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

P008764677

FACILITY: LG Energy Solution Michigan Inc.		**SRN / ID:** P0087
LOCATION: 875 E 48TH ST (1 LG Way), HOLLAND		**DISTRICT:** Kalamazoo
CITY: HOLLAND		**COUNTY:** ALLEGAN
CONTACT: Shellie Ritsema , Environmental & Sustainability Assistant Manager		**ACTIVITY DATE:** 07/22/2022
STAFF: Cody Yazzie	**COMPLIANCE STATUS:** Compliance	**SOURCE CLASS:** SM OPT OUT
SUBJECT: Scheduled Inspection		
RESOLVED COMPLAINTS:		

On July 22, 2022 Air Quality Division (AQD) staff (Cody Yazzie) arrived at 875 East 48th Street Michigan at 12:45 PM to conduct an unannounced air quality inspection of LG Energy Solution Michigan, Inc. (hereafter LG Chem) SRN (P0087). Staff made initial contact with the office receptionist and stated the purpose of the visit. Shellie Ritsema, LG Chem, Environmental & Sustainability Assistant Manager, is the environmental contact and arrived shortly thereafter and took staff to a conference room for further discussions.

LG Chem manufactures the Lithium-ion Batteries that are used in hybrid electric vehicles. These batteries are used in the GM Volt, Hyundai Sonata, and the Renault ZOE. The facility is also getting ready to produce batteries that will go in Ford Trucks. The facility has recently applied for a PTI modification that would bring the current version of the applicable PTI to PTI No. 64-10G which was issued on April 26, 2022. The modification was to permit a second facility located on the same property making it the same stationary source. Per the most recent PTI modification evaluation sheet the facility is considered (both before and after the expansion) a synthetic minor source for PM, PM10, PM2.5, and VOC's.

LG Chem was last inspected by the AQD on August 23, 2018 and appeared to be in Non-compliance at that time with PT No. 64-10A. As result of the violation notice LG Chem entered into a consent order on September 16, 2019. The facility is subject to stipulated penalties for compliance issues outlined in the Consent Order No. 2019-24. The Consent Order is required to be in effect for a period of at least 2 years. After the 2-year period LG Chem must request for the Consent Order to be terminated in a written request to AQD Director. The facility could have submitted the request to terminate the Consent Order as of September 16, 2021. As of the inspection LG Chem has not appeared to make the termination request in writing.

Mrs. Ritsema gave staff a tour of the facility. Required personal protective equipment are high visibility vest, hard hat, safety glasses, steel toe boots, and hearing protection. Inside the production area the facility requires a suit and hat to help minimize dust. Staff observations and review of records provided during and following the inspection are summarized below:

<u>Plant II:</u>

The facility was working on constructing this portion of the facility. The emission units and flexible units listed below are all associated with the new plant. These units are FGELECTRODEMIXII, FGSLRYAPPII, FGSLITTINGII, FGNOTCHINGII, FGELECTROLYTEII, FGBOILERSII, FGEMERGENCYGENSII, EUDEGASII, and EUSOLVENTII. There were no records that were requested for these emission units/flexible groups due to the emission units not being installed yet.

EUSOLVENT:

This emission unit is for original plant 1 usage of cleaning solvents and the operation of 42 inject printers across the plant.

The facility has both an Acetone and VOC 12-month rolling emission limit. The Acetone and VOC emission limits are permitted as 12.37 TPY and 12.45 TPY respectively. Staff request records for the time period of January 2021 through June 2022. The largest Acetone emissions for EUSOLVENT occurred in September and October of 2021. These months recorded 12.34 TPY of Acetone emissions on a 12-month rolling basis. This is close to the permitted limit but not over. During 2022 the emissions appear to have come down some as the reported average emissions appear to be around 11.63 TPY.

