

BARCLAY DAMON^{LLP}

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Partner



May 9, 2019

Reginald Parker, P.E.
Regional Engineer
NYSDEC Region 7 Headquarters
615 Erie Blvd. West
Syracuse, New York 13204

(7-0300-00019 = AIR REG)
ASF = 7-0346-00218



Re: Proposed Universal Waste Destination Facility and Universal Waste Handling Facility

Dear Mr. Parker:

As you know, SungEel MCC Americas LLC ("SMCC") proposes to operate a "Universal Waste Destination Facility" (the "Destination Facility") at an existing manufacturing complex in Endicott, New York. The Destination Facility will recycle (recover metals from) spent lithium-ion rechargeable batteries. SMCC, or a separate legal entity, also intends to operate a "Large Quantity Universal Waste Handling Facility" (the "Handling Facility") to temporarily store spent rechargeable batteries prior to recycling. The Handling Facility will be located on a noncontiguous property.

This letter is submitted on behalf of SMCC. It describes the intended operation of both facilities, the anticipated regulatory requirements, and certain unresolved issues regarding the applicability of particular regulations. Additionally, it suggests reasonable regulatory interpretations which we believe are consistent with the letter and intent of the Universal Waste regulations and appropriate to support this fledgling industry.

Background and Process Information

The Destination Facility.

SMCC proposes to build and operate a \$5 million lithium-ion battery recycling facility in the Village of Endicott, New York. Rechargeable batteries will be recycled to extract metals for the manufacture of new batteries.

412.886
4662.236

Location.

The proposed Destination Facility site will be located at the northeast corner of Robble Avenue and Clark Street, in an industrial park on the former IBM Endicott Campus which is now owned by Huron Real Estate Associates, LLC (the "Huron Campus"). The Huron Campus has been touted by the New York State Empire State Development Corporation as an important center for the research, development and manufacture of lithium-ion batteries on a large scale, to supply the next generation of electric vehicles ("EV's") and for the production of energy storage systems for homes and businesses. The SMCC Destination Facility will complement those industry-leading efforts and provide additional technical and manufacturing jobs to help revitalize the community. SMCC will employ a process that is now being successfully used by an affiliated company at a similar facility in South Korea.

Thermal Treatment of Battery Cells.

All recycling equipment, stock and finished product will be located within the recycling building. The Destination Facility will have an input capacity of approximately 2,200 pounds per hour. The process involves discharging the spent lithium ion battery cells using an electrical discharging station, which decreases the voltage from approximately 400 volts to 24 volts. The cells are then disassembled and placed into a rotary kiln furnace ("RK Furnace"), which removes the residual charge and dries the cells for further processing, including shredding and grinding. The RK Furnace will operate at a temperature range between 550° to 600° C, which will eliminate any residual electrical charge remaining in the lithium ion battery cells, and prepare the remaining material (the recovered metals) for grinding to powder.

Control Equipment.

Lithium-ion battery cells themselves contain no polyvinyl chloride ("PVC") or other chlorinated plastics. The only plastic that lithium ion batteries contain is polypropylene and polyethylene, neither of which contain chlorine. These plastics are used as separator sheets inside of the batteries. Some lithium ion batteries do have other plastic parts/casings, but as part of the process, these parts/casings are removed prior to feeding the lithium ion battery cells into the RK Furnace. Only batteries are fed into the RK Furnace. Therefore, as discussed further below, there should not be any dioxin emissions associated with the Facility. Nevertheless, the Facility will use the following control measures to control any potential dioxin emissions: (1) maintenance of stable conditions in the RK Furnace; (2) high temperature treatment (800°C) in an oxidizer/afterburner or other applicable technology; (3) cooling the exhaust gas to less than 100°C with a pre-duster/cooling spray tower as needed, which prevents re-synthesis of hydrocarbons; (4) a fabric filter for the capture of fine particles; and, (5) a wet scrubber.

Crushing/Grinding/Size Reduction of the Calcined Product.

Following heating in the RK Furnace, the calcined product is transferred to a mechanical cooling unit, and then into a collection tote bin receiver. The dust associated with this process is collected and controlled by passing it through a fabric filters, i.e., baghouse bags before it is exhausted. The recovered metal is then directed to one of two grinding machines (the “No. 2 Machines”). The powder recovered from the No. 2 machines constitutes the final product.

Dust from the No. 2 Machines will be treated by cycloning to remove the larger sized particles and then passed through a fabric filter for removal of the finer sized particles before the air is exhausted from the process. The collected dust is an important part of the recycled product as it consists of metal that will be eventually recovered. The products of the cyclone and baghouse are recovered in tote bins (or 55 gallon drums) and are added to the final product. The dust captured in the baghouse bags and the cyclone is mechanically/pneumatically removed by air pulse and dropped into the tote bins. Initially, the metal powder recovered will be shipped to South Korea for further processing and separation to produce metals of interest. In the future, this final phase of processing may be conducted in the U.S., potentially at or near the battery manufacturing facilities in Endicott.

Schematic diagrams and information relating to the recycling process and equipment, and the emission control devices were provided in the air permit applications that have been submitted to the Department.

By-Products of the Recycling Process.

