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

N831846017

FACILITY: A123 SYSTEMS		SRN / ID: N8318
LOCATION: 39000 SEVEN MILE RD, LIVONIA		DISTRICT: Detroit
CITY: LIVONIA		COUNTY: WAYNE
CONTACT: David Andersen , Environmental, Health & Safety Manager		ACTIVITY DATE: 09/11/2018
STAFF: C. Nazaret Sandoval	COMPLIANCE STATUS: Compliance	SOURCE CLASS: MINOR
SUBJECT: FY 208 Scheduled Inspection		
RESOLVED COMPLAINTS:		

**SOURCE:** SRN N8318 – A123 Systems, LLC  
**FACILITY LOCATION:** 39000 Seven Mile Rd., Livonia, MI 48174  
**PURPOSE OF INSPECTION:** Scheduled Inspection  
**INSPECTION DATE:** 9/11/2018  
**INSPECTOR:** Nazaret Sandoval (DEQ-AQD)  
**FACILITY PERSONNEL AND CONTACT INFORMATION:**  
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### 1. FACILITY HISTORY AND STATE PERMIT BACKGROUND

Based on AQD records, it appears as if A123 Systems was originally located in Oakland County at 46500 Humboldt Drive, Novi, MI 48377 and it was first inspected by AQD staff from the Southeast Michigan District Office (SEMDO). The inspection report saved in AQD MACES database under ID No. U63090433 corresponds to an inspection conducted on 09/11/2009. The report indicates that Owens Corning leased half of the space in their building to “A123 Systems” (A123) Laboratory Operations and Testing for Automotive Battery Packs.

A123 in Novi was described as a Research and Development (R&D) facility conducting testing for automotive applications of lithium ion battery. The cells were manufactured in South Korea and the assembly of the modules from the imported cells was done by A123 in Novi. According to the inspection report, when the facility was inspected on 09/11/2009, A123 had the capability of producing 15-20 battery packs per month with a maximum of 200 packs per year. In Novi, the company designed battery systems and developed prototypes in experimental scale. An industrial scale production was planned, and a move to a building owned by Technicolor located at 39000 Seven Mile Rd., Livonia, MI 48174 was in the works.

The inspection report mentioned two emission units at the Novi location, a small-scale laser welder and a robotic booth that sprayed adhesive for the assembly of the battery modules; both were considered exempt from permitting.

The inspection on 09/11/2009 concluded that the activities and/or equipment at Novi were exempt from the requirement of Rule 201 to obtain a permit to install (PTI) pursuant to R336.1283 (1) - Rule 283 - which exempts testing and inspection equipment.

A later inspection to the Novi location was conducted on 10/24/2012 by staff from the AQD SEMDO. It appears as if the intention of that inspection was to verify if the facility had moved and was operating in Livonia. The inspection report (ID No. U63090433) indicated that the

building space leased to A123 by Owens Corning was vacant. Apparently, A123 had moved out of Novi around 2010 but it wasn't clear if A123 operations were immediately relocated to Livonia after the move.

In a letter dated August 17, 2009, A123 explained the construction plans for the lithium-ion battery manufacturing facilities in Livonia and other potential sites in Wayne County. The letter listed the emission sources to be installed at the Livonia location and included the potential to emit (PTE) calculations for each one of the emission sources.

The following emission sources were planned for the Livonia site:

- 1, **Three natural gas-fired boilers, each with a maximum heat input of 2 MMBTU/hr;**
2. Natural gas-fired infrared space heaters with a total heat input of 2.1 MMBTU/hr;
3. Four natural gas-fired dehumidifier desiccant regeneration units, each rated at 216,000 BTU/hr (or electric heaters for regeneration);
4. One natural gas-fired 75 kW emergency generator;
5. One 1000-gpm fire pump driven by a 100 hp diesel engine;
6. Cell assembly - battery charging and degassing operations.

