



February 28, 2018

**PUBLIC DOCUMENT
TRADE SECRET DATA HAS BEEN EXCISED**

VIA Electronic Filing

Mr. Daniel P. Wolf, Executive Secretary
Minnesota Public Utilities Commission
121 7th Place East, Suite 350
St. Paul, MN 55101-2147

Dear Mr. Wolf:

Re: **Minnesota Rules 7825.2800 - 7825.2840
Annual Reports Containing Fuel Information and Data**

In compliance with the above rules, Minnesota Power hereby submits to the Commission the following reports and information:

Attachment No. 16 Handling of forced outages; the lessons learned, information sharing and a simple identification of forced outages with discussion on how such outages could have been avoided or alleviated. (Docket No. E999/AA-10-884 dated April 6, 2012).

***Revision to Docket #AA-17-492 Compliance Filing- Minnesota Power Annual Automatic Adjustment that was filed on 8/31/2017**

Minnesota Power believes this filing comports with the Commission's Notice relating to Revised Procedures for Handling Trade Secret and Privileged Data, pursuant to Minn. Rule part 7829.0500. As required by the revised procedures, a statement providing the justification for excising the trade secret data is attached to this letter.

Sincerely,

/s/ Leann Oehlerking-Boes

Leann Oehlerking-Boes
Manager –
Energy Pricing & Billing

Minnesota Power's Force Outages

Unit	Event Type	DOC Primary Reason for the Outage	GADS Equivalent MWh lost	GADS Start Date/Time of Actual Outage	GADS End Date/Time of Actual Outage	DOC Equipment or Condition that Resulted in the Outage	DOC Description of Equipment Failure (including identified root cause)	DOC Steps Taken to Alleviate Reoccurrence	DOC Change in Energy
BEC 3	Unplanned Outage	Boiler Waterwall Leak	9,099	7/8/16 1:22	7/9/16 2:53	Waterwall tube	Tube failure due to tube wall thinning from the inside out.	Pad weld repair of the leak. During this outage opportunity, additional tubes in the surrounding area were inspected and repaired as needed.	\$ 40,135
THEC 1	Unplanned Outage	Boiler Waterwall Leak	5,392	8/4/16 21:35	8/8/16 3:44	Waterwall tube leak on Northwest 5th level	Urea dripping from urea injection port caused corrosion in tube.	Repaired tube leak. No long term plan due to idling of facility in fall.	\$ 8,961
THEC 1	Unplanned Outage	Boiler Tube Leak	2,759	8/16/16 22:05	8/18/16 14:04	Low temp super heat tube leak 5 1/2 level.	Sootblower erosion caused tube failure.	Repaired tube leaks. No long term plan due to idling of facility in fall.	\$ (1,204)
THEC 2	Unplanned Outage	Boiler SH Tube Leak	5,299	8/18/16 22:00	8/22/16 3:36	Low temp super heat tube leak 5 1/2 level.	Sootblower erosion caused tube failure.	Repaired tube leak. No long term plan due to idling of facility in fall.	\$ 12,326
BEC 4	Unplanned Outage	Main Boiler Feed Pump 4B Repair	56,608	8/24/16 23:55	8/30/16 1:49	4B Main Boiler Feed Pump siezed, due to an axial thrust.	The boiler feedpump suction strainer failed in service releasing debris into pump. The material accumulated between blancing faces resulting in reverse thrust motion.	Original suction screen was made of wire screen. The screen wore between wires where it was not visible when inspected. The replacement screen is made of perforated steel and much more robust.	\$ 351,349
BEC 3	Unplanned Outage	Boiler Waterwall Leak	15,329	8/29/16 14:45	8/31/16 9:37	Waterwall tube leak.	Tube failure due to slag impact on bottom portion of tube resulting in mechanical failure of upper portion of tube.	Pad weld repair of the leak. During this outage opportunity, additional tubes in the surrounding area were inspected and repaired as needed.	\$ 129,503
BEC 3	Unplanned Outage	MBFP Safety Valve Leak	15,740	11/2/16 5:32	11/4/16 2:15	Suction safety on Main Boiler Feed Pump.	Cracked fitting on the pilot operated suction safety valve.	Removed suction safety for repair. Installed temporary suction safety valve in order to bring the unit back online to minimize customer costs.	\$ 107,064
BEC 2	Unplanned Outage	Boiler SH Tube Leak	2,142	12/27/16 22:54	12/29/16 6:52	Superheat tube leak.	Long-term overheating and external corrosion.	Pad weld repair of the leak. During this outage opportunity, additional tubes in the surrounding area were inspected and repaired as needed.	\$ (28,059)
BEC 3	Maintenance Outage	Boiler Waterwall Leak	8,800	12/30/16 23:00	1/1/17 10:19	Waterwall tube leak.	Sootblower erosion caused tube failure.	Pad weld repair of the leak. During this outage opportunity, additional tubes in the surrounding area were inspected and repaired as needed.	\$ 4,199
BEC 3	Unplanned Outage	Feedwater Heater 2 Drain Line Leak Repair	7,861	1/1/17 23:11	1/2/17 21:31	#2 Feedwater Heater - Drain line leak	Flow accelerated corrosion.	Replaced pipe with high chrome piping.	\$ 18,957
BEC 3	Unplanned Outage	Boiler RH Tube Leak	14,256	2/17/17 0:00	2/18/17 17:32	Reheat tube leak.	Long-term overheating and external corrosion.	Repaired tube leak. The long-term strategy for inspection and/or replacement is still in planning. There are three root causes of failures in this reheat, so the strategy to resolve all three root causes is more complex.	\$ (31,337)
BEC 1	Maintenance Outage	Baghouse Outlet Valve	2,481	3/4/17 23:34	3/6/17 12:36	Poppet valve failure on Baghouse.	Threaded poppet valve shaft broke.	Repaired poppet valve. No long term plan due to impending closure.	\$ (14,912)
BEC 2	Unplanned Outage	Boiler Tube Leak	2,928	3/5/17 23:44	3/7/17 19:26	Economizer tube leak	Sootblower erosion caused tube failure.	Pad weld repair of the leak. During this outage opportunity, additional tubes in the surrounding area were inspected and repaired as needed.	\$ (30,501)