The following by-products will result from the recycling process:

- Plastic battery packaging/casings – removed before batteries are placed in the RK Furnace, and sent offsite to be recycled;
- Metal battery packaging – nonferrous metals will be locally recycled;
- Baghouse dust – is part of the finished product and will be shipped with the remainder of the ground product. The dust captured in the baghouse bags and the cyclone is mechanically/pneumatically removed from the bags, and drops into a conical or pyramidal shaped hopper. The hopper has a rotary valve on the bottom of it that delivers the contents of the hopper (via gravity) into a tote bin located below. When full, the tote bin is sealed and readied for shipment.
- Scrubber water – will be recirculated and occasionally discharged to the Huron campus WWTP.

As previously noted, the polypropylene and polyethylene battery sheet separators will be destroyed in the RK Furnace. Any and all plastic casings will be removed prior to the batteries being fed into the RK Furnace.

Attachment “A” is a Process Flow Chart which illustrates the process flow associated with the receipt of spent lithium-ion batteries at the Universal Waste Handling (Storage) Facility, as well as the dispatch of batteries to the Universal Waste Destination (Recycling) Facility for processing at that facility.

The Handling Facility.

Again, Attachment “A” depicts the process flow associated with the receipt of spent lithium-ion batteries at the Universal Waste Handling (Storage) Facility.

Attachment “B” illustrates guidelines relating to the unloading, storage of lithium-ion batteries in metal drums at the Handling Facility, and their dispatch to the Recycling Facility.

Attachment “C” contains guidelines providing further details regarding packing of spent lithium-ion batteries associated with storage at and shipping from the Handling Facility.

The Regulatory Scheme

The Universal Waste Destination Facility.

As per 6 NYCRR § 374-3.1(i)(11), spent lithium ion batteries are considered “universal waste” for purposes of New York’s hazardous waste regulations. The Battery Recycling Facility is considered a “Universal Waste Destination Facility”. That is defined as “a facility that treats, disposes of, or recycles a particular category of universal waste....” 6 NYCRR § 374-3.1(i)(2) (emphasis added).

Standards for operating a Destination Facility are contained at 6 NYCRR § 374-3.5. The following requirements apply:

- a. The owner or operator must obtain an EPA ID number for the facility;
- b. The facility is subject to the air emission standards in subparts 373-2.7 and 2.28 or 373-3.27 and 3.28;
- c. The facility is subject to all applicable Manifest, Recordkeeping and Reporting requirements in subparts 373-2.5 or 373-e.5;
- d. **The facility is subject to all applicable requirements in 6 NYCRR parts 373-1, 373-2, 373-3, 374-1 and parts 376 and 621 and is subject to permitting as a hazardous waste Treatment, Storage or Disposal Facility (“TSDF”) unless they meet one of the exemptions contained within Subpart 373-1.1(d)(1).**

It is crucial to the economic viability of the facility to avoid the onerous TSDF regulatory scheme by meeting the exemption contained at 6 NYCRR § 373-1.1(d)(1)(viii). That states in part that the recycling of hazardous wastes is exempt from the Part 373 permit requirements

provided that the manifest, notice and recordkeeping requirements in that regulation are complied with¹.

SMCC recognizes that a Destination Facility is not exempt from the TSDF requirements if the hazardous waste being recycled is stored at that facility prior to recycling. Therefore, SMCC will not store any waste batteries at or contiguous to the Battery Recycling Facility prior to processing. “Just in time” processing will occur, in that, the only materials at the processing facility will be those that are involved in the processing. The estimated amount of material at the facility is 1.5 to 2 times the processing rate of the batteries, i.e., 3,300 to 4,400 lbs. Instead, either SMCC, or a separate legal entity, will establish a universal waste “handling facility” for the storage of spent rechargeable batteries prior to processing. That issue is discussed further below.

The Battery Recycling Facility will meet the remaining requirements of 6 NYCRR § 374-3.

The Universal Waste Handling Facility.

“Large quantity handler of universal waste” means a universal waste handler (as defined in this subdivision) who accumulates 5,000 kilograms or more total of universal waste (batteries, pesticides, thermostats or lamps, calculated collectively) at any time.” 6 NYCRR § 374-3.1(i)(6). Standards for operating a Destination Facility are contained at 6 NYCRR § 374-3.3. The following requirements apply:

- a. The operator must comply with all applicable parts of Part 360;
- b. The facility is prohibited from disposing of, treating, or diluting universal waste;
- c. The operator must send written notification of universal waste management with specified information, and obtain an EPA Identification number before meeting or exceeding the 5000 kg storage limit;
- d. Universal waste batteries must be managed to prevent releases, as prescribed in the regulations;
- e. Each container with batteries must be labeled or marked with one of the following phrases: “universal waste – battery(ies)”, or “waste battery(ies)”, or “used battery(ies)”;

¹ The regulation appears to have omitted one or more words and therefore, its actual meaning is unclear: “[t]he recycling of hazardous wastes, provided in section 373-2.2(c) (identification number), 373-2.5(b) or 373-3.5(b) (manifest requirements) of this Part and clause (d) of this subparagraph are complied with.” However, in the context of its inclusion among the Part 373 exemptions, it is clear that the drafters of the regulation intended that certain hazardous waste recycling facilities such as universal waste recycling facilities be exempted from the Part 373 permit requirements provided that the manifest, notice and recordkeeping requirements stated in that regulation are complied with. See 6 NYCRR § 373-1.1(d)(1)(viii).

