

## Appendix A

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.

### 2016 NH Transmission

Hazard trees removed:	7,216 trees
2016 Budget:	\$1,000,000
Actual Expended:	\$2,265,000

Note- The 2016 budget is for hazard tree removals only; and was based on expected work in 2016. Reclamation work added in February resulted in additional funding. There was minimal expenditures on reclamation in 2016 so bulk of expenditures were for hazard tree removals.

### 2016 NH Distribution

Hazard trees removed:	20,524 roadside trees 546 off-easement trees
2016 Budget <sup>1</sup> :	\$5,000,000
Actual Expended:	\$5,510,477 (roadside) \$249,254 (off-easement)

<sup>1</sup> 2016 hazard tree budget (goal) = 12,000 trees

# Exhibit 3 - EHT Testimony

## Attachment EHT-1

### Eversource Generation

#### Unit Outage Lists

**Merrimack 1**

01/01/2016 through 12/31/2016

<b>OUTAGE</b>	<b>START</b>	<b>END</b>	<b>OUTAGE CAUSE DESCRIPTION</b>	<b>DURATION HOURS</b>
A	02/14/2016 03:45	02/14/2016 05:05	FEEDWATER CONTROLS	1.33
B	02/18/2016 15:05	02/20/2016 16:15	FEEDWATER PUMP	49.17
C	05/05/2016 07:00	05/06/2016 10:30	TURBINE CONTROL VALVES	27.50
D	08/15/2016 08:40	08/15/2016 21:34	FORCED DRAFT FANS	12.90
E	09/26/2016 07:00	10/07/2016 19:30	FEEDWATER PUMP	276.50
F	12/29/2016 14:00	12/30/2016 04:10	CYCLONE FURNACE LEAKS	14.17

**Merrimack 2**

01/01/2016 through 12/31/2016

<b>OUTAGE</b>	<b>START</b>	<b>END</b>	<b>OUTAGE CAUSE DESCRIPTION</b>	<b>DURATION HOURS</b>
A	05/12/2016 06:00	05/12/2016 21:00	TURBINE LUBE OIL PUMPS	15.00
B	09/19/2016 07:00	11/14/2016 07:00	MAJOR BOILER INSPECTION	1,345.00
C	11/14/2016 07:00	11/15/2016 16:59	MAJOR BOILER INSPECTION EXTENSION	33.98
D	11/28/2016 19:37	12/03/2016 23:10	TURBINE LUBE OIL PUMP - MOTOR BEARING	123.55
E	12/05/2016 15:00	12/09/2016 07:14	TURBINE AUXILIARY OIL PUMP	88.23
F	12/09/2016 17:46	12/09/2016 20:25	OTHER GENERATOR CONTROLS AND METERING PROBLEMS	2.65
G	12/28/2016 17:30	12/31/2016 00:01	WATERWALL (FURNACE WALL) LEAKS	54.52

**Merrimack CT 1**

01/01/2016 through 12/31/2016

<b>OUTAGE</b>	<b>START</b>	<b>END</b>	<b>OUTAGE CAUSE DESCRIPTION</b>	<b>DURATION HOURS</b>
A	03/02/2016 03:02	03/02/2016 03:06	OTHER GENERATOR CONTROLS AND METERING PROBLEMS	0.07
B	05/09/2016 05:30	05/11/2016 16:45	GENERATOR INSPECTION	59.25
C	12/17/2016 11:46	12/17/2016 11:47	GT LUBE OIL SYSTEM - GENERAL	0.02

Merrimack CT 2

01/01/2016 through 12/31/2016

OUTAGE	START	<u>END</u>	OUTAGE CAUSE DESCRIPTION	DURATION HOURS
A	05/11/2016 07:02	05/13/2016 11:10	GENERATOR INSPECTION	52.13
B	05/19/2016 10:34	05/19/2016 11:14	JET STARTING SYSTEM (INCLUDING MOTOR)	0.67
C	07/27/2016 09:50	07/27/2016 12:10	PLC - LOGIC PROBLEMS	2.33
D	07/27/2016 12:41	07/27/2016 13:21	PLC - LOGIC PROBLEMS	0.67

Newington

01/01/2016 through 12/31/2016

OUTAGE	START	<u>END</u>	OUTAGE CAUSE DESCRIPTION	DURATION HOURS
A	04/04/2016 06:00	04/10/2016 16:16	MAJOR BOILER INSPECTION	154.27
B	04/28/2016 23:00	04/29/2016 06:58	OTHER GENERATOR CONTROLS AND METERING PROBLEMS	7.97
C	05/03/2016 09:06	05/03/2016 10:59	MISCELLANEOUS BOILER AIR AND GAS SYSTEM PROBLEMS	1.88
D	07/20/2016 04:57	07/20/2016 07:12	EXCITER PROBLEMS	2.25
E	08/05/2016 08:20	08/05/2016 11:37	FEEDWATER VALVES	3.28
F	08/14/2016 12:00	08/14/2016 15:30	FEEDWATER REGULATING VALVE, MISC BOILER AIR/GAS SYSTEM	3.50
G	11/21/2016 07:00	11/22/2016 21:21	BURNER TILTS	38.35
H	11/28/2016 11:00	11/29/2016 14:12	WATERWALL LEAKS	27.20
I	12/01/2016 21:40	12/02/2016 08:10	WATERWALL LEAKS	10.50

Schiller 4

01/01/2016 through 12/31/2016

OUTAGE	START	END	OUTAGE CAUSE DESCRIPTION	DURATION HOURS
A	02/09/2016 05:15	02/10/2016 20:30	OIL AND GAS FUEL SUPPLY PROBLEMS	39.25
B	05/05/2016 13:14	05/05/2016 16:15	FEEDWATER PUMP PROBLEMS	3.02
C	06/27/2016 10:49	06/27/2016 15:04	BOILER, MISCELLANEOUS	4.25
D	06/27/2016 15:43	06/27/2016 16:11	UNIT PERFORMANCE TESTING	0.47
E	07/25/2016 10:38	07/25/2016 11:17	BOILER, MISCELLANEOUS	0.65
F	08/29/2016 20:55	08/29/2016 20:59	FUEL OIL PUMPS	0.07
G	09/02/2016 04:05	09/02/2016 15:05	TRANSMISSION SYSTEM OUTAGE	11.00
H	09/19/2016 14:08	09/20/2016 15:00	BURNER MANAGEMENT SYSTEM	24.87
I	10/01/2016 00:01	10/28/2016 10:30	PLANNED OUTAGE - BOILER INSPECTION	658.48
J	12/22/2016 03:24	12/22/2016 03:50	BOILER, MISCELLANEOUS	0.43
K	12/29/2016 08:25	12/29/2016 11:00	CIRCULATING WATER SYSTEM PROBLEMS	2.58

**Schiller 5**

**01/01/2016 through 12/31/2016**

<b>OUTAGE</b>	<b>START</b>	<b>END</b>	<b>OUTAGE CAUSE DESCRIPTION</b>	<b>DURATION HOURS</b>
A	01/14/2016 02:15	01/14/2016 03:30	BOILER, MISCELLANEOUS	1.25
B	03/04/2016 19:37	03/05/2016 03:40	FEEDWATER CONTROLS	8.05
C	03/25/2016 23:57	05/05/2016 08:45	MAJOR BOILER INSPECTION	968.80
D	09/02/2016 23:11	09/09/2016 15:34	BOILER, MISCELLANEOUS	160.38
E	11/16/2016 12:16	11/16/2016 12:52	BOILER, MISCELLANEOUS	0.60
F	12/06/2016 02:34	12/06/2016 02:41	BOILER, MISCELLANEOUS	0.12
G	12/26/2016 03:05	12/31/2016 24:00	DESUPERHEATER/ATTEMPERATOR PROBLEMS	140.92

