DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION
ACTIVITY REPORT: On-site Inspection

B284058929

FACILITY: Consumers Energy D.E. Karn Facility		SRN / ID: B2840
LOCATION: 2742 N. Weadock Hwy., ESSEXVILLE		DISTRICT: Bay City
CITY: ESSEXVILLE		COUNTY: BAY
CONTACT: George Eurich , Senior Environmental Lead - Air Quality		ACTIVITY DATE: 06/09/2021
STAFF: Benjamin Witkopp	COMPLIANCE STATUS: Compliance	SOURCE CLASS: MAJOR
SUBJECT: Facility inspection and records review		
RESOLVED COMPLAINTS:		

Ben Witkopp of the Micigan Department of Environment, Great Lakes, and Energy (EGLE) - Air Quality Division (AQD) met with George Eurich of Consumers Energy. George is the environmental contact for the electrical power generating complex. Colby Cottick and Mike Gruber were also present. Colby is the site Fuel Handling and Technical Services Manager. Mike is in Consumers Environmental Services group specializing in Air Quality. He handles both the Karn site located in Essexville as well as the Campbell Plant located north of Holland Michigan. The complex in Essexville at one time consisted of Weadock 7 & 8 as well as Karn units 1-4. Weadock was coal fired as is Karn 1 & 2. Karn 3 & 4 runs on fuel oil or natural gas. Weadock 7 & 8 have been decommissioned and demolished. The final demolition took place in August of 2020. The complex is covered by renewable operating permit (ROP) MI-ROP-B2840 -2014c and consists of five sections. It is a major source of NOx, SO2, PM, and hazardous air pollutants (HAPs).

Colby was present for a short while but took the opportunity to provide an update on the disposal of fly ash also known as coal combustion residuals (CCR). A complaint was received earlier in the spring that was being handled by Lori Babcock of EGLEs Material Management Division (MMD). Colby explained his research on wind direction at the time of the complaint as well as steps planned for the future to hopefully minimize the chance for recurrence. The open working face was going to be reduced. Additional straw crimping into deposited material would lessen the impact of wind. A new mobile irrigation system is also planned to aid in keeping dust from being generated. Obviously nothing can be done about the weather / wind conditions themselves. Repair and / or replacement of the small mesh netting located on the southeast side of the disposal area was also on the docket. The netting acts to blunt the winds and aid in settling potentially wind borne dust.

Karn 1 and 2 are coal fired boilers with fuel oil capability for use during startup. Each unit has it's own stack. Pollution control consists of a number of different devices. To control particulate emissions, pulse jet fabric filters (PJFF) are used, one per unit. Each PJFF has 10 compartments with 1,016 bags per compartment for a total of 10,160 bags. The resulting total cloth area is 320,950 square ft. Selective catalytic reduction (SCR) is the technology used to control NOx emissions. Exhaust from a boiler is injected with ammonia to act as a reducing agent. The SCR reactor contains porous ceramic catalyst containing vanadium pentoxide. The result is that water and nitrogen are formed. Spray dry adsorbers (SDAs) are used for controlling SO2 with the added benefit of also controlling mercury though injection of activated carbon. Lime is prepped and then sprayed into exhaust gasses using an atomizer. The heat from the exhaust gases evaporates leaving only dry particulate. An additional benefit of the SDAs is that they use the fly ash / particulate collected by the PJFF. This allows the SDA to utilize any potential unspent lime. This eliminated the need for dry ash handling. The control strategies employed at Karn 1 & 2 help the complex to comply with 40 CFR part 63 subpart UUUUU as well as the cross-state air pollution rule (CSAPR). The units burn primarily low sulfur western coal along with some eastern coal. The eastern coal typically has a higher heating value but also higher sulfur content. Coal is delivered by ship or rail with the coal pile being on the north end of the site near the Saginaw River.

Karn 3 & 4 are dual fuel fired units capable of burning fuel oil and natural gas. The units operate primarily as peaking units. Outside of peak demand operation, the units are typically operated only during relative accuracy test audit (RATA). Exhaust from both units is sent out a single combined stack. Four fuel oil storage tanks can supply oil. The tanks are equipped with internal floating roofs and vapor seals. Low NOx burners are employed in Karn 3 and 4 and SO2 is minimized by fuel blending. The units also have two auxiliary boilers that are natural gas fired and equipped with low

NOx burners. The units can heat up Karn boilers 3 & 4 or can also provide steam to Karn 1 & 2 in the event one of the units goes down or is in a planned outage.

The complex also has some ancillary operations such as emergency generators, subject to 40 CFR Part 63 subpart ZZZZ, and some cold cleaners.

