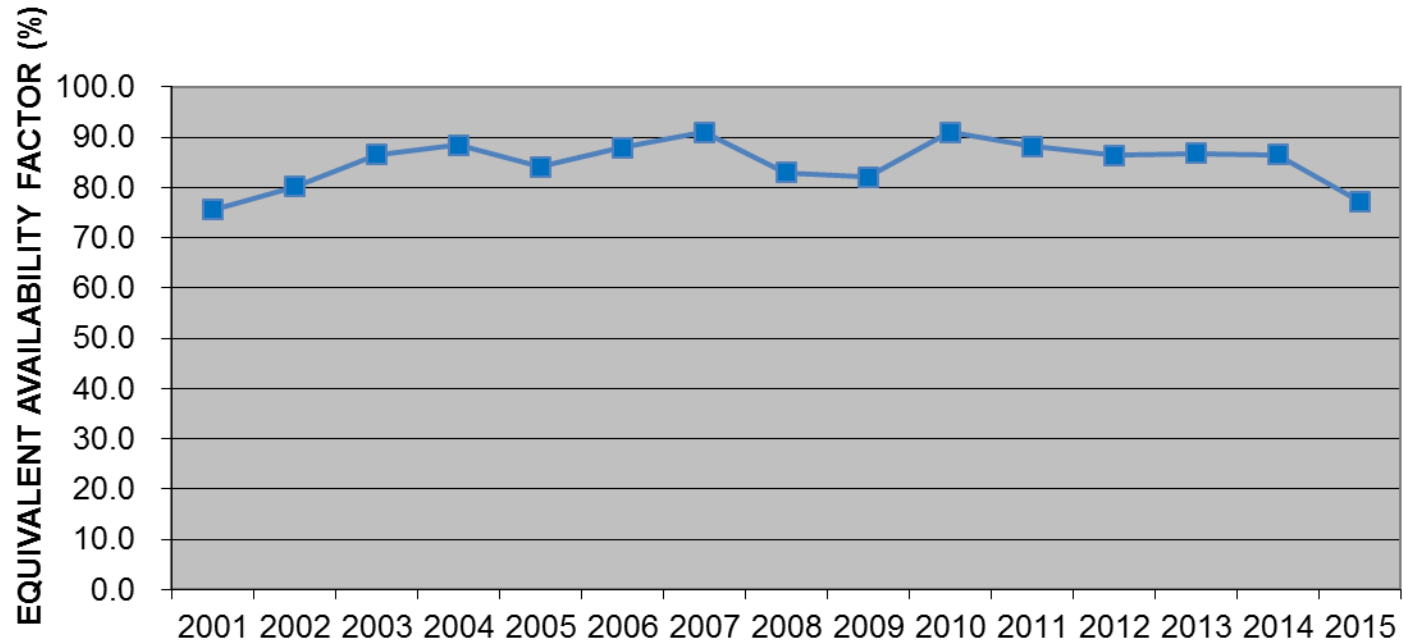
<b>Unit</b>	<b>Month(s)</b>
Merrimack 1	Apr-May
Merrimack 2	Oct-Nov
Newington	Mar and Sept-Nov
Schiller 4	N/A
Schiller 5	Mar-Apr
Schiller 6	Sept-Oct

Equivalent Availability Factor 1 (EAF) is calculated as follows.

$$EAF = [(Available\ Hours - Equivalent\ Unit\ Derated\ Hours) * 100] \div Period\ Hours.$$