Schiller 6

01/01/2016 through 12/31/2016

OUTAGE	START	END	OUTAGE CAUSE DESCRIPTION	DURATION HOURS
A	02/09/2016 05:15	02/10/2016 22:00	OIL AND GAS FUEL SUPPLY PROBLEMS	40.75
B	03/16/2016 05:12	03/16/2016 05:40	BOILER, MISCELLANEOUS	0.47
C	06/27/2016 09:30	06/27/2016 10:15	BURNER MANAGEMENT SYSTEM	0.75
D	06/27/2016 11:25	06/27/2016 12:06	BOILER, MISCELLANEOUS	0.68
E	07/26/2016 11:10	07/26/2016 11:40	BOILER, MISCELLANEOUS	0.50
F	08/14/2016 11:15	08/14/2016 11:50	BOILER, MISCELLANEOUS	0.58
G	09/02/2016 04:12	09/09/2016 07:29	TRANSMISSION SYSTEM OUTAGE	171.28
H	09/20/2016 12:40	09/20/2016 12:55	BURNER CONTROLS & INSTRUMENTATION PROBLEMS	0.25
I	12/05/2016 08:44	12/05/2016 09:35	TURBINE GOVERNING SYSTEM	0.85
J	12/05/2016 20:15	12/06/2016 13:45	BOILER, MISCELLANEOUS	17.50

Schiller CT 1

01/01/2016 through 12/31/2016

<b>OUTAGE</b>	<b><u>START</u></b>	<b><u>END</u></b>	<b>OUTAGE CAUSE DESCRIPTION</b>	<b><u>DURATION HOURS</u></b>
A	10/31/2016 07:00	11/04/2016 08:45	GENERAL JET ENGINE UNIT INSPECTION	97.75
B	11/28/2016 08:00	11/28/2016 10:50	BLACK START TESTING	2.83
C	11/30/2016 07:00	12/02/2016 14:45	OTHER JET ENGINE PROBLEMS	55.75

Wyman 4

01/012016 through 12/31/ 2016

OUTAGE	START	END	OUTAGE CAUSE DESCRIPTION	DURATION HOURS
A	10/01/2016 0:00	11/04/2016 14:21	PLANNED OUTAGE - ANNUAL BOILER INSPECTION	830.35
B	11/14/2016 23:45	11/15/2016 3:56	LOSS OF SUPPORT SYSTEMS DUE TO LOSS OF AC	4.18
C	11/29/2016 10:00	11/29/2016 12:29	MAINTENANCE OUTAGE -ISOLATE START UP TRANSFORMER	2.48
D	12/16/2016 11:26	12/16/2016 13:52	LOSS OF POWER TO CONTROL COMPONENTS	2.43
E	12/16/2016 15:44	12/16/2016 16:15	LOSS OF BOILER FEED PUMP AUTO CONTROL	0.52

## Eversource Hydro Outage Matrix - 2016

Item	Site	Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Outage Duration - Days	Lost Generation (Y or N)	Outage Type	Cause of Outage
A	Amoskeag	S	9/7/16 7:51	9/7/16 8:29	<b>0.63</b>	<b>0.03</b>	N		Required Black Start Testing
A	Amoskeag	1	2/26/16 7:22	2/26/16 8:12	<b>0.83</b>	<b>0.03</b>	Y	EMO	Rack rake OOS for repairs
B	Amoskeag	1	2/29/16 7:28	2/29/16 8:50	<b>1.37</b>	<b>0.06</b>	Y	EMO	Rack rake OOS for repairs
C	Amoskeag	1	3/1/16 7:30	3/1/16 8:33	<b>1.05</b>	<b>0.04</b>	Y	EMO	Rack rake OOS for repairs
D	Amoskeag	1	3/1/16 12:58	3/1/16 15:48	<b>2.83</b>	<b>0.12</b>	Y	EMO	Overheated hardware
E	Amoskeag	1	3/2/16 12:46	3/2/16 13:37	<b>0.85</b>	<b>0.04</b>	Y	EMO	Rack rake OOS for repairs
F	Amoskeag	1	3/4/16 12:35	3/4/16 13:23	<b>0.80</b>	<b>0.03</b>	Y	EMO	Rack rake OOS for repairs
G	Amoskeag	1	3/30/16 10:30	3/30/16 11:05	<b>0.58</b>	<b>0.02</b>	Y	EMO	Diver safety
H	Amoskeag	1	3/30/16 13:15	3/30/16 14:15	<b>1.00</b>	<b>0.04</b>	Y	EMO	Diver safety
I	Amoskeag	1	7/14/16 13:47	7/18/16 8:47	<b>91.00</b>	<b>3.79</b>	N	Trip	Relay coil failure
J	Amoskeag	1	11/19/16 22:49	11/20/16 12:41	<b>13.87</b>	<b>0.58</b>	Y	Trip	Unit failed to start - unknown
K	Amoskeag	1	11/20/16 15:16	11/20/16 15:45	<b>0.48</b>	<b>0.02</b>	N	Trip	Unit failed to start - unknown
A	Amoskeag	2	2/18/16 10:06	2/18/16 11:32	<b>1.43</b>	<b>0.06</b>	Y	EMO	Worn exciter brushes
B	Amoskeag	2	2/26/16 7:22	2/26/16 8:15	<b>0.88</b>	<b>0.04</b>	Y	EMO	Rack rake OOS for repairs
C	Amoskeag	2	2/29/16 7:28	2/29/16 8:53	<b>1.42</b>	<b>0.06</b>	Y	EMO	Rack rake OOS for repairs
D	Amoskeag	2	3/1/16 7:30	3/1/16 8:28	<b>0.97</b>	<b>0.04</b>	Y	EMO	Rack rake OOS for repairs
E	Amoskeag	2	3/2/16 12:46	3/2/16 14:10	<b>1.40</b>	<b>0.06</b>	Y	EMO	Rack rake OOS for repairs
F	Amoskeag	2	3/4/16 12:26	3/4/16 13:26	<b>1.00</b>	<b>0.04</b>	Y	EMO	Rack rake OOS for repairs
G	Amoskeag	2	11/19/16 22:49	11/20/16 13:46	<b>14.95</b>	<b>0.62</b>	Y	Trip	Mercoïd Switch not responding
H	Amoskeag	2	12/4/16 0:33	12/4/16 1:48	<b>1.25</b>	<b>0.05</b>	Y	Trip	Mercoïd Switch not responding
I	Amoskeag	2	12/5/16 13:13	12/5/16 14:47	<b>1.57</b>	<b>0.07</b>	Y	Trip	Mercoïd Switch not responding
A	Amoskeag	3	2/26/16 7:27	2/26/16 8:17	<b>0.83</b>	<b>0.03</b>	Y	EMO	Rack rake OOS for repairs
B	Amoskeag	3	2/26/16 8:19	2/26/16 8:23	<b>0.07</b>	<b>0.00</b>	Y	Trip	Unknown
C	Amoskeag	3	2/29/16 7:28	2/29/16 9:22	<b>1.90</b>	<b>0.08</b>	Y	EMO	Rack rake OOS for repairs
D	Amoskeag	3	3/1/16 7:30	3/1/16 8:36	<b>1.10</b>	<b>0.05</b>	Y	EMO	Rack rake OOS for repairs
E	Amoskeag	3	3/2/16 12:46	3/2/16 13:50	<b>1.07</b>	<b>0.04</b>	Y	EMO	Rack rake OOS for repairs

### Eversource Hydro Outage Matrix - 2016

Item	Site	Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Outage Duration - Days	Lost Generation (Y or N)	Outage Type	Cause of Outage
F	Amoskeag	3	3/4/16 12:36	3/4/16 13:29	<b>0.88</b>	<b>0.04</b>	Y	EMO	Rack rake OOS for repairs
G	Amoskeag	3	8/13/16 17:30	8/15/16 15:47	<b>46.28</b>	<b>1.93</b>	N	Trip	Stator RTD alarm caused by possible voltage spike

