

DRAFT
ENGINEERING EVALUATION REPORT
LION CELLS
APPLICATION NUMBER 017121

BACKGROUND:

Lion Cells (P# 18845) has applied for an Authority to Construct and Permit to Operate the following:

S-1: Lithium Ion Cell Manufacturing Operation – Flow Coating Line; Abated by A-1 Regenerative Thermal Oxidizer

A-1: 2-Bed Regenerative Thermal Oxidizer; Regenex 204, 4000 scfm, 1.278 MMBTU/hr

The Coating Line S-1 applies a lithium ion slurry (lithium ions mixed with a binder and organic solvent) to a foil substrate. The coated foil is then dried within the enclosed line and the vapors are exhausted to the Regenerative Thermal Oxidizer (RTO) A-1.

Note: To comply with the applicant's request not to disclose Trade Secret information about their proprietary manufacturing process, the parts of this evaluation relating to specific materials and usage amounts have been modified or removed. However, the actual maximum projected emissions for the project have been included.

EMISSION DISCUSSION:

Primary Pollutant from S-1

The proprietary coating process will result in emissions of *N-methylpyrrolidone (NMP)* up to 11.06 tons per year after abatement.

Secondary Pollutants from A-1

The RTO A-1 consists of two heat exchangers connected by a common combustion zone. The heat exchangers are beds filled with media designed to allow air to pass while also storing heat. The VOC laden air stream enters the first heat exchange bed, passing through the media where it is preheated en route to the combustion chamber. There a burner adds the necessary heat to achieve the optimum combustion temperature to complete pollutant oxidation. The clean air stream then passes through the second heat exchange bed, transferring heat to the bed and cooling the stream. The flow through the heat exchange beds is reversed at regular intervals to keep the incoming pollutant stream entering the hottest media bed. The manufacturer claims that up to 95% of the heat of combustion is recovered and reused in this process. Because of the efficiency of the process, the generation of secondary pollutants is expected to be low.

The manufacturer has not provided specific emission factors for this particular application, therefore AP-42 emission factors for external natural gas combustion sources will be used to estimate emissions for secondary pollutants. From AP-42 Table 1.4-1 "Emission Factors for Nitrogen Oxides (NO_x) and Carbon Monoxide (CO) from Natural Gas Combustion" the following NO_x and CO emission factors based on heat input are derived for "Small Boilers – Controlled with Low NO_x Burners and Flue Gas Recirculation":

NO_x: 0.03 lb/MMBTU

CO: 0.08 lb/MMBTU

Similarly, a PM₁₀ emission factor can be derived from Table 1.4-2 "Emission Factors for Criteria Pollutants and Greenhouse Gases from Natural Gas Combustion" (Filterable PM):

PM₁₀: 0.002 lb/MMBTU

SO₂ emissions are assumed to be negligible because the primary fuel source (*NMP**) contains no sulfur. These factors are indicative of a well-controlled combustion process, such as exists within the RTO A-1.

Based on equipment sizing and product usage the RTO could operate at the equivalent of full capacity for 4,608 hrs/yr. Therefore:

$$\begin{aligned} \text{NOx} &= (0.03 \text{ lb/MMBTU})(1.278 \text{ MMBTU/hr})(4,608 \text{ hrs/yr}) \\ &= 177 \text{ lb/yr} \\ \\ \text{CO} &= (0.08 \text{ lb/MMBTU})(1.278 \text{ MMBTU/hr})(4,608 \text{ hrs/yr}) \\ &= 471 \text{ lb/yr} \\ \\ \text{PM10} &= (0.002 \text{ lb/MMBTU})(1.278 \text{ MMBTU/hr})(4,608 \text{ hrs/yr}) \\ &= 12 \text{ lb/yr} \end{aligned}$$

CUMULATIVE EMISSIONS:

(lbs/day)	(tons/yr)
POC = 60.6	POC = 11.060
NOx = 0.5	NOx = 0.089
CO = 1.3	CO = 0.236
PM10 = 0.03	PM10 = 0.006

TOXIC RISK ASSESSMENT:

The Lithium Ion Cell Manufacturing Operation S-1 will not use any compounds identified as toxic air contaminants (TAC) by the District. Therefore, no risk assessment is required for this application.

BACT REVIEW:

Best Available Control Technology (BACT) review is triggered for any new source, which results in a potential emission equal to or greater than 10.0 pounds per highest day of precursor organic compounds (POC). Since the POC emissions associated with S-1 are potentially greater than 10 lb/day of POC, BACT is triggered.

BACT #1 (Technologically Feasible/ Cost Effective) for “Flow Coater, Dip Tank, and Roller Coater, ≥ 36 lb/day (uncontrolled)” is “Coating w/ lower VOC content than applicable BAAQMD rules, and emissions from coating area, drying area, and oven vented to control device w/ overall capture/ destruction efficiency $\geq 90\%$ ”. (Ref. BACT Guideline, Revision 1, Document # 84.2.1, 08/30/91).