- f. Waste batteries may be accumulated for up to one year unless it has been held longer in order to accumulate enough universal waste to facilitate proper recovery, treatment, or disposal (subject to proof requirements);
- g. Handlers must demonstrate the length of time that universal waste has been accumulated since the date of receipt;
- h. Handlers must “ensure that all employees are thoroughly familiar with proper waste handling and emergency procedures, relative to their responsibilities during normal facility operations and emergencies”;
- i. Handlers “must immediately contain all releases of universal wastes and other residues from universal wastes”, and in the case of a release, the handler is considered a generator of waste and is subject to management regulations contained in 6 NYCRR Parts 370 through Subpart 374-1 and Part 376;
- j. Universal waste may only be sent to “another universal waste handler, a destination facility, or a foreign destination”;
- k. Transporting universal waste offsite requires compliance with 6 NYCRR Part 364, however, transport of “rechargeable batteries destined for recycling” is exempt, provided there is no intermixing of universal wastes, however self-transportation of batteries requires the handler to comply with the requirements for universal waste transporters contained at 6 NYCRR § 374-3.4;
- l. All universal waste shipments received and sent must be recorded and records must be maintained for at least three years from the date of receipt/shipment (6 NYCRR § 374-3.3(j)).

Location and Ownership of the Universal Waste Destination and Handling Facilities.

Pursuant to 6 NYCRR §§ 374-3.1(i)(12) and 370.2(208)(b), a Universal waste “handler” includes the owner or operator of a facility, including all contiguous property, that receives universal waste from other universal waste handlers, accumulates universal waste, and sends universal waste to another universal waste handler, to a destination facility, or to a foreign destination. Similarly, 6 NYCRR § 370.2(b) (170) provides that “site” “means the land or water areas where any facility or activity is physically located or conducted, including adjacent land used in connection with the facility or activity” (emphasis added).

Because a Universal Waste Destination Facility cannot store universal waste and still be exempt from the TSDF permitting requirements (6 NYCRR § 373-1.1(d)(1)(viii)), and because contiguous properties are considered part of the same facility for purposes of the definition of universal waste handler and the definition of “site” in 6 NYCRR § 370.2(b) (170), the Universal Waste Destination Facility and the Universal Handling Facility may not be located on contiguous properties. They must be considered separate facilities for the Destination Facility to maintain its exemption from the TSDF permit requirements. There appears to be no definition of “adjacent” or “contiguous” in the state’s hazardous waste regulations. However, according to the Merriam-Webster Dictionary (on-line version) and similar authorities, “contiguous means

being in actual contact: touching along a boundary or at a point.” “Adjacent” is listed as a synonym by Merriam-Webster.

Based upon the foregoing, it appears clear that the Handling Facility may be located in the general vicinity of the Destination Facility, as long as its boundary does not contact the boundary of the Destination Facility’s property. To avoid any question whether the owner of the Destination Facility and the Handling Facility may be the same entity, the two entities will be owned/operated by separate legal entities.

Finally, the Destination Facility will be located in a large industrial campus owned by an unaffiliated third party. It remains an open question whether both the Destination Facility and the Handling Facility may be located within separate leased spaces within the Huron Campus, and still be considered non-contiguous and not part of the same site. 6 NYCRR § 370.2((b)(134) defines “onsite”, in part, as:

the same, geographically contiguous property which may be divided by public or private right-of-way, provided the entrance and exit between the properties is at a cross-roads, intersection and access is by crossing, as opposed to going along, the right-of-way; provided, **however, where two portions of the property are rented or leased by different persons, those portions are not on-site with respect to each other** but are on-site with respect to portions operated by the property owner... (emphasis added).

Solid Waste Issues.

We have been advised by Department staff that provided the hazardous waste recycling exemption applies, the Battery Recycling Facility will require a full Part 360 permit or registration.

6 NYCRR § 360.1(b) provides that any facility or collection event which is exempt from regulation under Part 372, 373 . . . Subpart 374-1 or 374-3 of this Title is subject to Parts 360, 361, 362, 363, and 365 of this Title (as applicable). As previously discussed, the Battery Recycling Facility is exempt from the requirements by 6 NYCRR § 373-1.1(d)(1)(viii). So, the Department must determine whether it will require a permit or registration under the solid waste regulations.

6 NYCRR § 360.15(a)(1) provides that “certain facilities . . . may be eligible for registration pursuant to the conditions specified under Parts 361, 362, 363, 364 and 365 . . . of this Title.” Although those sections are not directly applicable to the Destination Facility and the Handling Facility, because both facilities will be subject to the notice, recordkeeping, and reporting obligations in Part 374, permitting as a solid waste management facility is unnecessarily burdensome. Registration, with its own additional reporting requirements,

provides the Department with adequate regulatory control, as will the air state facility permit discussed below.

Air Issues.

a. Emission Points.