### Eversource Hydro Outage Matrix - 2016

Item	Site	Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Outage Duration - Days	Lost Generation (Y or N)	Outage Type	Cause of Outage
A	Hooksett	1	6/17/16 8:23	6/17/16 8:34	<b>0.18</b>	<b>0.01</b>	Y	T/D	Transmission line fault on 332 / 335 line
B	Hooksett	1	6/20/16 10:27	6/20/16 10:50	<b>0.38</b>	<b>0.02</b>	N	Trip	Low flow during load adjustment
C	Hooksett	1	12/29/16 22:32	12/30/16 1:56	<b>3.40</b>	<b>0.14</b>	Y	T/D	line fault

### Eversource Hydro Outage Matrix - 2016

Item	Site	Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Outage Duration - Days	Lost Generation (Y or N)	Outage Type	Cause of Outage
A	Jackman	1	1/4/16 9:19	1/4/16 10:09	<b>0.83</b>	<b>0.03</b>	N	EMO	Carbon build up on commutator
B	Jackman	1	7/11/16 10:45	7/15/16 10:47	<b>96.03</b>	<b>4.00</b>	N	EMO	Drained penstock for surge tank maintenance
C	Jackman	1	9/19/16 8:18	9/29/16 12:50	<b>244.53</b>	<b>10.19</b>	N	AI	Annual inspection

## Eversource Hydro Outage Matrix - 2016

Item	Site	Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Outage Duration - Days	Lost Generation (Y or N)	Outage Type	Cause of Outage
A	Garvins	S	8/8/16 7:00	8/26/16 0:00	425.00	17.71	N	AI/EMO	Annual Inspection (including canal draw down and dredging for concrete repairs)
B	Garvins	S	9/8/16 8:31	9/8/16 9:14	0.72	0.03	N		Required Black Start Testing
A	Garvins	1	3/2/16 2:10	3/2/16 3:25	1.25	0.05	N	EMO	Speed matching relay / switch issue
B	Garvins	1	5/24/16 1:00	5/25/16 16:45	39.75	1.66	N	Trip	Pressure switch failure
C	Garvins	1	6/7/16 4:25	6/7/16 8:28	4.05	0.17	Y	Trip	Synchronizer problem
D	Garvins	1	8/31/16 10:00	9/6/16 12:00	146.00	6.08	N	EMO	Hydraulic pipe leak
E	Garvins	1	12/18/16 12:00	1/18/17 13:30	745.50	31.06	N	EMO	Exciter failure
A	Garvins	2	3/7/16 19:37	3/7/16 20:56	1.32	0.05	Y	Trip	Voltage Regulator or Synchronizer relay problem
B	Garvins	2	5/19/16 11:00	5/23/16 11:00	96.00	4.00	N	EMO	Connecting rod at servo failure
C	Garvins	2	8/13/16 7:30	8/14/16 7:45	24.25	1.01	N	Trip	Debris in wicket gates
D	Garvins	2	11/5/16 4:26	11/5/16 5:40	1.23	0.05	Y	Trip	Synchronizer problems
A	Garvins	3	1/10/16 22:38	1/10/16 23:45	1.12	0.05	Y	Trip	Voltage Regulator / Synchronizer issues
B	Garvins	3	2/17/16 12:31	2/17/16 14:25	1.90	0.08	Y	Trip	Control switch not located in supervisory
C	Garvins	3	3/7/16 14:39	3/7/16 15:32	0.88	0.04	Y	EMO	Hydraulic hose failure
D	Garvins	3	3/7/16 19:32	3/7/16 19:41	0.15	0.01	Y	Trip	Computer issue
E	Garvins	3	6/28/16 14:11	6/28/16 15:00	0.82	0.03	N	Trip	Synchronizer / voltage regulator issues
F	Garvins	3	7/19/16 17:57	7/20/16 8:20	14.38	0.60	N	Trip	Check alarms call not made to operator
G	Garvins	3	11/30/16 12:06	12/2/16 9:30	45.40	1.89	N	Trip	Relay failure
H	Garvins	3	12/21/16 23:45	12/22/16 9:11	9.43	0.39	N	Trip	Synchronizer / voltage regulator issues
A	Garvins	4	3/7/16 14:39	3/7/16 15:31	0.87	0.04	Y	EMO	Hydraulic hose failure
B	Garvins	4	10/3/16 8:36	10/14/16 13:54	269.30	11.22	N	EMO	planned outage to repair draft tube hole
C	Garvins	4	11/30/16 21:34	12/1/16 7:45	10.18	0.42	N	Trip	Voltage Regulator contacts failed
D	Garvins	4	12/28/16 13:20	12/28/16 15:00	1.67	0.07	Y	Trip	Synchronizer / voltage regulator issues

Eversource Hydro Outage Matrix - 2016

Item	Site	Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Outage Duration - Days	Lost Generation (Y or N)	Outage Type	Cause of Outage
A	Ayers Island	1	3/17/16 23:53	3/18/16 1:28	1.58	0.07	Y	T/D	Distribution line disturbance
A	Ayers Island	2	2/28/16 3:47	2/28/16 5:10	1.38	0.06	Y	Trip	Unknown
B	Ayers Island	2	3/6/16 22:06	3/7/16 0:03	1.95	0.08	Y	Trip	Unknown
C	Ayers Island	2	3/9/16 5:29	3/9/16 5:45	0.27	0.01	Y	Trip	Unknown
D	Ayers Island	2	4/26/16 9:36	4/26/16 11:49	2.22	0.09	N	EMO	Oil Change
E	Ayers Island	2	5/20/16 3:13	5/20/16 4:35	1.37	0.06	N	Trip	Unknown
F	Ayers Island	2	7/29/16 8:08	9/29/16 12:59	1492.85	62.20	Y	AI/EMO	Annual Inspection (including penstock and exciter repairs)
G	Ayers Island	2	10/9/16 8:26	10/11/16 12:21	51.92	2.16	N	Trip	Coil failure
H	Ayers Island	2	11/15/16 10:15	11/15/16 14:00	3.75	0.16	N	Trip	Mechanical Overspeed Malfunction
B									
A	Ayers Island	3	3/9/16 8:43	3/9/16 8:53	0.17	0.01	Y	Trip	Middle guide bearing- high temperature
B	Ayers Island	3	3/11/16 22:21	3/12/16 0:08	1.78	0.07	Y	Trip	Middle guide bearing- high temperature
C	Ayers Island	3	4/7/16 8:27	4/7/16 9:35	1.13	0.05	N	EMO	Collector ring brushes replacement
D	Ayers Island	3	4/21/16 3:39	4/21/16 4:48	1.15	0.05	Y	Trip	Middle guide bearing- high temperature
E	Ayers Island	3	7/8/16 7:09	8/10/16 14:44	799.58	33.32	Y	EMO/AI	Annual Inspection (including penstock repairs)

## Eversource Hydro Outage Matrix - 2016

Item	Site	Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Outage Duration - Days	Lost Generation (Y or N)	Outage Type	Cause of Outage
A	Eastman	1	2/3/16 22:16	2/4/16 9:32	11.27	0.47	N	Trip	Governor cams adjustment
B	Eastman	1	5/3/16 13:49	5/3/16 15:04	1.25	0.05	Y	Trip	Voltage reduction test
C	Eastman	1	5/16/16 8:37	5/16/16 9:29	0.87	0.04	Y	T/D	Transfer trip from Webster substation
D	Eastman	1	6/14/16 13:00	6/23/16 8:06	211.10	8.80	Y	Trip	PLC board failure
E	Eastman	1	8/25/16 13:50	8/25/16 13:58	0.13	0.01	Y	Trip	Operator error
F	Eastman	1	12/6/16 9:43	12/8/16 18:30	56.78	2.37	N	EMO	Planned outage -governor inspection
G	Eastman	1	12/17/16 19:50	12/17/16 20:15	0.42	0.02	Y	Trip	High VARS
A	Eastman	2	5/3/16 13:51	5/3/16 14:56	1.08	0.05	Y	Trip	Voltage reduction test
B	Eastman	2	5/16/16 8:37	5/16/16 12:54	4.28	0.18	Y	T/D	Transfer trip from Webster substation
C	Eastman	2	6/11/16 18:48	6/11/16 20:23	1.58	0.07	Y	T/D	Line disturbance
D	Eastman	2	8/22/16 8:08	9/16/16 9:11	601.05	25.04	N	AI	Annual Inspection
E	Eastman	2	10/25/16 13:54	10/25/16 14:44	0.83	0.03	Y	Trip	Voltage reduction test
F	Eastman	2	12/17/16 18:27	12/17/16 20:26	1.98	0.08	Y	Trip	High VARS

