P0024
MAW11

DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION
ACTIVITY REPORT: Scheduled Inspection

P002445420

FACILITY: A123 Systems		**SRN / ID:** P0024
LOCATION: 38100 Ecorse, ROMULUS		**DISTRICT:** Detroit
CITY: ROMULUS		**COUNTY:** WAYNE
CONTACT: David Andersen , Environmental, Health & Safety Manager		**ACTIVITY DATE:** 05/23/2018
STAFF: C. Nazaret Sandoval	**COMPLIANCE STATUS:** Compliance	**SOURCE CLASS:** SM OPT OUT
SUBJECT: FY 2018 Scheduled Inspection		
RESOLVED COMPLAINTS:		

SOURCE: SRN P0024 – A123 Systems, LLC
FACILITY LOCATION: 38100 Ecorse Road, Romulus, MI 48174
PURPOSE OF INSPECTION: Scheduled Inspection
INSPECTION DATE: 5/23/2018
INSPECTOR: Nazaret Sandoval (DEQ-AQD)
FACILITY PERSONNEL AND CONTACT INFORMATION:
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1 - FACILITY AND PROCESS DESCRIPTION

The facility located at 38100 Ecorse Road, Romulus MI occupies an area of 287,000 square feet with approximately 15,000 sq. ft. office space and 272,000 sq. ft. manufacturing space. They manufacture anode and cathode electrodes in rolls. The rolls are provided to the A123 Livonia plant for the manufacture of cells and battery modules.
A site plant provided by A123 Systems, LLC (A123) shows the layout of the equipment and other areas in the building. The anode and the cathode manufacturing operations consist of separate coating lines, solvent recovery operations and control equipment. The anode manufacturing process uses graphite as the primary coating component, whereas the cathode manufacturing uses a lithium ion phosphate powder.

The following is a description of the manufacturing process:

- The electrode making process starts with mixing materials into what is called “slurry”. From each chemical storage and receiving area, the raw materials are mixed separately in the anode mixing room and the cathode mixing room with binders and with n-methylpyrrolidone (NMP) that acts as a carrier. There is one dust collector per coating line to control particulate matter from powder mixing and weighing.
- Thereafter, the anode slurry and the cathode slurry are applied as a thin coating to rolls of metallic foils sheet in the coating room.
- The coated foil sheets pass through curing ovens to yield the final anode and cathode products.
- The NMP, which is driven off in the curing ovens, is captured, condensed, distilled and reused in the process.
- Separate scrubbers for the anode and cathode lines control the VOC exhaust emissions generated from the NMP recovery system.
- The rolls of electrodes are then sent to calender machines (hard pressure rollers) for electrode pressing to achieve uniform thickness of electrode material coating on the foils.

- From the pressure rollers, the rolls are unloaded and transferred to other facilities for cutting in individual sheets of specific geometries for cell assembly operations.

There are other areas in the building dedicated to office space and Research & Product Development (R&D). A process flow diagram of the R&D activities is attached to this report. In the R&D process, lithium iron phosphate powders are produced using a spray dry system and an electric oven. The spray dry system uses a three-step filtration method to eliminate emissions of particulates which include: a cyclone system, followed by a dust collection, ending with a HEPA filtration unit. The electric-fired oven is used to further dry the powder in the final product. The final product is shipped out for use in experimental cells.

Other areas in the building include: the boiler room, chiller room, and part washers. There is also a natural gas emergency generator.