The Facility will have four air emission points, as follows: (1) the RK Furnace; (2) the dryer bin; and, (3 & 4) the two No. 2 Machines. Each of these emission points are discussed below.

Emission Point 1 (RK Furnace): The RK Furnace is natural gas-fired, with a maximum heat input of 4.0 MMBTU/hr, and operates in a temperature range of 550-600° C. Emissions from the RK Furnace would be controlled by an oxidizer (afterburner) or similar technology, a fabric filter, and a wet scrubber. The emission stream would leave the RK Furnace, and enter the oxidizer, which will operate at a temperature of 800° C. A cooling spray tower will be used as needed to control the temperature of the emission stream before entering the fabric filter. Finally, a wet scrubber would provide final treatment of the emission stream by injecting water. The emission stream is then exhausted through emission point 00001.

Emission Point 2 (RK BIN): The dried cells are removed from the RK Furnace into a tote bin and are brought to the No. 2 Machines. The dust associated with this process is collected and controlled by passing it through a fabric filter before being exhausted through emission point 00002.

Emission Points 3 and 4 (No. 2 Machines): After the RK Furnace dries the cells, they are ground in two grinding machines known as “No. 2 Machines.” The ground material is the product and contains the metals to be recovered in downstream processes. The dust produced by these machines is collected in a cyclone for recovery, then sent through a fabric filter, before being exhausted through emission points 00003 and 00004.

b. Air Permit Application and Correspondence.

On December 27, 2018, an Air Facility Registration application was submitted by Plumley Engineering (Dale Volmer) on behalf of SMCC to the Department for approval, and on January 9, 2019 a meeting was held with the Department to discuss the application. As a follow-up to the meeting, on January 18, 2019 additional clarifications and information was provided by Plumley to the Department. In a letter dated January 30, 2019, the Department requested additional information related to the Air Facility Registration application. This letter also requested that a State Facility Permit application be submitted to NYSDEC, and noted that NYSDEC was considering whether an Air Facility Registration or a State Facility Permit would be required for the Facility. On February 28, 2019, Plumley submitted an updated application

package, including emissions calculations, and a letter responding to the Department's January 30, 2019 letter.

In a letter from the Department dated March 18, 2019, the following additional comments were provided:

- The RK Furnace may be subject to 40 CFR Part 60, Subpart CCCC Standards of Performance for Commercial and Industrial Solid Waste Incineration ("CISWI") Units. In response SMCC can either lower the operating temperature of the RK Furnace to below the auto-ignition temperature or request a determination from EPA on whether Subpart CCCC applies to the RK Furnace.
- If SMCC continues with its request to operate the RK Furnace above the auto-ignition temperature, than NYSDEC will require activated carbon to be injected into the flue gas upstream of the fabric filter to abate potential dioxin emissions; or, for precautions to be taken to prevent batteries containing chlorine from entering the dryer.
- Due to the complexity of the control equipment, a State Facility Permit is required for construction and operation of the Facility. The permit application, which needs to be supplemented with a PE stamp, was forwarded to the Division of Permits in Region 7.

? NOT RECD.

The RK Furnace clearly fits within the CISWI 40 CFR 60.2020(h) exemption, which provides that Materials Recovery Units are exempt from the CISWI regulations defined as "[u]nits that combust waste for the primary purpose of recovering metals, such as primary and secondary smelters". Based on the Department's request, however, in an email dated April 1, 2019 to EPA (Viorica Petriman), Plumley (Dale Volmer) requested an applicability determination from EPA on whether the RK Furnace is subject to the CISWI regulation, or whether it is exempt pursuant to 40 CFR 60.2020(h). This request was forwarded to Gaetano LaVigna (EPA), who informed Dale Volmer on April 11, 2019 that Julian Velez (EPA) was working on the applicability determination for the RK Furnace. The response from EPA is still pending.

As mentioned above, the Department suggested in its March 18, 2019 letter that SMCC could do one of the following to avoid or mitigate potential dioxin emissions from the RK Furnace: lower the operating temperature of the RK Furnace to avoid the potential creation of dioxin emissions; add carbon to the flue gas upstream of the fabric filter to abate potential dioxin emissions; or, for precautions to be taken to prevent batteries containing chlorine from entering the RK Furnace, thereby avoiding the potential creation of dioxin emissions.

With respect to the potential formation of dioxin from operation of the RK Furnace at 550-600°C, lithium-ion batteries are only known to contain polypropylene and polyethylene separators, common plastics which do not contain chlorine, which is essential to the formation of dioxin. Some batteries do utilize plastic casings that may use plastics other than polypropylene and polyethylene. However, all casings will be removed prior to feeding the battery cells into the RK Furnace, thereby preventing the introduction of potential chlorine-containing plastics.

Only the batteries and non-chlorinated plastics, i.e., the polypropylene and polyethylene separators, will be fed into the RK Furnace. Operation of the RK Furnace at temperatures below 500-600° C will not result in separation of the materials required in the process, and is therefore not feasible.

SMCC does not believe that operation of the RK Furnace in this manner causes the formation of dioxin, without chlorine it is impossible to create dioxins. However, at the request of the Department, SMCC is in the process of measuring dioxin levels associated with operation of the existing facility located in South Korea, which as you know is similar to the proposed Facility. SMCC expects to be able to forward these results to the Department within the next month (late May 2019).