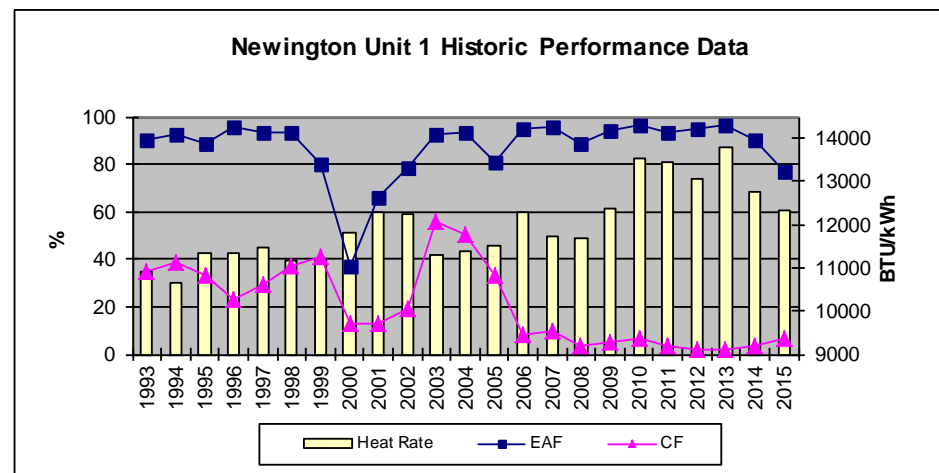
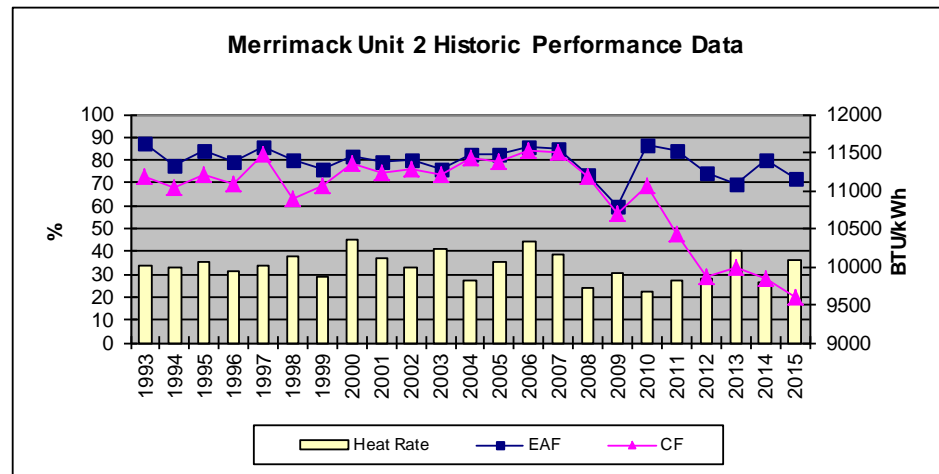
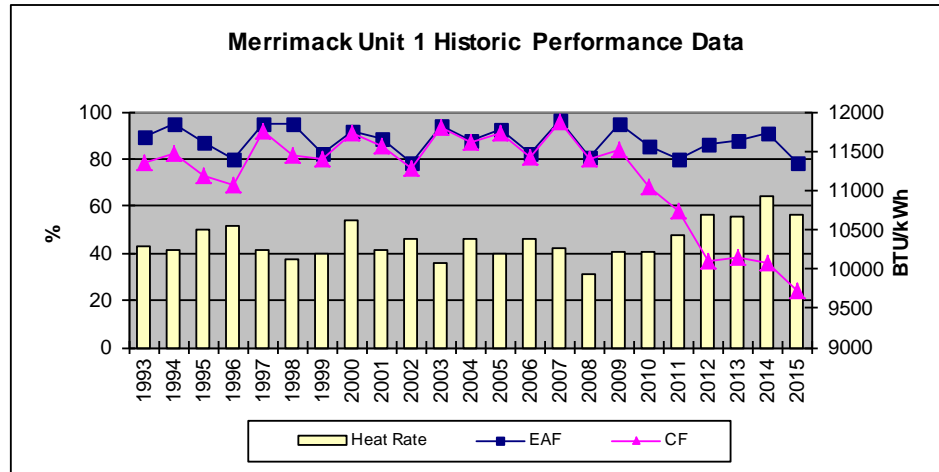
<sup>1</sup> The term equivalent availability is an industry standardized metric, and is used to represent the portion of hours that a unit is available to be dispatched at full capacity. Equivalent availability is recognized by the North American Electric Reliability Corporation (NERC) and other regional entities such as ISO-NE. The NERC approved equation to calculate the Equivalent Availability Factor is provided above.