2 - PERMIT BACKGROUND AND APPLICABLE REQUIREMENTS

State Regulations:

The original project proposal submitted with a permit application to the DEQ on December 7, 2009 considered the installation of powder blocks and/or coating blocks operations at six different locations in Romulus, MI to support the powder production and coating processes of the rechargeable lithium-ion battery manufacturing process. All six facilities and emission units were grouped into one Permit (PTI 291-09) issued by the DEQ on September 22, 2010. If all six facilities were built, the source would have been subject to Title V, requiring an ROP, based on the potential CO emissions being over 100 tons per year (tpy). All other pollutants would have potential emissions below applicable thresholds for Title V and PSD. However, the scope of the project was cut down and only the facility at 38100 Ecorse Road, Romulus, MI was built. According to a letter dated January 12, 2012 from A123 to the DEQ-AQD Detroit field office, the facility located at Ecorse Road was under construction during the months of January and February of 2011, and some of the equipment were tested during those months.
In addition, the powder block operations, described in the original 2009 permit application, which included the production of lithium-iron phosphate powder material for cathode manufacture was not installed at Ecorse road. The lithium-ion phosphate powders are manufactured in another facility and they are brought to the plant and stored in several tanks located at the cathode powder storage area.

On August 27, 2015 I conducted an unscheduled site review of the facility operations at Romulus. During the inspection I confirmed that a very limited portion of the original permit PTI 291-09 was applicable to the existing operations at the site and there were some discrepancies between the permitted equipment and the equipment that was installed. In addition, the company had gone through multiple changes in ownership since the time PTI 291-09 permit was issued. As a result of these observations, I requested Larry Zink, the former EHS Engineer at A123, to apply for a permit to install that adequately represented the actual operations at Romulus. A123 submitted a permit application to AQD in 2016. AQD permit section evaluated the permit application and PTI 291-09A was issued on 12/20/2016.

The main emissions associated with the anode and cathode electrode manufacturing process include VOC from the NMP usage in coating lines, solvent recovery and parts cleaners. In addition, natural gas combustion emissions are associated with the boilers and emergency engine.
According to the evaluation in permit files this facility is classified as a synthetic minor source for VOCs and the PTI is an opt-out permit. A123 has a facility-wide emission limit for HAPs which

restricts the emissions to below the major source threshold, and is considered an area source of HAPs

In summary, AQD regulates the following emission units with their respective descriptions as they are identified in permit to install (PTI) No. 291-09A:

Emission Unit ID	Emission Unit Description (Process Equipment & Control Devices)	Flexible Group ID
EU5BOILER1	59.9 MMBTU/hr natural gas-fired boiler	NA
EU5ANODELINE1	Anode Coating Line 1. Two pass Anode Coater, Curing Oven and refrigerated condenser.	FG5ANODE
EU5ANODELINE2	Anode Coating Line 2. One pass Anode Coater, Curing Oven and refrigerated condenser.	FG5ANODE
EU5ANODEDISTIL	Anode Line solvent recovery by Distillation	FG5ANODE
EU5CATHODELINE1	Cathode Coating Line 1. Two pass Cathode Coater, Curing Oven and refrigerated condenser.	FG5CATHODE
EU5CATHODELINE2	Cathode Coating Line 2. Two pass Cathode Coater, Curing Oven and refrigerated condenser.	FG5CATHODE
EU5CATHODEDISTIL	Cathode Line solvent recovery by Distillation.	FG5CATHODE

Federal Regulations:
The federal regulations that could potentially apply to the operations in Romulus were evaluated when A123 submitted the most recent permit application to AQD, in 2016 (For details refer to evaluation in AQD files). The evaluation determined that:

- NSPS Subpart Dc - The 59.9 MMBtu/hr. natural gas-fired boiler is subject to the federal NSPS for Small Industrial-Commercial -Institutional Steam Generating Units as specified in 40 CFR 60 Subpart Dc. This standard requires the facility to track and maintain records of the fuel usage per calendar month for a period of two years.
- NSPS Subpart JJJJ - The emergency engine is subject to the "Standard of Performance for Stationary Spark Ignition Internal Combustion Engines. Owners and operators of emergency RICE that commenced construction after January 1, 2009, must comply with the emission standards listed in Table 1 of the subpart. Compliance with the emission standard could be demonstrated by purchasing a USEPA certified engine. In addition, the operating time for the emergency engine must be limited to 100 hours per year for maintenance and readiness testing, but 50 hours may be used for non-emergency situations.
- NESHAP Subpart ZZZZ – The 100 KW natural gas emergency engine is subject to the NESHAP for Stationary RICE; however, spark ignition RICE located at an area source, which commenced construction after June 12, 2006 meets these requirements by meeting the requirements cited for NSPS Subpart JJJJ.