Unit	Event Type	DOC Primary Reason for the Outage	GADS Equivalent MWh lost	GADS Start Date/Time of Actual Outage	GADS End Date/Time of Actual Outage	DOC Equipment or Condition that Resulted in the Outage	DOC Description of Equipment Failure (including identified root cause)	DOC Steps Taken to Alleviate Reoccurrence	DOC Change in Energy
BEC 4	Maintenance Outage	Boiler Tube Leak	20,774	3/13/17 23:25	3/15/17 11:14	Three pin hold tube leaks on the 16th floor.	Sootblower erosion caused tube failure on one tube. This impinged and caused two more tube leaks.	Pad weld repair of the leak. During this outage opportunity, additional tubes in the surrounding area were inspected. Two more tube leaks were repaired based on inspections. The tube area will be sectioned out in the next planned outage.	\$ 67,243
BEC 3	Unplanned Outage	Boiler RH Tube Leak	16,896	3/28/17 17:37	3/30/17 17:37	Reheat tube leak.	Fatigue stress cracking - overheating.	Pad weld repair of the leak. During this outage opportunity, additional tubes in the surrounding area were inspected and repaired as needed.	\$ 4,325
BEC 3	Maintenance Outage	Feedwater Line Pressure Relief Valve Leak	6,788	4/15/17 20:05	4/16/17 15:22	Suction safety on Main Boiler Feed Pump.	Cracked tubing on the pilot operated suction safety valve.	Removed suction safety and installed a different designed valve with no tubing and no fittings.	\$ (19,186)
BEC 3	Unplanned Outage	Feedwater Piping Leak	4,259	4/17/17 21:57	4/18/17 10:03	Feedwater line leak.	Sock weld failure from high cycle fatigue.	Weld repaired sock weld.	\$ (5,424)
BEC 3	Unplanned Outage	Main Boiler Feed Pump Damaged by Debris	35,927	4/26/17 17:56	5/3/17 6:22	MBFP Barrel	Debris in Feed water system due to damaged screen at DA	Redesign of suction screen in boiler feed scution tank to include standpipe. A Change of procedure made to include independent verification of cleanliness for suction tank entry and inspection prior to exit.	\$ 203,916
BEC 2	Unplanned Outage	Boiler SH Tube Leak	2,928	5/19/17 0:10	5/19/17 23:46	Reheat header tube leak.	Weld porosity caused pin hole leak.	Pad weld repair using weld repair program quality control. During this outage opportunity, additional tubes in the surrounding area were inspected and repaired as needed.	\$ (1,932)
BEC 3	Unplanned Outage	Boiler RH Tube Leak	12,273	5/5/17 22:44	5/7/17 9:36	Reheat tube leak.	Sootblower erosion caused tube failure.	Pad weld repair of the leak. During this outage opportunity, additional tubes in the surrounding area were inspected and repaired as needed.	\$ (16,670)
BEC 3	Unplanned Outage	Boiler RH Spacer Tube Leak	15,019	6/13/17 17:59	6/15/17 12:39	Reheat spacer tube leak.	Sootblower erosion caused tube failure.	Pad weld repair of the leak. During this outage opportunity, additional tubes in the surrounding area were inspected and repaired as needed.	\$ (29,576)