LG Chem is maintaining 12-month rolling VOC emissions for EUSOLVENT. For the facility is providing monthly emission calculations for Acetone, Isopropyl Alcohol (IPA), Domino Ink Solvent, Domino Make Up Solvent, and Domino Wash Solvent. The calculations are based on the density and VOC content of each solvent. The facility is including Acetone emission in the VOC emissions. Acetone is considered an exempt VOC and should not be included in the VOC calculation. Staff Reviewed VOC emissions for the time period of January 2021 through June 2022.

The largest 12-month rolling VOC emissions were reported to occur in June 2022, which the facility reported 2.08 TPY of VOC emissions. 2.08 TPY is the accurate VOC emissions and not including the Acetone emissions. LG Chem should remove the Acetone emissions from total VOC emissions records. The facility appears to be well below the permitted limit.

The facility has material limits for Acetone, IPA, Domino Ink Solvent, Domino Make Up Solvent, and Domino Wash Solvent that are based on a 12-month rolling time period. The gallons usage limits for each solvent are 3,750 gallons, 2,000 gallons, 200 gallons, 1,200 gallons, and 200 gallons respectively. For the time period of January 2021 through June 2022 the largest 12-month rolling of acetone usage occurred in September and October of 2021. The facility recorded 3,740 gallons of acetone usage. The largest 12-month rolling of IPA occurred in February 2022 in which the facility recorded 440 gallons of IPA used. The largest 12-month rolling of Domino Ink Solvent occurred in June 2022 in which the facility recorded 75.12 gallons of Domino Ink Solvent used. The largest 12-month rolling of Domino Make Up Solvent occurred in March, April, and May of 2021 in which the facility recorded 81.93 gallons of Domino Make Up Solvent used. The largest 12 -month rolling of Domino Wash Solvent occurred in June of 2022 in which the facility recorded 58.11 gallons of Domino Wash Solvent used. The facility has been close on the Acetone 12-month rolling usage but the facility has appeared to be in compliance with all material limits for the time frame reviewed of January 2021 through June 2022.

EUDEGAS:

EUDEGAS is a degassing process utilizing vacuum pumps to degas cells after the charging and aging process.

This emission unit has a VOC emission limit of 5.67 TPY based on a 12-month rolling time period. Records were reviewed for the period of January 2021 through June 2022. The facility calculates monthly VOC emissions by multiplying the amount of cells that were produced per month by a

0.0004047 lb VOC/cell emission factor that appears to be used in the PTI evaluation. The largest 12-month rolling VOC emissions occurred in May 2022, which 2.79 TPY of VOC emissions were calculated. The facility appears to be well below the permitted limit.

The facility has material limit that limits the amount of cells that are produced through the emission unit based on a 12-month rolling time period. The largest amount of cells produced occurred in May 2022, which the facility produced 13,772,059 cells on a 12-month rolling period. This is well below the 28,000,000-cell limit in the permit.

FGELECTRODEMIX:

FGELECTRODEMIX is composed of EUCATMIX1, EUCATMIX2, EUANOMIX1, and EUANOMIX2. These emissions units produce the anode and cathode slurry through a metering and mixing process. Particulate emissions from this unit controlled by a dust collector.

The facility does have VOC emission limits that are based on a 12-month rolling time period. The emission factor that is used is 0.035875 lbs of VOC/batch, which is based on the solvent lost in the charge and transfer. The largest VOC emissions occurred in July and August of 2021, which the facility calculated 0.11 TPY of VOC emissions. This is below the permitted 0.14 TPY of VOC emissions.

The facility has material limits for the amount of batches that can be mixed for both the cathode and anode mixes. The facility is not allowed to produce more than 8,000 batches of cathode material and 8,000 batches of anode material. The facility is recording the monthly batches as apart of the 12-month rolling records. The largest number of batches mixed in EUCATMIX1 and EUCATMIX2 occurred in August 2021, which the facility produced 2,826 batches. The largest number of batches mixed in EUANOMIX1 and EUANOMIX2 occurred in July 2021, which the facility produced 3,246 batches. Both these are well below the respective material limits.