## Eversource Hydro Outage Matrix - 2016

Item	Site	Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Outage Duration - Days	Lost Generation (Y or N)	Outage Type	Cause of Outage
A	White Lake	1	10/12/16 15:44	10/12/16 17:36	<b>1.87</b>	<b>0.08</b>		Trip	Relay failure
B	White Lake	1	10/17/16 9:28	10/17/16 9:43	<b>0.25</b>	<b>0.01</b>		Trip	Relay failure
C	White Lake	1	11/22/16 10:26	11/22/16 10:38	<b>0.20</b>	<b>0.01</b>			Required Black Start testing

### Eversource Hydro Outage Matrix - 2016

Item	Site	Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Outage Duration - Days	Lost Generation (Y or N)	Outage Type	Cause of Outage
A	Smith	1	9/12/16 9:45	9/22/16 15:48	246.05	10.25	Y	AI	Annual Inspection

### Eversource Hydro Outage Matrix - 2016

Item	Site	Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Outage Duration - Days	Lost Generation (Y or N)	Outage Type	Cause of Outage
A	Gorham	S	8/15/16 8:00	8/29/16 8:00	<b>336.00</b>	<b>14.00</b>	N	AI	Annual Inspection (including canal relining)
B	Gorham	S	10/11/16 8:00	12/23/16 8:00	<b>1752.00</b>	<b>73.00</b>	Y	EMO	Scheduled Electrical Upgrade
A	Gorham	1	3/15/16 18:48	3/15/16 22:27	<b>3.65</b>	<b>0.15</b>	Y	Trip	Rectifier circuit breaker Failure
B	Gorham	1	4/29/16 14:57	5/1/16 18:50	<b>51.88</b>	<b>2.16</b>	Y	Trip	Unit stopped by dispatcher
A	Gorham	2	4/30/16 22:29	5/1/16 18:50	<b>20.35</b>	<b>0.85</b>	Y	Trip	Unit stopped by dispatcher

### Eversource Hydro Outage Matrix - 2016

Item	Site	Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Outage Duration - Days	Lost Generation (Y or N)	Outage Type	Cause of Outage
A	Canaan	1	8/20/16 12:06	8/21/16 0:00	<b>11.90</b>	<b>0.50</b>	Y	T/D	355 line fault
B	Canaan	1	9/19/16 7:32	11/19/16 18:50	<b>1475.30</b>	<b>61.47</b>	Y	EMO/AI	Scheduled Electrical Upgrade
C	Canaan	1	11/27/16 18:02	11/28/16 8:35	<b>14.55</b>	<b>0.61</b>	Y	Trip	Pressure switch not responding

### Eversource Hydro Outage Matrix - 2016

Item	Site	Unit Number	Date & Time OFF line	Date & Time ON line	Outage Duration - Hours	Outage Duration - Days	Lost Generation (Y or N)	Outage Type	Cause of Outage
A	Lost Nation	1	2/10/16 0:26	2/10/16 4:30	<b>4.07</b>	<b>0.17</b>	Y	Trip	Power supply trouble
B	Lost Nation	1	3/2/16 2:59	3/2/16 4:18	<b>1.32</b>	<b>0.05</b>	Y	Trip	Power supply fuse failure
C	Lost Nation	1	3/2/16 6:24	3/2/16 7:45	<b>1.35</b>	<b>0.06</b>	N	EMO	Power supply trouble
D	Lost Nation	1	3/3/16 14:00	3/3/16 14:26	<b>0.43</b>	<b>0.02</b>	N	EMO	Power supply trouble
E	Lost Nation	1	7/29/16 19:29	7/29/16 20:41	<b>1.20</b>	<b>0.05</b>	Y	Trip	Unknown
F	Lost Nation	1	9/26/16 7:00	12/5/16 18:47	<b>1691.78</b>	<b>70.49</b>		EMO	Control system replacement
G	Lost Nation	1	12/14/16 12:49	12/14/16 13:57	<b>1.13</b>	<b>0.05</b>	N	EMO	Oil change

# Exhibit 3 - EHT Testimony

## Attachment EHT-2

### Eversource Generation

### Unit Outage Reports

## **NH GENERATION**

### **STEAM STATION OUTAGE REPORT**

**PUC Outage Report No.:** OR-2016-01

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

**Dates:** February 18 – February 20, 2016

**Duration:** 2.0 Days

**Immediate Cause:** Boiler Feedwater Pump

**Discussion/Remedy:** This Merrimack Unit 1 outage was 2.0 days long and began on February 18. The unit was in reserve status with expected low energy load and price forecasts. It was decided to declare the unit unavailable; and replace the outboard mechanical seal on the 1A Boiler Feed Pump that had been leaking excessively during the previous unit run. Station personnel worked a limited amount of extended hours. The low energy prices allowed the work to be completed on a one-shift basis, maintain crew consistency and reduce overtime costs.

To complete the repair the thrust bearing was overhauled, the mechanical seal was replaced, and the oil sump was cleaned.

The work was completed and the unit released to ISO at 16:15 on Saturday, February 20th. The unit remained in reserved outage. Additional jobs from the outage backlog were also completed including the following.

#### **Mechanical Department:**

- Replaced boiler port and repaired boiler door frame on elevation 238, south side
- Changed oils and cleaned oil level sight glasses on 1A & 1B forced draft fan bearings

#### **Electrical and I&C Departments:**

- Tested and adjusted 1A cyclone flame detector
- Checked and adjusted torque on 1B boiler feed pump discharge valve
- Tested operation of secondary superheater attemperation spray block valve

**NH GENERATION**

**STEAM STATION OUTAGE REPORT**

**PUC Outage Report No.:**      **OR-2016-02**

**Station/Unit:**                      Schiller Station, Unit 6

**Dates:**                                      September 2 – September 9, 2016

**Duration:**                                  7.1 Days

**Immediate Cause:**                      Transmission System Outage

**Discussion/Remedy:** This transmission outage work was scheduled during what was expected to be a low cost, low demand energy period; and there were no replacement power costs associated with the Schiller Unit 6 outage. The transmission outage was needed to complete work in the Schiller Station high yard by the T&D organization.

During this outage, Unit 6 was available to operate; however, transmission work being performed in the high-yard prevented the unit from sending energy to the grid. This outage is identified in the GADS database, but does not impact the unit's availability.

## NH GENERATION

### STEAM STATION OUTAGE REPORT

**PUC Outage Report No.:** OR-2016-03

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

**Dates:** September 2 – September 9, 2016

**Duration:** 6.7 Days

**Immediate Cause:** Maintenance Outage - Boiler

**Discussion/Remedy:** This maintenance outage was planned coincident with the transmission outage which was needed to complete work in the Schiller Station high yard by the T&D organization. The unit was scheduled to be removed from service on Friday, September 2 @ 19:00 and to be returned to service at Monday, September 12 @ 07:00.

The unit came off at Friday, September 2 @ 23:11. The unit was returned to service on Friday, September 9 @ 15:34 approximately 2½ days ahead of the original ISO completion date.

During this boiler maintenance outage a number of activities were completed in preparation for the upcoming winter period.

Boiler and Balance of Plant items included the following.