The intention of the letter dated 8/17/2009 was to demonstrate that the proposed sources of emissions would qualify for exemption from PTI requirements. For details, refer to AQD files for SRN N8318, letter dated August 17, 2009. The letter included the PTE calculations for each one of the proposed emission units as well as a discussion of the exemption rules potentially applicable to each emission sources. A123 analysis identified the following exemption rules to be applicable to the emission sources listed below:

- Rules 282(b)(i) - natural gas-fired boilers and space heaters;
- Rule 281(e) - natural gas-fired desiccant regeneration units;
- Rule 285 (g) - natural gas-fired emergency generator and diesel-fired fire pump;
- Rule 285(l)(viii) – battery charging operations

Later that year, on November 3, 2009, AQD received a PTI application from A123. The PTI application (No. 260-09) was for a lithium-ion rechargeable battery manufacturing operation and associated equipment described in the August 17, 2009 letter. AQD Permit Section reviewed the PTI application and supporting documents. On November 18, 2009 the application No. 260-09 was voided by AQD because the proposed equipment appeared to be able to qualify for exemption, once installed.

On August 31, 2010 the AQD Permit section received a revised permit application and the updated PTE calculations for a proposed "Lithium Ion Battery Low Volume Manufacturing (LVM) Factory" at the Livonia location. A123 applied for an increase in the production of cells from the original 20 battery packs per months to 30 battery packs per month. The request was essentially an amendment to the original PTI application No. 260-09. Apparently, the small increase in emissions resulting from the proposed changes did not alter the previous determination, which was that the equipment, once installed, would likely qualify for one or more exemptions.

To summarize, based on the information presented above, the proposed A123 facility at 39000 Seven Mile Rd., Livonia, MI 48174, was "potentially" a true-minor source of NOx, CO, SO2, PM, VOCs, Pb and HAPs. Even with the increase in cell production proposed in 2010, the facility-wide emissions of the cited pollutants would remain substantially below the PSD and NSR major source thresholds, and below Rule 119 significant levels. The proposed project was not a

construction or reconstruction of a major source of HAPs and it was not subject to Part 61 of NESHAP. Therefore, the amended proposed project appeared to continue to be eligible for state permitting exemptions.

In conclusion, A123 used the exemption rules to install and operate the equipment at the Livonia location. However, the verification to whether a facility qualifies for permit exemptions can only be done by conducting a field inspection of the actual installed equipment once the facility is up and running. A123's responsibilities for operating under PTI exemptions include the installation of the equipment described in their exemption analysis and/or maintaining an exemption analysis that adequately represents the "actual" installed equipment.

## **2. FACILITY DESCRIPTION**

On September 11, 2018 I arrived at A123 at approximately 11 AM and met with Mr. David Andersen, EHS Manager at A123 at Livonia. After the introduction, 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 and with the applicable air quality regulations in the State of Michigan.

Mr. Andersen walked me through the various areas of the building where A123 has its operations and explained the activities that were taking place at each area. A123 leased a 291,000 square foot building located in Wayne County at 39000 Seven Mile Rd., Livonia, MI 48174. The activities at the site include manufacturing activities, research and development, engineering functions and administrative offices. The manufacturing activities consist of the cell assembly, LVM production pack and module assembly line and prototype battery assembly line. A site map of the plant provided by Mr. Andersen during the inspection illustrates the specific areas involving the LVM process for cell assembly. According to Mr. Andersen, at their current rate of production, they do not manufacture more than 11,000 cells per week. In addition, cylindrical cell assembly was discontinued and they only produce prismatic cell modules

The site map also shows other areas of the building, such as: the warehouse, shipping and receiving, the quality lab, the module/pack validation testing and the starter battery assembly.

During the walkthrough, as we observed the LVM manufacturing process, we also stopped at the following service areas of the building: the boiler room, the diesel-fired fire pump housing, and at the location of the natural-gas fired emergency generators. A123 has two emergency generators, one is located outside at the main building entrance and it is mainly used to supply power to the IT equipment when the main power fails. The other generator is smaller, and it is used to supply power to the building lights and circuits, in the event of power outage. This one is located in the mechanical room.

Most of the assembly activities located inside the building do not generate emissions of pollutants. There are minor welding operations and one adhesive booth that has a vent-hood similar to the ones used in labs. Negligible quantities of glue are used in the module assembly.