The facility is required to develop and maintain a malfunction abatement plan (MAP) for FGELECTRODEMIX. The MAP included an identification of the equipment and the supervisory personnel responsible for overseeing the inspections, maintenance, and repair. There was also a description of the corrective procedures that should be followed in the event of a malfunction. The MAP included a list of replacement parts that should be maintained in inventory for a quick replacement. Operating parameters were also included in which it established typical operating parameters that the equipment should be operated at. The information included appeared to be sufficient for Special Condition III.2 and Rule 910. If the MAP becomes insufficient in the future modifications may be required to address those deficiencies.

The facility has pressure drop meters on the dust collectors and product collector's portions of FGELECTRODEMIX. The product collectors are located on the top mezzanine floor for each emission unit. The dust collectors pressure drops are required to be recorded once per day per Special Condition VI.2. The product collectors pressure drops are required to be recorded once per week per Special Condition VI.3. In addition Special Condition VI.6 requires that the facility verify the filters are operating properly by maintaining weekly visible emission records. The facility did submit weekly visible emission readings and daily pressure drop records.

Staff did observe the stack of the emission unit during the inspection. Staff noted that there were no visible emissions.

FGSLRYAPP:

FGSLRYAPP is composed of EUCATSLRYAPP1, EUCATSLRYAPP2, EUANOSLRYAPP1, EUANOSLRYAPP2, and EUSVNTRCVY.

The facility has three 12-month rolling VOC emissions limits for this flexible group. There is a VOC emission limit for EUCATSLRYAPP1 and EUCATLSRYAPP2 combined, EUSVNTRCVY, and EUANOSLRYAPP1 and EUANOSLRYAPP2.

The facility calculates the VOC emissions for the EUCATSLRYAPP1 and EUCATLSRYAPP2 combined multiplying the NMP processed by weight by the control efficiency of the associated absorption column. The absorption column is required to maintain a minimum control efficiency of 99.85%. This makes the control efficiency factor used in the calculation 0.0015. The facility appears to be calculating the emissions correctly. Staff reviewed emission records for the time period of January 2021 through June 2022. The largest VOC emissions for these combined units occurred in August 2021, which the facility calculated 4.18 TPY of VOC emissions. This is below the 10.54 TPY permitted limit.

The facility calculates the VOC emissions for the EUANOSLRYAPP1 and EUANOLSRYAPP2 combined multiplying the amount of Diacel2200 processed by the VOC content of the Diacel2200 which is 0.008% from the PTI application. The facility appears to be calculating the emissions correctly. Staff reviewed emission records for the time period of January 2021 through June 2022. The largest VOC emissions for these combined units occurred in August 2021, which the facility calculated 0.3126 TPY of VOC emissions. This is below the 0.54 TPY permitted limit.

The facility calculates the VOC emissions for EUSVNTRCVY by multiplying the amount of NMP processed by the 0.00001 emission factor that is specified in the PTI. The facility appears to be calculating the emissions correctly. Staff reviewed emission records for the time period of January 2021 through June 2022. The largest VOC emissions for these combined units occurred in January 2021, which the facility calculated 1.14 TPY of VOC emissions. This is above the 106 lb/year or 0.053 TPY of VOC emissions however there have been a number of PTI modifications that the emission unit have been through in 2020 the facility was using a larger emission factor and also had a larger 12-month rolling VOC emission limit for EUSVNTRCVY. In 2021 there was a stack test conducted that led to the 0.00001 emission factor that are the basis for emissions calculations now. Records using the stack test emission factor shows that since 2021 the emissions have steadily decreased to around 0.03 TPY which is below the facility's permitted limit. Due to the discrepancy of the emission factors used it is possible the facility never exceeded the emission limit. Since January 2022 the facility has been well below the permitted limit.

The facility has material limits for NMP and Diacel2200 processed on a 12-month rolling time period. The largest amount of NMP processed occurred in August 2021, which 5,575,425.92 lbs of NMP was processed through the cathode slurry app. The largest amount of Diacel2200 processed occurred in August 2021, which 78,159.21 lbs of Diacel2200 were processed. These are both well below the 10,545,000 lbs of NMP and 135,000 lbs of Diacel2200 material limits.

