SAFT JACKSONVILLE, INC.
PROCESS DESCRIPTION

The Saft Jacksonville lithium ion battery manufacturing plant to be located at 13575 Waterworks Street in the Cecil Commerce Center is a lithium battery manufacturing plant. The entire manufacturing process is fully enclosed.

The main chemical of concern used in the electrode manufacturing process is N-Methyl-2-Pyrrolidone (NMP). NMP is stored outside the main building in a tank. The tank is covered with a nitrogen blanket that floats on the top of the NMP to prevent losses to the atmosphere.

There are two other tanks associated with the manufacturing process: a 10,000-gal 95% NMP and a 10,000-gal 100% water tank. All of the tanks are sealed and there are no emissions of VOC to the atmosphere. The only VOC emissions are at the scrubbers. The tanks are either of double-walled constructed or within secondary containment.

A process flow diagram and building layout is provided and can be used to follow the materials through the process to the final product. Materials enter the east end of the plant and manufacturing operations occur as the materials flow through the building and exit as final product at the west end (from the right to the left on the process flow diagram and building layout).

Most of the emissions in the plant will be very minor and are insignificant. They are described in the "List of Insignificant Emissions Units" attached to the electronic permit application. There are only two operations in the plant that will require permitting:

- The two lines in the filling room, condenser/wet scrubber (cathode) and condenser/wet scrubber (anode) emit VOC from the two scrubbers. They are permitted under EU-001.
- NO_x, CO, PM, PM_{10}, SO_2 and VOC are emitted from burning natural gas in the drying ovens. There are four ovens in the plant, each with three burners. The emissions are permitted under EU-002.

The plant will be constructed in phases:

- Phase 1 is anticipated to begin in December, 2010.
- Phase 2 is anticipated to begin in the first quarter, 2012.
- Phase 3 is anticipated to begin in the fourth quarter, 2012. Phase 3 will be permitted at a later date and is not addressed here.

The materials enter the process in either the positive (cathode) or negative (anode) line.

The cathode line chemicals are:

- Lithium
- NMP
- (PVDF) Polyvinylidene Fluoride (#1 and #2)

- Acetylene Black

The anode line chemicals are:

- D. I. (deionized) water
- Graphite Powder
- CMC (Sodium CarboxyMethylCellulose)
- SBR (Styrene Butadiene Rubber) Latex
- NMP (possible for some receipes)

The first process is materials handling. This involves the respective powders, NMP, D.I. water and other materials entering the process.

The materials are conveyed to the mixing area where they are combined in the mixers. This produces small amounts of particulate matter (PM) which passes through a filter system and exhausted to atmosphere.

The negative and positive mixes (slurry or ink) then enter the coating lines where there are mix transfer systems. The positive line uses aluminum as a substrate and the negative line uses copper as a substrate. The aluminum substrate is corona treated prior to coating. This is an electrostatic radiation source and ozone is generated and exhausted to the atmosphere. In phase 1, this process is anticipated to generate approximately 10.6 pounds per day of ozone. Phase 2 will not generate any additional ozone. In Phase 3, however, ozone generation is anticipated to double to approximately 21.2 pounds per day. Phase 3 will be permitted at a later date and is not addressed in this application. Each machine will have its own exhaust to atmosphere. If there is a breakdown in either the positive or negative line, one line could be used to run both the positive and negative lines at 50% capacity for each line.

The coated material then enters the drying ovens. The drying ovens use indirect fired natural gas. NMP vapors are also pulled into the ovens. There are no particulate emissions from this process. There are, however, emissions from the products of combustion of the natural gas. These emissions are addressed in EU-002.

Each oven is equipped with its own condensing system. For the negative (anode) drying oven, the majority of the water vapors and NMP vapors, if present, are removed via the anode condenser. For the positive (cathode) drying oven, the majority of the NMP vapors are removed from the exhaust via the cathode condenser. Approximately 95% of the condenser exhaust is returned to the respective drying oven. For the anode, if only water is present, the remaining vapor is exhausted to atmosphere. The exhaust from the cathode condenser and from the anode condenser, if NMP is present, will pass through a wet scrubber system to remove additional NMP. The outlet of the scrubber is exhausted to atmosphere. Each scrubber is sized to accommodate the discharge from three condensers. The VOC emitted from this operation is addressed in EU-001.

The coated foil then enters the slitting process where it is cut from one 800 mm strip to four 200 mm strips. The slitting process removes and collects debris. Minor PM

emissions from this process will be directed to a HEPA filter and exhausted back into the plant.

From there, the foil goes through splicing stations where defects are removed. This process will generate very minor amounts of PM which also will be directed to a HEPA filter and exhausted back into the plant. From there, the foil goes through calenders which size the materials from one thickness to another thickness and then through a dryer where it is heated and the moisture is removed.

The next process is the winding operation which combines the positive and negative electrode material together to make a cell.

Following winding, is cell assembly which includes cell folding where minor particles of metals are generated and directed to HEPA filters and the air exhausted back into the plant. The rest of the line consists of laser welding stations and has no environmental concerns.

There is another assembly operation for cover assembly. Cover assembly consists of laser welding and etching operations and have no environmental concerns.

Next, in the electrolyte filling operation, the cells are filled with organic electrolyte. There is one filling machine to each assembly line. Carbon scrubbers are installed on this line.

The feeding room is located in an outside building away from the main plant and feeds the filling lines. There are three feeding cabinets, each with its own carbon filter and exhaust. There are three electrolytes. All three can be pumped to any of the lines. Minor fugitive emissions of VOCs and organics are generated and are sent to the scrubber. The filling insulation is cooled to 60°F - below the flashpoint. It will be listed as an Insignificant Emissions Unit.

Cells then go to the rivet section where a rivet is placed into each cell to close it.

The automated guided vehicle (AGV) then transfers the filled and closed cells to the formation area which is located in a separate building.

Electrical formation is performed within closures (cabinets). The closures have an argonite fire suppression system. The chamber will be flooded in case of fire or explosion. For planning purposes, estimate one incident per year. If there is an incident, emissions will be directed to a wet scrubber.

From formation, the cells go to electrical testing for testing, storage, etc. No emissions are generated in this area.

After electrical testing, the finished cells go to storage and then to module/battery assembly. There are no emissions from this process.

There is one emergency backup generator on site. It will operate on No. 2 fuel oil. It will only operate approximately 0.5 hours a month in order to insure it will be operational if needed in an emergency. Since emissions from the emergency generator are minimal, the generator is listed in the "Insignificant Emissions Unit" section.

The two emissions units to be addressed in this permit application are:

EU-001: NMP Recovery System with its two lines:

- Condenser/wet scrubber (cathode +)
- Condenser/wet scrubber (anode -)

EU-002: Drying Ovens

All of the other operations will produce only insignificant emissions. They will be described in the "List of Insignificant Emissions Units" and be attached to the electronic application.

For the life of the permit, the double line is projected to run for 99+% of the time. Running a single line (both + and -) will probably operate only 1 to 2 weeks in the 5-year life of the permit.

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