The battery assembly rooms must be maintained dry and clean, so a desiccant material is used to control the humidity in the rooms. A123 uses modular dehumidifiers identified as "Munters" (the manufacturer's brand) that use natural gas for desiccant regeneration.

The pollutants venting to the outside air are those from the combustion of the natural gas in the boilers, the space heaters, the dehumidifiers and the emergency generators.

The current equipment and their capacities are described below. For convenience, the information has also been summarized in a table saved with this report in AQD facility files.

1.- Natural gas-fired boilers: Two (2) XTherm, Ultra High Efficiency, RAYPAK Boilers Model H7-1505A, each with a maximum heat input of 1.5 MMBTU/hour, installed in 2016. One (1) Cleaver Brooks, Model 4 Watertube natural gas-fired boiler with a maximum heat input capacity of 2 MMBTU/HR, built in 1985.

The two RAYPACK units (dark green cases) are relatively new and they replaced two of the old "light-blue" Cleaver Brooks Boilers. I was informed that the Cleaver Brooks boiler (2 MMBTU/HR) currently onsite, is not in-use.

2.- Space Heaters: There are four space heaters, two are natural gas-fired infrared heaters located in the cell assembly room at the east and west sides with a total heat input capacity of 2.1 MMBtu/ hr. The other two space heaters are rooftop units serving the cell aping area, their heat input capacity could not be verified during the site inspection.

3.- Emergency Generators: As indicated earlier, there are two emergency generators at the Livonia facility.

- The "Kohler Model 100RZ72", an 88-kW natural-gas fired emergency generator that supplies power for lighting during power outage. The hourly meter indicated a total run time of 1,214.9 hours. This generator appears to have been installed in the mid-1980s when the building was completed, and it was there when A123 moved to Livonia. The generator is located in the mechanical room along the west side of the building.

-The "Kohler Model 150REZGC" is a natural gas-fired emergency generator used to supply power to the computers if the main power fails. The generator is located outside at the main entrance of the building. The manufacturing date for the engine is unknown but appears to have been during 2014. A written note in the records shows that the engine wasn't operational until December of 2015. Readiness testing is done once a month. The EPA certificate of conformity with the CAA for the engine was provided during the inspection. The certified gross flywheel horsepower at 1800 rpm is cited to be 171.6 kW. However, according to the technical spec sheet I found on line, the generator has a maximum power of 193 kW at a rated 1800 rpm. The hourly meter at the time of the reading on 9/11/2018 showed a total running time of 73.5 hours. I was told that they have once used this generator for about 40 hours for emergency purposes.

4.- Clarke Fire Pump Engine: The facility has a diesel-fired fire pump engine. The engine plate showed a John Deere, 6-cylinder, compression diesel engine Model JU6H-UFADP8 rated at 220 BHP at 1760 rpm.

5.- Battery Charging and Degassing Operations: These operations occur at the battery assembly area. After a prismatic cell is assembled and filled with an electrolytic solution, the resulting "pouch" is sealed and given initial charge. During the charging process gases evolve in the sealed pouch. The rate of gas lost per cell during the charging process at the Livonia facility was estimated (in 2010) based on actual measurement from A123 System's Asian operations, at an average of 0.4 grams of electrolyte vapors and gases per cell. Gas chromatography (GC) was used to evaluate the quality of the gases produced during the degassing operations. This type of operations was not occurring when we toured the facility, but Mr. Andersen indicated that it is

still a common operation and A123 is planning to relocate the trailers to the new location when they move the facility next year.

6.- Battery Testing: In addition to the activities described above, there are two trailers located outside at the far north end area, behind the building, coming out of the exit door that connects to the shipping and receiving area. There was not access to the trailers and I could only observe thru a glass door. Testing equipment is installed inside the trailers. Apparently, these trailers were installed in 2011, but they were not listed in the revised permit application that was submitted to AQD Permit Section in August of 2010.

Occasionally battery testing is done with the purpose of investigating the gas venting process that occurs when lithium batteries fail under adverse conditions (i.e. overcharge, thermal heating and a combination of the two). A report dated 6/3/2011 from BTEC was provided during the inspection. It contains the results of sampling HF, HCl, metals and organic compound concentrations in the exhaust gas and emission rates in pounds per hour from two battery test modules for testing conducted on 5/4/2011

The inspection concluded with a closing meeting where I indicated that an inspection report will be prepared when the concerns regarding the facility operations and permitting issues are evaluated. I left the facility at approximately 1:00 PM.