The facility is required to develop and maintain a malfunction abatement plan (MAP) for FGSLRYAPP. The MAP included an identification of the equipment and the supervisory personnel responsible for overseeing the inspections, maintenance, and repair. There was also a description

of the corrective procedures that should be followed in the event of a malfunction. The MAP included a list of replacement parts that should be maintained in inventory for a quick replacement. Operating parameters were also included in which it established typical operating parameters that the equipment should be operated at. The information included appeared to be sufficient for Special Condition III.2 and Rule 910. If the MAP becomes insufficient in the future modifications may be required to address those deficiencies.

FGSLITTING:

FGSLITTING are the anode and cathode material slitting processes that are controlled by 6 dust collectors.

FGSLITTING has two hourly PM limits that can only be verified through stack testing. As of the inspection the Kalamazoo District Office have not found it necessary to request a stack test.

The facility is required to develop and maintain a malfunction abatement plan (MAP) for FGSLITTING. The MAP included an identification of the equipment and the supervisory personnel responsible for overseeing the inspections, maintenance, and repair. There was also a description of the corrective procedures that should be followed in the event of a malfunction. The MAP included a list of replacement parts that should be maintained in inventory for a quick replacement. Operating parameters were also included in which it established typical operating parameters that the equipment should be operated at. The information included appeared to be sufficient for Special Condition III.2 and Rule 910. If the MAP becomes insufficient in the future modifications may be required to address those deficiencies.

Special condition VI.2 require the facility to maintain and record pressure drop readings once per day while operating. Special Condition VI.3 requires that the facility maintain records of weekly visible emissions. The facility did provide daily pressure drop readings and weekly visible emission readings for the stacks/dust collectors.

Special Condition I.3 specifies that there shall be no visible emissions from the FGSLITTING emission units. During the inspection Staff did observe these stacks and noted that there were no visible emissions during the inspection.

FGNOTCHING:

FGNOTCHING are the anode and cathode material notching processes that are controlled by 12 dust collectors.

FGNOTHCING has 6 PM hourly emission limits that can only be verified through stack testing. As of the inspection the Kalamazoo District Office have not found it necessary to request a stack test.

The facility does have material limits for the amount of cathode and anode materials that can be processed on a 12-month rolling basis. Staff reviewed material records for the period of January 2021 through June 2022. The largest amount of cathode material processed were 47,691,178 meters that were processed in August of 2021. The largest amount of anode material processed were 47,307,020 meters that were processed in August of 2021. These are both below the permitted limit of 90,000,000 meters each.

The facility is required to develop and maintain a malfunction abatement plan (MAP) for FGNOTCHING. The MAP included an identification of the equipment and the supervisory personnel responsible for overseeing the inspections, maintenance, and repair. There was also a description of the corrective procedures that should be followed in the event of a malfunction. The MAP included a list of replacement parts that should be maintained in inventory for a quick replacement. Operating parameters were also included in which it established typical operating parameters that the equipment should be operated at. The information included appeared to be sufficient for Special Condition III.2 and Rule 910. If the MAP becomes insufficient in the future modifications may be required to address those deficiencies.

Special condition VI.2 require the facility to maintain and record pressure drop readings once per day while operating. Special Condition VI.3 requires that the facility maintain records of weekly visible emissions. The facility did provide daily pressure drop readings and weekly visible emission readings for the stacks/dust collectors.

Special Condition I.3 specifies that there shall be no visible emissions from the FGNOTCHING emission units. During the inspection Staff did observe these stacks and noted that there were no visible emissions during the inspection.

FGELECTROLYTE:

FGELECTROLYTE is the battery cell packaging processes where each cell is filled with electrolyte material.

FGELECTROLYTE does have a VOC emission limit that is calculated on 12-month rolling basis. The facility calculates monthly emissions by multiplying the number of cells processed by an emission factor of 0.000012252 lb of VOC/cell, which appears to be from the PTI application. The facility appears to be calculating emissions correctly. The largest VOC emissions occurred in June 2022, which 0.09 TPY of VOC emissions were calculated. This is well below the 0.18 TPY emission limit.