The Lithium Cell Manufacturing Operation S-1 is subject to Regulation 8, Rule 4 “General Solvent and Surface Coating Operations”, which does not include a mandatory VOC limit for coatings. The RTO A-1 will be required by permit condition to have an overall POC capture/destruction efficiency of at least 95% by weight. Therefore, the abatement of POC emissions from S-1 by the RTO A-1 meets BACT #1 requirements.

OFFSET REVIEW:

Offsets are not required for this application because the permitted facility wide POC emissions are less than 15 tons/yr.

STATEMENT OF COMPLIANCE:

The Lithium Cell Manufacturing Operation S-1 is subject to the requirements of Regulation 8, Rule 4 “General Solvent And Surface Coating Operations”. This regulation limits uncontrolled VOC emissions to 5 tons/yr; or 90% control for VOC incineration. The RTO A-1 will be required by permit condition to have an

overall POC capture/destruction efficiency of at least 95% by weight. Therefore, the abatement of POC emissions from S-1 by the RTO A-1 meets BACT #1 requirements.

PSD, NSPS, and NESHAPs do not apply.

This application is exempt from the requirements of a CEQA review because the permitting of "Miscellaneous Organic Operations" as outlined in Permit Handbook Chapter 11.9 is a ministerial operation.

Since the Lithium Cell Manufacturing Operation S-1 is located within 1,000 feet of the outer boundary of a K-12 school and will emit a compound on the list of chemicals known to the State to cause cancer or reproductive toxicity, it requires a public notification in accordance with Regulation 2-1-412.

PERMIT CONDITIONS:

Note: Trade Secret information has been replaced by "XXXXX".

S-1: Lithium Ion Cell Manufacturing Operation; Abated by A-1 Regenerative Thermal Oxidizer

1. Total organic solvent usage at the Lithium Cell Manufacturing Operation S-1 shall not exceed XXXXX gallons during any consecutive twelve-month period. (Basis: Cumulative Increase)
2. XXXXX is the only organic solvent that has been approved for use at S-1. However, the permit holder may use an alternative solvent, provided that both of the following requirements are demonstrated: (Basis: Cumulative Increase; Toxics)
 - a. Total solvent usage does not exceed XXXXX pounds in any consecutive twelve-month period; and
 - b. The use of these materials does not increase toxic emissions above any risk screening trigger level of Table 2-5-1 in Regulation 2-5.
3. All volatile organic compounds (VOC) from S-1 shall be captured under negative pressure and abated by the Regenerative Thermal Oxidizer (RTO) A-1. The system be operated and maintained such that the overall VOC capture and destruction efficiency is at least 95% by weight. (Basis: BACT, Cumulative Increase)
4. The temperature in the combustion chamber of A-1 shall be maintained at least 1,400 degrees F. The District may adjust this minimum temperature (up or down), if source test data demonstrates that a higher temperature is necessary for; or a lower temperature is capable of maintaining; compliance with Part 3 above. (basis: BACT, Cumulative Increase)
5. To demonstrate compliance with the temperature requirement in Part 4, A-1 shall be equipped with a temperature-measuring device capable of continuously measuring and recording the temperature in the combustion zone. This device shall be installed, and maintained in accordance with manufacturer's recommendations. The minimum and maximum measurable temperatures shall be of an appropriate range to demonstrate that the unit is operating properly and the accuracy of the device over this temperature range shall be at least 1.0 percent of full-scale. (basis: BACT, Cumulative Increase)
6. The permit holder shall report any non-compliance with part 4 to the Director of the Compliance & Enforcement Division at the time that it is discovered. The submittal shall detail the corrective action taken and shall include the data showing the exceedance as well at the time of occurrence. (basis: BACT, Cumulative Increase)

7. In order to demonstrate compliance with the above requirements, the permit holder shall maintain the following records:
- a. the type and total amount of organic solvent used at S-1, recorded daily and summarized on a monthly basis
 - b. a product data sheet for every organic solvent used at S-1
 - c. daily operational status and temperature record for A-1

Records shall be kept on site for at least 5 years from the date of entry and shall be made available for inspection by District personnel upon request. (basis: BACT, Toxics, Cumulative Increase, Regulation 8-4-501)

8. Initial source test requirement: In order to demonstrate initial compliance with the VOC removal efficiency required by part 3, the Permit Holder shall conduct a District approved source test of the Regenerative Thermal Oxidizer A-1 within 60 days of startup. All testing shall be performed in accordance with Volume V of the District's Manual of Procedures and shall be approved in advance by the District's Source Test Section. Source test results shall be provided to the District within 60 days of the test date. (basis: BACT, Cumulative Increase)

RECOMMENDATIONS:

It is recommended that an Authority to Construct be issued to Lion Cells for the following:

S-1: Lithium Ion Cell Manufacturing Operation – Flow Coating Line; Kraemer Q606260, 20 fpm; Abated by A-1 Regenerative Thermal Oxidizer

A-1: 2-Bed Regenerative Thermal Oxidizer; Regenex 204, 4000 scfm, 1.278 MMBTU/hr

By: _____
Ted Hull
Senior Air Quality Engineer
DATE: 1/29/08