George provided full access to electronic records. We started with Karn 1 and proceeded through the ROP requirements. Karn 1 has a SO2 limit of 0.090 pounds per mmBTU heat input on a 30 day rolling average. The highest found was 0.067 and that was the current value. Another SO2 limit is for a 365 day rolling average. The highest amount found was 0.070 in comparison to a limit of 0.075. Overall, the SO2 controls and methodology in place provide about 90% reduction in SO2. George stated it could be close to 100% reduction if only western coal was burned and pure virgin lime was used in the SDAs. Karn 1 emitted 270 tons of SO2 in 2020. PM had a limit of 0.015 pounds per mmBTU on an hourly basis. The highest found was 0.002 and that was the current value. The pressure drops on the PJFF were not able to be checked at that time. The highest NOx level found was 0.071 pounds per mmBTU based on a 30 day rolling average and it occurred November 8 -19 of 2020. The internal target for NOx is 0.065. The NOx limit is 0.08. On a per year basis Karn 1 emitted 310 tons. Opacity was currently running at 1%.

Karn 2 was checked next. It has a SO2 limit of 0.090 pounds per mmBTU heat input on a 30 day rolling average. The highest found was 0.071 on May 26, 2021. Another SO2 limit is on a 365 day rolling average basis. It is 0.075. The highest value found was the current value of 0.058. Karn 2 emitted 265 tons of SO2 in 2020. PM had a limit of 0.015 pounds per mmBTU on an hourly basis. The current value was 0.001. The highest value found was 0.002 and occurred on December 11, 2020 and February 9, 2021. The highest NOx level found was 0.069 pounds per mmBTU based on a 30 day rolling average. It occurred from December 30, 2020 through January 7, 2021. The internal target for NOx is 0.065. The NOx limit is 0.08. On a per year basis Karn 2 emitted 284 tons in 2020. Opacity was currently running at 1%.

Lime prep consists of storage, slaker, and lime slurry transfer and storage tanks for use in the SDA systems mentioned above. Control equipment consists of bin vent filters, spray scrubbers etc. The reuse of ash collected by the PJFF allows less use of lime. Testing has not been requested due to the nature of the emissions. Opacity is read once per shift.

BP (byproduct) recycle is set up to handle ash, spent lime, and sorbent to minimize the amount of fresh lime needed in the SDA system. George said that through waste reduction and strategically better use of reagents in the SDA they can use less material yet still meet limits. Testing has not been requested due to the nature of the emissions. Opacity is checked once per shift.

BP disposal consists of vacuum transport blowers with filter separators and storage silos with bin vent filters. Testing has not been requested due to the nature of the emissions. Opacity is checked.

Sorbent (activated carbon) for the SDA system is stored in two silos controlled by bin vent filters. No testing has been required. Opacity is checked.

Flexible groups (FGs) have been established for Karn 1 & 2, parts cleaners, and emergency generators. The FG for Karn 1 & 2 concerns the use of boiler cleaning solutions. George said neither unit has burned boiler cleaning solutions. A parts cleaner still exists in the maintenance area. The solvent being used is Pennsolv L10055 which is 100% volatile organic compounds (VOCs). Two diesel fired emergency generators are found in Karn 1 & 2, one for AC and one for DC. Both are less than 500 HP. There are a total of three 40 HP propane fired generators. Two are located at the guard house and one at the fish barrier control room. The hours were checked on the AC and DC units. AC had 22 in 2020 while the DC unit had 15. The company does not use the option of oil analysis but instead changes the oil and filters and performs other required maintenance.

Lastly, the permit contains sulfur dioxide allowance allocations and nitrogen oxides requirements for Karn 1 & 2. However, averaging is no longer used as the Company's consent decree basically threw it out as the SCR control equipment was mandated.

Karn 3 & 4 are natural gas and fuel oil fired boilers. Sulfur dioxide is controlled via fuel blending and NOx emissions are controlled through the use of low NOx burner technology. The units are basically operated as standby peaking units. The units were running to meet current energy demands. Since

the units share a common exhaust stack only one needs to be run during testing to confirm pollution monitor accuracy.

There are also two auxiliary boilers A & B both of which are natural gas fired and equipped with low NOx burner technology. These boilers can warm up Karn 3 or 4 or provide steam to Karn 1 or 2 in the event of a unit going down or during a planned outage. The boilers are subject 40 CFR part 63 subpart DDDDD which basically requires boiler tune up. Records were checked. Boiler A was tuned up in September 2020 while boiler B was tuned in late 2019.

There are monthly average limits on SO2 in terms of pounds per mmbtu heat input for Karn 3 & 4 and the auxiliary boilers. SO2 emissions were well below the 1.11 pounds per mmbtu heat input. The highest value was 0.621. NOx has a limit of 0.45 pounds per mmbtu on a daily average. The highest hourly value was 0.309. Therefore, the units were well below the limit on any given day. George said one interesting aspect of Karn 3 and 4 is that 4 is needed to start up 3 or both auxiliary boilers are needed to start up 3.