### **3. COMPLIANCE HISTORY (Complaints, Violations Notice, Consent Orders)**

Our records show that this facility has no history of Complaints, Violations Notice or outstanding Consent Orders.

### **4. COMPLIANCE EVALUATION**

#### State Regulations:

The state regulations applicable to A123 emission sources were evaluated in the first part of this report under state permit background. The facility installed and operated the equipment under specific Michigan Air Pollution Control Rules (R 336.1278 – R 336.1291) listed earlier in this report.

According to Rule 278a(1) to be eligible for a specific exemption listed in R 336.1280 to R 336.1291, any owner or operator of an exempt process or exempt process equipment must be able to provide information demonstrating the applicability of the exemption and include the following information:

- (a) A description of the exempt process or process equipment, including the date of installation.
- (b) The specific exemption being used by the process or process equipment.
- (c) An analysis demonstrating that R 336.1278 does not apply to the process or process equipment.

#### **Compliance evaluation consisted in the verification of the applicability of the exemptions and the adequacy of the demonstration in fulfilling items (a), (b) and (c) above.**

I found that the facility has provided pieces of information (for most of the installed equipment) that could be used to demonstrate the applicability of the exemptions; but that information does not adequately fulfill the items (a), (b) and (c).

In general, the type of emission sources and the current process activities at A123 are as they were described in 2010, with the exemptions of the "battery testing" in the outside trailers (which

was not part of the initial project). However, based on the information collected during the walkthrough and the emails following the inspection, it appears as if the equipment currently installed at the facility do not exactly match the capacities of the equipment proposed in the exemption analysis of 2009/2010. Although the Potential to Emit (PTE) will not translate into significant increase in the total emissions, the PTE calculations need to be updated to reflect the changes.

There is a decrease in the manufacturing rate of cell modules. At their current rate of production, A123 manufactures less than 11,000 cells per week. This is about 3.5 % of the production rate proposed in 2010 which was set at 30 cells per minute (306,000 cells per week). In addition, cylindrical cell assembly was discontinued and they currently only produce prismatic cell modules.

The number of boilers is the same as the ones proposed in 2010. There are three boilers, but the difference is that two high-efficiency boilers replaced two of the old ones. Currently, the total heat-input capacity is 3 MMBTU /hr = (2) x 1.5 MMBTU /hr (active boilers) plus one of the 2 MMBTU /hr old boilers. The proposed total heat input in 2010 was 3 x 2 MMBTU/hr = 6 MMBTU / hr

There are two emergency generators with a total power rating higher than the 75-kW emergency generator proposed in 2010. There are two additional space heaters of unknown heat input capacities. The diesel fired engine (220 hp) use for stationary fire pump service has a higher rated horse power than the proposed 100 hp engine of 2010.

In 2010, the battery charging and degassing operations were considered to be eligible for exemption under Rule 285(l)(viii). AQD expected to have actual data from the charging process at the Livonia facility to quantify the emissions and validate the exemption, but this information was not obtained subsequent to the original evaluation.

With respect to the battery testing operations conducted at the outside trailers, it appears as if those might be exempt from Rule 201 permitting requirements pursuant to Rule 283. However, a demonstration of the applicability of the cited exemption was not available at the time of the visit and although it was provided (in a follow-up email) it did not fully demonstrate the exemption applicability. Further information is needed to evaluate exemption applicability.

#### Federal Regulations:

There are federal requirements applicable to natural gas-fired boilers built/installed after certain date and within a specific capacity range. NSPS Subpart Dc applies to each steam generating unit for which construction, modification, or reconstruction is commenced after June 9, 1989 and that has a maximum design heat input capacity of 29 megawatts (MW) (100 MMBtu/h) or less, but greater than or equal to 2.9 MW (10 MMBtu/h). The boilers installed at Livonia are post June 9, 1989 but the heat input capacities are below 10 MMBtu/h, therefore, they are not subject to Subpart Dc.