- Critical path activities - the inspection and cleaning of the six cyclone separators, as well as the inspection, repair and/or replacement of the in-bed tubes
  - Cyclone 1: Cleaning completed - buildup to cone; dip leg 50% open
  - Cyclone 2: Dip leg plugged - cone buildup
  - Cyclone 3: Cleaning completed - cone buildup
  - Cyclone 4: Cleaning completed
  - Cyclone 5: Dip leg partially plugged- cone buildup
  - Cyclone 6: Cleaning completed

- O'Connor completed in bed tube repairs -14 pad weld repairs completed and 16 shields installed
  - Boiler hydro successfully completed
  - Tuyeres cleaned and inspected
- Thielsch Engineering performed nondestructive examination of the boiler tubes in the deaerator heater
- Millennium Valve performed valve maintenance including the soot blower control valve and the boiler feed pump recirculation valve
- C5 conveyor belly pan cleaned
- Wood silo inspected
- Moly coolers cleaned including installation of new covers
- Baghouse filter bag replacements by RPS
  - Module 1- 20 bags
  - Module 2- 0 bags
  - Module 3 - 0 bags
  - Module 4 - 0 bags
  - Module 5 - 21 bags
  - Module 6 - 2 bags
  - Module 7 - 2 bags
  - Module 8 - 360 bags (worn bottom wear cuffs vs bag failure)
- Cooling water sump cleaned
- C5 conveyor splice inspected
- C5 conveyor scale calibrated
- Cyclone separator air cannon installed
- Economizer Plattco valve installed and programmed
- Reclaimer wear strips replaced
- Hog liner replaced
- C1 and C5 conveyors -magnet belts replaced

Instrument and Controls Department items included the following.

- Cyclone separator & dip leg thermocouples and transmitter calibrated
- Chemical analyzer calibrated
- Other routine preventative maintenance activities completed

Other work included:

- Condenser water boxes and tubes cleaned by operations department after they opened all the doors
- Condenser & Heat Exchanger Services (CHES) completed condenser tube brush cleaning (no blocked tubes identified)
- Scale type coating that had been noted during the last inspection cleaned
- Water boxes washed and scrubbed to remove the light coating of dirt and debris

## NH GENERATION

### STEAM STATION OUTAGE REPORT

**PUC Outage Report No.:** OR-2016-04

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

**Dates:** September 26 – October 7, 2016

**Duration:** 11.5 Days

**Immediate Cause:** Maintenance Outage – Boiler Feedwater Pump

**Discussion/Remedy:** The unit was in reserve status with expected low energy load and price forecasts. It was decided to declare the unit unavailable to replace the 1A boiler feed pump barrel assembly balance drum and other rotating components.

During previous unit operation, 1A Boiler Feed Pump had exhibited operational characteristics that indicated that the rotating assembly needed to be changed. The outboard pump bearing vibration was elevated, the inboard pump bearing temperature was high, and the balance drum leak-off pressure had noticeably increased compared to its normal level. A pump specialist was consulted and the diagnosis confirmed the need for replacement of the barrel assembly balance drum and other rotating components. With actual energy demand and prices low, an outage was scheduled with ISO to complete the work. While some of the vendor shop work was performed on an expedited basis, the low energy prices allowed station repairs to be completed on a one-shift basis to control overtime costs and maintain crew consistency.

Specific work included the replacement of the rotating assembly and the balance drum.

The unit was declared unavailable on September 26 at 07:00 and declared available to reserve status at 19:30 on 10/7/16 when the work was completed.

**Additional work completed during the outage included the following.**

### **Mechanical Department:**

- Serviced linkage and servo to west turbine throttle valve. Installed new relief and check valves
- Repaired oil leak on east side turbine interceptor servo
- Re-sequenced turbine governor valves
- Repaired oil leak on turbine turning-gear gearbox
- Inspected hotwell internal. Repaired broken steam drain deflector. Plugged three damaged condenser tubes.
- Swapped out 1B cooling water pump motor and re-built pump
- Addressed packing leak on 1A condensate drip pump
- Repaired leak on 4<sup>th</sup> point heater flange
- Replaced south economizer bypass damper Limitorque gearbox and resealed drive shaft
- Rebuilt PCV-39 auxiliary steam to DA Tank valve and replaced the inlet valve
- Opened / repaired DA warm-up line check valve
- Replaced isolation valve for house heat steam supply

### **Electrical & I&C Departments:**

- Replaced the 1B Air Heater breaker
- Inspected and serviced the 1A condensate pump breaker
- Inspected and adjusted controller on transformer rectifier "E"
- Replaced gauge and fittings on slag sluice pump discharge

## NH GENERATION

### STEAM STATION OUTAGE REPORT

**PUC Outage Report No.:** OR-2016-05

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

**Dates:** November 28 – December 3, 2016

**Duration:** 5.1 Days

**Immediate Cause:** Turbine Lube Oil Pumps

**Discussion/Remedy:** During startup of the unit for station scheduled testing, the turbine auxiliary oil pump experienced high vibration and tripped its breaker. The pump supplies oil pressure to open the turbine valves. Initial inspection indicated damage to both the motor and pump. The turbine oil tank was drained to facilitate removal of the pump and both were sent to vendor shops for repairs.

The repair included the removal, rebuild and reinstallation of the oil pump and motor.

The repaired pump and motor were re-installed by turbine contractor personnel with the support of a representative from the pump repair company and then test ran. The unit was declared available and placed in reserve status at 23:10 on December 3.

**Additional work completed during the outage included the following.**

#### Mechanical Department:

- Repaired leak on 2C ignitor assembly
- Replaced IK-5 soot blower poppet
- Repaired leaking boiler wind box door
- Repaired leak on 2G coal feeder downcomer
- Repaired leak on primary fan coil steam supply
- Replaced pump and repaired leak on FD fan room sump pump discharge
- Pulled / cleaned condensate pump strainers
- Aligned flange on 2C Blast Gate

- Adjusted tracking on 2E Coal Feeder
- Replaced boiler aspirating air 3-way valve on 3<sup>rd</sup> floor
- Re-sealed original precipitator hopper #7 door
- Replaced 2F ignitor pressure sensing line
- Repacked 2A downcomer slip joint
- Replaced seal air hose on 2C cyclone
- Replaced piping to view port for slag tank enclosure
- Replaced HRV's-3,4,9 & 10 relief valves in ammonia system

**Electrical & I&C Departments:**

- Stroked and checked torque settings on 210 drain valve
- Checked for potential ground on phase-A of 2LC
- Replace circuit board on supplemental precipitator control AVC-4
- Cleaned contacts and tested 2F bunker discharge gate limitorque
- Checked ground fault on Unit 2 annunciator battery charger
- Tested DA normal block valve electrical operation
- Re-tubed and calibrated condensate pump strainer differential gauges
- Purged sensing lines and tested 2C and 2G guillotine damper positions
- Calibrated start-up boiler feed pump oil temperature gauge
- Checked / lubed mercoid switch for gland water reinjection tank

**NH GENERATION**

**STEAM STATION OUTAGE REPORT**

**PUC Outage Report No.:**      **OR-2016-06**

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

**Dates:**                                      December 5 – December 9, 2016

**Duration:**                                  3.7 Days

**Immediate Cause:**                      Turbine Lube Oil Pumps

**Discussion/Remedy:** During startup of Unit 2 for station scheduled testing, the turbine auxiliary oil pump experienced high vibration and was shut down by operations personnel. Initial inspection indicated that the lower motor bearing had failed. The pump and motor had been recently worked on, reference OR-5, by qualified vendors, both with strong histories of successful prior similar repairs for the station. However, given the repetitive failure the motor was removed and sent to a second motor shop for inspection and repair. The turbine lube oil tank was drained and the pump was inspected in place with no damage found. When returned, the motor was reinstalled by station personnel with support of a representative from the pump repair company. Subsequent operational testing and operation was satisfactory.

The unit was declared available at 07:14 on December 9 and began startup activities to perform the required station testing.

The station has since purchased a spare motor for this pump.