Additionally, as discussed above, SMCC will apply the following controls to abate any potential dioxin emissions associated with operation of the RK Furnace:

- Maintain stable process conditions in the RK Furnace;
- Use the oxidizer/afterburner (or other similar technology) for high temperature treatment of gases exhausted from the RK Furnace;
- Cool the exhausted gases to 100° C;
- Collect the dust; and,
- Use a wet scrubber to further control gas phase pollutants.

While SMCC does not object to the Department's determination that the Facility will be subject to a State Facility Permit rather than an Air Facility Registration as initially discussed, due to the complex air emission control devices the Facility will utilize, we note that this determination has the effect of discouraging rather than encouraging rechargeable battery recycling.

c. Applicability of the 374-1.8(a)(3) Exemption to the Facility.

The RK Furnace is conditionally exempt from regulation under 6 NYCRR Part 374 Hazardous waste burned in boilers and industrial furnaces, pursuant to 6 NYCRR 374-1.8(a)(3).

6 NYCRR 374-1.8 is applicable to:

hazardous waste burned or processed in a boiler or industrial furnace (as defined in section 370.2[b] of this Title) irrespective of the purpose of burning or processing, except as provided by paragraphs (2), (3), (4) and (6) of this subdivision. In this section, the term *burn* means burning for energy recovery or destruction, or processing for materials recovery or as an ingredient.

6 NYCRR 374-1.8(a)(1). However, pursuant to 6 NYCRR 374-1.8(a)(3),

Owners and operators of smelting, melting, and refining furnaces (including pyrometallurgical devices such as cupolas, sintering machines, roasters, and foundry furnaces, but not including cement kilns, aggregate kilns, or halogen acid furnaces burning hazardous waste) that process hazardous waste solely for metal recovery are conditionally exempt from regulation under this section, except for subdivisions (b) and (m) of this section.

Open Issues to Address

Based upon the foregoing, SMCC requests that the following open issues be given immediate attention:

1. Can both the Handling Facility and the Destination Facility be located within separate leased spaces within the Huron Campus without being considered part of the same site or facility (subject to TSDF requirements)?

Proposed Response: Yes. Because 6 NYCRR § 370.2(134) excludes two separate leased portions of the same property owned by a separate person from the definition of “onsite”, SMCC believes that the Destination Facility and Handling Facility, provided they are owned/operated by separate legal entities, may both lease separate spaces within the Huron Campus without causing the Destination Facility to be subject to the Part 373 permit requirements.

2. Is the recycling of spent lithium-ion rechargeable batteries exempt from EPA’s CISWI regulations (Standards of Performance for Commercial and Industrial Solid Waste Incineration)?

Proposed Response: Yes. A formal applicability determination was requested from EPA on April 1, 2019. A response from EPA is pending. Materials Recovery Units are exempt from the CISWI regulations, which are defined as “[u]nits that combust waste for the primary purpose of recovering metals, such as primary and secondary smelters.” The RK Furnace clearly falls under this exemption.

3. Is the RK Furnace subject to 6 NYCRR 374-1.8?

Proposed Response: No. Pursuant to 6 NYCRR 374-1.8(a)(3), the RK Furnace is conditionally exempt from regulation under 6 NYCRR Part 374.

4. Will registration of the Universal Waste Destination Facility be adequate, or will the Department require permitting?

Proposed Response: Registration is adequate. The facility is already subject to notice, recordkeeping, and reporting obligations in Part 374-3.

5. Will the Department also require registration for the Universal Waste Handling Facility?

Proposed Response: Unknown. SMCC believes that registration of this facility is unnecessary.

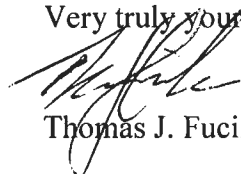
Conclusion

The continued development of new battery-related technology for EV's and other modes of energy storage is an important element of New York's efforts to reduce carbon emissions. The recycling of spent lithium ion batteries is central to that effort by making reuse rather than disposal of the component materials a reality. The importance of this new industry was demonstrated in the State's passage of the Rechargeable Battery Recycling Law which signaled the State's clear intention to reduce regulatory hurdles imposed by existing hazardous waste regulations.

SMCC's proposed facility will place New York at the forefront of this industry and will dovetail with other efforts in Endicott, New York to provide advancements in rechargeable battery use and reuse. The two facilities proposed by SMCC will create high-paying jobs and foster economic development in an underperforming part of the State, and will bring a proven technology for the recycling of rechargeable batteries to the United States.

We appreciate the Department's efforts to expedite its decision-making and reduce regulatory hurdles in its decision-making associated with this application.