3 - EXEMPT EQUIPMENT

There are various emission units that are exempt from the requirements of Rule 201(1) to obtain a permit to install. A list of the exempt equipment is attached to this report. The list contains, the equipment identification and description, the applicable exemption, as well as the justification for the exemption. The list was prepared by AQD based on the evaluation provided by A123 and their consultants during the permit application of 2016. Additional information pertaining Rule 278a - Scope of permit exemption - was submitted by A123 consultants in previous years and it is saved in AQD files.

4 - INSPECTION NARRATIVE

On May 23, 2018, I arrived at A123 at approximately 1:30 PM and met with Ms. Kristen Anolick – Facility Maintenance at the Romulus facility. Mr. Andersen (who works at the A123 -Livonia location) was not available to meet with me and he had arranged for Ms. Anolick to escort me during the walkthrough of the Romulus plant. After the introductions, I stated the purpose of the inspection, which was to determine compliance with the Federal Clean Air Act; Article II, Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451, the applicable Michigan Department of Environmental Quality, Air Quality Division (MDEQ-AQD) regulations, and the requirements/conditions cited in permit PTI 291-09A.

At the time of the visit the facility was not operating. Since its installation, the manufacturing process has always run significantly below its maximum capacity and lately the plant does not run in a continuous mode. According to the records, year 2016 has been one of the few times when the facility operated continuously for a full year. In the most recent years and according to the information collected during the inspection of 5/23/2018, the facility has been operating based on product demand. It stopped production at the end of May 2017 and remained closed through October 1, 2017. Then, they restarted manufacturing at about 25% capacity in October 2017 and continued to operate through December 2017. The facility remained closed until approximately mid-June 2018 and will continue operations at about 25% capacity through September/October 2018. It appears as if there are no plans to extend manufacturing beyond 2019.

Ms. Anolick showed me the main manufacturing areas inside the building (i.e. anode and cathode coating lines) as well as the solvent recovery system located outside (i.e. refrigerated condensers and scrubber). We also checked the utility room, the auxiliary equipment, and the baghouses. I asked Ms. Anolick to show me the R& D area to verify if they were still conducting the same type of activities that were described during the permit application in 2016. I noticed that the equipment in the R&D lab was the same that we have listed in our records. We talked to one of the lab researchers and she explained the operations. It appears as if nothing has changed in the lab since 2016 and the permit exemption per Rule 283 is still applicable.

I checked the design capacities and sizes of the exempt equipment listed in the attached summary table to verify that they have not changed and remain exempt.

I showed the permit to Ms. Anolick and identified the sections of the PTI that included the equipment currently installed at A123 Romulus location. I identified the emission units that are described on the permit and identified the emission limits restrictions as well as the recordkeeping requirements. I asked for the operating records, inspection logs and monitoring data but Ms. Anolick said that since the plant was not in operation and there wasn't anybody that could provide that information at the time of my visit I should request the records from Mr. David Andersen. Mr. Andersen provided the records via email during the months following the inspection.

The inspection concluded with a closing meeting where I indicated that additional information was needed to complete my report. I would be contacting Mr. Andersen for follow up questions. A report with the inspection findings would be prepared. I left the facility at approximately 4:30 PM.

The permit compliance analysis and the outcomes of the inspection are presented on the next sessions of this report.

5 - COMPLIANCE HISTORY (Complaints, Violations Notice, Consent Orders)
Our records show that this facility has no history of Complaints, Violations Notices or outstanding Consent Orders.

6 - COMPLIANCE EVALUATION
The facility operations were checked for compliance with the applicable state and federal air quality regulations and the permit conditions of PTI 291-09A (PTI) .
Some of the special conditions in the PTI are noted as not-applicable (NA), those are not mentioned in this evaluation.