## NH GENERATION

### FOSSIL STATION OUTAGE REPORT

**PUC Outage Report No.:** OR-2016-07

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

**Dates:** December 26 – December 31, 2016

**Duration:** 5.9 Days

**Immediate Cause:** Superheater/Attemperator Problems

**Discussion/Remedy:** Unit 5 coal feeders tripped December 25 at 2358. While returning the unit to full load, the attemperator control valve packing developed a leak. The station notified ISO on December 26 at 0200 that the unit would be coming offline to repair the valve packing. The wood silos were emptied; and removal of the bed material was initiated but hampered by a plugged removal line. The unit was taken offline at 0305.

A work plan had been previously developed and would be used to prioritize work during this forced outage. Critical path was the removal of pluggage, inspection and cleaning of the six cyclone separators. Priority work also included repair and/or replacement of the in-bed tubes using inspection and NDE testing of the tubes performed by Thielsch during the previous outage.

Other outage work included the following.

- Inspection of the backpass by Alstom
- Inspection of the screenhouse
- Inspection of the west condenser valve.
- Repacked the attemperator control valve
- Adjusted packing of the feedwater block valve
- Replaced the sootblower block valve
- Replaced the Unit 5 DCS MW transducer
- Replaced the fuel distribution blower motor
- Inspected the woodyard equipment
  - Inspected C5 conveyor splice
  - Inspected C1, C3 and C4 conveyors
  - Inspected PB1 belt

- Completed I&C preventative maintenance tasks on the cyclone and dip leg thermocouples and transmitter
- Repaired the bed fill piping
- Repaired flyash piping
- Millennium Valve performed valve maintenance on critical control valves
- Replaced the DCS MW transducer
- Replaced the fuel distribution blower motor
- Replaced the 10th Stage feedwater heater safety valve

## NH GENERATION

### STEAM STATION OUTAGE REPORT

**PUC Outage Report No.:** OR-2016-08

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

**Dates:** December 28 – December 31, 2015

**Duration:** 2.3 Days

**Immediate Cause:** Furnace Wall Leaks

**Discussion/Remedy:** Unit 2 was off-line in reserve status. Prior to the winter months of January and February, a boiler inspection was performed. The inspection identified cyclone and waterwall waterside tube leaks.

- Cyclones 2A, 2B and 2E each had tube leaks in the cyclone neck areas.
- Cyclone 2D had a tube leak behind the flat studs.
- There was a furnace wall tube leak on the rear wall above the stud line above 2G cyclone.
- There were two furnace wall tube leaks on the rear wall, 6' in from the north wall and 10' up from the floor.
- In the front wall of the firebox, IR-14 had a leak in one of the port tubes.
- The boiler floor had an 18" crack in the membrane.

All tube leaks were pad welded back to original thickness and a hydrostatic test was performed. The unit was released to ISO in reserve status on December 31.

**Additional work completed during the outage included the following.**

#### Maintenance Department:

- Opened and closed boiler doors
- Performed weekly operation of the pug mill ash conditioner
- Checked oil level and belt adjustment on 2-A flyash reinjection blower
- Inspected and greased cooling water pumps

- Performed inspection on the DUSCO powder system
- Tested the slag tank jack hammer rodder system
- Checked 2-C cyclone cooling water return line
- Repaired locking mechanism on the 2-A forced draft fan outlet damper manual/auto changeover
- Repaired hole in the gland seal water reinjection pump tank
- Repaired the hotwell sight glass (east, center of hotwell)

#### **Electrical Department:**

- Checked limitorque setting on 2-B secondary shut off damper guillotine.
- Replaced fuse for precipitator control "B" field north.
- Repaired the supplemental precipitator AVC-1.

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

- Performed weekly anhydrous ammonia gauge inspection
- Inspected generator monitor filter and checked fault log
- Adjusted TCV-56 primary fan coil steam control valve
- Verified operation of turbine supervisory 3500 system monitor interface
- Adjusted temperature reading set point for the forced draft fan primary preheat coils
- Performed check on turbine point 2249 on the ADH
- Rebooted the keyboard video mouse (KVM) on the MK-2 control system
- Verified condenser vacuum gauge MK2-TGS-PI-2018

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

- Vacuumed gas recirculation duct
- Vacuumed tempering duct
- Vacuumed ducts and economizer hoppers
- Vacuumed original and supplemental precipitator hoppers

#### **Boiler Work:**

- Performed a complete boiler inspection
- Repaired tube leaks in 2A, 2B, 2D, 2E, and 2G cyclones

# Exhibit 3 - EHT Testimony

## Attachment EHT-3

### Eversource Steam Units'

#### Availability and Performance

**EVERSOURCE Generating Steam Unit  
Equivalent Availability Factor (EAF)  
January 2016 through December 2016**

	<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	98.9	100.0	100.0	100.0	99.8	99.0
February	92.4	100.0	100.0	94.4	100.0	93.2
March	100.0	100.0	98.2	100.0	79.5	98.9
April	100.0	100.0	77.4	100.0	0.0	99.0
May	96.3	98.0	99.7	99.6	85.8	99.0
June	100.0	100.0	100.0	99.4	99.7	98.8
July	100.0	100.0	99.6	99.9	100.0	98.9
August	98.3	99.9	99.0	100.0	100.0	98.9
September	84.3	61.0	100.0	95.0	77.7	75.4
October	78.0	0.0	100.0	11.5	100.0	99.0
November	99.8	43.6	90.9	100.0	99.6	99.0
December	95.3	70.7	98.5	99.6	81.0	96.5
<b>Annual</b>	<b>95.4%</b>	<b>81.1%</b>	<b>96.9%</b>	<b>91.6%</b>	<b>85.3%</b>	<b>96.3%</b>

**Planned Maintenance Outages  
January 2016 through December 2016**

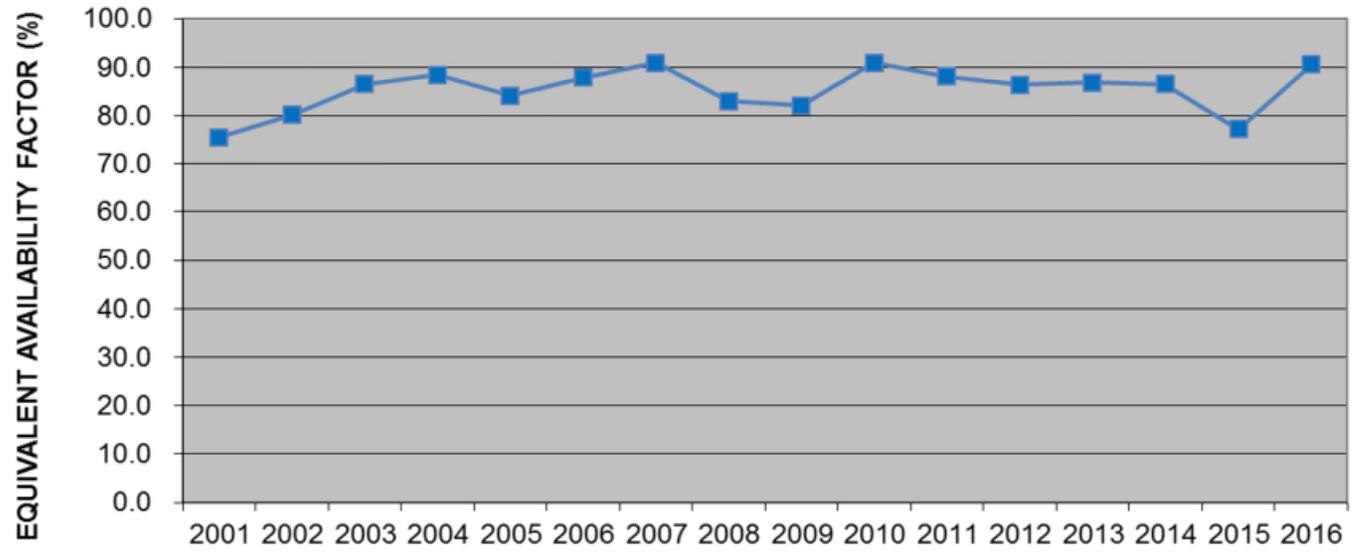
<b>Unit</b>	<b>Month(s)</b>
Merrimack 1	N/A
Merrimack 2	Sep-Nov
Newington	Apr
Schiller 4	Oct
Schiller 5	Mar-May
Schiller 6	N/A