Very truly yours,



Thomas J. Fucillo

TJF:tmd

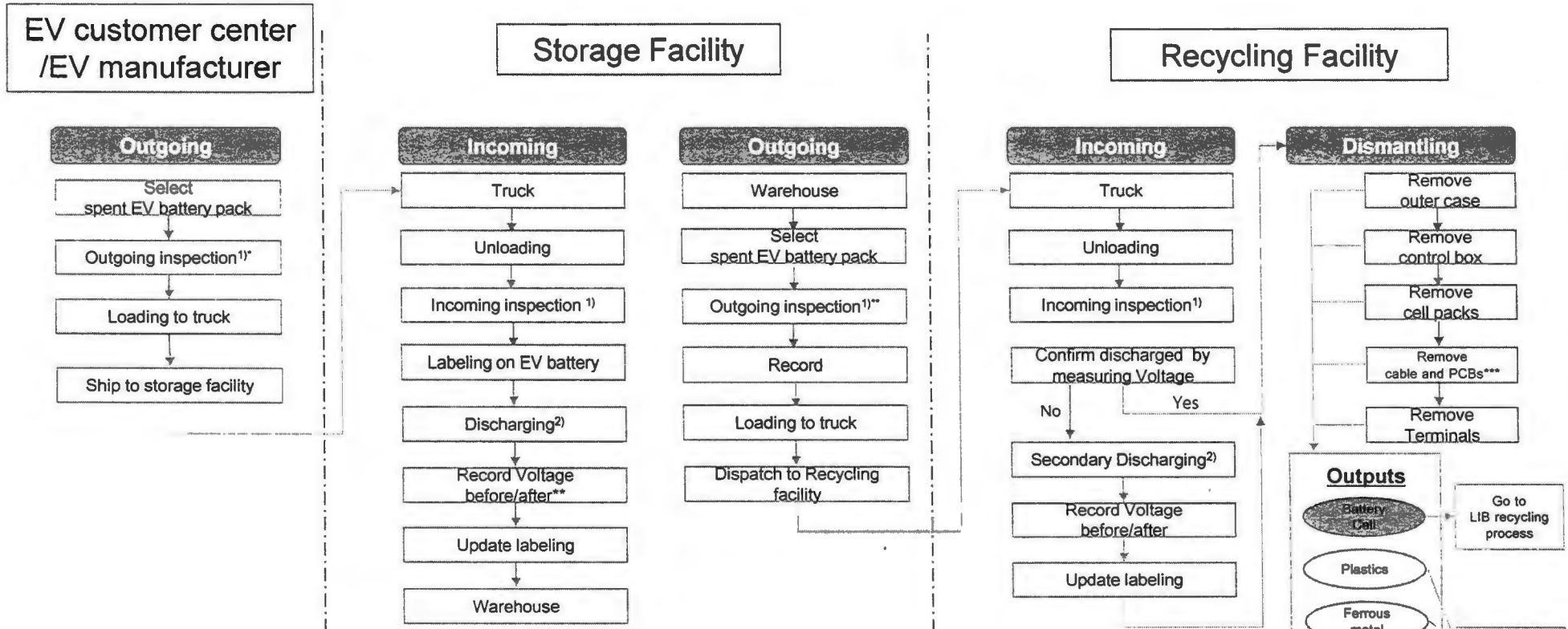
cc: Matthew Marko, P.E., Regional Director, NYSDEC Region 7
Joseph Dlugolenski, Regional Permit Administrator
Michelle Ching, P.E., Division of Materials Management
Thomas A. Elter, P.E., Regional Air Pollution Control Engineer
Brian Rogers, P.E., Regional Hazardous Waste Engineer
Thomas Annal, P.E., Regional Material Management Supervisor
Danish Mir, SMCC
Dale Vollmer, P.E., Plumley Engineering, P.C.
Danielle Mettler-LaFeir, Esq.

Spent EV battery pack handling procedure for LIB recycling

2019 May



Process Flow (Spent EV battery pack handling guideline for Lithium ion battery recycling)



[Foot note]

1) Run visual inspection for check appearance/ leaking/ abnormality and measure power(V/I) for recording and data tracking.

2) Reuse discharged power to micro grid

*Provide the record data to storage facility

**Provide the record data to recycling facility

***PCB: Printed circuit board

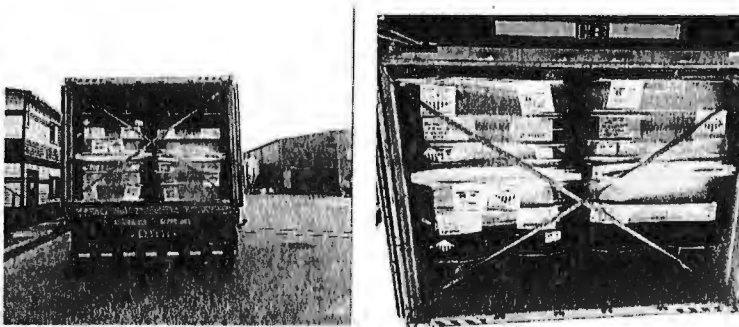
Metal drum Storage guideline for USED Lithium Ion battery (P002)

1. Purpose

This document is Metal drum Storage guideline for USED Lithium Ion battery to provide the safety of storage and convenience of it's handing before it goes into pre-treatment procedure.

- 2. Type of used battery in the metal drum:** This guideline applies to 'used lithium ion batteries' or 'used lithium ion batteries contained in the plastic package' and shipped through SMCC USED Lithium Ion battery Packing Guideline (P001) using metal drums.