FGELECTROLYTE does have a limit on the amount of cells that the facility can produce on a 12-month rolling basis. The largest amount of cells that were produced in FGELECTROLYTE occurred in June 2022, which there were 13,739,649.1 cells produced in FGELECTROLYTE. This is well below the permitted limit of 28,000,000 cells allowed to be produced.

FGDCBOILERS:

FGDCBOILERS are natural gas-fired boilers that have the following emission unit IDs: EUHWBOIL2, EUHWBOIL3, EUHWBOIL4, EUHOBOIL1, and EUHOBOIL2.

This flexible group does have a 12-month rolling emission limit for NOx. The facility calculates the NOx emissions by using the monthly gas usage for each boiler and multiplying by 100 lbs of NOx/MMCF. This 100 lb of NOx/MMCF is the emission factor listed in AP 42 and appears to be the appropriate emission factor to use. The largest NOx emissions calculated occurred in January 2022 in which it reported 30.82 TPY of NOx emissions and the only month the facility records showed it going over the limit.

While looking at the January 2022 month the facility appears to report 400 times more gas usage for a single month on EUHWBOIL4 compared to what EUHWBOIL4 appears to use on average.

Staff reached out to Mrs. Ritsema to verify that the gas usage that was reported for EUHWBOIL4 during January 2022 was a typo. Mrs. Ritsema was unable to verify if the reading was correct, but based on Staff calculations the maximum heat input value of the boiler (12.6MMBTU/hr), a heating value of natural gas (1020 BTU/scf), and assumption that the facility operated the boiler 24 hours a day for the entire month Staff calculated the maximum volume of natural gas the boiler could use is 9.2 MMSCF, which is well below the 420 MMSCF reported. Staff indicated to Mrs. Ritsema that a worst-case calculation should be used if the documentation of actual gas usage can be verified. With Staff worst case assumptions, the facility does not go over the limit during January 2022.

The records show that the facility typically averages around 7.5 TPY of NOx emissions up until this anomaly of gas usage occurs.

FGEMERGENCYGENS:

This flexible group is for two 15 MMBTU/hr diesel fired emergency generators.

The facility has specific requirements that the facility needs to maintain 12-month rolling operating hours for both engines. The facility is maintaining monthly hours of operations records. These records showed that the facility typically averages around 40 hours each. This is well below the permitted 500-hour limit.

The facility has maintained the certification and maintenance documentation of the engine that demonstrates it meets the emission limit requirements that are specified in Special Conditions I.1 -4. The facility appears to be maintaining a max sulfur content of 0.05% for the diesel fuel.

FGTACS:

This flexible group is for process units that have affected emission limits under Rule 225. The emission units or flexible groups that are included under this are FGSLRYMIX, FGSLITTING, and FGNOTCHING.

FGTACS has an emission limit for manganese and cobalt based on a 12-month rolling time period. The facility calculates the PM emissions for each source then assumes the PM emitted is 100% Manganese and 100% Cobalt to show compliance which would be an overestimation. Staff reviewed records from the time period of January 2021 through June 2022. The largest amount of manganese emissions occurred in August 2021, which 12.8 lbs of manganese emissions were emitted. The largest amount of cobalt emissions occurred in August 2021, which 12.8 lbs of cobalt emissions were emitted. These are well below the permitted limits of 125 lb of manganese/year and 24 lbs of cobalt/year.

At the time of the inspection and based on a review of records obtained during or following the inspection, the facility appears to be in compliance with PTI No. 64-10G. Staff informed Mrs. Ritsema that if LG would like to request the Consent Order to be terminated. That it is something the would have to initiate on their own by requesting it in writing to the AQD Director. Staff stated to Mrs. Ritsema that a report of the inspection would be sent to the facility for their records. Staff concluded the inspection at 2:30 PM.-CJY

NAME Cody Yaggie DATE 9/22/22 SUPERVISOR RJL 9/22/22