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

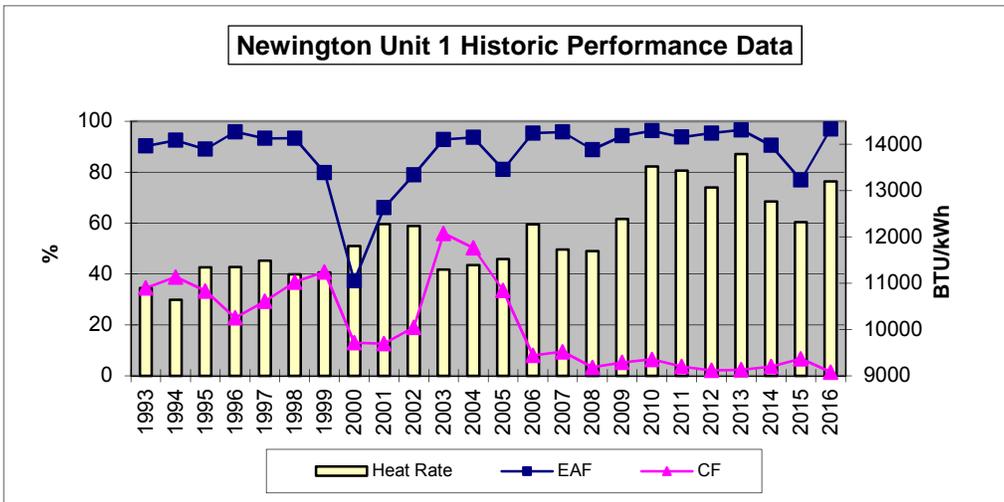
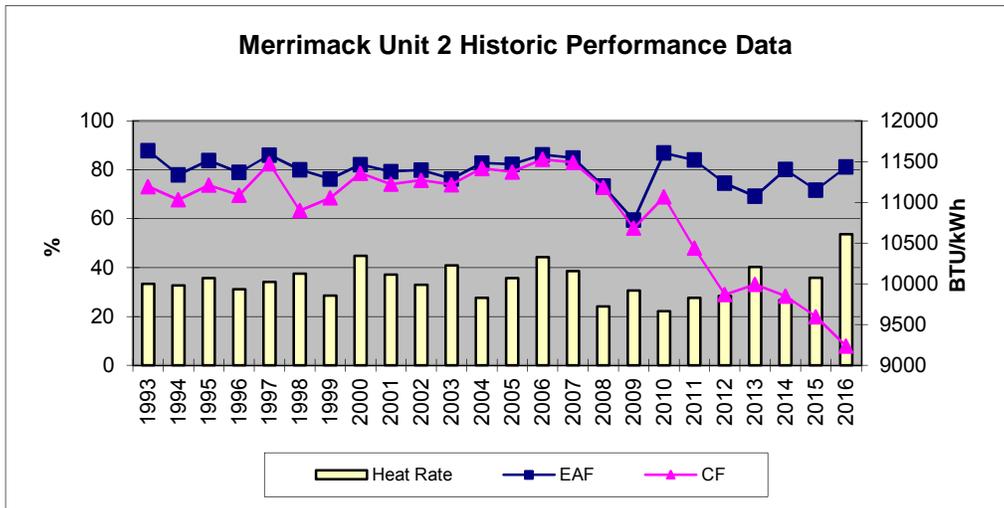
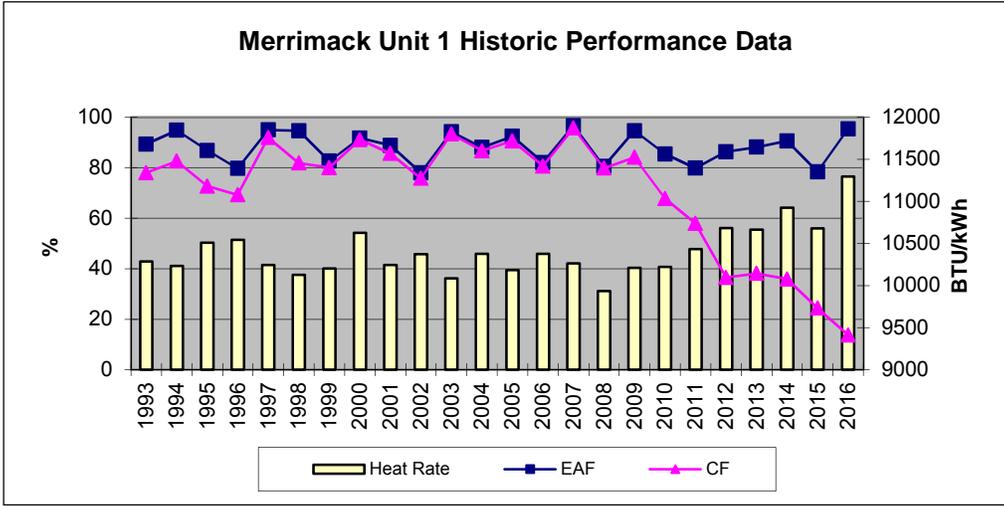
$$EAF = [(Available\ Hours - Equivalent\ Unit\ Derated\ Hours) * 100] \div Period\ Hours.$$

<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.