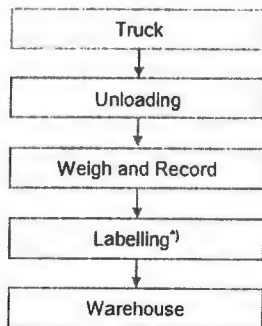
Fig. Example of metal drums shipped through SMCC USED Lithium Ion battery Packing Guideline (P001).



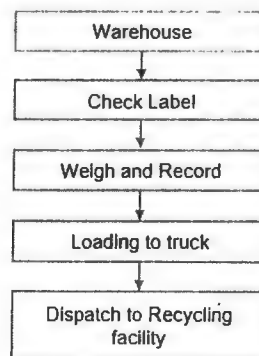
3. Storage Process Flow chart

Process Flow (Storage Facility)

(Unloading and Storage)



(Dispatching for Recycling Facility)



*a) Universal waste label
b) Data label

4. Storage Process descriptions

A. Unloading metal drums and weigh the each drums/pallet weight.

Fig. Example of unloading step

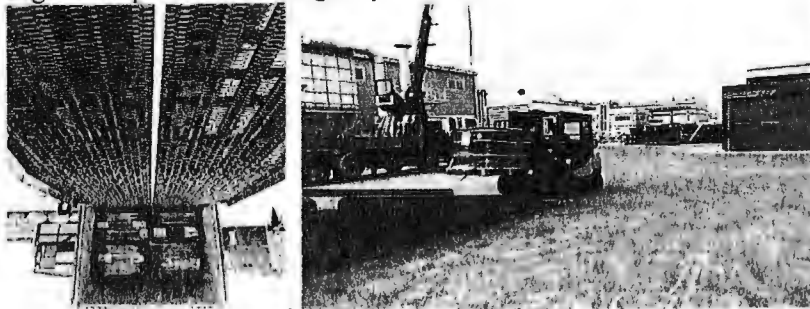
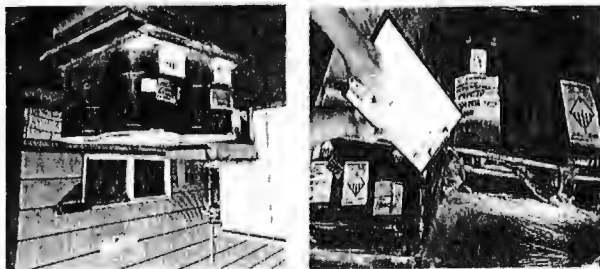


Fig. Weighing station and record it



B. Move the pallet into the storage area and storage them as below.

- i. Do not storage the drums without pallet.
- ii. Storage area should be easily visible.
- iii. In case of storage using rack. (Recommended)
: Put 1 layer of pallet per 1 layer of rack



- iv. In case of storage without rack
 - ✓ Put maximum 2 layers of pallet is allowed.



- ✓ Do not put the pallet as 3 layers. There is high risk of turn over and collapsing.
- ✓ Do not storage the drums without pallet.

Fig. Example of 3 layer storage which is banned.



C. The dispatching process is reverse step of unloading and storage procedure. Please refer the process flow chare of dispatching for recycling facility.

5. Additional requirement;

If you have any questions or concern, please feel free to contact supervisor.

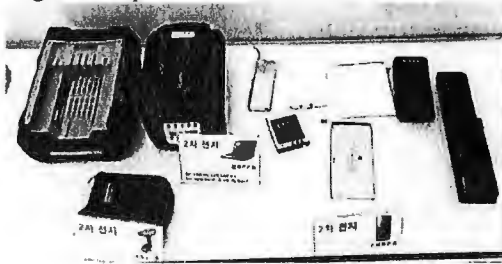
PACKING Guideline (P001)

1. Purpose

This document is packing guideline to provide the general provisions in packing of used lithium ion batteries / or used lithium ion battery with plastic case.

2. Type of used battery: This guideline applies to ‘used lithium ion batteries’ or ‘used lithium ion batteries contained in the plastic package’.


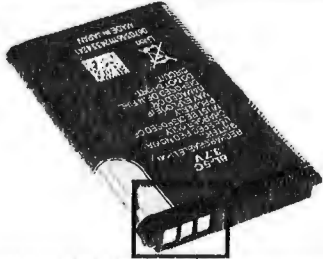
Fig. Example of used batteries



3. Packing instruction

A. Individual protection on the battery terminals :

- i. There is a case that need an individual protection on the battery terminals depends on the terminal shapes of battery. Please see below 2 cases to understand the case and following action needed.