The permit conditions are summarized below for each emission unit:

EU5BOILER1: 59.9 MMBTU/hr natural gas-fired boiler

Pollution Control Equipment - Low NOx burners

SC I. - EMISSION LIMITS -In Compliance

Pollutant	Limit	Time Period / Operating Scenario	Equipment	Refer to:	Compliance Y/N
1. NO_x	2.9 lb/hr	*Test Protocol	EU5BOILER1	SC VI. 4	Y
*As Specified in the Test Protocol					

SC II. 1 - MATERIAL LIMITS - In Compliance
The fuel records show that the facility only burns natural gas in EU5BOILER1. - Refer to the attached records of natural gas usage collected for year 2017 and reported as part of MAERS report.

SC III, SC IV and SC VI - Verification of compliance with SC III, SC IV and SC VI is based on the evaluation of the most recent maintenance records and annual inspections for the boiler. - Refer to records attached.

SC III. 1 - PROCESS/OPERATIONAL RESTRICTIONS - In Compliance
The boiler and the associated emission control equipment are maintained and operated according to the
manufacturer's instructions.

SC IV - DESIGN/EQUIPMENT PARAMETERS - In Compliance

1. The associated low-NOx burners are installed, maintained, and operated in a satisfactory manner.

2. The burners in EU5BOILER1 do not exceed a total capacity of 59.9 MMBTU/hr.

SC VI - MONITORING/RECORDKEEPING - In Compliance

1. Monthly records (in a format acceptable to the AQD) are maintained and were provided as part of the inspection of 5/23/2018.

2. The facility keeps monthly fuel use records in accordance with 40 CFR 60.48c(g)(2). The records are maintained in a satisfactory manner and were available to AQD upon request. Refer to the attached monthly natural gas records.

3. The facility maintains manufacturer's written instructions for operating and maintaining the boiler and emission control equipment. Records of all maintenance performed on the boiler and control equipment are maintained.

4. The facility maintains the manufacturer's documentation certifying the heat capacity of each burner installed in EU5BOILER1. The short term NOX limit cited on the permit was based on the maximum heating capacity of the boiler (59.9 MMBTU/hr.) and the usage of natural gas with a heating value of 1,020 MMBTU/ MMCF and an accepted NOx emission factor of 50 lbs of NOx per MMCF natural gas usage. There are not requirements for testing.

SC VIII. - STACK/VENT RESTRICTIONS - In Compliance
The exhaust gases from the stacks listed in the table below discharge unobstructed vertically upwards to the ambient air:

Stack & Vent ID	Maximum Exhaust Diameter/Dimensions (inches)	Minimum Height Above Ground (feet)	Compliance Y/N
1. SV5AE10	**50.8**	**65.6**	**Y - No Changes**

FG5ANODE and FG5CATHODE: Anode and Cathode coating lines and solvent recovery system

Emission Units: EU5ANODELINE1, EU5ANODELINE2, EU5ANODEDISTIL and EU5CATHODELINE1, EU5CATHODELINE2, EU5CATHODEDISTIL

Pollution Control Equipment: Refrigerated condensers, scrubber

SC I. - EMISSION LIMITS - In Compliance

Pollutant	Limit	Time Period/ Operating Scenario	Equipment	Compliance Y/N
1. VOC	39.3 lb/day (for each flexible group)	calendar day	FG5ANODE and FG5CATHODE	Y

The VOC emission limit of 39.3 lb./day for FG5ANODE and 39.3 lb./day for FG5CATHODE is based on a total maximum NMP usage of 12,000 tons per year. That usage was estimated for a continuous operation (24 hours, 365 days in a year) of the emission units included in FG5ANODE and FG5CATHODE and accounted for the NMP used during cleaning and mixing operations. The release of VOC from the NMP recovery system is associated with a satisfactory

operation of the pollution control equipment as defined under SC IV.1 and SC IV.2.