There is a limit on the amount of fully reclaimed on-spec fuel oil however, such oil has not been received for years.

There is also an emergency diesel fired generator for Karn 3 & 4 which is greater than 500 HP. The only requirement for 40 CFR Part 63 subpart ZZZZ is initial notification. Records indicated the diesel was less than the 1.0 % sulfur limit.

Karn 3 & 4 has a paint room which is restricted to 200 gallons of coating per month. It really isn't a traditional paint booth but basically is a room where very occasional painting is conducted using aerosol spray cans. It is not being used.

A parts cleaner is also located in Karn 3 and 4 however, it remains unused.

Neither the paint room nor cold cleaner was checked as it was felt time was better spent checking the fly ash / CCR disposal area. George and I toured the CCR disposal area. It should be noted the disposal area was sized for a long life. However, given the closure of Weadock 7 and 8 along with the impending closure of Karn 1 and 2 in the near future, a lack of available material to bring the site up to grade was inevitable. Since MMD did not want water to accumulate in the disposal area, Consumers decided to bring in additional CCR material with the source being the former Cobb plant in Muskegon. On the south west side there were railcars sitting idle with a hydro unit on a structure built over the rail line. George said the hopes were that material brought over from the defunct Cobb Plant located in Muskegon Michigan would be transported entirely by rail. However, the material could not be unloaded like coal or grain. The hydro unit would basically dig it out of rail cars and drop it into trucks for final deposition in the disposal area. It just didn't work out as planned. All material is now transported by truck from Muskegon.

The netting on the southeast side was torn in some spots and was in need of repair and / or replacement as Colby had stated. However, at least the south end of the disposal area was showing vegetative growth to keep material in place. The area now being worked on was on the north side of the disposal area abutting the Karn complex warm water discharge. The area being filled was essentially the interior of the site with the filling proceeding from east to west. Though Colby Cottick had stated the open working face would be limited to five acres, in actuality the area was currently much smaller and appeared to be about three acres. George said the CCR is conditioned prior to bring loaded in Muskegon. The conditioning aids in keeping the material moist. After the material is deposited, several additional steps are taken. A binding agent is added, a roller is used to compact the material, and straw is also crimped into the material. The straw crimping appeared to work quite well with the result being somewhat similar to a stubble field. This lowers the wind speed on the surface and lessens the chance for material to become airborne. The addition of a mobile irrigation system can only help.

We also checked the site of the former Weadock complex. The entire site was gone, leveled, and was being revegetated. On the way north along the Sagainaw River we observed dust coming from the coal pile. We initially thought it was due to the increasing winds. However, it was being generated by workers actively digging out a hot spot in the coal pile. A water truck was close nearby to cool the hot spot and also knock down the dust.

On August 9, we were able to regroup and review information concerning PJFF operating parameters. A number of months of data were checked. A PJFF has 10 individual compartments and can actually operate effectively if only seven were functional. However, the system is set up to avoid that scenario. The differential pressure drop of each compartment is monitored and recorded. The differential pressure across a unit, as a whole, is also monitored and recorded as an average, minimum, and maximum. Data starting from 2020 to present was spot checked. The typical average pressure drop was 6.71 inches. The minimum pressure drop was only slightly lower at 6.16 inches. The maximum pressure data was skewed a bit higher by an outlier data point of 9.42 inches. Excluding the outlier, the typical maximum pressure drop was 7.57 inches. Alarm settings, across a PJFF, are high dP of 9 inches, HI /HI of 15 inches, and a low dP of 0.5 inches. All alarm settings are after a three second delay. There are also detectors for broken bags, ash hopper levels, temperatures, and cleaning system air pressure. The settings and monitoring for temperature take into account the status of other operations such as the SDA. Additionally, as a final monitoring, Karn 1 and 2 have continuous opacity monitoring systems (COMS) / PM continuous emissions monitoring (CEMS). The current alarm settings for each were high opacity of 7% and 0.015 lb PM / mmbtu.

In the much bigger picture, Consumers has recently announced the future closure of all electrical generating capacity in Essexville. All Karn units are now slated to close by 2023. Karn 1 and 2 were already scheduled to be closed by 2023. However the closure of Karn 3 and 4 was moved up to 2023 which is 8 years sooner than their design life. On June 9, 2021, live system data showed the electrical generating units fired by fossil fuel under the Consumers Energy portfolio were producing a total of 2,670 MW. The entire state-wide wind generated electrical production by Consumers Energy was 37 MW. George said the air pollution control equipment alone, for each of Karn 1 and 2, requires 23 MW for a total of 46 MW.

The facility is considered to be in compliance.

NAME B. Lithgow DATE 8-13-21 SUPERVISOR Chris Hare