### PSNH FOSSIL SYSTEM WEIGHTED EAF 2015

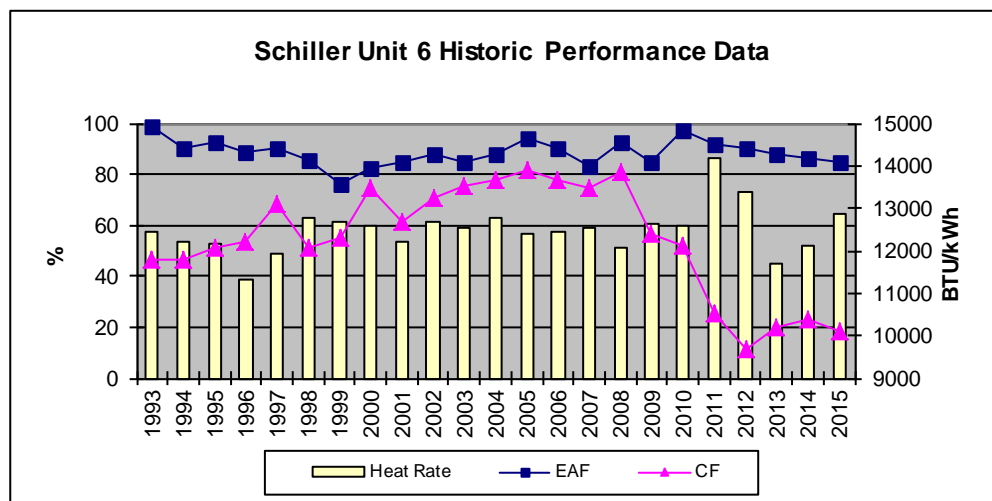
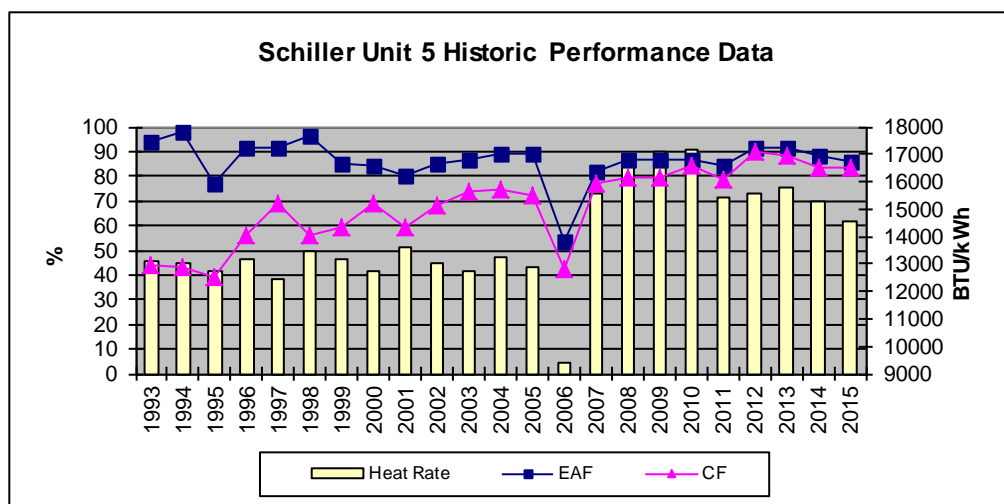
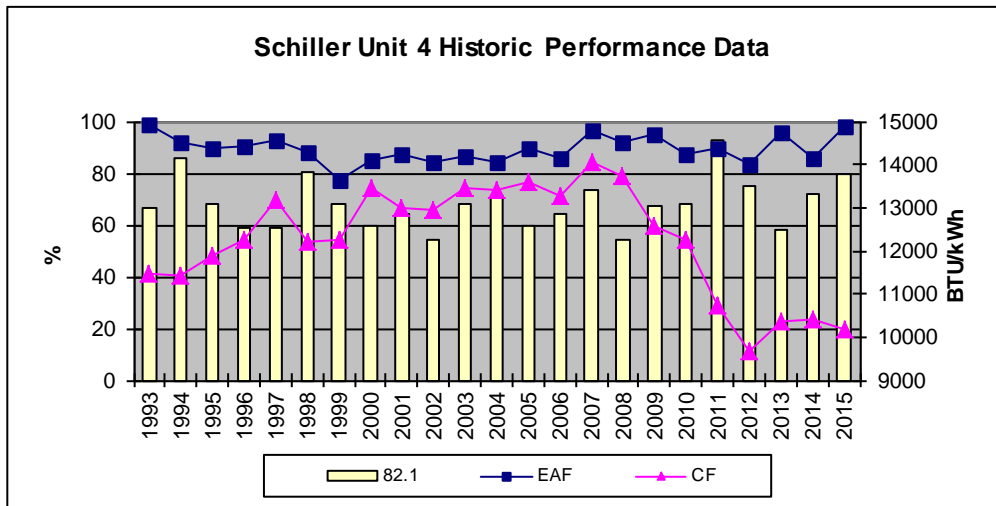