The stationary engines for emergency power rated at 193 kW, installed in 2014 is subject to NSPS Subpart JJJJ - 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. A123 demonstrates compliance by having purchased 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. According to the hourly meter reading reported earlier, the total operating hours has not

exceeded 100 hours for the entire life of the engine.

The John Deere fire pump engine Model JU6H-UFADP8 is an EPA Tier 3 certified engine that complies with NSPS Stationary Engines Subpart IIII.

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.

## 5. CONCLUSION

As a result of the inspection conducted at A123 in Livonia and the follow up discussions that I maintained with the facility representative via email and phone, I have concluded that some of the process and/or process equipment installed and operated by A123 in Livonia are exempt from the requirements of Rule 201 to obtain a Permit to Install (PTI). However, to be eligible for the specific exemptions listed in R 336.1280 to R 336.1291, any owner or operator of an exempt process or exempt process equipment must be able to provide information demonstrating the applicability of the exemption in accordance with the provisions of Rule 278a(1). This information will be requested of the facility in order to confirm the facility's standing with the claimed exemptions.

NAME Handoval

DATE 11-02-2018 SUPERVISOR JK

**SRN: N8318 - A123 Systems - Livonia****TABLE 1.a - Equipment Parameters<sup>a</sup>**

SOURCE	Proposed Equipment - YEAR 2010							Installed Equipment - Inspection 9/11/2018						
	FUEL	CAPACITY	Units	NUMBER OF UNITS	HEAT INPUT	Units	Notes	FUEL	CAPACITY	Units	NUMBER OF UNITS	HEAT INPUT	Units	Notes
Boilers	NG	2	MMBtu/hr	3				NG	1.5	MMBtu/hr	2			Raypak Units (Install. 2016)
									2	MMBtu/hr	1			Cleaver Brooks (Built in 1985) - No longer used but still onsite
Space Heaters	NG	2.1	MMBtu/hr				b	NG	2.1	MMBtu/hr	2			Located In Cell-Assembly Room (East and West)
								NG	Unknown	MMBtu/hr	2			Rooftop Units serving the Cell Aging Area
Desiccant Regenerators	NG	0.216	MMBtu/hr	4				NG	Unknown		4			Two Units located in Cell Assembly Area and two in Mechanical Room
Emergency Generators	NG	75	kW	1	0.975	MMBtu/hr	c	NG	88	kW	1	1.144	MMBtu/hr	Emergency Power for Lights
								NG	193	kW	1	2.51	MMBtu/hr	Emergency Power for IT Equipment
Fire Pump Engine	Diesel	100	hp	1	0.7	MMBtu/hr	d	Diesel	220	hp	1	1.54	MMBtu/hr	John Deere Engine serving the Fire Emergency Pumps
Prismatic Cell Assembly		15,800,000	cells/yr	1			e		572,000	cell / yr				Based on 11,000 cells per week (at 52 weeks /yr)
Cylindric Cell Assembly		2,700,000	cell/yr	1			f	Cylindric Cells Are not produced at the facility						
Overcharge and Thermal Destructive Battery Testing (2 trailers outside at north end of building )	These emission units were not part of the project proposed in 2010							These units appear to have been installed in 2011 with the purpose of investigating the gas venting process that occurs when lithium batteries fail under adverse conditions ( i.e overcharge, thermal heating and a combination of the two). A report dated 6/3/2011 from BTEC was provided during the inspection. It contains the results of sampling HF, HCl, metals and organic compound concentrations in the exhaust gas and emission rates from two battery test modules for testing conducted on 5/4/2011. The demonstration of the applicability of Rule 283 exemption is required						

**Notes: Year 2010**

a - Provided by A123

b - Several space heaters were proposed . Capacity represents total capacity for all units

c - The conversion from kW to MMBtu/hr assumes approximately 13,000 BTU/kW-hr (including efficiency)

d - The conversion from hp assumes approximately 7,000 BTU/hp-hr (including efficiency)

e - Prismatic cel assembly capacity assumes full-time operations (i.e. , 8760 hrs/yr), based on production of 30 cell per minute

f - Cylindric cell assembly capacity assumes full-time operations, based on production of 5 cells per minute.