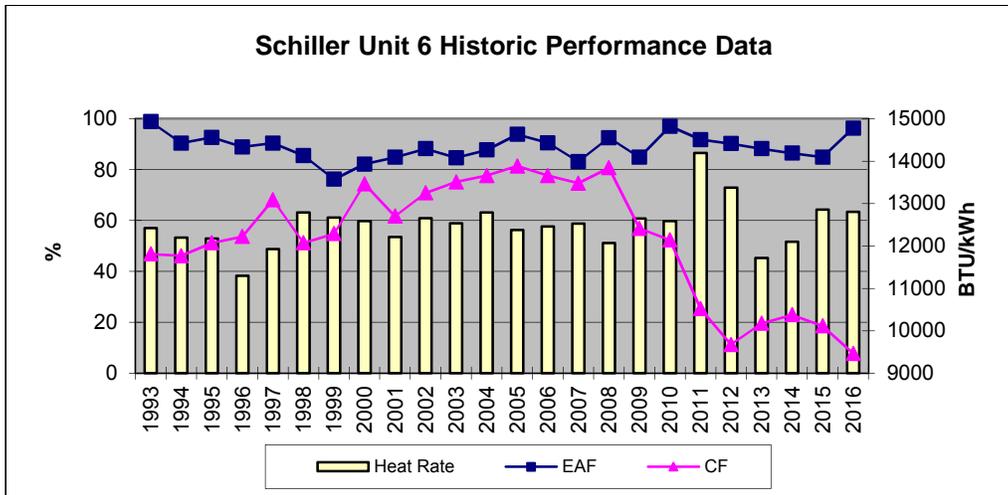
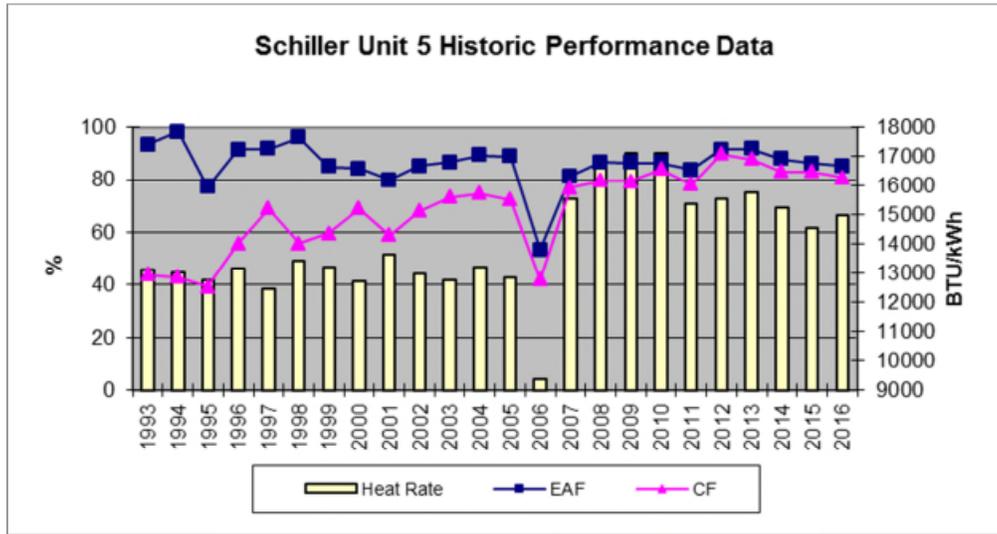
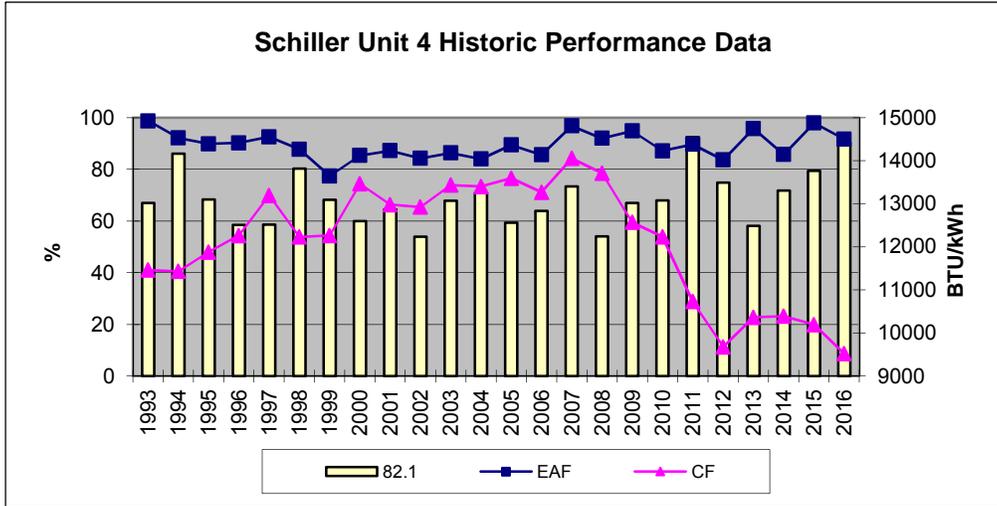
### PSNH FOSSIL SYSTEM WEIGHTED EAF 2016



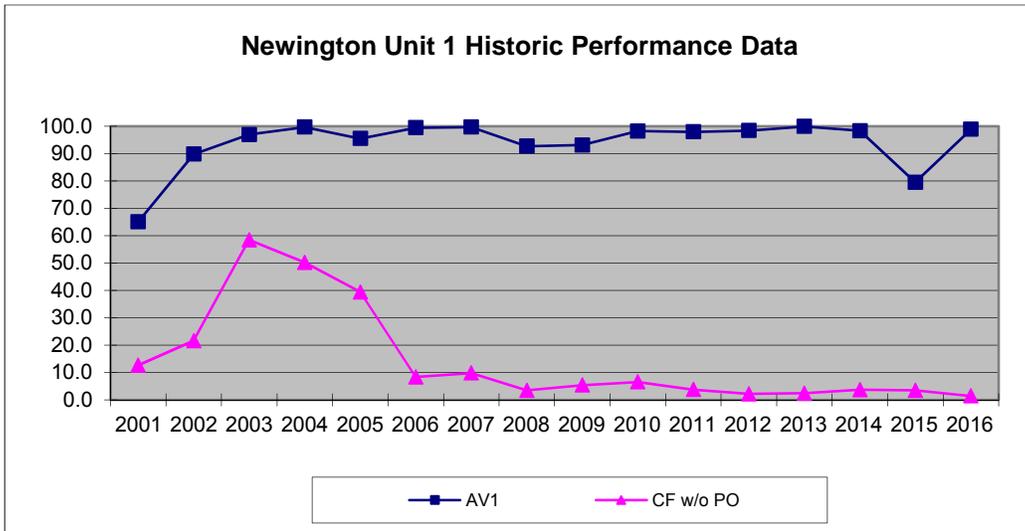
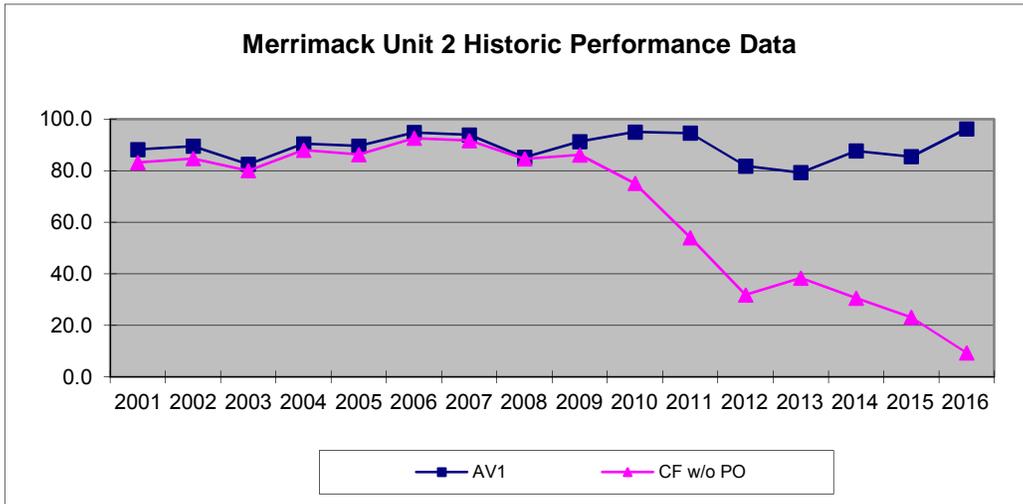
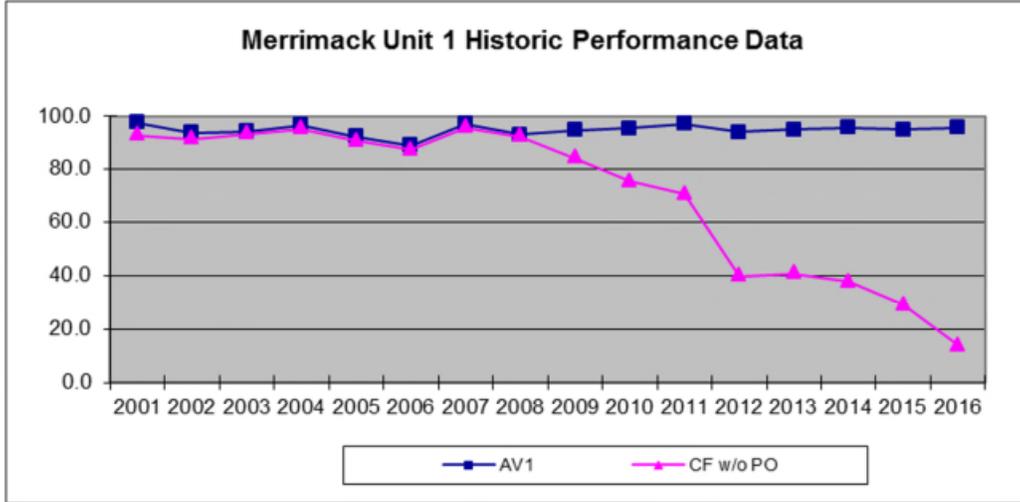
### Steam Unit Graphs – Planned Outages Included



### Steam Unit Graphs – Planned Outages Included



### Steam Unit Graphs – Planned Outages Omitted



### Steam Unit Graphs – Planned Outages Omitted