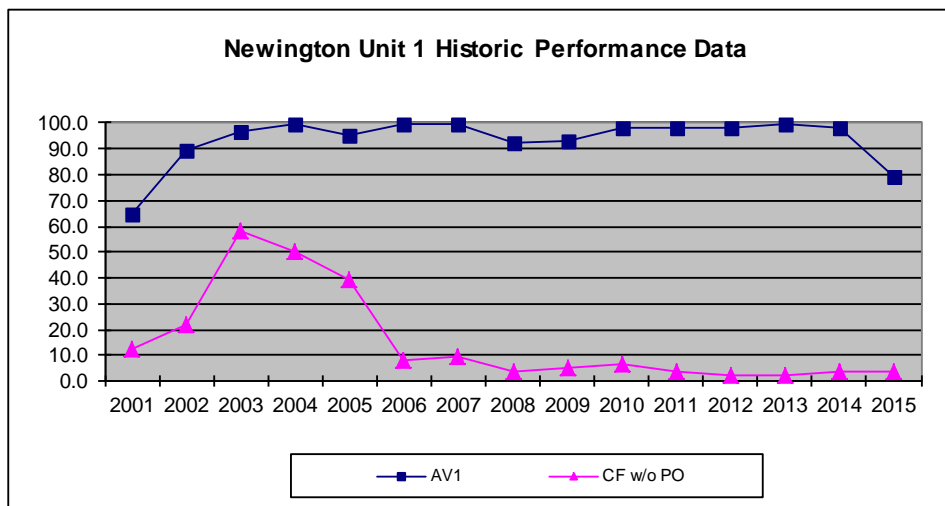
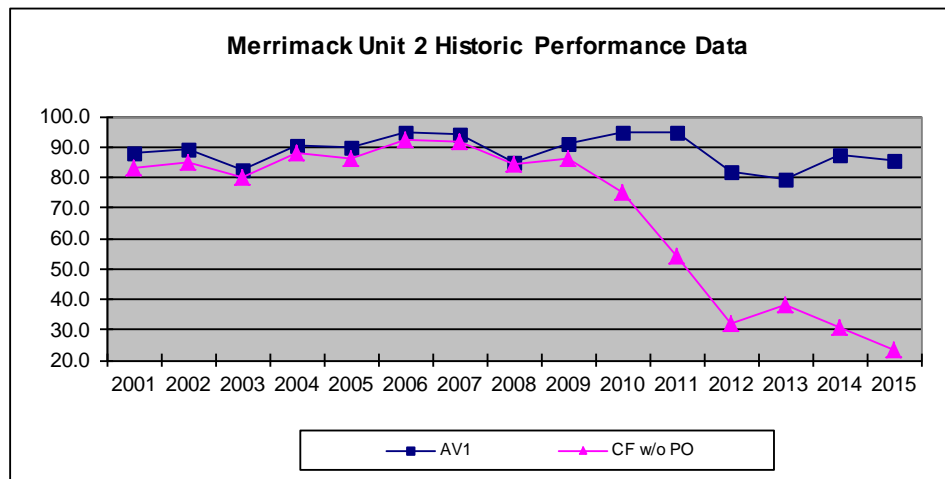
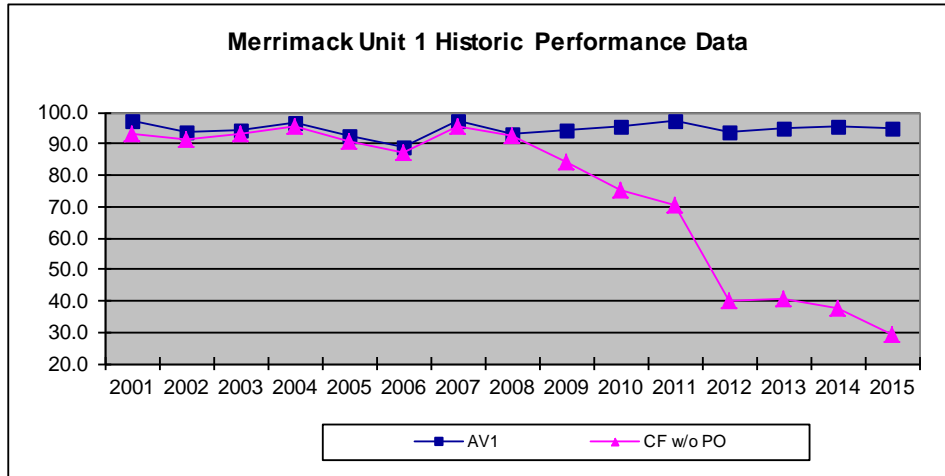
## Steam Unit Graphs – Planned Outages Included



## Steam Unit Graphs – Planned Outages Included



## Steam Unit Graphs – Planned Outages Omitted



### Steam Unit Graphs – Planned Outages Omitted