In 2017, the records showed that the NMP usage rate was substantially below the potential value established during permit evaluation. The actual NMP reported usage for year 2017 was 65 tons for FG5ANODE and 133 tons for FG5CATHODE; for a total of 198 tons/year. In 2017 the plant only operated coating line No. 1 for 260 days and both values included the NMP used in cleaning and mixing operations. Based on the annual reported NMP usage and the number of operating days per year, the estimated total controlled VOC emissions were only 0.45 lb. per day for FG5ANODE, and 0.13 lb. per day for FG5CATHODE. Please note that even though the amount of NMP used by FG5CATHODE is higher than the reported usage for FG5ANODE, the VOC emissions from FG5ANODE are higher. That's because the VOCs emissions from cleaning operations are substantially lower than those from the actual coating lines and the consumption of NMP for cleaning parts was higher in the cathode line. In contrast, 43 tons/year of the total 65 tons of NMP usage in FG5ANODE were for the coating line process, whereas only 17 tons/year were consumed by FG5CATHODE.

SC IV. 1 & SC IV. 2 - DESIGN/EQUIPMENT PARAMETERS - In Compliance
The facility operates the anode and cathode coating lines and the solvent recovery system in a satisfactory manner. Satisfactory operation of the condenser includes maintaining the exhaust gas temperature below 21 degrees Celsius (C). According to the records, in 2017 there has not been an increase above 21 degrees C and corrective actions to lower the exhaust gas temperature have not been needed. Records show that the temperature is generally maintained around 12 degrees C.
Satisfactory operation of the packed bed wet scrubber includes maintaining the makeup water flow rate above 3 liters per minute. According to the records, in 2017 there has not been a decrease in the fresh water flow rate below the requirements for optimal operation.
Therefore, corrective action to raise the makeup water flow rate back above 3 liters per minute has not been needed. Based on the records inspected, the minimum recorded rate has been around 4 liter per minute. The spreadsheet with the sample records are attached for both the anode and the cathode. It was noticed that the sample provided for the cathode did not show the actual fresh water flow but only the "valve position" . However, judging by the information of the valve position for the anode, it is assumed that the recorded fresh water flows for the cathode were of the same magnitude. In any case, I was told that the scrubber shuts down if the make-up water flow rate falls below 3 liters per minute.

SC VI. - MONITORING/RECORDKEEPING - In Compliance
Records are maintained on file for a period of five years.

1 - In 2017, all required monthly calculations in acceptable format have been maintained by the facility and were provided upon request.

2 - The exhaust gas temperature of the condenser is continuously monitored every five seconds. Temperature records can be printed out from the facility computer data system for any period of time (as requested). The records were available upon request. A spreadsheet with an example of the recorded temperature for an operating day was provided and part of the records has been attached to the report.

3 - The makeup water flow rate of the packed bed wet scrubber is continuously monitored every five seconds. Records can be recorded/printed out for any lapse of time. Monthly records were available upon request by the last day of the calendar month, for the previous calendar month. A

eadsheet with an example of the recorded fresh water flow rate an operating day was provided and part of the records has been attached to the report.

SC VIII. - STACK/VENT RESTRICTIONS - In Compliance

The exhaust gases from the stacks listed in the table below discharge unobstructed vertically upwards to the ambient air:

Stack & Vent ID	Maximum Exhaust Diameter/Dimensions (inches)	Minimum Height Above Ground (feet)	Compliance (Y/N)
1. SV5AE12	56	47	Y - No Changes

7 - MAERS

The report for emission year 2017 was timely submitted to AQD on 3/12/2018. AQD reviewed the report and completed the audit on 5/31/2017. For details refer to compliance activity report No. CA_P002444537 in MACES database. The facility passed the audit with no further comments or review from AQD.

8 - FINAL COMPLIANCE DETERMINATION

A123 appears to be in substantial compliance with the applicable state and federal air quality regulations, as well as with the requirements and special conditions of PTI 291-09A.

NAME C Sandoval DATE 10/12/2018 SUPERVISOR JK