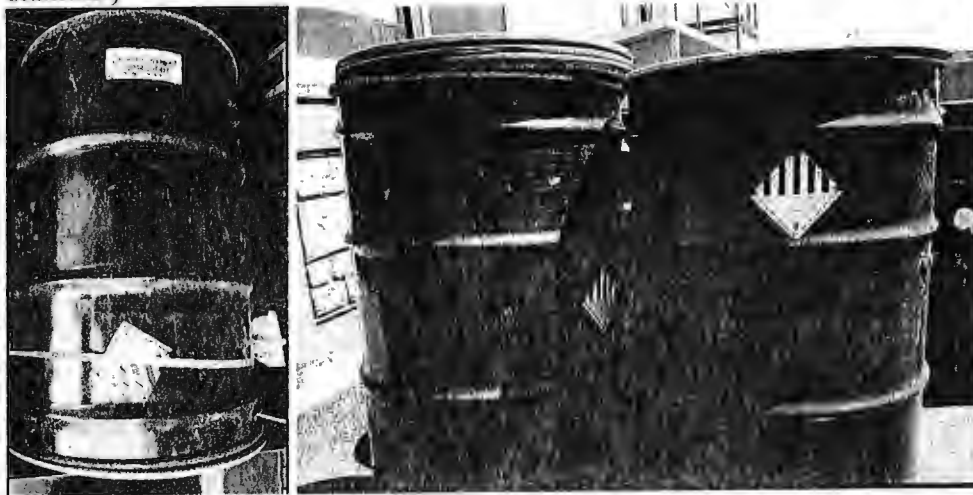
Case	Case 1	Case 2
Sample Image		
Terminal design and location	Hidden inside the plastic or its case	Exposed to the outside
Actions	Individual protection on the battery terminals is not required	Put a plastic tapes on the battery terminals to prevent contact with other battery terminals during shipping

If you are not sure the case, please contact us before the packing.

B. Outer case

- i. Use only Steel drum, removable head, which is its UN code is 1A2, the Performance level of the drum, solid rating X is recommended.
- ii. Please do not use plastic drum (1H1) in any case.

Fig.1 Example of Steel drum as the outer case (55 gallon, 34.5" height, 22.25" diameter)



- C. Put used lithium ion batteries batteries/and or used lithium ion batteries contained in the plastic package in the drum and fill them to-the-rim then closed the head also tighten the lid.

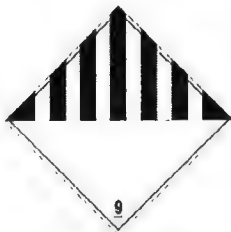
Fig. Example of drum filled with used lithium ion battery with plastic case.



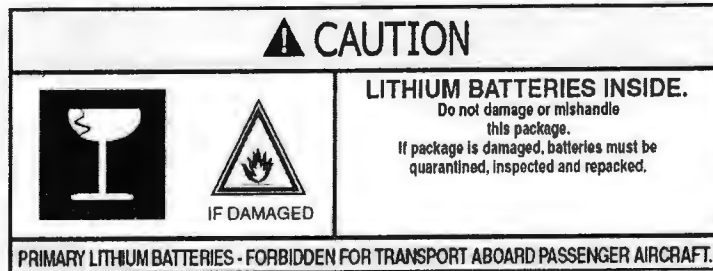
Fig. Example of the drum closed the head with tighten the lid.



- D. If there is any unfilled space in a drum, do not ship the drum until it is filled up to 100% to prevent excessive movement during transport.
- E. Label : Put below labels on the outside of drum.



Class 9 Miscellaneous Dangerous Goods Hazard Label
Figure 2

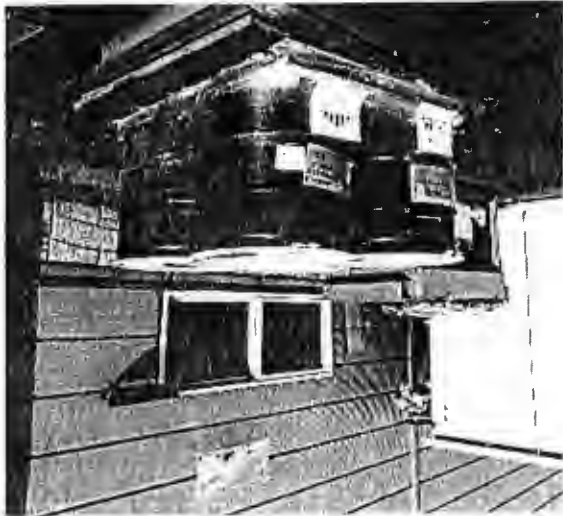


- F. Use pallet to ensure the containers create a stable and safe stacking configuration.

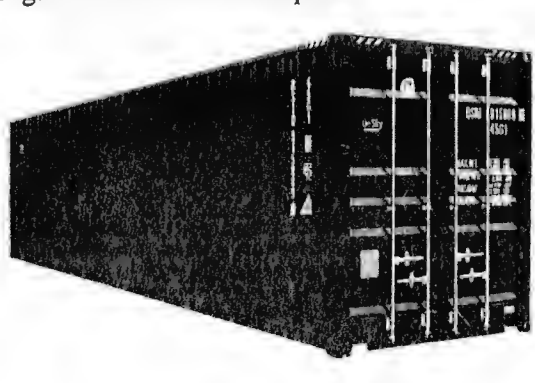
Fig. Pallet integrity example



G. Lapping drums using plastic laps.



H. Shipping the drums to destination using container box.
Fig. Container box example



I. All other general shipment guide line and packaging using metal drum, please refer Department of Transportation (DOT) container regulatory requirements.

4. Additional requirement;

If you have any questions or concern, please feel free to contact SMCC.